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REPORT GD-28

GLACIOLOGICAL DATA

WORKSHOP ON PERMAFROST DATA RESCUE AND ACCESS

World Data Center A
for
Glaciology
[Snow and Ice]

INTERNATIONAL PERMAFROST ASSOCIATION

WDC operated for:
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Boulder, Colorado 80303 U.S.A.

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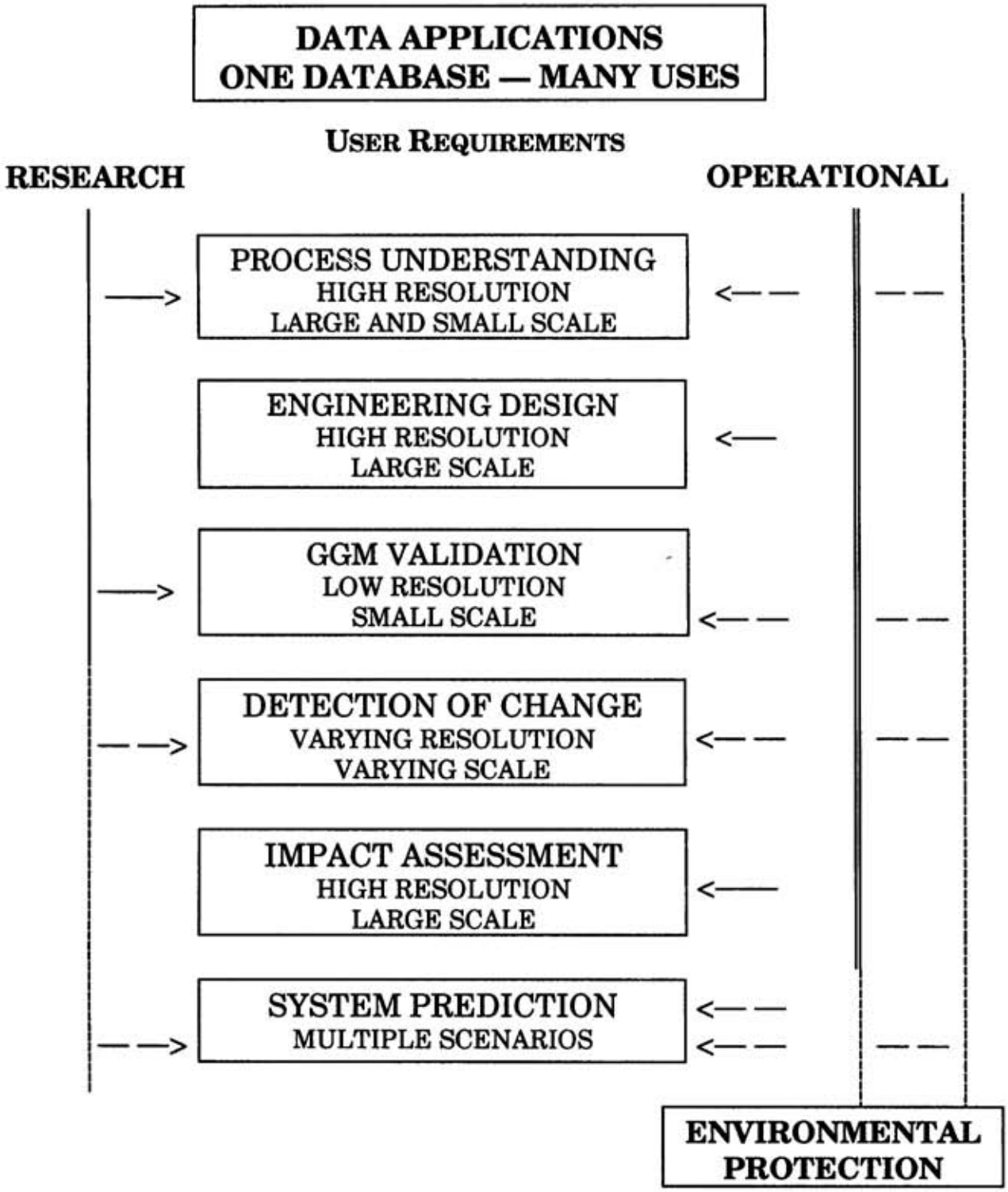
WORKSHOP ON PERMAFROST DATA RESCUE AND ACCESS

GLOBAL GEOCRYOLOGICAL DATABASE



An illustration of the diverse user requirements of the Global Geocryological Database (GGD).

GLACIOLOGICAL DATA

REPORT GD-28

WORKSHOP ON PERMAFROST DATA RESCUE AND ACCESS

3-5 November 1994, Oslo, Norway

by

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Boulder, Colorado 80303 U.S.A.

June 1995

DESCRIPTION OF THE WORLD DATA CENTER SYSTEM[1]

The World Data Centers (WDCs) were established in 1957 to provide archives for the observational data resulting from the International Geophysical Year (IGY). In 1958 the WDCs were invoked to deal with the data resulting from the International Geophysical Cooperation 1959, the one-year extension of the IGY. In 1960, the International Council of Scientific Unions (ICSU) Comite International de Geophysique (CIG) invited the scientific community to continue to send to the WDCs similar kinds of data from observations in 1960 and following years, and undertook to provide a revised *Guide to International Data Exchange* for that purpose. In parallel the CIG inquired of the IGY WDCs whether they were willing to treat the post-IGY data; with few exceptions, the WDCs agreed to do so. Thus the WDCs have been serving the scientific community continuously since the IGY, and many of them archive data for earlier periods.

In November 1987 the International Council of Scientific Unions (ICSU) Panel on World Data Centers prepared a new version of the *Guide to International Data Exchange*, originally published in 1957, and revised in 1963, 1973 and 1979. The new publication, *Guide to the World Data Center System, Part 1, The World Data Centers (General Principles, Locations and Services)*, was issued by the Secretariat of the ICSU Panel on World Data Centers. This new version of the *Guide* contains descriptions of each of the twenty-seven currently operating disciplinary centers, with address, telephone, telex, and contact persons listed. The reader is referred to the new *Guide* for descriptions of the responsibilities of the WDCs, the exchange of data between them, contribution of data to WDCs, and the dissemination of data by them. The WDCs for Glaciology are listed below.

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Manager:	Oliver J. Merrington

World Data Center D for Glaciology [Snow and Ice] and Geocryology

Address:	Lanzhou Institute of Glaciology and Geocryology Chinese Academy of Sciences Lanzhou 730000, China
Telephone:	(86)0931-082-2815
Fax:	(86) 931-888-5241
Director:	Professor Cheng Guodong

The following organization provides international data services including data analyses and preparation of specialized data products. It merges the previous activity of the Permanent Service on the Fluctuations of Glaciers and the Temporary Technical Secretariat for World Glacier Inventory. These activities are not part of the WDC system but the center cooperates with WDCs in the discipline. Users wishing assistance in seeking data or services from this group may contact an appropriate WDC.

World Glacier Monitoring Service (WGMS)

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[1]Adapted from *Guide to the World Data Center System. Part 1. The World Data Centers (General Principles, Locations and Services).* International Council of Scientific Unions. Panel on World Data Centers, November 1987, 91pp.

FOREWORD

This issue of *Glaciological Data* highlights international efforts to improve the accessibility of data on permafrost, ground ice and seasonally frozen ground and to rescue data sets that may be at risk. A small workshop on the prioritization of permafrost data and on improved access to data in general was organized under the auspices of the International Permafrost Association, through its Executive Committee and the Working Group on Permafrost Data and Information. The meeting took place at the Norwegian Geotechnical Institute (NGI) in Oslo, Norway, 3-5 November 1994. We wish to thank Dr. Susan Lacasse, Director of the NGI, for hosting the meeting, and especially Dr. Odd Gregerson, NGI, and Dr. Kaare Flaate, Norwegian Directorate of Public Roads, for their generous assistance with the local arrangements.

The attendance of Russian and Chinese delegates at the meeting and partial assistance to some other non-government scientists was made possible by funds from NOAA's Earth System Data and Information (ESDIM) program for data rescue and the National Science Foundation Arctic System Science data management program support to NSIDC. The assistance of Claire Hanson, Paul Farley and Cindy Brekke, NSIDC, in the coordination of the travel arrangements was indispensable. Claire Hanson also prepared the Data Base Inventory format included as Appendix 1. Ann Brennan has assisted greatly with the editing and Lyn Ryder and Carol Pedigo with word processing.

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Workshop on Permafrost Data Rescue and Access

Norwegian Geotechnical Institute
Oslo, Norway
3-5 November 1994

1. Background

The origins of this workshop and its purpose arose from several parallel and converging initiatives within the science and data programs of the International Permafrost Association, the National Oceanic and Atmospheric Administration's (NOAA) Earth System Data and Information Management (ESDIM) program and the National Science Foundation (NSF) Arctic System Science (ARCSS) program. These three strands are summarized below.

1.1. The International Permafrost Association

At the ninth council meeting of the International Permafrost Association (IPA) in Beijing, China, 8 July 1993, a resolution was adopted to "seek a more active role in International Geosphere-Biosphere Program (IGBP) core projects" and for "relevant IPA working groups [to] give particular attention to global climate change." The IPA Working Group on Data and Information seeks to improve and standardize the collection, archiving, documentation and dissemination of permafrost and ground ice data (*Frozen Ground*, No. 14, December 1993, p. 8 and p. 10).

The report of a workshop on permafrost data and information, held at the Fifth International Conference on Permafrost in Trondheim, Norway, on 7 August 1988 (Brennan and Barry, 1989) recommended that the IPA, through its working groups, should seek to ensure the security of key historical information and data records and to facilitate the development of user-friendly data systems, including data directories. Some preliminary steps were reported by Barry and Brennan (1993). As an outcome of those initiatives, during the winter of 1993-94, the IPA Working Group on Data and Information, in conjunction with the IPA Executive Committee, developed a draft prospectus for a Global Geocryological Database (GGD). This was circulated for comment and finalized at a two-day workshop held at the GeoData Institute, University of Southampton, UK, on 30 June-1 July 1994. The IPA Executive Committee, at its meeting on 2-3 July, endorsed the project and the proposed course of action. Accordingly, a workshop was organized in Oslo, Norway, by the Working Group on Data and Information to establish priorities for data rescue, to develop an implementation plan and procedures for data recovery, storage and dissemination, and to review the results of pilot projects underway in Russia and the UK.

1.2. NOAA Earth System Data and Information Management Program

The National Oceanic and Atmospheric Administration has instituted a program of Earth System Data and Information Management to coordinate data and information management activities on an agency-wide basis. The specific objectives of the program are to:

- Rescue critical NOAA environmental data currently at risk of being lost.
- Improve access to NOAA environmental data and information for scientists and administrators.
- Modernize and interconnect environmental data systems throughout NOAA to increase their capability and responsiveness.
- Assist in developing standards for data documentation, data quality, and network connectivity.
- Provide agency-wide-guidelines on developing policies related to environmental data management.
- Build a top-level consensus within NOAA on data management issues, and formulate a vision of the agency's data and information management strategy for the 1990s and beyond.

The final objective is addressed in the ESDIM plan and involves the construction of a strategic approach to data management and information that can be applied agency-wide. The early focus of the ESDIM implementation plan is on the rescue of critical NOAA environmental data, with the cryosphere being one of the first topics addressed. The first Workshop on Cryospheric Data Rescue and Access was held in May 1993 (Crane, 1993).The Permafrost Data Rescue and Access Workshop built on the approach developed at the earlier meeting; it addressed specific problems of data rescue and improved access to data. Data rescue in this context refers to saving data sets that are critical for scientific research. This may involve: copying data from existing magnetic tapes to new tapes or to other media; transcribing disintegrating or otherwise inaccessible historical paper records to digital, analog, or micro-form; or the compilation of new data sets from highly varied, original sources with different media types. The concept of data rescue, in the context of this workshop, focused on data records relating to permafrost, ground ice and seasonally frozen ground, and to the consideration of potential future data sources. Although the primary objective of the workshop was data rescue, the discussion included plans to make data readily accessible to the user community. Data access focuses on providing, or enhancing, the ability of researchers to access existing or rescued data sources.

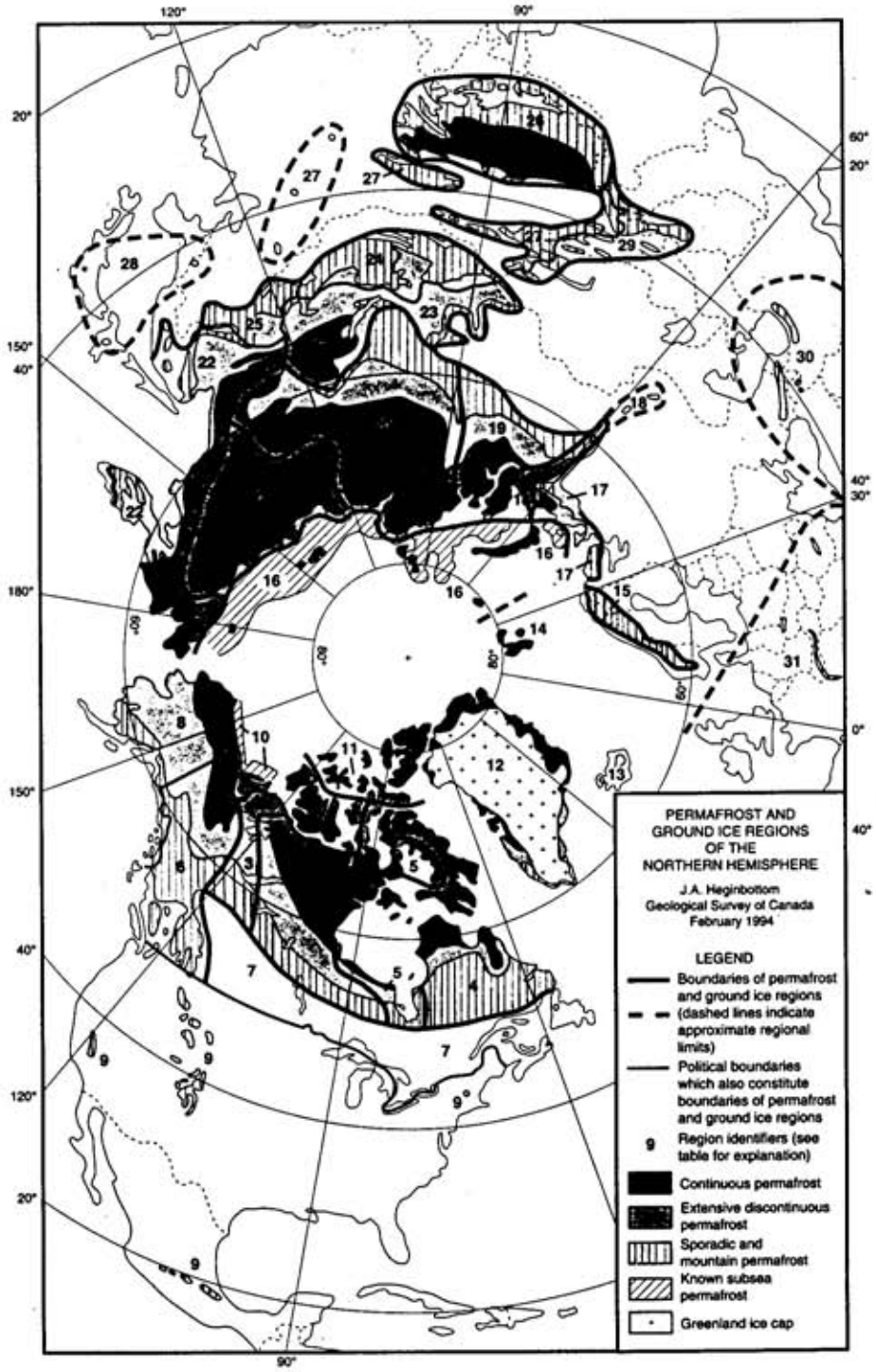
1.3. Arctic System Science Program of the US National Science Foundation

Since September 1994 the National Snow and Ice Data Center (NSIDC), University of Colorado at Boulder, has been funded as the ARCSS Data Coordination Center for all components of the United States Arctic System Science (ARCSS) Program; ARCSS represents NSF's global change program for the Arctic. This unified data project follows separate grants for ARCSS data management pilot projects relating to the Ocean-Atmosphere-Ice Interactions (OAII) and Land-Atmosphere-Ice Interactions (LAII), and the Greenland Ice Sheet Project Two (GISP2) components of ARCSS. Current NSIDC efforts focus on identifying ways to integrate the ARCSS component communities, and on providing access to existing, unarchived data of interest for ARCSS research. In parallel, the planning for archiving of ARCSS-funded data sets continues in concert with the OAII, LAII, GISP2 and PALE (Paleoclimates of Arctic Lakes and Estuaries) Science Management Offices. Close contact is maintained with the emerging Human Dimensions component, the Surface Heat Budget of the Arctic Ocean (SHEBA) experiment planning process, and the developing Synthesis, Integration and Modeling component. The concept of "System Science", or integration, depends heavily on the accessibility and sharing of data and results among all those involved. NSIDC is seeking to develop the ways and means to ensure that accessibility.

As part of the LAII component and in keeping with the underlying ARCSS principles of integration and data accessibility, NSIDC is collaborating with the IPA Working Group on Data and Information in its efforts to identify and archive permafrost and other active-layer data for the IPA Global Geocryological Database. As an example, J. Brown and F. Nelson have provided active layer temperature and thickness, soil moisture, and snow depth data from the former US Army Cold Regions Research and Engineering Laboratory (CRREL) site and the new ARCSS site at Barrow for the first ARCSS/LAII CD-ROM product, "North Slope Alaska Data Sampler"(NSIDC, 1994). The CD-ROM also contains climate, soils, vegetation, and river runoff data. Such information is identified as vital for documenting the climate signal, for assessing changes in hydrological regimes, biologic processes and the Arctic ecosystem (McCauley and Meier, 1991).

2. Permafrost Data and Applications

The cryosphere, representing the solid phase of the hydrosphere, occupies a unique place in the global water cycle. Ice in the atmosphere plays a vital role in the precipitation process and, and at the surface of the oceans, it drastically modifies the ocean-atmospheric exchanges of heat and momentum. When ice occurs on land, it represents a major source of fresh water for societal use, and acts as a significant agent for geomorphic activity. The widespread distribution of permafrost in the Northern Hemisphere is shown in Figure 1. Past changes in climate have led to variations in the extent of the cryosphere, and the effects of this can still be see in the geomorphic and isostatic history of large parts of the middle and high latitudes. Changes in the extent and distribution of the cryosphere itself



KEY TO PERMAFROST AND GROUND ICE REGIONS		
NORTH AMERICA	NORTH ATLANTIC	22 Far East
Canada	12 Greenland	23 Southern Siberia and Trans-Baikalia
1 Queen Elizabeth Islands	13 Iceland	24 Mongolia
2 Western Arctic Lowlands	14 Svalbard	China
3 Interior Plains	15 Fennoscandia	25 Northeast China
4. Eastern Arctic and Canadian Shield	ASIA	26 Tibet Plateau
5 Basins within Canadian Shield	Russia	27 West China and other Mountain Permafrost Areas
6 Cordillera	16 Arctic Islands and Arctic Ocean Continental Shelf	28 Japan and Korea
7 Areas outside the permafrost region	17 European North	29 Central Asia
USA	18 Urals	30 Southwestern Asia
8 Alaska	19 West Siberia	EUROPE
9 Conterminous USA and Mexico	20 East Siberia	31 Central and Southern Europe
	21 Northeast Siberia	

Figure 1. The distribution of permafrost in the Northern Hemisphere. (See Brown *et al.*, in press; Heginbottom *et al.*, 1993)

have a positive feedback on climate, and thus the magnitudes of past climatic changes are likely to be linked, in part, to the expansion and contraction of the snow and ice cover. Similarly, global climate model predictions of future global warming through enhanced greenhouse effects are strongly dependent on the effectiveness of the cryospheric response.

The cryosphere interacts with the earth system in a variety of ways, the most important of which is its interaction with climate. While climate controls on the cryosphere are readily apparent (in general outline, if not in detail), what may be less obvious is the way in which changes in the permafrost can feed back to influence the climate system. The presence of permafrost has a strong influence on soil water and runoff and therefore on the energy and moisture balance in cold regions. Thawing of thin permafrost, or a deepening of the active layer would greatly modify the runoff regimes, both water and sediments, as well as the soil moisture balance. Frozen organic materials also sequester substantial amounts of radiatively active trace gases (CO_2, CH_4, etc.) both within and beneath the permafrost body; their potential release to the atmosphere involves an important and little understood biogeochemical/climate link. Permafrost contains large quantities of ground ice and, once thawed, the ground becomes unstable, promoting dramatic increases in sediment yields.

Feedbacks between the cryosphere and the rest of the earth system have led to the suggestion that the permafrost is not only an important component of the system; possibly instrumental in mediating global change, but it may also be a sensitive indicator of such global change processes (see Koster et al., 1994, for an annotated bibliography). The attention focused on the cryosphere has been prompted by the important role that the snow and ice plays in General Circulation Models' (GCM) climate change experiments, together with the recognition that the cryosphere has undergone large variations in the past that correspond to periods of extensive changes in global climate. It is important to note, however, that many processes involving perennially or seasonally frozen ground are not well understood and are very poorly simulated by current numerical climate models. Permafrost data are thus essential for validating Earth System Models and for improving model physics, as well as for monitoring environmental change and variability. These two (overlapping) requirements are central components of the IGBP and many national global change programs, and they contributed to themes for the data rescue discussions in the present workshop. Additionally engineering design and environmental impacts were also considered.

The cryosphere is an appropriate target for ESDIM's early data rescue efforts not only because of the apparent importance of these data, but also because of the nature of the data themselves. Permafrost-related data encompass a wide range of parameters including, for example, depth and distribution of permafrost and seasonally frozen soils, as well as snow cover extent, depth, and mass balance, periglacial features, chemistry and temperature structure from boreholes in permafrost. In addition to their contribution to studies of snow cover-vegetation-ground ice interactions and trace gas fluxes, these data have operational applications in hydrology, engineering, shipping/fisheries, and off-shore development. Scientific applications, as noted above, tend to focus on cryosphere-climate interactions, but again this implies a wide range of possibilities that would include, in the case of permafrost, ground ice and seasonally-frozen ground, hydrological processes, and paleoclimatic reconstructions. The importance of these permafrost conditions is reported in the most recent impacts assessment of the Intergovernmental Panel on Climate Change, Working Group II; the report containing a chapter on the cryosphere is in preparation and final review.

Apart from the wide range of possible data sets and applications, several other factors complicate decision making with regard to cryospheric data management. For example, data sets are not application specific, and where time series of active-layer thickness and its physical and chemical properties may be of use to scientists interested in modeling frozen ground processes, they may also be of interest to engineers concerned with construction of pipelines and transportation facilities. The importance of any given data set will, therefore, vary according to the application concerned, which must obviously be reflected in the guidelines developed for prioritizing data sets, i.e., prioritizing of data sets must also involve some prioritizing of scientific objectives.

Permafrost data have been collected by both governmental and non-governmental agencies from many different countries. This raises problems of data acquisition and highlights the problem encountered when integrating data collected over varying temporal and spatial scales that exist on different media with a wide range of formats. Some further indication of the nature of the problem is shown in earlier data surveys/inventories conducted by the World Data Center-A for Glaciology (e.g. Barry, 1988; Crane, 1993).

3. Workshop Objectives

3.1. Prioritizing Data Sets

A first objective of the workshop was to derive a set of guidelines for data set selection that will facilitate the successful implementation of a rescue and access program. Given the limited resources initially available for the project, the volume of data involved, and the wide range of data sets/applications noted above, it was recognized that guidelines must be established early in the program.

3.2. Identification of Candidate Data Sets

A second objective was to identify high-priority data sets that satisfy the criteria recognized as a result of the first objective. The purpose was to begin the process of data set selection by identifying data sets with which to begin the data rescue activity.

3.3. The Global Geocryological Database (GGD) Concept

The specific objectives of the GGD project are to help identify, acquire and disseminate data on permafrost and frozen ground to serve several important purposes:

- To advance the scientific understanding of permafrost, with specific reference to relationships among climate, process, material and morphology; definition of paleo-permafrost conditions; and specification of future long-term environmental monitoring programs.
- To improve the basis of engineering design in cold regions, for both contemporary and predictive purposes.
- To aid in understanding and predicting global and regional climatic change, and specifically to support the verification of general circulation models and trace gas cycles.
- To offer a basis for detecting environmental change at a range of temporal and spatial scales, particularly through establishing and managing long-term, wide-area monitoring programs.
- To enhance the basis for developing environmental scenarios and assessing environmental impact, including pollution and the socioeconomic implications of environmental change in cold regions, for planning and environmental protection.

The meeting endorsed the proposition of M.J. Clark (see Appendix 2) of "one database, many uses" and the proposed organization of the Russian National Geocryological Database (NGD), (see Appendix 3).

3.4. Data Base Structure

As currently proposed, the GGD will consist of an internationally distributed system of linked data centers or nodes. Information from regions of perennially and seasonally frozen ground will be assembled in National or Regional Geocryological Databases (NGDs, RGDs) and/or selected World Data Centers. The information will be made available to the scientific, engineering, environmental and policy communities.

The general issue of data structure was specifically addressed by M.J. Clark and J. Branson; their report is included in its entirety in Appendix 2. The group made no specific recommendations, however, as to a preferred structure.

3.5. The GGD Process

The GGD will operate by identifying existing data sets, current and historic; rescuing those that are at risk of being lost; managing the acquired data; and making data available to the scientific and engineering communities either in raw form or processed into specific usable forms of information. Standard data descriptions will be held in national and international directories, and users will gain access to the data through a variety of modes and media. The IPA is working with user communities to identify priorities for data rescue, acquisition and monitoring. Initially, the emphasis is being placed on retrieving data and time-series that are in danger of being lost.

Once identified and described, data sets will be organized into standard file structures and accessioned by an appropriate National Geocryological Database or regional node. Currently, the designated nodes are:

- Federal Center for Geoecological Systems, Moscow, Russia
- GeoData Institute, Southampton, UK
- World Data Center A for Glaciology, Boulder, Colorado, USA
- World Data Center D for Glaciology and Geocryology, Lanzhou, China

The GGD nodes are using their existing in-house facilities, but are also developing additional funding to support NGD/GGD data rescue and management activities, as well as to promote information generation and dissemination through analysis and modeling.

Further working links have been established with other organizations pursuing similar goals for data rescue, monitoring, management and dissemination.

These include:

- Global Resources Information Database (UNEP/GRID), Arendal, Norway; Director: Svein Treitdal
- International Arctic Science Committee (IASC), Oslo, Norway (see IASC, 1994); President: Magnús Magnússon
- Scientific Committee on Antarctic Research (SCAR); Chair: A.C. Clarke
- Council of Managers of National Antarctic Programs (COMNAP), Ad Hoc Planning Group on Antarctic Data Management, Cambridge, UK; Co-Chair: M.R. Thorley
- World Conservation Monitoring Centre (UNEP/WCMC), Cambridge, UK
- World Glacier Monitoring Service, Zurich, Switzerland; Director: W. Haeberli.

The topic of access to the GGD was raised by N.N. Romanovskii and M. Liebman (Appendix 3). A proposed protocol for use of the database was presented by J. Branson and is included as Appendix 4.

4. Priorities for Data Rescue

The results of the workshop discussions are presented under four headings:

- **Demands for permafrost data**. Priority should be given to data sets for which there is a high demand or that are important for a critical research goal. As resources are limited and as we cannot anticipate all future demands for data, priority is given to research areas considered to be important today, as well as to monitoring impact assessment and engineering needs. Three of these areas fall within the current US Global Change program:

data sets identified as being important for the validation of general circulation of global climate or earth system models, for system monitoring, and for process studies. Specific cryospheric parameters are assessed in the light of all these areas of application, and each is prioritized as discussed below.

- **Guidelines for prioritizing data sets**. A set of guidelines was presented for assessing the relative importance of prospective data sets and their priority in the data rescue effort.
- **High priority data sets**. Two groups of data sets are identified – one group having high priority and worthy of immediate attention, and one group that should be considered in the data rescue effort, but have a lower priority or require more information before priority can be fully assessed.
- **General recommendations**. A set of recommendations is presented for the near-term implementation of the permafrost data rescue effort.

4.1. Demands for Permafrost Data

As noted above, the workshop discussion focused on emphasizing data sets useful for parameterizing or validating large-scale GCMs or earth system models, data sets that could be used for monitoring climate change and variability, and data for developing or validating empirical or numerical models of system processes. It is also recognized that data are required to support specific international and national programs, e.g., Global Energy and Water Experiment (GEWEX), Arctic Climate System Study (ACSYS), Arctic System Science (ARCSS), International Tundra Experiment (ITEX), etc.

Although not considered specifically in this workshop, it should be noted that there are important linkages between the distribution and erosion of permafrost terrain and sea level (which is a concern over time scales of 100 years), and between the cryosphere and hydrology (important in terms of future water resources and the timing and quantity of runoff). Both of these are important research questions that may require data not discussed here.

4.1.1. Validation of Earth System Models

The results from the present generation of climate models suggest that the model climate and its sensitivity to greenhouse gas-induced climate change are greatly affected by the cryosphere, particularly by the distribution of sea ice and snow cover. This is exemplified by the fact that most model results show their greatest greenhouse-induced warming at high latitudes, and at least one study has shown that about one third of the temperature feedback is due to albedo changes in high latitudes.

4.1.1.1. Permafrost and Ground Ice

The primary importance of ground ice and permafrost is the way in which they modify the surface thermal and moisture regimes and how they respond to these surface modifications (thermokarst, etc.). In this regard, the most important parameters are ground ice extent, active layer depth and moisture content. Given this, we can establish that the highest priority data sets will be those that verify a model's ground ice extent and ground temperature above the depth of zero annual amplitude (DZAA). Most of the present generation of climate models include only a simple treatment of ground processes (Nelson et al., 1993). However, temperature and moisture are treated in newer models of surface processes. For example, a permafrost subcomponent has been developed by the UK Meteorological Office (UKMO) Hadley Centre and implemented in a single column model. For each of four soil layers, the variables of soil temperature, liquid and frozen water content are calculated based on the hydraulic and thermal properties of the soil. Dr. H. Cattle, of the UKMO (personal communication, 1994), confirms that the current data requirements include the seasonal variations in soil temperature and moisture profiles, together with information on the annual variations in thaw depth. Currently, research projects in several countries are obtaining soil moisture and temperature data, as reported at the 1994 Fall Meeting of the American Geophysical Union. Maps of these variables and of the current distribution of permafrost would be useful model validation data. In

addition, seasonal patterns of freeze-thaw may be important in the context of modelling and predicting trace gas fluxes.

For Earth System Models, highest priority will also go to those data sets that are global in coverage and have sufficient duration to derive climatological statistics (mean and variance). Although monthly data are adequate for most purposes, original data must be collected at sufficient temporal resolution to derive representative monthly averages. Several soil models utilize daily and monthly input data (see Waelbroeck, 1993). A possible future development could be a move towards the use of statistical methods to derive the spatial variability of the temperature-moisture ground-ice parameters within a grid cell. This would require the collection of data at a higher spatial resolution than the surface grid of the model (i.e., 2 degrees or better) in order to derive the spatial relationship for use in the model.

4.1.1.2. Snow Cover

Snow cover was not specifically discussed at the workshop. However, there is a consensus among permafrost scientists and engineers that snow cover is a key control in mediating ground temperature and must be considered in all models. It is worth nothing that state-of-the-art Earth System Models predict the fractional snow cover, snow depth and water equivalent, and layer temperature. Little work has been done on the sensitivity of climate models to snow cover, the importance of which appears to be due to its albedo (and the related masking effect on the vegetation canopy), and to its effect on the surface hydrology and active layer temperature and moisture regimes. The required data sets for model validation are snow cover extent, snow water equivalent, and snow depth (for land surface models that allow vegetation masking by snow accumulation). Again the data should be global and of sufficient duration (> 10 years) to derive climatological statistics. Both conventional and remotely sensed snow data are required. Recent work by Hölze (1994) in the upper Engadine Valley, Switzerland, shows that the bottom temperature of winter snow cover is a good indicator of permafrost distribution if combined with digital elevation model data. This would potentially be an additional parameter for inclusion in the list shown in Table 1, for change detection.

Table 1. Results of priority setting for key permafrost variables.

	APPLICATIONS				
Parameters	**Process understanding**	**Engineering design**	**Model validation**	**Change detection**	**Impact evaluation**
Geometry					
Permafrost extent	M*	H	H	H	M
Permafrost thickness	M	H	M	H	M
Active layer thickness	H	H	M	H	H
Ground ice extent	H	H	M	M	H
Thermal State					
Temperature<DZAA†	H	H	H	H	H
Temperature>DZAA	M	M	M	H	L
Thermal conductivity	H	H	M	L	L
Composition and Properties					
Moisture content	H	H	M	H	H
Chemical composition					
Soil	M	H	L	M	M
Water or ice	M	M	L	M	M
Trace gases	M	L	M	M	M

* H, M, L = High, Moderate, and Low priority.

† Depth of zero annual amplitude.

4.1.2. System Monitoring and Change Detection

Permafrost data can be used for Earth System monitoring and change detection in several ways: the data may be used alone (e.g., measuring the areal extent of permafrost and ground ice content, or development of thermokarst features); they may be used as an integrator of various climate parameters (e.g., active layer thickness); and they may be used to support trends noted in the data sets (e.g., changes in shallow ground temperatures may be used to support trends noted in regional meteorological data).

For monitoring purposes the most important consideration is the length of record of the data set and its internal consistency. As with any meteorological data set these require a length of record sufficient to extract long-term trends from the short-term variability, and they require sufficient metadata to assess the data set history and to separate natural changes from artifacts introduced by the data collection process. While global data are less critical for change detection than they are for model validation, data sets have to be available from enough regions to demonstrate that observed changes are globally significant.

Interactions and feedbacks between permafrost and climate (mainly via greenhouse reinforcing as a consequence of thawing of frozen organic matter) involve very long time scales, but alterations due to continued or even accelerated warming could be dramatic over vast areas (affecting land subsidence, coastal erosion, drainage patterns, slope stability, etc.). Borehole temperatures in ice-supersaturated and, hence, impermeable permafrost provide extremely clear signals of secular warming trends (Lachenbruch *et al.*, 1988) and recently accelerated temperature increases. Commercial boreholes have been drilled in connection with Arctic oil exploration, but these boreholes are not always available for long-term temperature measurements. A few research boreholes of limited depth have recently been drilled at high altitude/low latitude sites in Canada, China, and the European Alps, and their records should become part of the proposed GGD.

4.1.3. Process Studies/Process Model Development and Verification

Data priorities for process studies and models are less easily defined than they are for the Earth System Models or for climate monitoring. Virtually any data at any temporal or spatial resolution are potentially useful for empirical analysis, as inputs for process models, for model parameterization, or for model validation. In this case, the greatest priority would go to those data sets that comprise a suite of co-located measurements of several related parameters.

4.2. Guidelines for Prioritizing Data Sets

The guidelines reported by Crane (1993) have been modified slightly, but essentially adopted for the present purpose.

1) The five areas of application – process understanding, engineering design, model validation, change detection, and impact evaluation – have equal priority. Other applications should not be excluded but they would receive a lower priority level.
2) Only data sets with a certain minimum level of accompanying metadata should be considered. Metadata do not have to be complete, but enough information is needed to determine the exact nature of the data collected, the location and period of coverage, and to evaluate the data reliability. It should be recognized, however, that the reliability may not be immediately obvious. The evaluation of reliability often comes from the research process and through comparison with other data sets. What defines a minimum level of metadata will vary from application to application.
3) Data in danger of being lost should get a higher priority for data rescue. Priority is determined by length of time before the data set is likely to be lost. Higher priority should also go to data that, while in no danger of being lost, are presently inaccessible to the user community.

4) Data quality is an important consideration, but it is difficult to quantify. Requirements for data accuracy and reliability will vary from application to application. A lower quality may be more acceptable for unique data sets compared to those for which other alternatives are available. The decision on an acceptable data quality (as with the decision on what constitutes sufficient metadata) will rest with the Data Center manager.
5) Having satisfied the previous criteria, data sets may be prioritized according to data set attributes such as coverage, duration, frequency, and cost.

The results of the prioritization exercise conducted at the workshop for five key applications are summarized in Table 1 (p.8). As the table illustrates, the requirements in these categories vary for each application. Comments on these rankings are welcomed as we anticipate that the priorities will be reassessed as the GGD process develops.

It was noted that data would be especially useful for model validation if they coincided with the 10-year (1979 to 1988) Atmospheric Model Intercomparison Project (AMIP) period used for GCM intercomparisons. High priority would also go to data sets having a spatial coverage and duration that match other extensive data collection/analysis programs such as GEWEX, ACSYS, ITEX, etc.

Further discussion following this priority-setting exercise led to the conclusion that permafrost thickness should also have been divided into shallow and deep (or thin and thick), perhaps using the same depth division as used for temperature. Greater emphasis might also have been given to trace gas composition, especially methane. Site descriptions (location, geology, vegetation, ownership), and metadata (sampling techniques, equipment used, precision, post-processing) are included in the data description and were not prioritized separately.

Ultimately, decisions about which data sets to rescue will depend on the cost of the rescue operation as well as scientific importance. A cost-benefit analysis should be part of any decision making process – where costs are high and the importance of the data set relatively low, the data set would automatically receive a low priority. Low costs, on the other hand, should not automatically raise the priority of the data set. It is likely that decisions regarding costs can only be made by considering the data rescue in terms of opportunity cost (i.e., the loss of other data sets that might alternatively have been rescued). Again, this is a decision that would appear to rest with the data center. Recognizing the limited resources available for data retrieval tasks, the workshop also developed a number of recommendations for guiding data rescue, archiving, and information management. Other, more technical and procedural results of the workshop included the discussion of formats for data set information and the preparation of drafts of a statement of protocol for data management, acquisition, and dissemination (see Appendix 4).

4.3. High Priority Data Sets

The meeting participants discussed several candidate data sets that should receive priority treatment, following the presentations by the Russian specialists (see Appendix 3) and brief status reports by other national representatives. It was decided that the following data should be targeted for early attention in the Global Geocryological Database:

- digital point values of permafrost thickness, ground temperature and ground ice content that were used in preparing the 1:10 million Circumarctic Map of Permafrost and Ground Ice Conditions (Heginbottom et al., 1993; Brown et al., in press); data from some 100 boreholes in Russia also incorporated in the same map;
- data on temperatures and moisture content in soil layers at standard depths at selected stations in Russia (Table 2);
- metadata on national and regional maps of permafrost published in Russia (see Appendix 5);
- a directory of institutions and individuals in the Former Soviet Union holding major collections of permafrost data (See Appendix 6).

Table 2. SELECTED RUSSIAN METEOROLOGICAL STATIONS. SOIL TEMPERATURE DATA (PILOT PROJECT). STATIONS WITH OBSERVATIONS AT DEPTHS > 2.4 m

STATIONS	LOCATION	PERIOD OF RECORD
Aleisk	Not Available	1947 - 1965
Eleckay	Not Available	1955 - 1965
Erbogachon	61°16' N - 108°01' E	1953 - 1970
Irkutsk	52°16' N - 104°21' E	1958 - 1970
Ishim	56°06' N - 69°26' E	1947 - 1965
Kazach'ye	70°75' N - 136°26' E	1952 - 1965
Khantynansiysk	61°00' N - 69°10' E	1961 - 1965
Komsomolskiy	69°17' N - 172°70' E	1963 - 1965
Markovo	64°41'N - 170°25' E	1948 - 1965
Olëkminsk	60°36' N - 120°36' E	1948 - 1965
Oimykon	63°47' N - 142°50' E	1949 - 1965
Ostrovnoy	58°58'N - 163°57' E	1951 - 1965
Russkaya Polyana	53°48' N - 73°54' E	1954 - 1965
Salekhard	66°55' N - 66°67' E	1949 - 1958
Seimchan	62°55' N - 152°25' E	1948 - 1965
Sidorovsk	66°35' N - 82°18' E	1953 - 1965
Skovorodino	54°60' N - 123°53' E	1953 - 1965
Srednekolymsk	62°27' N - 153°35' E	1931 - 1965
Syktyvkar	61°42' N - 50°45' E	1949 - 1965
Tarko-Sale	64°55' N - 77°50' E	1949 - 1965
Tobolsk	58°20' N - 68°23' E	1947 - 1965
Troitsko-Pechorsk	62°70' N - 56°22' E	1949 - 1965
Ugut	60°31' N - 74°07' E	1947 - 1965
Ust-usa	66°00' N - 57°00' E	1947 - 1965
Verhoyansk	67°58' N - 133°50' E	1932 - 1965
Vitim	59°26' N - 112°35' E	1931 - 1965
Yakutsk	62°02' N - 129°72' E	1949 - 1965
Zhigansk	66°75' N - 123°33' E	1948 - 1965

4.4. General Recommendations

Given limited resources we recommend that:

1) Immediate efforts should be made to begin, or to assist with, the rescue of data sets pertaining to the high priority variables listed in Table 1.
2) The IPA should consider a follow-up meeting in mid-1995 that would review the data rescue procedures and focus on identifying other high priority data sets for the next stage of the rescue effort.
3) This workshop focused almost entirely on the recent time period. We should not lose sight of the fact that the best verification of an Earth System Model's ability to predict climate change is to run the model for past climate states. Paleoclimatic data are vital for this approach, and a focused effort should address the question of permafrost data rescue for paleoclimate applications in this context. This can be done in cooperation with other programs such as the International Geosphere-Biosphere Program's Past Global Changes Progect (PAGES), the UNESCO-International Union of Geological Sciences CLIMEX (Climatic Extremes of the Past), mapping project, and the ARCSS PALE program (PALE Steering Committee, 1993).
4) The order of processing for rescuing data sets should not automatically start with the oldest records and work forward (unless the oldest records are deteriorating at a rate that makes this approach necessary), nor should it start at the present and work backwards. As was noted in the criteria for data set prioritization, the most useful data, such as those that coincide temporally with other large-scale experiments or overlap with the introduction of new satellite systems, should receive early attention.
5) The question of data rescue, in general, and permafrost data rescue in particular, should be included on the agenda of the meetings of the IPA Executive Committee and Council and special sessions at the five-yearly international conferences.
6) Data rescue should also be placed on the agenda of the International Commission of Snow and Ice, and other international organizations with common interests.

5. Next Steps

Several useful data sets have been compiled and released on CD-ROM; an example is the Alaska North Slope Data Sampler containing soil and permafrost data distributed by NSIDC (1994). It would be useful if a general cryospheric data set that included permafrost data could be made available in this form. This could include gridded data contained in the permafrost map of the northern hemisphere, selected borehole temperature data from Russia and Canada, and measurements of active layer characteristics for circum-Arctic sites.

The Data and Information Working Group anticipates that the IPA, through the Council and other Working Groups, will encourage the implementation of the GGD in the following ways:

- Develop an inventory of relevant national data sets (see Appendix 5).
- Compile approved data set descriptions into master directories, accessible to users. The International Arctic Environmental Data Directory (ADD) project is a possible means of facilitating user access to GGD (Appendix 7).
- Retrieve priority data sets, and archive them in standard formats at National Database Centers or GGD nodes.
- Make the databases available to users through appropriate distribution media (diskettes, CD-ROM, hard copy) or on-line via FTP.
- Promote user-oriented analytical, modeling and mapping information products, based on NGD or GGD data sets.
- Concurrently develop funding proposals to national and international, governmental and non-governmental funding sources.

The Data and Information WG invites all IPA member countries, working groups and interested individuals, wherever they are, to participate in and contribute to the GGD project. As a first step this requires completion of a data set description on the form being distributed with the December 1994 issue of *Frozen Ground* to over 2,000 readers (see Appendix 1). Readers of *Frozen Ground*, are encouraged to complete and return the form to the WDC-A for Glaciology or their National Representative at their earliest convenience. The WG plans to convene a three-day meeting and workshop in Potsdam, Germany, before the XIV International Congress of the International Union for Quaternary Research, in Berlin. It will report on the status and results of GGD activities to the IPA Council at its 4-5 August, 1995 meeting.

The participants recommended the following strategic targets and time table for GGD implementation.

A. RESEARCH AND DEVELOPMENT

A1 Review and refine the GGD Parameter Priorities List (through *Frozen Ground*) (6 months)

A2 Refine the GGD Data Structure
(coordinate through the groups in Southampton and Moscow) (6 months)

A3 Converge on agreed GGD DIF (in consultation with USGS) (9 months)

A4 Combine A1-A3 into a first Draft of IPA "Guidelines for Geocryological Data Management" with metadata guidance (12 months)

B. DATA SETS

B1 Compile first version of Inventory of Candidate Data Sets (6 months)

B2 Using refined List A1, develop from B1 a List of Rescue Priorities for IPA (9 months)

B3 Define technology. (Scan v. Automated digitization v. Manual digitization) (6 months)

C. INFORMATION SYSTEM

C1 Continue work on IPA GGD database pilot, initially using Barrow and CPM data (6 to 12 months)

C2 Develop proposals for pilot GGD Dissemination System (media and mamagement (6 to 12 months)

C3 Develop proposals for high level derivative products (9 to 15 months)

- Derivative data
- Analysis and monitoring
- GGM input data
- Permafrost bulletin
- Inputs to the Intergovernmental Panel on Climate Change
- Flagship data sets

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7. AGENDA

Objectives

1. Establish priorities for the recovery of permafrost and frozen ground data
2. Develop the implementation plan and procedures for the data recovery, storage and dissemination
3. Review results of pilot projects and approaches to database structure and utilization

Agenda – Day 1, Thursday, 3 November 1994

09:00	Welcome and Introductions	(Flaate, Barry)
09:15	Review Purpose and Program of Meeting, Accept Agenda	(Barry, Heginbottom)
09:30	GGD project – Status Report, Summary of Southampton Meeting	
10:00	Break	
10:15	Criteria for data prioritization (See Crane, 1993)	(Barry, Brown)
13:00	Lunch	
14:00	Data set identification and description, Data availability (existing Directory Interchange Format [DIF] and Master Directory activities	(Participants)
16:00	Break	
16:15	Presentations of on-going GGD-NGD activities (Russia, US, Canada, China, Fennoscandia, Alpine Europe, Japan, etc.)	(Participants)
17:30	Adjourn	

Day 2, Friday, 4 November 1994

08:30	Models and structures: GeoData results of pilot projects including GLOCOPH	(Clark, Branson)
10:00	Break	
10:15	Working sessions: Priorities and options	(Participants)
12:30	Lunch	
13:30	Working session: Data distribution and archives	(Participants)
15:00	Break	

15:15	Working session: Activities, options, schedules, funding, responsibilities	(Participants)
17:30	Adjourn	

Day 3, Saturday, 5 November 1994

08:30	Working session: Report preparation
10:00	Break
10:15	Plenary session: Review progress, Next meeting
12:00	Closure
12:30	Lunch
13:30	IPA Data Working Group Business Meeting
16:30	Closure

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APPENDIX 1

IPA GLOBAL GEOCRYOLOGICAL DATABASE INVENTORY

The International Permafrost Association is conducting a survey of available data on past and current investigations of permafrost, seasonally frozen ground and periglacial conditions and related laboratory studies. An electronic mail form is also available. You may submit more than one form if data types differ substantially. Results of this survey will be reported in *Frozen Ground* and other relevant publications. Please complete this form and return it to your IPA national representative with a copy to the World Data Center-A for Glaciology, Attn: Claire Hanson, Campus Box 449, University of Colorado, Boulder, Colorado 80309-0449, U.S.A. **Forms and instructions are also available electronically from: hanson@kryos.colorado.edu.**

Name of data set			
Principal Investigator			
Name			
Address			
Tel	Fax	E-mail	
Data compiler/author			
Name			
Address			
Tel	Fax	E-mail	
Coverage			
Study location (region/countyr)			
Latitude (south to north)	to		
Longitude (east to west)	to		
Period of investigation			

Summary: Give brief details of site, collection technique, measurement frequency, and quality. Indicate what ancillary data on site, climate, data processing and metadata are available or can be reliably obtained (with sources).

(Attach additional sheets if necessary)

Current storage medium: CD-ROM / Spreadsheet / Word processor / Database / Data centre (give name) / Paper

Are your data at risk of being lost? YES / NO

Bibliography (Published and unpublished reports about this data set; attach additional sheets if necessary)

Key Words: (Maximum of 10 such as Active layer, Permafrost thickness, Temperature, Moisture content, Ice content, Chemistry, etc.)

APPENDIX 2

GLOBAL GEOCRYOLOGICAL DATABASE: SUGGESTION FOR DATA STRUCTURE

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Database Prototype

A prototype database has been prepared to illustrate how the development of the GGD database could be approached. The development of the prototype has assumed that the end product should be a tool to facilitate data manipulation and analysis (see figure 1) rather than simply a method of data storage. The prototype as presented is a developers' version and has no user front end and only limited functionality compared to a full production system. Two different types of data set have been entered into the database: 1) the Barrow data set comprising soil moisture, temperature, etc., taken at multiple points and plots over a number of years and 2) the data used to compile the Canadian permafrost map (See Heginbottom *et al.*, 1993).

This report outlines issues that should be addressed during the development of the production database, describes the software used and discusses three different possible forms of data structure.

Software

For the prototype the data have been stored in a relational database system. A relational database is one in which the data are kept in several related tables. Each table contains data from a particular aspect of the data set. Tables are linked to each other using unique keys: for example, in a library data set the borrowers and book detail tables could be linked by a unique book number.

Advantages of relational structure over storing data in individual flat files include:

1) data can be queried to obtain items in the database which select data fulfilling a requirement either from many data sets or just particular items from one data set. Data can be output from queries as a text report or as an ASCII file that could be transferred into a spreadsheet or other package;
2) data redundancy (duplication) is reduced and thus storage requirements are reduced.

A disadvantage, however, is that some data manipulation may be required to input the data and fit it into the table format, particularly if it is presently held in a digital format.

The system used for the prototype is Paradox by the Borland Corporation. This package has been used by many other international projects, such as the North American and European pollen databases and the global palaeoflood database, and is relatively inexpensive (not more than about $200). The advantage of this system over ones such as ORACLE is that graphical images can be easily incorporated into the product and there are also facilities for producing simple graphs within the database interface. A disadvantage, however, is that Paradox does not support structured query language (generally regarded as the industry standard language for relational databases), although this may not affect the end-user. For the production database it may be appropriate to hold the data on a central robust large database system and to transfer it to a more user-friendly system for distribution.

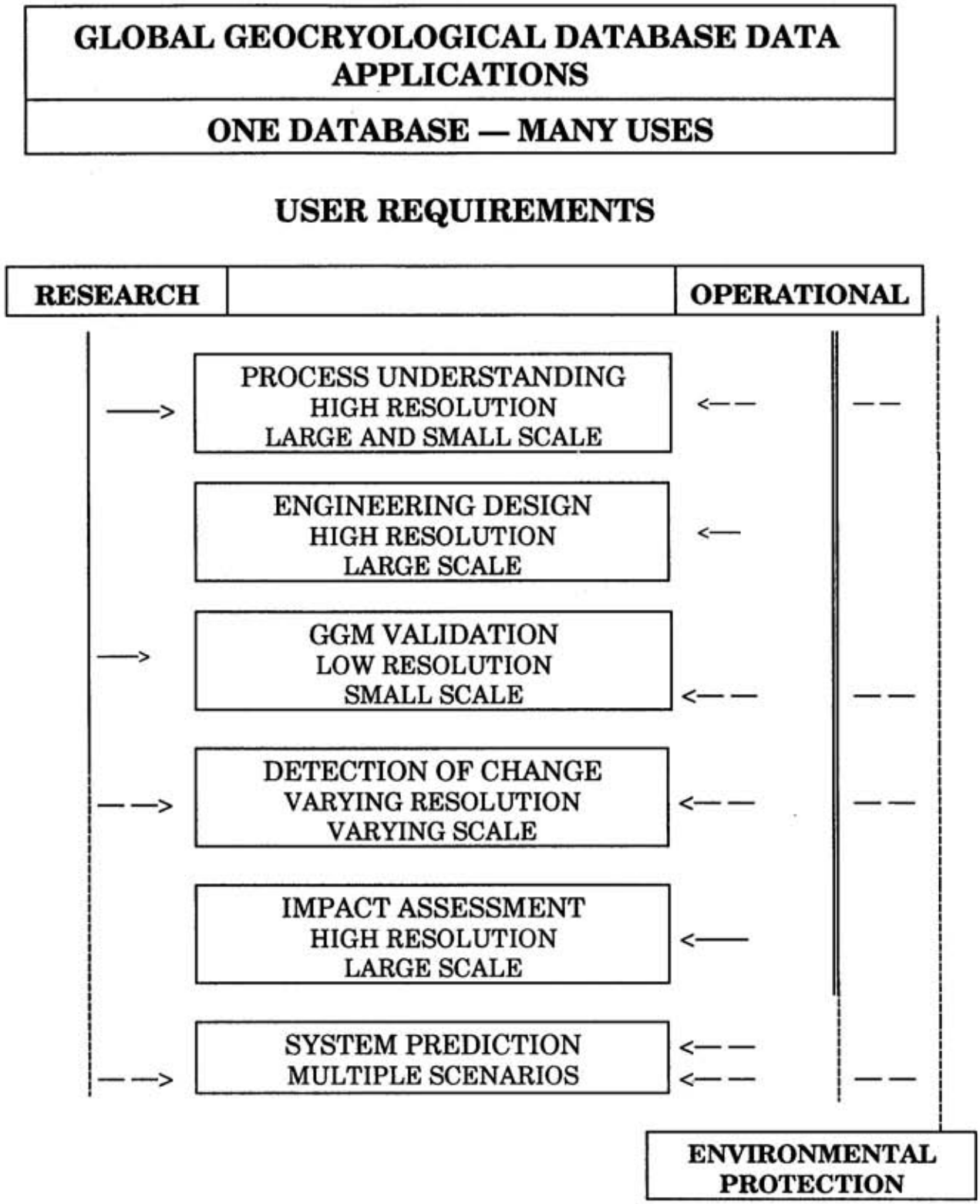

Figure 1. An illustration of the diverse user requirements of the Global Geocryological Database (GGD): research versus operational and science versus engineering design. The requirements range from access to archived 'raw' data to standardized/transformed data.

Access to the database

It is envisaged that access to the database could be either on-line (via INTERNET), thus allowing the user to perform interactive queries on the main database, or distributed on a CD-ROM that contains simple querying and visualization software. (The disadvantage of the latter is that the data that the user accesses will not necessarily be the most up-to-date version as available from the main database.) Either distribution method would allow users to download data to their own software.

The majority of database systems have the facility to allow restricted access to the database. Thus users may be requested to register to use their data on-line. Database security will restrict the users to only viewing and downloading the data and they will be unable to change the data. A sample of a database protocol is attached as Appendix 4.

Data structure

A possible data structure for the GGD is shown in Figure 2. This structure is most suitable for the representation of point data. For the storage of non-point data (either linear or area) it may be appropriate to link the database to a Geographical Information System.

The tables relate to the following:

The data in the database have been initially classified by data set and further details are given in the **Data set** table. This table contains similar information to other Directory Interchange Format (DIF) flat files and should be designed when the DIF for the GGD has been finalized and would include details of spatial and temporal coverage, keywords and a brief description. This is linked by publication number to the **Bibliography** table that contains references to the reports/papers from which the data were taken or which refer to the data and other relevant articles. It is not suggested that a complete permafrost bibliography should be maintained as this is available elsewhere.

The data set table also connects to the **Researchers** table which gives the name, address, e-mail, etc. of the person/people who submitted the data to the database and who should be contacted regarding the data.

The data are held in a hierarchical structure. Initially they have been split into sites (in the case of the Barrow data set a site is an individual plot). The **Site** table gives details of the site name and a unique site key. Locational information (latitude, longitude, elevation) is described in the **Location** table (if data are referenced to a smaller scale then they can be recorded at the Record level (see below)), and a longer text description of the site is in the **Site comments** table.

The data are then classified by what has been termed a **Record**, in the case of the Barrow data a record is an individual core (or point). The **Record** table gives the name and type of each record.

Representation of data

For ease of use of the database, to ensure that different data sets can be easily compared, and to avoid misrepresentation, it may be appropriate to translate all data to a common mensuration (probably the International Standard). It is important that a copy of the raw data is also held in the database, however, although it is recommended that this should only be available to privileged users.

Storage of spatially and temporally variable data at the record level

Storage of data that have been collected at different spatial and temporal intervals is a complex matter and three different alternatives have been explored here (see Figures 2, 3, and 4). The following tables are common to the three types of structure above: Data Set, Site, and Record tables.

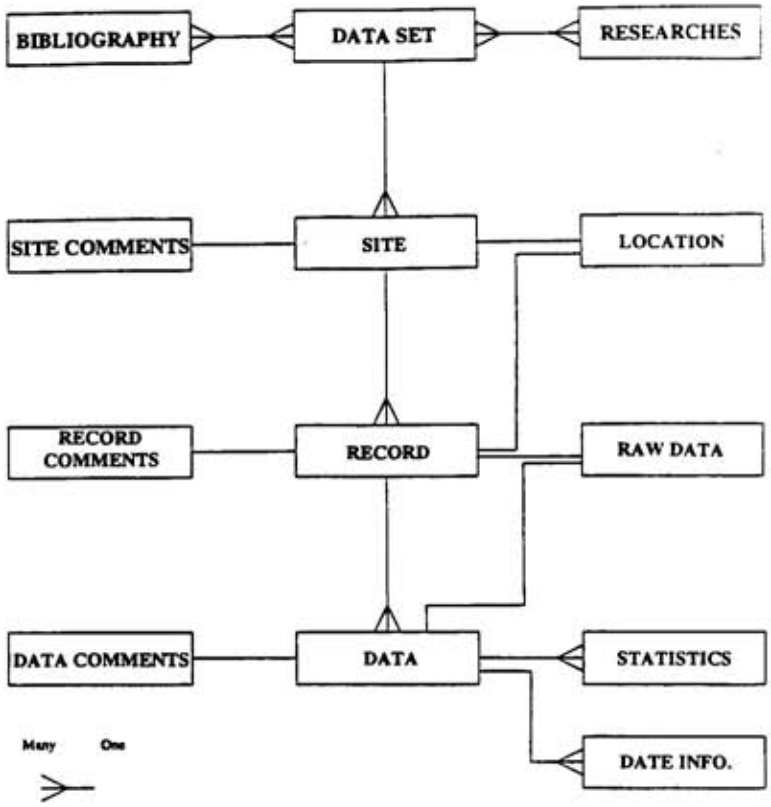

Figure 2. Candidate data structure for GGD: Alternative 1. This is especially suitable for point data.

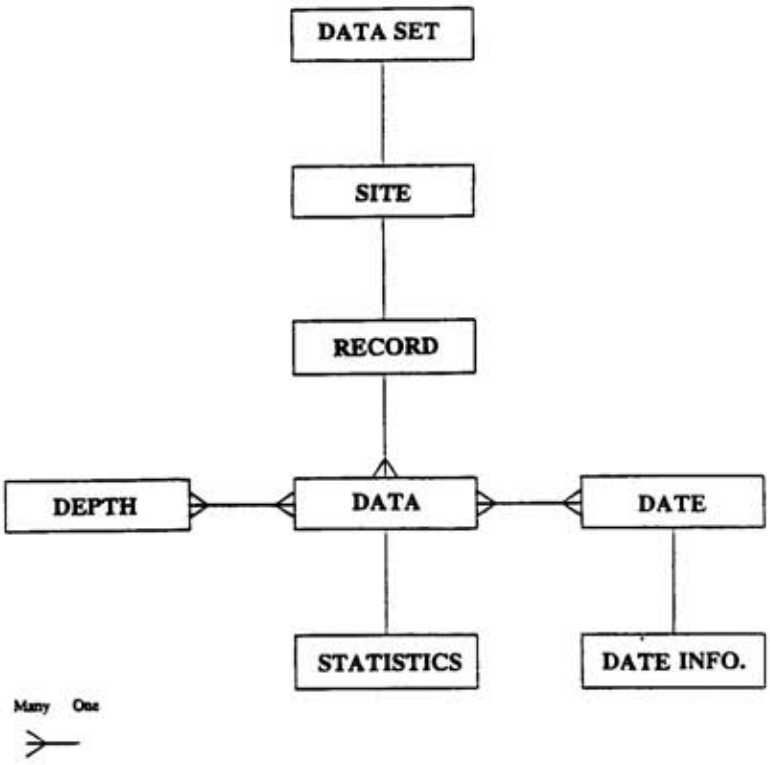

Figure 3. Candidate data structure for the GGD: Alternative 2.

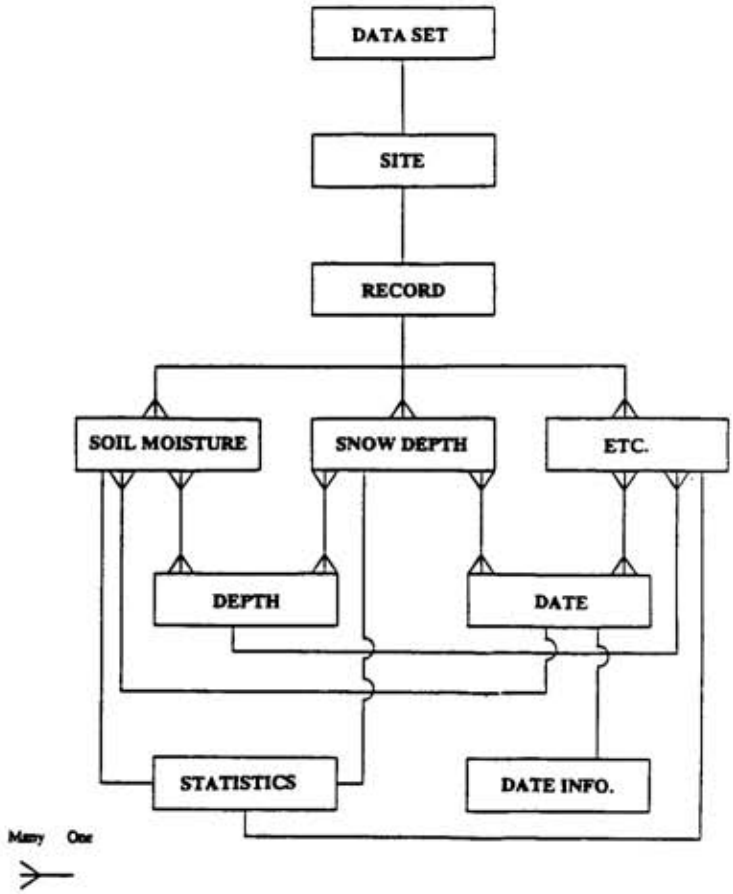

Figure 4. Candidate data structure for the GGD: Alternative 3.

Alternative 1) The data are held in just one main table; within this the different depths within a core have unique sequence numbers. The table contains the following:

Type of data (e.g., soil moisture content, snow depth, permafrost extent)
Value — this can be either numerical (e.g., 50%) or text (e.g. continuous)
Depth at which the sample is taken
Date — this is stored in a year field, a day/month field and an AD/BP date field.

The disadvantage behind this method is that there is a considerable amount of data redundancy, as the depth, dates, etc., have to be repeated for each sequence in each record. The advantage, however, is that queries of the data are relatively simple and quick to construct and, also, only a limited amount of manipulation is usually required to transfer the data from an original digital flat file to the database table.

The other two alternatives are more fully relational, and thus reduce the amount of data redundancy (and the amount of storage required). A considerable amount of data manipulation would be required, however, to transfer the digital data into the table structure. Queries are also complex to construct.

Alternative 2) The location and the date values are kept in individual tables so that many sequence numbers can refer to them, and the tables linked with key numbers (Figure 3).

Alternative 3) Each data type is stored in an individual table (Figure 4). This solution is not recommended as a large number of tables would be required to cover the wide range of possible data. Querying would also be very complex.

Other database tables

If the date has been determined by a dating method (e.g., radiocarbon) or has been inferred by stratigraphic inference then further details are given in the **Date information** table. This gives the errors, sample and laboratory numbers, dating method, etc., associated with the date.

If various statistics have been collected for a particular item of data (e.g. maximum, minimum temperature) then the details are given in the **Statistics** table which is linked to the **Data** table.

APPENDIX 3

RUSSIAN CONTRIBUTION TO THE GLOBAL GEOCRYOLOGICAL DATABASE

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According to the goals and objectives announced in the letter distributed by the IPA Data Working Group on September 26, 1994, Russian participants in the meeting suggest that the approaches developed for the Russian National Geocryological Database (NGD) be applied to the Global Geocryological Database (GGD). Geocryological databases represent one component of the much broader cryospheric database and should be compatible with the latter. At the same time, permafrost and geocryological conditions differ fundamentally from other components of the cryosphere, such as snow and ice. As a geological feature, permafrost is much more inert to external influences. That is why it is more sensitive to medium (10s of years) and long-term (100s-1000s of years) climate fluctuations than to short-term (interannual years) and seasonal ones.

The main manifestations of permafrost changes are concentrated at and just below the earth's surface where external climatic and human-induced factors are interacting with permafrost features. This interaction results in specific cryogenic (periglacial) processes and phenomena. Nevertheless permafrost is not only a geological but a climatic feature as well, and hence several processes having a seasonally variable character are inherent in the geocryological conditions of the permafrost/atmosphere/hydrosphere interfaces.

Another specific feature of permafrost in comparison with surficial features is that some methods of observation are not applicable to the study of the permafrost temperature regime, such as repeated aerial and satellite photography. This method gives little information on the upper layers of permafrost and virtually none for the deep layers of permafrost. Only those features that have a geological origin but surficial expression, such as icings, can be studied like glacial features. Data obtained when studying permafrost thus differ from that obtained for snow and ice, and the data processing and generalization depend upon the existence of stability in the medium. The main method of collecting data and of mapping permafrost in Russia is linked to the landscape type. This involves two main procedures for acquiring data, depending on the degree of generalization. The first is archiving maps with generalized information on each category (the maximal degree of generalization). The second is archiving of the coordinates of the points (boreholes, etc.) with complete information layer by layer on lithology, cryogenic features, and laboratory tests (the minimal degree of generalization, but still varying according to the depth and goals of drilling, or description).

The problem of choosing the degree of generalization also concerns data collection about the permafrost regime. At meteorological and agricultural stations, climatic and active layer records are averaged for daily, weekly, monthly, annual and multi-year intervals. Different subjects need different degrees of generalization. Some cryogenic processes and active layer studies need daily information. Such processes as thermoerosion and thermoabrasion need seasonal information, frost heave and thermokarst need long-term information. There are several hundred weather and agricultural stations in the Russian permafrost zone and in the zone of the deep seasonal freezing (for example, a seasonally frozen layer of about 3-5 m deep is characteristic of the southern part of West Siberia). At least one hundred of them measure the depth of thawing or freezing and the temperature of active layer at 8 levels in the profile (0, 20, 40, 80, 120, 160, 240, and 320 cm). There is a 60-year long period of observations at one of the stations. In this case we have 35,000 readings just for the temperature of the active layer; moisture content is also measured there. Should all these records be digitized or should we choose a selection based on some criteria?

The data obtained at the meteorological stations, agricultural stations, and steady-state permafrost stations during investigations for construction have different content, different techniques

of monitoring, laboratory testing and generalization. This makes it difficult to work out unique criteria for data selection.

To summarize:

- Permafrost as a geological feature has parameters that are stable or changing very slowly with time. They are important to the fundamental understanding of permafrost and its relationships with " ... climate, process, material and morphology ..."

- At the same time permafrost as a climatic feature is characterized by short-term fluctuations reflecting the changes in climate and environments and in its turn influencing them.

- This duality results in heterogeneity of the database structure. We suggest that GGD should consist of several blocks with different internal structures depending on their subject. Neither present geological nor geographical database structures are acceptable. The structure of the geocryological database combines several blocks of features and parameters on one side and regime observations on the other side. Four main criteria and several specific criteria are proposed.

We suggest the following main criteria for data prioritization:

1. **Relevance** — the use of relations between the geocryological data and important problems such as global climatic change, environmental protection, and development of useful mineral deposits in the Arctic.

2. **Availability** —the possibility of obtaining data with minimal time and use of funds.

3. **Completeness** —the maximal set of information at one point.

4. **Spatial distribution** — the acquisition of a uniform distribution of the points throughout the territory.

The last two points are, to some extent, contradictory, so an optimal combination should be found.

Specific criteria should be attached to specific data sets. Some permafrost elements, such as icings, have features of a stochastic character (analogous to glaciers) and icing data can be generalized only for situations with adequate local data. Hence, the fourth criterion cannot be used in cases where statistical analyses are to be performed.

Most permafrost data are concentrated in regions of active economic development where they are often not accompanied by the collection of weather data. In this case, high quality analyses of permafrost data are impossible. In this situation weather records play a more important role than the number of permafrost parameters monitored and the third criterion is not considered.

The most numerous data on the active layer are concentrated at agricultural stations but they are situated mostly to the south of the southern limit of the permafrost zone. Here the main criterion should be the existence of paired data (on hills and in valleys) and at an intermediate latitude; the latter refers to a location on some transect from the southernmost to the northernmost stations within different geographical regions.

Most data on ground temperature refer to the depth of zero annual amplitude. Often there are single measurements in each borehole, but sometimes there are repeated measurements although not necessarily on the permafrost regime. Those cases are most important in considering the stability of the permafrost thermal regime. Here the criterion of the time of recording is less important. The main criteria for monitoring borehole temperature are data extending below the base of permafrost, or at

least exceeding of the depth of zero annual amplitude, measuring the temperature gradient in permafrost, and monitoring processes in the same location (again data at paired elevations).

In order to unravel the problem of dividing the criteria, we suggest a list of informational blocks. Each block in the list would have a different structure and criteria for data acquisition.

Block I — Geocryological maps.
Block II — Geocryological conditions existing in boreholes, excavations, and description points.
Block III — Cryogenic (periglacial) processes.
Block IV — Observations on permafrost regime.
Block V — Inventory of metadata sets.

The inventory of metadata sets includes:

Set 1 — A list of permanent weather stations, agricultural stations and permafrost stations.
Set 2 — A list of investigations, design institutions and construction companies involved in Arctic and subarctic development.
Set 3 — A list of published and unpublished sources of information.
Set 4 — A list of existing digital or hard copy local databases (with a specific standard description of each database).
Set 5 — A list of important unpublished geocryological maps.

We have started to develop a Russian National Geocryological Database (NGD) taking account of the following:

- the NGD should be compatible with the GGD, and
- the NGD should be compatible with existing local databases. This is why we started by planning the NGD structure. An initial version was reported at the summer meeting 1994 in Southampton. Now we are presenting the version that has been accepted for the NGD use for the GGD.

The NGD is based on a GIS-program and other compatible programs of data archiving. Four separate data blocks, referred to above, have been prepared for this meeting containing different type of information:

I — Bibliographical description of geocryological maps both published and unpublished, including maps of permafrost conditions, cryohydrogeological maps, terrain engineering maps, ecological maps, and maps of cryogenic (periglacial) processes and phenomena.
II — Numerical and text information on geocryological conditions obtained in boreholes, excavations, and at description points,
III — Numerical and text information on cryogenic (periglacial) processes,
IV — Numerical information on observations of permafrost regime.

The structure of the first block is rather obvious – it is a list including information on the authors, publisher, date and place of publication, scale and legend of the map. As a completed example we present a database of published maps of the FSU, Russia and regions of Russia (Appendix 5).

The second block includes practically all the information obtained in the boreholes and other points having coordinates on digitized maps. All the information is accumulated in several subblocks and can be retrieved layer by layer, or in a combination of layers according to the given legend.

The third block provides information on the extent, characteristics and rates of cryogenic (periglacial) processes and the morphometry of the phenomena referred to the category or to the area.

The fourth block is a collection of tables including measurement data and readings at the observation points of permanent research stations. Regime information can be obtained also from the published data of meteorological and agricultural stations (up to 1978) and unpublished, but available at a reimbursable cost, after 1978.

The fifth block gives information on the existence and content of geocryological data at the regional and local levels, format, archive address, owners' names and contact telephones. The structure of the block is not yet worked out but the contacts with the owners have begun.

The main sources of the data are held at:

- Permafrost institutions and research stations of the Russian Academy of Sciences (Yakutsk, Chersky, Tiksi, Syktyvkar),
- Research stations of other institutions (All-Russian Geological Institutes – Yamal, Gydan)
- Geological Survey of Russia (throughout Russia),
- Design companies (Hydroproject – Transbaikal region, Kolyma region; Mosgyprotrans, Lengyprotrans, Sibgyprotrans – Transbaikal region, West Siberia including Yamal, South Yakutia, Fundamentproekt – West Siberia, and many others).

It is a long-term task to complete the entire database, but a start should be made so that it can be of use in the future when the main emphases may change.

Conclusions

1. We support the goals and objectives of the GGD Project of IPA. We especially appreciate reference to permafrost conditions as a basis for environmental scenario development, impact assessment, and engineering design, together with the reference to global climatic change.

2. We agree that the status of GGD should be as a non-commercial, internationally accessible database. The only reason to encourage the owners of the data to make their data accessible to the general public should be that of free access to the database. Nevertheless, we suggest including a list of owners (block V, set 4) who are ready to release their data only on a commercial basis. That will at least help to provide a list of data available from the companies who are making temperature measurements in course of extensive drilling in Russia.

3. We would like to know how the existing system will work, what will be the ways of using the international database. In what way is its public character achieved?

4. We consider it important that the placing of data in the GGD is recognized as a publication. If we can gain such an acceptance, it would help in submitting proposals to different science foundations.

We would like to stress the additional problem of translation from Russian into English while developing the Russian part of GGD. This takes extra time and funds.

The system of GGD development is currently at the starting point. To make it work we need equipment, software, and funds. The minimal amount required for equipment and software is detailed in a separate report.

APPENDIX 4

DRAFT PROTOCOLS: A POSSIBLE MODEL FOR THE GGD

The participants discussed the issue of protocols for data management and dissemination. Draft protocols prepared for the ARCSS PALE program (PALE Steering Committee, 1993) and for the Global Continental Paleohydrology Project (GLOCOPH) database were discussed. GLOCOPH is organized by a commission of the International Union for Quaternary Research (INQUA).

The GLOCOPH draft protocol, presented by J. Branson, is summarized below.

Data

1) Data should include both original field measurements (raw data) and the paleoenvironmental reconstructions.
2) Only data that are available for unrestricted use will be accepted for the database.
3) GLOCOPH is not liable for ensuring the accuracy of the data - this is the responsibility of the data contributor.
4) Data must include a time-frame, even if it is very approximate.

Data contributors

1) Data should be made available to the database free of charge.
2) A printout of the data can be sent to the data contributor, if requested, so that the entry of the data may be verified.
3) Contributors can request to be informed if their data are being used, for what purpose and by whom.
4) Data can be removed from the database at any time at the request of the contributor.

Data users

1) Users must be registered to use the database.
2) The database can be used free of charge.
3) The database should be referenced when referring to data obtained from it and publications by the data contributor which discuss the original data should be cited.
4) Users should acknowledge the contributor if unpublished data are used.
5) Users should send contributors reprints of publications which use their data.
6) Data from the database should not be passed onto a third party; all data should be taken directly from the central database.
7) The data can be used by non-profit-making organizations for research purposes only. Profit-making organizations may use the data only if written consent has been given by the originator of the data and the database production group.

PALE Steering Committee. 1993. *Research Protocols for PALE. Paleoclimates of Arctic Lakes and Estuaries.* PAGES Workshop Report-Series 94-1. Bern, Switzerland, pp. 35-39.

APPENDIX 5

RUSSIAN PERMAFROST MAP INVENTORY

The list of published maps includes both maps printed as separate items and those found in papers and monographs as illustrations. In the latter, references are given to the publication and page where the map is found. There are 375 maps listed; this is less than 20% of those published. Only the period 1950 to 1980s is covered by the list. The compilation is being continued and will include later publications. Irina D. Streletskaya, Ph.D. (Industrial and Research Institute for Investigations of Construction, Moscow) and Marina O.Leibman, Ph.D., Federal Center for Geoecological Systems, Moscow) are the editors. The listing is alphabetical by first author and the entries are numbered consecutively. The map scale index which follows p. 114, refers to that number.

AUTHOR	Afanasenko, V.E., Goncharov, S.V., Zaitsev, V.N.
NAME:	Geocryological-hydrogeological regionalization of the territory
PUB:	Moscow, Moscow University Publishers, 1981
SCALE:	1:3 500 000
SOURCE:	"Natural conditions Transbaikal railway industrialization zone", p.18. In the article by Afanasenko, V.E., Goncharov, S.V., Zaitsev, V.N. p.4-20
REGION:	Transbaikal
LEGEND	Cryohydrogeological massif of deep discontinuous freezing, cryoartesian basins of continuous and discontinuous shallow freezing
LAT/LONG:	54°00-57°00/120°00-127°00
INSTITUTE:	Moscow State University
NUMBER	00001

AUTHOR	Are, F.E.
NAME:	Soviet Arctic regionalization scheme referring to thermoabrasion in shelf cryolithozone
PUB:	Moscow, Nauka, 1983
SCALE:	1:37 500 000
SOURCE:	"Geocryology problems"/edited by P.I. Mel'nikov, p.197. In the article by Are, F.E., p.195-201
REGION:	North of the USSR
LEGEND	5 areas (characteristic in article)
LAT/LONG:	68°00-82°00/20°00-170°00
INSTITUTE:	Permafrost Institute
NUMBER	00002

AUTHOR	Arkhipov, S.A., Astakhov, V.I., Volkov, I.A.
NAME:	Paleogeography of West Siberian plain (sketch-map) at maximum of Late Zyriansk Glaciation (22-17 thousand years)
PUB:	Novosibirsk: Nauka, 1980
SCALE:	1:15 000 000
SOURCE:	Inset-map in monograph "Paleogeography of West Siberian plain at the maximum of Late Zyriansk Glaciation"
REGION:	West Siberia
LEGEND	Northern limit of permafrost deep thawing
LAT/LONG:	48°00-80°00/70°00-96°00
NUMBER	00003

AUTHOR	Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I., Trofimov, V.T.
NAME:	Extent and contemporary tendency for development of ice wedges in West-Siberian platform
PUB:	Moscow, Moscow University Publishers, 1986
SCALE:	1:20 000 000

SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities)/ edited by V.T. Trofimov, p.104
REGION: West Siberia
LEGEND Old and contemporary developing and static syngenetic and epigenetic wedge ice in different soils on different topography, soil wedges spread, degradation ice places
LAT/LONG: 50°00-72°00/60°00-95°00
INSTITUTE: Moscow State University
NUMBER 00004

AUTHOR Badu, IU.B., Trofimov, V.T.
NAME: Extent of wedge ice and injective ice in Yamal Peninsula
PUB: Moscow, Moscow University Publishers, 1974
SCALE: 1:2 500 000
SOURCE: "Problems of cryolithology", issue 4 / edited by A.I. Popov, p.132
REGION: West Siberia, Yamal Peninsula
LEGEND Epigenetic and syngenetic wedge ice of active, nonactive and ice melting stages in ground and organic soils, volumetric macro ice content, polygonal-wedge relict two-floor ice, injective ice
LAT/LONG: 68°00-74°00/66°00-74°00
INSTITUTE: Moscow State University
NUMBER 00005

AUTHOR Badu, IU.B.
NAME: General features of paleogeography of Gydan Peninsula to the end of Kazan period
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:3 000 000
SOURCE: "Engineering-geological conditions of Gydan Peninsula", p.14
REGION: West Siberia, Gydan Peninsula
LEGEND Regions of formation of syngenetic and epigenetic wedge ice, permafrost of Salekhard strata, permafrost near surface with epigenetic wedge ice
LAT/LONG: 67°30'-74°00/73°00 -84°00
INSTITUTE: Moscow State University
NUMBER 00006

AUTHOR Badu, IU.B.
NAME: General features of paleogeography of Gydan Peninsula to the end of Zyryan period
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:3 000 000
SOURCE: "Engineering-geological conditions of Gydan Peninsula", p.17
REGION: West Siberia, Gydan Peninsula
LEGEND Divided plain (salekhrdskaya) with permafrost in upper part of section, coastal plain (kazanksevskaya) with permafrost in upper part of section, epigenetic and syngenetic wedge ice
LAT/LONG: 67°30'-74°00/73°00 -84°00
INSTITUTE: Moscow State University
NUMBER 00007

AUTHOR Badu, IU.B.
NAME: General features of paleogeography of Gydan Peninsula to the end of Late-Middle Quaternary maximum (Yamal transgression)
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:3 000 000
SOURCE: "Engineering-geological conditions of Gydan Peninsula", p.9
REGION: West Siberia, Gydan Peninsula
LEGEND Lowlands with sporadic permafrost, places of shelf with syngenetic wedge ice, freezing in the end of Middle Pleistocene, areas of formation of syngenetic and epigenetic wedge

	ice
LAT/LONG:	67°30'-74°00/73°00 -74°00
INSTITUTE:	Moscow State University
NUMBER	00008
AUTHOR	Badu, IU.B.
NAME:	Map of ground ice genetic types and macro- ice content in 10m upper of deposit section in West-Siberian platform
PUB:	Moscow, Moscow University Publishers, 1980
SCALE:	1:7 500 000
SOURCE:	Trofimov, V.T., Badu, IU.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.84-85
REGION:	West Siberia
LEGEND	Syngenetic and epigenetic polygonal wedge ice in different evolution states, volumetric macro ice content, injected ice, sheet ice, injected-segregated ice in different genetic complexes of deposits, buried ice
LAT/LONG:	64°00-74°00/65°00-85°00
INSTITUTE:	Moscow State University
NUMBER	00009
AUTHOR	Badu, IU.B.
NAME:	Map of the potential thaw settlement for the upper 10 m of permafrost section in West-Siberia platform
PUB:	Moscow, Moscow University Publishers, 1980
SCALE:	1:7 500 000
SOURCE:	Trofimov, V.T., Badu IU.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.216-217
REGION:	West Siberia
LEGEND	Summary of potential settlement in the different genesis sediments, composition and ice content ground, catastrophic settlement in areas with injected ice
LAT/LONG:	64°00-74°00/65°00-85°00
INSTITUTE:	Moscow State University
NUMBER	00010
AUTHOR	Badu, IU.B.
NAME:	Primary features of paleogeography of Gydan Peninsula in Sartan epoch
PUB:	Moscow, Moscow University Publishers, 1986
SCALE:	1:3 000 000
SOURCE:	"Engineering-geological conditions of Gydan Peninsula", p.21
REGION:	West Siberia, Gydan Peninsula
LEGEND	Permafrost extent on terrace plains, deep lakes and lake depression on thawing sheet ice places, polygonal-wedge ice erosion
LAT/LONG:	67°30-74°00/73°00-84°00
INSTITUTE:	Moscow State University
NUMBER	00011
AUTHOR	Badu, IU.B.,Trofimov, V.T.
NAME:	Scheme of genetic types and ice content extent of upper part (10 m) permafrost in Yamal Peninsula
PUB:	Moscow, Moscow University Publishers, 1974
SCALE:	1:2 500 000
SOURCE:	"Problems of cryolithology", issue 4 / edited by A.I. Popov, p.126
REGION:	West Siberia, Yamal Peninsula
LEGEND	Type of freezing, ice content, age of permafrost, boundaries of various age permafrost, Paleozoic bedrock
LAT/LONG:	68°00-74°00/66°00-74°00

INSTITUTE: Moscow State University
NUMBER 00012

AUTHOR Badu, IU.B.,Kudryashov V.G., Lurie I.S., Trofimov, V.T., Firsov N.G.
NAME: Scheme of permafrost average annual temperature in Yamal peninsula
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:2 500 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberian platform", p.67
REGION: West Siberia
LEGEND Prevailing temperature
LAT/LONG: 73°00-67°00/66°00-74°00
INSTITUTE: Moscow State University
NUMBER 00013

AUTHOR Badu, IU.B., Gruzdov, A.V., Gusev, A.B.
NAME: Scheme of territories having different forecast erosional ground resistance
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:5 000 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities)/ edited by V.T. Trofimov, p.. 230-231
REGION: West Siberia
LEGEND Forecast resistance types depending on macro ice content and wedge ice in the different lithological composition places
LAT/LONG: 56°00-72°00/60°00-85°00
INSTITUTE: Moscow State University
NUMBER 00014

AUTHOR Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I., Trofimov, V.T.
NAME: Sketch map of massive ice extent in the Northern part of West-Siberian platform
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:10 000 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.131
REGION: West-North Siberia
LEGEND Injected-segregated, injected, buried ice in different genesis and age sediments
LAT/LONG: 65°00-85°00/68°00-72°00
INSTITUTE: Moscow State University
NUMBER 00015

AUTHOR Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I.
NAME: Types of seasonal freezing referring to lithological composition and soil moisture content
PUB: Moscow, Moscow University Publishers, 1986
SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities)/ edited by V.T. Trofimov, P.. 76
REGION: West Siberia
LEGEND Main seasonal freezing and thawing types and their expansion boundaries
LAT/LONG: 50°00-72°00/60°00-95°00
INSTITUTE: Moscow State University
NUMBER 00016

AUTHOR Badu, IU.B., Vasilchuk, IU.K., Kashperiuk, P.I.
NAME: Types of seasonal freezing and thawing referring to ground average annual temperature and temperature amplitudes on surface ground massif
PUB: Moscow, Moscow University Publishers, 1986

SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.75
REGION: West Siberia
LEGEND Types of seasonal freezing, boundaries of seasonal freezing and thawing types
LAT/LONG: 50°00-72°00/60°00-95°00
INSTITUTE: Moscow State University
NUMBER 00017

AUTHOR Badu, IU.D., Trofimov, V.T.
NAME: Map of genetic types and ice content in upper permafrost (10 m) of section of West-Siberia platform
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:7 500 000
SOURCE: Trofimov, V.T., Badu, IU.B., Dubikov G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.60-61
REGION: West Siberia
LEGEND Genetic types, ice content
LAT/LONG: 64°00-74°00/65°00-85°00
INSTITUTE: Moscow State University
NUMBER 00018

AUTHOR Baranov, I.J.
NAME: Geocryology map of the USSR
PUB: Moscow, GUGK, 1977
SCALE: 1:5 000 000
REGION: USSR
LEGEND Genetic type of permafrost, expansion, thickness, temperature, depth of seasonal freezing and thawing, frozen ground features and hillocky terrain conditions
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR, Glavpromstroyproect, Permafrost Institute, Academy of Science USSR
NUMBER 00019

AUTHOR Baranov, I.J.
NAME: Map of permafrost regions of the Earth
PUB: Moscow, Moscow University Publishers, 1978
SCALE: 1:50 000 000
SOURCE: General permafrost (geocryology)/ edited by V.A. Kudriavtsev, p.16-17
REGION: The Globe
LEGEND Permafrost regions and glacial caps, regular and irregular repetition freezing of soil zones
INSTITUTE: Obruchev Permafrost Institute
NUMBER 00020

AUTHOR Baranov, L.J.
NAME: Geocryological map of USSR
PUB: Moscow, 1956
SCALE: 1:10 000 000
REGION: USSR
LEGEND Expansion, temperature, thickness, cryogenic processes and relief
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: Obruchev Permafrost Institute
NUMBER 00021

AUTHOR Baranova, IU.P.
NAME: General view and interpretation"lunar landscape"

PUB: Magadan, Knizh. izd-vo, 1972
SCALE: Large
SOURCE: Tomirdiaro, S.V. "Perennial frost and industrialization of mountain countries and lowlands, the Magadan area and Yakutia", p.61
REGION: North-East
LEGEND Alas depressions, thermodenudational terraces, baydzherakhs, thermokarst depression, places of original surface
LAT/LONG: 63°00-69°00/158°00-170°00
NUMBER 00022

AUTHOR Baulin, V.V.
NAME: Average annual temperature of the ground for districts with different conditions (3 maps)
PUB: Moscow, Nedra, 1985
SCALE: 1:30 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.24-25
REGION: West Siberia
LEGEND Average annual temperature of ground in the places with the maximum and minimun snow cover, various lithological composition and thickness of the seasonal thaw layer
LAT/LONG: 55°00-74°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00023

AUTHOR Baulin, V.V.
NAME: General geocryological areas of the Siberian platform
PUB: Moscow, Nedra, 1985
SCALE: 1:40 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.92
REGION: North-East
LEGEND Geocryological areas, zones, boundaries of zones, subzones and areas
LAT/LONG: 53°00-75°00/90°00-130°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00024

AUTHOR Baulin, V.V., Chekhovskii A.L., Gruzdov, A.V.
NAME: Map of permafrost thickness in west Siberian plain
PUB: Moscow, Stroiizdat, 1976
SCALE: 1:5 000 000
SOURCE: Inset-map in monograph "Transactions of Industrial and Research Institute for Engineering Investigations of Construction", issue 49
REGION: West Siberia
LEGEND Bedding near surface permafrost thickness, the depth of relict permafrost table, southern limit of relict permafrost, places of intensive contemporary freezing of ground, places of deeply bedding permafrost table
LAT/LONG: 60°00-71°00/60°00-87°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00025

AUTHOR Baulin, V.V., Danilova, N.S., Kondratieva, K.A.
NAME: Map of permafrost expansion in Holocene climatic optimum
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.90
REGION: USSR
LEGEND Permafrost expansion
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR, Moscow State University

NUMBER 00026

AUTHOR Baulin, V.V., Chekhovskii, A.L.
NAME: Map of permafrost thickness in West Siberia plain
PUB: Novosibirsk, Nauka, 1990
SCALE: 1:3 000 000
SOURCE: Inset-map in monograph "Geocryologcal investigations history in West Siberia"/ edited by Nekrasov
REGION: West Siberia
LEGEND Thickness, depth of relict permafrost table, isolines of depth of permafrost base, areas of intense contemporary freezing, areas of deep permafrost table
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: PNIIIS, Gostroi USSR
NUMBER 00027

AUTHOR Baulin, V.V.
NAME: Map of taliks under lakes with different depth
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.49
REGION: West Siberia
LEGEND Southern limit of lake taliks (with snow cover and without snow cover, different depth of lakes)
LAT/LONG: 62°00-74°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00028

AUTHOR Baulin, V.V.
NAME: Permafrost base in Urengoi gas field
PUB: Moscow, Nedra, 1985
SCALE: Large
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.121
REGION: West Siberia
LEGEND Isolines (m) of permafrost base
LAT/LONG: 66°30/77°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00029

AUTHOR Baulin, V.V., Danilova, N.S., Sukhodolskaia, L.A.
NAME: Permafrost map of the Holocene climatic optimum
PUB: Moscow, Nauka, 1981
SCALE: 1:40 000 000
SOURCE: "History of permafrost development in Eurasia", p.28. In the article by Baulin, V.V., Danilova, N.S., Sukhodolskaia, L.A. p.24-40
REGION: USSR
LEGEND Zone of deep layer permafrost; seasonal frost thickness,m; thermokarst, permafrost spread, average annual temperature geoisotherms
LAT/LONG: 30°00-180°00/48°00-80°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00030

AUTHOR Baulin, V.V., Danilova, N.S., Sukhodolskaia, L.A.
NAME: Permafrost map of Late Pleistocene
PUB: Moscow, Nauka, 1981
SCALE: 1:40 000 000
SOURCE: "History of permafrost development in Eurasia", p.26. In the article by Baulin, V.V.,

Danilova, N.S., Sukhodolskaia, L.A. p.24-40
REGION: USSR
LEGEND Permafrost spread, depth of permafrost base, average annual temperature geoisotherms, southern limit of permafrost, frost cracking, cryogenic weathering, frost heaving
LAT/LONG: 30°00-180°00/48°00-80°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00031

AUTHOR Baulin, V.V.
NAME: Permafrost zoning map of West Siberian plain (upper part of permafrost)
PUB: , GUGK, Moscow, 1985
SCALE: 1:1 500 000
REGION: West Siberia
LEGEND Expansion, temperature, ice content, ground, peat, geomorphological levels
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Gosstroi USSR, Geological Ministry, Moscow State University
NUMBER 00032

AUTHOR Baulin, V.V., Chekhovskii, A.L.
NAME: Permafrost zoning of West Siberian plain referring to thickness of permafrost and cryogenic structure
PUB: Moscow, Gosstroi of the USSR, 1985
SCALE: 1:2 500 000
REGION: West Siberia
LEGEND Geomorphology, thickness, structure and condition of permafrost, depth of relict permafrost table
LAT/LONG: 50°00-70°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00033

AUTHOR Baulin, V.V.
NAME: Regionalization scheme of West Siberian plain (for the permafrost thickness map)
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.66
REGION: West Siberia
LEGEND Permafrost regionalization, boundaries: permafrost zones, provinces and areas
LAT/LONG: 55°00-74°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00034

AUTHOR Baulin, V.V.
NAME: Scheme of contemporary thermokarst extent in West Siberia platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.210
REGION: West Siberia
LEGEND Dynamic thermokarst zones, thermokarst on peatlands, boundaries of thermokarst on polygonal wedge ice, segregated and sheet ice
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00035

AUTHOR Baulin, V.V.
NAME: Scheme of long standing ground heave phenomena extent range in West Siberian

	platform
PUB:	Moscow, Moscow University Publishers, 1977
SCALE:	1:10 000 000
SOURCE:	Trofimov, V.T. "Regularities of spatial variability for engineering- geological conditions in West Siberian platform", p.206
REGION:	West Siberia
LEGEND	Hillocky peatlands expansion range zones, areas of hydrolaccoliths and frost mounds
LAT/LONG:	62°00-72°00/60°00-90°00
INSTITUTE:	PNIIIS, Gosstroi USSR
NUMBER	00036

AUTHOR	Baulin, V.V.
NAME:	Scheme of permafrost extent in Holocene Climatic Optimum . The third formation stage
PUB:	Moscow, Nedra, 1985
SCALE:	1:25 000 000
SOURCE:	Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.147
REGION:	West Siberia
LEGEND	Zones of continuous, discontinuous and deep seated permafrost, the depth of relict permafrost base and table, isotherms of average annual temperature, southern limit of permafrost
LAT/LONG:	55°00-75°00/50°00-90°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00037

AUTHOR	Baulin, V.V.
NAME:	Scheme of permafrost extent in Demyanskoe Glacial epoch (Eopleistocene)
PUB:	Moscow, Nedra, 1985
SCALE:	1:25 000 000
SOURCE:	Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.133
REGION:	West Siberia
LEGEND	Subareal, subsea permafrost, permafrost under retaining basins, ice caps, southern limit of permafrost
LAT/LONG:	55°00-75°00/50°00-90°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00038

AUTHOR	Baulin, V.V., Bykov, I. IU., Sadchikov, P.B.
NAME:	Scheme of permafrost expansion in the north-east of European part of the USSR
PUB:	Moscow, Stroiizdat, 1984
SCALE:	1:20 000 000
SOURCE:	Geocryological conditions and their change forecast in the primary development regions of the North, p.187
REGION:	North European part of the USSR and West Siberia
LEGEND	Permafrost expansion, vertical structure, southern limit of relict permafrost
LAT/LONG:	60°00-70°00/50°00-80°00
INSTITUTE:	PNIIIS, Gosstroi USSR
NUMBER	00039

AUTHOR	Baulin, V.V., Danilova, N.S., Pavlova, O.P.
NAME:	Scheme of permafrost extent for Medvezhie gas field region
PUB:	Moscow, Stroiizdat, 1984
SCALE:	Large
SOURCE:	Geocryological conditions and their change forecast in primary development regions of the North, p.4
REGION:	West Siberia
LEGEND	Expansion, depth of permafrost base, depth of taliks

LAT/LONG: 65°00-68°00/72°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00040

AUTHOR Baulin, V.V.
NAME: Scheme of permafrost extent in Sartan Glaciation epoch (the second half of Neopleistocene). The second formation stage
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.146
REGION: West Siberia
LEGEND Off shore permafrost, permafrost under ice caps, permafrost in areas of Kazan sea, average annual ground temperature
LAT/LONG: 55°00-75°00/50°00-90°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00041

AUTHOR Baulin, V.V.
NAME: Scheme of permafrost extent in Yamal transgressive epoch (the second part of Mesopleistocene). The first formation stage
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.143
REGION: West Siberia
LEGEND Subsea permafrost, permafrost in regions with change glacial and sea conditions, permafrost under ice caps and subaeral, southern limit of permafrost (54-55° of n.l.)
LAT/LONG: 55°00-75°00/50°00-90°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00042

AUTHOR Baulin, V.V.
NAME: Scheme of permafrost extent in Tobolskoe Interglacial epoch (the first part of Mesopleistocene)
PUB: Moscow, Nedra, 1985
SCALE: 1:25 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.142
REGION: West Siberia
LEGEND Subareal permafrost, places of subsea degradation permafrost, zone of subareal degradation permafrost, zone of permafrost, unfrozen ground
LAT/LONG: 55°00-75°00/50°00-90°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00043

AUTHOR Baulin, V.V., Trofimov, V.T.
NAME: Scheme of seasonal frozen ground and permafrost spreading
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering- geological conditions in West Siberian platform", p.64
REGION: West Siberia
LEGEND Seasonal frozen ground and permafrost expansion zones
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: Moscow State University, PNIIIS, Gosstroi USSR
NUMBER 00044

AUTHOR Baulin, V.V.

NAME: Sketch-map of permafrost spreading, thickness and structure in West Siberian plain
PUB: Moscow, Nedra, 1985
SCALE: 1:15 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.69
REGION: West Siberia
LEGEND Permafrost spreading, thickness, genetic complexes and lithological composition
LAT/LONG: 60°00-73°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00045

AUTHOR Baulin, V.V.
NAME: Sketch-map of ice content in West-Siberia plain
PUB: Moscow, Nedra, 1985
SCALE: 1:15 000 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.41
REGION: West Siberia
LEGEND Ice content (3 ranges), boundaries: southern limit of before Holocene and Holocene syngenetical permafrost, epigenetic wedge ice, permafrost spreading, sheet ice
LAT/LONG: 55°00-72°00/60°00-80°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00046

AUTHOR Baulin, V.V.
NAME: Sketch-map of relict permafrost
PUB: Moscow, Nedra, 1985
SCALE: 1:3 500 000
SOURCE: Baulin, V.V. "Permafrost in the oil-gas containing regions of the USSR", p.73
REGION: West Siberia
LEGEND Large blocks of relict permafrost, small islands of relict permafrost, geomorphological levels
LAT/LONG: 58°00-63°00/69°00-78°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00047

AUTHOR Baulin, V.V., Efimova I.V., Timofeev V.G.
NAME: Sketch-map of relict permafrost
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:2 000 000
SOURCE: Permafrost Studies, XII, p.144
REGION: West Siberia
LEGEND Relict permafrost in large massifs and islands, geomorphological level
LAT/LONG: 59°00-63°00/69°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00048

AUTHOR Baulin, V.V., Belopukhova, E.B., Dubikov, G.I.
NAME: West Siberian Geocryological Map
PUB: Moscow, Academy of Science Publisher, 1968
SCALE: 1:5 000 000
SOURCE: Inset-map in paper by Baulin, V.V., Belopukhova, E.B., Dubikov, G.I. "Permafrost geographical features in West Siberia". Proceedings of Academy of Science USSR, Geography, p.64-70
REGION: West Siberia
LEGEND Type of freezing, spreading, temperature, active layer depth, ice wedges and massive ice, recent and fossil thermokarst, perennial frost-heave mounds, southern permafrost limit
LAT/LONG: 60°00-74°00/64°00-87°00

INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00049

AUTHOR Baulin, V.V.
NAME: West Siberian regionalization scheme for expansion and average annual temperature permafrost study
PUB: Moscow, Nedra, 1985
SCALE: 1:30 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.22
REGION: West Siberia
LEGEND Southern limit of permafrost, potential expansion permafrost zones
LAT/LONG: 55°00-75°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00050

AUTHOR Belopukhova, E.B., Tikhomirova, N.A., Sukhov A.G.
NAME: Permafrost expansion in Yagenetta river head (Nadym-Pur interfluve)
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development regions of the North, p.167
REGION: West Siberia
LEGEND Expansion, geomorphological levels
LAT/LONG: 64°00-68°00/72°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00051

AUTHOR Belopukhova, E.B., Tikhomirova, N.A., Sukhov, A.G.
NAME: Permafrost extent in Yamsovey down-stream (left shore Pur valley)
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development regions of the North, p.166
REGION: West Siberia
LEGEND Expansion, geomorphological levels
LAT/LONG: 64°00-68°00/72°00-78°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00052

AUTHOR Belopukhova, E.B.
NAME: Permafrost extent map of central part of West Siberia
PUB: Moscow, TSINIS, 1972
SCALE: 1:5 000 000
SOURCE: "Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol. XVIII), p.95
REGION: West Siberia
LEGEND Permafrost spreading
LAT/LONG: 60°00-68°00/60°00-87°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00053

AUTHOR Belopukhova, E.B.
NAME: Scheme of permafrost temperature zoning of Yamburg tectonic structure
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in primary development of the North,

p.87
REGION: West Siberia
LEGEND 4 types of places with different ground temperature ranges
LAT/LONG: 68°00-69°00/74°00-77°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00054

AUTHOR Belopukhova, E.B.
NAME: Scheme of polygonal ground extent range in West Siberian platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability of engineering and geological conditions of the West Siberian platform
REGION: West Siberia
LEGEND Polygonal ground growth and dormant stages of hillocky terrain on poor and well drained places, young hillocky terrain relief
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00055

AUTHOR Belopukhova, E.B.
NAME: Sketch-map of polygonal relief
PUB: Yakutsk, Yakutskoe knizh. izd., 1966
SCALE: 1:20 000 000
SOURCE: "Scientific report of VIII All-Union Conference on geocryology", no.6. Geomorphological section, p.124. In the report by Belopukhova, E.B. p.117-125
REGION: West Siberia
LEGEND Area polygonal relief in stage of growth and dormant, hillocky terrain on bad and good drained places, on peatland and on soil, southern limit of continuous permafrost at present time
LAT/LONG: 60°00-73°00/63°00-87°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00056

AUTHOR Belopukhova, E.B., Dubikov, G.I.
NAME: West Siberia regionalization sketch-map referring to permafrost ice content
PUB: Moscow, TSINIS, 1972
SCALE: 1:10 000 000
SOURCE: "Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol.XVIII), p.33
REGION: West Siberia
LEGEND Boundaries of zones, subzones, districts
LAT/LONG: 60°00-74°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00057

AUTHOR Bobov, N.G., Novoselskaiia, N.B.
NAME: Kamchatka geocryological scheme
PUB: Novosibirsk, Nauka, 1975
SCALE: 1:10 000 000
SOURCE: "Regional and special geocryological investigations", p.37
REGION: Kamchatka
LEGEND Expansion (real and estimated), temperature, thermokarst lakes and depressions, frost mounds
LAT/LONG: 53°00-61°00/155°00-165°00
NUMBER 00058

AUTHOR Bobov, N.G., Molodykh, I.I.
NAME: Zoning of European part of the USSR referring to cryogenic processes and expansion
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.252
REGION: European part of the USSR
LEGEND Contemporary and late Valdai epoch permafrost expansion, processes
LAT/LONG: 40°00-70°00/20°00-70°00
INSTITUTE: VSEGINGEO
NUMBER 00059

AUTHOR Boyarskii, O.G., Mitt, K.L.
NAME: Regionalization sketch-map of Anabaro-Olenek North referring to thermokarst topography development
PUB: Moscow, Moscow University Publishers, 1964
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, IV, p.152
REGION: North-East of the USSR
LEGEND Thermokarst development regions in different age and genesis deposits, polygonal ground expansion, classes, remanent lakes
LAT/LONG: 71°00-73°00/120°00-124°00
NUMBER 00060

AUTHOR Boyarskii, O.G., Maksimova L.N., Romanovskii N.N
NAME: Scheme of Patomski upland permafrost temperature
PUB: Moscow, Moscow University Publishers, 1968
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, VIII, p.207
REGION: Baikal
LEGEND Number of area and region (the table lists the permafrost expansion, ground temperature, snow cover thickness, ground content and age, geomorphological levels)
LAT/LONG: 57°00-60°00/112°00-119°00
INSTITUTE: Moscow State University
NUMBER 00061

AUTHOR Boyarskii, O.G., Mitt, K.L.
NAME: Sketch-map of mounds of different genesis extent in Anabaro-Olenekskoi lowland
PUB: Moscow, Nauka, 1974
SCALE: 1:2 500 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p. 46
REGION: Central Siberia
LEGEND Pingos, thermokarst topography, remanents of original rocks
LAT/LONG: 70°00-76°00/114°00-120°00
NUMBER 00062

AUTHOR Bubnov, V.M., Pokrovskii, N.S.
NAME: Permafrost thickness and tectonic structure in the Nizh. Tunguska drainage basin
PUB: Moscow, Nedra, 1985
SCALE: 1:9 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.122
REGION: Central Siberia
LEGEND Permafrost thickness, zone of geotermal anomaly near deep-seated domes of tectonic structures
LAT/LONG: 64°00-77°00/95°00-110°00
NUMBER 00063

AUTHOR	Buldovich, S.N., Melentiev, V.S., Naumov, M.S.
NAME:	Scheme of permafrost-hydrogeological conditions and fractured tectonics in Neryungi place
PUB:	Moscow, Moscow University Publishers, 1976
SCALE:	Large
SOURCE:	Permafrost Studies, XV, p.122
REGION:	Central Siberia
LEGEND	Permafrost expansion, wells with underground water level, alluvial deposits
LAT/LONG:	57°00-00°00/125°00- 00°00
INSTITUTE:	Moscow State University
NUMBER	00064

AUTHOR	Chekhovskii, A.L., Shamanova I.I.
NAME:	Map of lake depths (lakes, below which are possible taliks)
PUB:	Moscow, Stroiizdat, 1974
SCALE:	1:10 000 000
SOURCE:	"Transactions of Industrial and Research Institute for Engineering Investigations of Construction", no.49, p.74
REGION:	West Siberia
LEGEND	Depths of lake (7 ranges)
LAT/LONG:	60°00-74°00/60°00-90°00
INSTITUTE:	PNIIIS, Gosstroi, U.S.S.R.
NUMBER	00065

AUTHOR	Chekhovskii, A.L.
NAME:	Regionalization scheme of Kara Sea referring to benthic water layer temperature
PUB:	Moscow, TSINIS, 1972
SCALE:	1:12 000 000
SOURCE:	"Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol. XVIII), p.105
REGION:	Kara Sea
LEGEND	Benthic water layer average annual temperature (5 ranges), oceanic, suboceanic and subcontinental areas
LAT/LONG:	70°00-90°00/54°00-114°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00066

AUTHOR	Cherniadev, B.P.
NAME:	The changes of the position of southern limit of permafrost in West Siberia under disturbed natural conditions
PUB:	Moscow, TSINIS, 1971
SCALE:	1:15 000 000
SOURCE:	"Geocryological and hygrogeological research for engineering investigations", Transactions of PNIIIS, vol. 8, p.192
REGION:	West Siberia
LEGEND	Southern limit: possible neogenesis of permafrost under cooling to maximum temperature; thawing potential of permafrost by moving of moss-lichen cover
LAT/LONG:	52°00-72°00/60°00-90°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00067

AUTHOR	Cherniadev, V.P.
NAME:	Map-scheme of upper limiting conditions and natural zones of West Siberia
PUB:	Moscow, Stroiizdat, 1987
SCALE:	1:10 000 000
SOURCE:	"Recommendations to estimate change of permafrost conditions in industrialization

territories of West Siberia/ PNIIIS, Gosstroi USSR", p.9
REGION: West Siberia
LEGEND Summary of mean monthly air temperature in warm and cold periods, summary mean monthly temperature of exposed soil surface, average snow cover, duration of summer period, natural zones
LAT/LONG: 60°00-72°00/60°00-85°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00068

AUTHOR Cherniadev, V.P.
NAME: Sketch-map of limiting conditions of perennial freezing
PUB: Moscow, TSINIS, 1971
SCALE: 1:20 000 000
SOURCE: "Geocryological and hydrogeological research for engineering investigations", Transactions of PNIIIS, vol. 8, p.191
REGION: West Siberia
LEGEND Summary of degree months in maximum cold period, summary of degree months in minimum and maximum warming-up periods
LAT/LONG: 52°00-72°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00069

AUTHOR Chizhova, N.I.
NAME: Map of Aldan-Timpton interfluve relative formation of an icing(%)
PUB: Moscow, Nedra, 1989
SCALE: 1:2 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.309
REGION: Central Siberia
LEGEND Relative formation of an icing (6 ranges), icings on the ground surface
LAT/LONG: 55°00-60°00/122°00-130°00
INSTITUTE: Moscow State University
NUMBER 00070

AUTHOR Chizhova, N.I.
NAME: Map of icings of Aldano-Timptonski interfluve
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:2 500 000
SOURCE: Ospennikov, E.N., Trush, N.I., Chizhov, A.B., Chizhova, N.I. Exogenetic geological processes and phenomena (South Yakutia), p.188
REGION: South Yakutia
LEGEND Icing coefficient, icing on the ground surface
LAT/LONG: 57°00-69°00/123°00-128°00
INSTITUTE: Moscow State University
NUMBER 00071

AUTHOR Churinov, M.V., Tsipina, I.M., Lazareva, V.P.
NAME: Stratigraphic and genetic complexes and engineering- geological groups of sedimentary rocks
PUB: Moscow, GUGK, 1983
SCALE: 1:7 500 000
SOURCE: Atlas of hydrogeological and engineering-geological maps of the USSR
REGION: USSR
LEGEND Expansion frozen and unfrozen Quaternary ground
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: VSEGINGEO
NUMBER 00072

AUTHOR	Danilova, N.S., Kondratieva, K.A.
NAME:	Central Siberia permafrost regionalization referring to cryogenic processes and frozen ground features development
PUB:	Moscow, Nedra, 1989
SCALE:	1:20 000 000
SOURCE:	Geocryology of the USSR. Central Siberia/ edited by E.D. Ershov, p.125
REGION:	Central Siberia
LEGEND	Latitudinal thermal zones, thermal and regional subzones, regions of prevalent Quaternary deposits
LAT/LONG:	50°00-75°00/80°00-135°00
INSTITUTE:	Moscow State University
NUMBER	00073

AUTHOR	Danilova, N.S.
NAME:	Sketch-map of the structure of perennial frozen ground in Central Siberia
PUB:	Moscow, TSINIS, 1972
SCALE:	1:10 000 000
SOURCE:	"Geocryological research for engineering investigations for construction" (Transactions of PNIIIS vol. XVIII), p.166
REGION:	Central Siberia
LEGEND	Types of freezing, permafrost thickness, ice content and cryogenic structure, genesis and composition of deposits, time of freezing, wedge ice (old and contemporary), cave and sheet ice
LAT/LONG:	52°00-80°00/84°00-140°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00074

AUTHOR	Danilova, N.S.
NAME:	Sketch-map of polygonal ice wedges of Central Siberia
PUB:	Moscow, Nedra, 1975
SCALE:	1:20 000 000
SOURCE:	Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.128
REGION:	Central Siberia
LEGEND	Zone of occurrence of relict and contemporary permafrost
LAT/LONG:	52°00-80°00/78°00-138°00
INSTITUTE:	PNIIIS, Gosstroi USSR
NUMBER	00075

AUTHOR	Demidiuk, L.M.
NAME:	Geocryological scheme of Charanorskoi lowland
PUB:	Moscow, Nedra, 1989
SCALE:	Large
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.118
REGION:	Transbaikal
LEGEND	Expansion, temperature, thickness, cryogenic processes and frozen ground features
LAT/LONG:	50°00-52°00/114°00-119°00
INSTITUTE:	Moscow State University
NUMBER	00076

AUTHOR	Demidiuk, L.M., Shaumian, L.V.
NAME:	Sketch-map of jointing and permafrost extent of Talnakh field
PUB:	Moscow, Moscow University Publishers, 1969
SCALE:	Large
SOURCE:	Permafrost Studies, IX, P.35

REGION: Central Siberia
LEGEND Expansion, temperature, permafrost thickness, content and age deposits, jointing zones
LAT/LONG: 69°00-00°00/88°00-89°00
NUMBER 00077

AUTHOR Dubikov, G.I.
NAME: Districts with ice wedges and ground wedges in alluvial terraces
PUB: Moscow, Academy of Sciences, 1962
SCALE: 1:5 000 000
SOURCE: "Academy of Sciences Information, Geographical Serie"s, no. 6, p.81
REGION: West Siberia
LEGEND Wedge ice and soil wedges
LAT/LONG: 65°30-69°00/68°00-74°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00078

AUTHOR Dubikov, G.I.
NAME: Geological sketch-map with massive ice outcropping
PUB: Moscow, Stroiizdat, 1983
SCALE: Large
SOURCE: Dubikov, G.I. Problems of Regional Engineering Geocryology, p.53
REGION: West Siberia, Yamal Peninsula
LEGEND Sites of massive ice outcrops; bore-holes with massive ice; deposits: genesis and age
LAT/LONG: 70°00/70°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00079

AUTHOR Dubikov, G.I., Ivanova, N.V.
NAME: Map of saline permafrost in West Siberia
PUB: Moscow, Scientific Council of the Earth Cryology, 1990
SCALE: 1:12 000 000
SOURCE: "Saline permafrost as a foundation for construction. Collected scientific articles"/ Edited by Vyalov S.S., p.6
REGION: West Siberia
LEGEND Saline ground, iono-saline content, general genetic complexes, permafrost extent with different saline content, districts with bedding table of saline Paleogene ground to 50 m depth
LAT/LONG: 65°00-73°00/60°00-90°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00080

AUTHOR Dubikov, G.I., Ivanov, N.V.
NAME: Scheme of marine saline and non-saline permafrost in West Siberia
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: "Permafrost formation and forcast of cryogenic processes forecast", p.18. In the article by Dubikov, G.I. p.14-27
REGION: West Siberia
LEGEND Boundaries: Holocene freezing in upper layer permafrost, maximum àdvance of the sea in Pleistocene (by Lazukov), saline and non-saline ground, quantity of test
LAT/LONG: 46°00-73°00/64°00-84°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00081

AUTHOR Dubikov, G.I., Ivanova, N.V.
NAME: Scheme of saline permafrost extent in the USSR

PUB:	Moscow, Scientific Coundil of the Earth Cryology, 1990
SCALE:	1:35 000 000
SOURCE:	"Saline permafrost as a foundation for constructions. Collected scientific articles"/ Edited by S.S. Vyalov, p.4
REGION:	The USSR
LEGEND	Type of saltings, saline permafrost table, saline and non-saline permafrost spreading, boundary of saline permafrost, southern limit of permafrost
LAT/LONG:	40°00-80°00/40°00-170°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00082

AUTHOR	Dubikov, G.I., Belopukhova, E.B., Stremiakov, A.IA., Sukhov, A.G.
NAME:	Sketch-map of Byngapur tectonic structure permafrost regionalization
PUB:	Moscow, Stroiizdat, 1984
SCALE:	Large
SOURCE:	Geocryological conditions and their changes forecast in the primary development of the North, p.122
REGION:	West Siberia
LEGEND	Zoning referring to permafrost expansion, lithological composition, gensis and age of deposits
LAT/LONG:	64°00-68°00/72°00-78°00
INSTITUTE:	PNIIIS, Gosstroi USSR
NUMBER	00083

AUTHOR	Dubikov, G.I., Shmelev, L.M.
NAME:	Sketch-map of southern limit of mineral and organic perennial ground between the Urals and the Ob
PUB:	Moscow, Stroiizdat, 1976
SCALE:	1:5 000 000
SOURCE:	"Transactions of Industrial and Research Institute for Engineering Investigations of Construction", issue 49, p.87
REGION:	West Siberia
LEGEND	Boundaries by Kunitsin L.F., Belopukhova, E.B., Popov, A.I., Shpolianskaia, N.A., authors
LAT/LONG:	60°00-64°00/60°00-66°00
INSTITUTE:	PNIIIS, Gosstroi, USSR
NUMBER	00084

AUTHOR	Dubikov, G.I.
NAME:	Sketch-map of lithological composition and permafrost ice content to the depth 10 m in Yamburg structural high area
PUB:	Moscow, Stroiizdat, 1984
SCALE:	Large
SOURCE:	Geocryological conditions and their change forecast in the primary development regions of the North, p.108
REGION:	West Siberia
LEGEND	Types of freezing, lithological composition, genetic and ground ice content
LAT/LONG:	68°00-69°00/74°00-77°00
INSTITUTE:	PNIIIS, Gosstroi USSR
NUMBER	00085

AUTHOR	Dunaeva, E.N., Koreisha, M.M.
NAME:	Geocryological sketch-map of the Caucasus
PUB:	Moscow, Nedra, 1989
SCALE:	1:10 000 000
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.E. Ershov, p.335

REGION: Caucasus
LEGEND Expansion, thickness, temperature, types of seasonal freezing of soils
LAT/LONG: 38°00-45°00/40°00-50°00
INSTITUTE: Moscow State University, PNIIIS Gosstroi USSR
NUMBER 00086

AUTHOR Ershov, E.D., Danilov, I.D.
NAME: Map of permafrost expansion types and large concentration of surface and ground ice
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.111
REGION: USSR
LEGEND Cryogenic ground types, injected ice, sheet ice, polyzonal wedge ice, buried ice, glaciers, permafrost expansion
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00087

AUTHOR Ershov, E.D., Dunaeva, E.N., Parmuzin, S.IU.
NAME: Sketch-map of seasonal freezing and thawing of soil types in the USSR
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.141
REGION: USSR
LEGEND Thawing of soil types referring to average annual ground temperature and temperature fluctuations amplitude on surface
LAT/LONG: 35°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00088

AUTHOR Ershov, E.D.
NAME: Sketch-map of contemporary permafrost expansion on the Earth
PUB: Moscow, Nauka, 1988
SCALE: 1:100 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.15
REGION: The Globe
LEGEND Seasonal frozen ground and permafrost expansion
INSTITUTE: Moscow State University
NUMBER 00089

AUTHOR Evseev, V.P.
NAME: Scheme of palsas and flat-topped polygonal peatlands contemporary spreading
PUB: Moscow, Moscow University Publishers, 1976
SCALE: 1:10 000 000
SOURCE: "Cryolithology problems", issue V / edited by A.I. Popov, p.108
REGION: European North and West Siberia
LEGEND Southern limit of palsas (southern limit of permafrost), northern limit of palsas, northern and southern limit of flat-topped polygonal peatlands
LAT/LONG: 55°00-72°00/30°00-90°00
INSTITUTE: Moscow State University
NUMBER 00090

AUTHOR Fedorov, A.N.
NAME: Sketch-map of physiographical districts in Leno-Amginsk interfluve northern part
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:20 000 000

SOURCE: Geographical reseach in Yakutia, p.130
REGION: Southen Yakutia
LEGEND Number of district (permafrost terrain, thickness, temperature, ice content)
LAT/LONG: 61°00-63°00/128°00-135°00
INSTITUTE: Permafrost Institute
NUMBER 00091

AUTHOR Fedorovich, D.I., Zhukov, V., Vialov, S.S.
NAME: Geocryological sketch-map
PUB: Moscow, Stroiizdat, 1980
SCALE: 1:25 000 000
SOURCE: "Textbook for engineering of bases and foundations on permafrost/Gersevanov Institute of Foundation and Underground Construction, Gosstroi, USSR, p.8-9
REGION: USSR
LEGEND Permafrost spread, thickness, temperature of the ground to the depth 10m, southern limit of permafrost
LAT/LONG: 38°00-85°00/20°00-170°00
INSTITUTE: NIIOSP
NUMBER 00092

AUTHOR Feldman, G.M.
NAME: Atlas of forecast permafrost map of North-West Siberia
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:20 000 000
SOURCE: Feldman, G.M. Methodology book of permafrost temperature dynamic forecast (e.g., north West Sibiria), p.7-40, 64 maps
REGION: West Siberia
LEGEND Isotherms of average annual frozen ground temperature on active layer base and isolines of active layer base thickness (for 63 combinations)
LAT/LONG: 60°00-74°00/60°00-84°00
INSTITUTE: Permafrost Institute
NUMBER 00093

AUTHOR Fotiev, S.M.
NAME: Map of permafrost dynamics in Pleistocene and Holocene
PUB: Moscow, Moscow University Publishers, 1978
SCALE: 1:35 000 000
SOURCE: General permafrost(geocryology)/ edited by V.A. Kudriavtsev, p.386
REGION: USSR
LEGEND Relict permafrost zone under Polar basin, partial and complete thawing of Pleistocene permafrost, Holocene frozen and thawing ground, thickness of late Holocene frozen and thawing ground
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00094

AUTHOR Fotiev, S.M.
NAME: Regionalization scheme of West Siberia referring to discontinuos and permafrost spread
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:10 000 000
SOURCE: "Questions of geocryological mapping", p.44. In the article by Fotiev, S.M. p.38-52
REGION: West Siberia
LEGEND Permafrost spread, unfrozen ground, taliks, areas of types of cryolithogenesis
LAT/LONG: 59°30-74°00/69°00-84°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00095

AUTHOR Fotiev, S.M.
NAME: Regionalization scheme of West Siberia region referring to conditions of open-water absorption for talik formation
PUB: Moscow, Nauka, 1991
SCALE: 1:12 000 000
SOURCE: "Permafrost and cryogenic processes: Collection of scientific articles "/ Edited by G.I. Dubikov, p.74
REGION: West Siberia
LEGEND Calculated boundary of the region where possibile of open water absorption taliks were formed by favourable geological-geomorphological conditions, natural zones boundary
LAT/LONG: 58°00-74°00/66°00-84°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00096

AUTHOR Fotiev, S.M.
NAME: Scheme of different types of permafrost extent in West Siberia
PUB: Moscow,TSINIS, 1972
SCALE: 1:12 000 000
SOURCE: "Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol.XVIII), p.118
REGION: West Siberia
LEGEND Permafrost stages, permafrost types and subtypes
LAT/LONG: 60°00-72°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, U.S.S.R.
NUMBER 00097

AUTHOR Fotiev, S.M.
NAME: Scheme of West Siberia regionalization referring to conditions of open talik formation
PUB: Moscow, Nauka, 1991
SCALE: 1:12 000 000
SOURCE: "Permafrost and cryogenic processes: Collection of scientific articles"/ Edited by G.I. Dubikov, p.77
REGION: West Siberia
LEGEND Condition: very unfavourable - talik area less than 5%, unfavourable- talik area 5-25%, favourable - talik area (insolation-insolation-heat, water absorption and lake taliks)--25-50% and 50-75%, very favourable - 75-100% talik area
LAT/LONG: 58°00-74°00/66°00-84°00
INSTITUTE: PNIIIS, Gosstroi, U.S.S.R.
NUMBER 00098

AUTHOR Fotiev, S.M., Danilova, N.S., Sheveleva, N.S.
NAME: Sketch geocryological map of Central Siberia
PUB: Moscow, Nauka, 1974
SCALE: 1:7 500 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.135
REGION: Central Siberia
LEGEND Thickness, expansion, ground temperature, cryogenic processes, composition and genesis Quaternary deposits
LAT/LONG: 52°00-80°00/78°00-138°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00099

AUTHOR Fotiev, S.M., Danilova, N.S., Sheveleva, N.S.
NAME: Sketch-map of Quaternary deposits with their cryogenic structure and ice content characteristics (Northern Siberian lowland)

AUTHOR Fotiev, S.M.
NAME: Regionalization scheme of West Siberia region referring to conditions of open-water absorption for talik formation
PUB: Moscow, Nauka, 1991
SCALE: 1:12 000 000
SOURCE: "Permafrost and cryogenic processes: Collection of scientific articles "/ Edited by G.I. Dubikov, p.74
REGION: West Siberia
LEGEND Calculated boundary of the region where possibile of open water absorption taliks were formed by favourable geological-geomorphological conditions, natural zones boundary
LAT/LONG: 58°00-74°00/66°00-84°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00096

AUTHOR Fotiev, S.M.
NAME: Scheme of different types of permafrost extent in West Siberia
PUB: Moscow,TSINIS, 1972
SCALE: 1:12 000 000
SOURCE: "Geocryological research for engineering investigations for construction"(Transactions of PNIIIS, vol.XVIII), p.118
REGION: West Siberia
LEGEND Permafrost stages, permafrost types and subtypes
LAT/LONG: 60°00-72°00/60°00-86°00
INSTITUTE: PNIIIS, Gosstroi, U.S.S.R.
NUMBER 00097

AUTHOR Fotiev, S.M.
NAME: Scheme of West Siberia regionalization referring to conditions of open talik formation
PUB: Moscow, Nauka, 1991
SCALE: 1:12 000 000
SOURCE: "Permafrost and cryogenic processes: Collection of scientific articles"/ Edited by G.I. Dubikov, p.77
REGION: West Siberia
LEGEND Condition: very unfavourable - talik area less than 5%, unfavourable- talik area 5-25%, favourable - talik area (insolation-insolation-heat, water absorption and lake taliks)--25-50% and 50-75%, very favourable - 75-100% talik area
LAT/LONG: 58°00-74°00/66°00-84°00
INSTITUTE: PNIIIS, Gosstroi, U.S.S.R.
NUMBER 00098

AUTHOR Fotiev, S.M., Danilova, N.S., Sheveleva, N.S.
NAME: Sketch geocryological map of Central Siberia
PUB: Moscow, Nauka, 1974
SCALE: 1:7 500 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.135
REGION: Central Siberia
LEGEND Thickness, expansion, ground temperature, cryogenic processes, composition and genesis Quaternary deposits
LAT/LONG: 52°00-80°00/78°00-138°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00099

AUTHOR Fotiev, S.M., Danilova, N.S., Sheveleva, N.S.
NAME: Sketch-map of Quaternary deposits with their cryogenic structure and ice content characteristics (Northern Siberian lowland)

PUB: Moscow, Nauka, 1974
SCALE: 1:7 500 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.43
REGION: Northern Siberian lowland
LEGEND Type of freezing, cryogenic structure, sheet ice, ice content, possible thaw settlements, age and genesis type of deposits
LAT/LONG: 67°00-82°00/80°00-130°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00100

AUTHOR Fotiev, S.M.
NAME: Sketch-map of permafrost extent in Central Siberia
PUB: Moscow, Nauka, 1975
SCALE: 1:20 000 000
SOURCE: Fotiev, S.M., Danilova, S.M., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.105
REGION: Central Siberia
LEGEND Expansion
LAT/LONG: 52°00-80°00/78°00-138°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00101

AUTHOR Fotiev, S.M.
NAME: Sketch-map of permafrost thickness and spreading
PUB: Moscow, Nedra, 1975
SCALE: 1:20 000 000
SOURCE: Fotiev, S.M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.113
REGION: Central Siberia
LEGEND Cryogenic structure (one and two stade), factual data about permafrost thickness
LAT/LONG: 52°00-80°00/78°00-138°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00102

AUTHOR Garagulia, L.S., Ershov, E.D., Kondratieva, K.A.
NAME: Engineering-geological zoning map of the USSR
PUB: Moscow, Nedra, 1988
SCALE: 1:20 000 000
SOURCE: Inset-map in monograph "Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, E.D. "
REGION: USSR
LEGEND Areas with technical changes of geocryological conditions and with activity and origin of cryogenic processes and frozen ground features, types of geocryological conditions technical changes, permafrost zones (expansion and temperature)
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00103

AUTHOR Garagulia, L.S., Trush, N.I., Bogoliubov, A.N.
NAME: Permafrost map of Eruda valley
PUB: Moscow, Nauka, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.291
REGION: Southern Siberia

LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00109

AUTHOR Gilichinski, D.A.
NAME: Sketch-map (fragment) of ground water depth and mineralization (referring to their influence on seasonal freezing and ground temperature regime)
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Gilichinski, D.A. Seasonal frozen ground in West Siberia, p.42
REGION: West Siberia
LEGEND Bedding in layer of seasonal freezing ground water, which provide inflow moisture to freezing
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00110

AUTHOR Gilichinski, D.A.
NAME: Sketch-map fragment of the phase change of the quantity of heat in seasonal frozen layer
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Inset-map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Quantity heat (13 ranges)
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00111

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of expenditure of energy on permafrost conditions influencing compensation
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Inset-map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Expenditure of energy on compensation of influence of permafrost conditions
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00112

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of annual ground heat storage layer thickness, m
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Inset-map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Annual ground heat storage layer thickness
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00113

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of types of seasonal freezing of soil referring to the average annual ground temperature
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Inset-map in monograph D.Ç. Gilichinski, "Seasonal frozen ground zone in West Siberia"

REGION: West Siberia
LEGEND Type of seasonal freezing of soils
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00114

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of snow cover influence on ground temperature
PUB: Moscow, Nauka, 1989
SCALE: 1:7 500 000
SOURCE: Inset map in monograph "Seasonal frozen ground in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Heat/snow cover influence
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00115

AUTHOR Gilichinski, D.A.
NAME: Sketch-map of the depths of potential seasonal thawing
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Insert-map in monograph "Seasonal frozen ground zone in West Siberia" by Gilichinski, D.A.
REGION: West Siberia
LEGEND Seasonal thawing (11 ranges)
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00116

AUTHOR Gilichinski, D.A.
NAME: Zoning referring to the development of frost heaving (fragment)
PUB: Moscow, Nauka, 1986
SCALE: 1:7 500 000
SOURCE: Gilichinski, D.A. Seasonal frozen ground in West Siberia, p.68
REGION: West Siberia
LEGEND Regions with the intensive and weak development of heave processes or absence of them, areas with few frost mounds
LAT/LONG: 50°00-61°00/62°00-94°00
INSTITUTE: Institute of Soil Science and Photosynthesis
NUMBER 00117

AUTHOR Glushkova, O.IU., Degtiarenko, IU.P., Prokhorova, T.P.
NAME: Aerophotogeomorphological map of eastern Verkhne-Khatyrskoi depression surrounding
PUB: Magadan, SVKNII DVO, 1987
SCALE: 1:1 000 000
SOURCE: "Quaternary period in North-East Asia", p.38. In the article by Glushkova, O.IU., Gegtyarenko IU.P., Prokhorov, T.P. p.33-55.
REGION: Kamchatka
LEGEND Gentle slopes of solifluction removal and accumulation; relief, working by cryogenic processes
LAT/LONG: 61°00-64°00/172°00-178°00
NUMBER 00118

AUTHOR Gogichishvili, V.V.
NAME: Sketch-map of cryological landscape indicator near settlement Azei (Irkutsk area)
PUB: Novosibirsk, Nauka, 1983

SCALE: Large
SOURCE: Leshchikov, F.N., Shats, M.M. South Central Siberia permafrost, p.136-137
REGION: Central Siberia
LEGEND Expansion permafrost ground and short-term permafrost, relief, vegetation associations
LAT/LONG: 56°00-58°00/102°00-104°00
INSTITUTE: Permafrost Institute
NUMBER 00119

AUTHOR Gorbunov, A.P.
NAME: Geocryological map of Dzhungarsk Alatau
PUB: Moscow, Nauka, 1989
SCALE: 1:1 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern of USSR / edited by E.E. Ershov, p.301
REGION: Southern Siberia (Kazakhstan)
LEGEND Expansion, temperature, thickness, types of seasonal freezing of soils
LAT/LONG: 40°00-47°00/75°00-83°00
NUMBER 00120

AUTHOR Gorbunov, A.P.
NAME: Geocryological map of Saur-Tarbagai
PUB: Moscow, Nauka, 1989
SCALE: 1:1 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.297
REGION: Southern Siberia (Kazakhstan)
LEGEND Expansion, temperature, thickness, types of seasonal freezing of soils
LAT/LONG: 47°00/83°00-85°00
NUMBER 00121

AUTHOR Gorbunov, A.P.
NAME: Permafrost under Fedchenko Glacier
PUB: Moscow, Nauka, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.E. Ershov, p.327
REGION: South-East Central Asia (Pamirs)
LAT/LONG: 37°00-40°00/66°00-75°00
NUMBER 00122

AUTHOR Gorbunov, A.P.
NAME: Sketch-map of altitudinal geocryological zonality
PUB: Moscow, Nauka, 1976
SCALE: 1:200 000 000
SOURCE: "Questions of global cryology", p.44
REGION: Global
LEGEND Types of altitudinal zonality (8 ranges), tops with permafrost, absolute height of boundaries, permafrost belts, southern limit of permafrost in lowlands
INSTITUTE: Permafrost Insitute
NUMBER 00123

AUTHOR Gorbunov, A.P.
NAME: Spreading, thickness and average annual temperature of permafrost in Pamiro-Altai
PUB: Moscow, Nauka, 1989
SCALE: 1:4 000 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by

E.E.Ershov, p.308
REGION: South-East Central Asia, Tien Shan
LEGEND Expansion, temperature, thickness
LAT/LONG: 40°00-43°00/69°00-80°00
NUMBER 00124

AUTHOR Gorbunov, A.P.
NAME: Spreading, thickness and avereage annual temperature of permafrost in Pamiro-Alai
PUB: Moscow, Nauka, 1989
SCALE: 1:2 500 000
SOURCE: Geocryology of the USSR, Mountain countries of the southern USSR / eduted by E.E. Ershov, p.325
REGION: South-East Central Asia (Pamirs)
LEGEND Expansion, temperature, thickness
LAT/LONG: 37°00-40°00/66°00-75°00
NUMBER 00125

AUTHOR Gotovtsev, S.P.
NAME: Sketch-map of cryogenic processes zoning in Charo-Tokinsky interfluve
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: Large
SOURCE: Geographical research in Yakutia, p.91
REGION: Southern Yakutiia
LEGEND Area of cryogenic processes expansion and topography formation
LAT/LONG: 58°00-60°00/118°00-120°00
INSTITUTE: Permafrost Institute
NUMBER 00126

AUTHOR Gravis, G.F., Drozdov, D.S., Stashenko, A.I.
NAME: Fragment of engineering-geological map
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: Large
SOURCE: "Questions of geocryological mapping", p.89. In the article by Gravis, G.F., Drozdov, D.S., Stashenko, A.I. p.85-96.
REGION: Central Yakutia
LEGEND Thermokarst, rock stream
LAT/LONG: 61°30/127°00
INSTITUTE: VSEGINGEO
NUMBER 00127

AUTHOR Grigorev, N.F.
NAME: Climatic regionalization of cryolithozone
PUB: Moscow, Nauka, 1981
SCALE: 1:50 000 000
SOURCE: Gasanov, Sh.Sh. "Cryolithological analysis", p.23
REGION: The USSR
LEGEND Permafrost boundary
LAT/LONG: 50°00-80°00/30°00-70°00
NUMBER 00128

AUTHOR Gruzdov, A.V., Badu, IU.B., Lobov, A.P.
NAME: Map of permafrost average annual temperature distribution
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:7 500 000
SOURCE: Trofimov, V.T., Badu IU.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.34-35

REGION: West Siberia
LEGEND Prevailing temperatures in 8 ranges, places of untouched permafrost
LAT/LONG: 64°00-74°00/65°00-85°00
INSTITUTE: Moscow State University
NUMBER 00129

AUTHOR Gruzdov, A.V., Badu, IU.B., Varenyshev, V.B. et.al.
NAME: Map of permafrost thickness in West Siberia platform
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:7 500 000
SOURCE: Trofimov, V.T., Badu, IU.B., Dubikov, G.I. Cryogenic structure and ice content of permafrost in West-Siberian platform, p.46-47
REGION: West Siberia
LEGEND Prevailing permafrost thickness (5 ranges)and their expansion, boundary of territory where wideextent cooling grounds are found or assumed, untouched permafrost places
LAT/LONG: 64°00-74°00/65°00-85°00
INSTITUTE: Moscow State University
NUMBER 00130

AUTHOR Gruzdov, A.V., Badu, IU.B., Varenyshev, V.B., Trofimov, V.T., Firsov, N.G.
NAME: Map of permafrost thickness in West Siberia platform
PUB: Novosibirsk, Nauka, 1990
SCALE: 1:3 000 000
SOURCE: Inset-map in monograph "Geocryological investigation history in West Siberia "/ edited by Nekrasov
REGION: West Siberia
LEGEND Thickness, areas of discontinuous permafrost, boundaries of areas with cooling ground with cryopegs
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: Moscow State University
NUMBER

AUTHOR Gruzdov, A.V., Trofimov, V.T., Filkin, N.A.
NAME: Scheme of distribution of permafrost thickness in Nadym, Taz, Pur river-systems and Tazovski peninsula
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:5 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberian platform", p.77
REGION: West Siberia
LEGEND Expansion, thickness
LAT/LONG: 64°00-69°00/68°00-88°00
INSTITUTE: Moscow State University
NUMBER 00132

AUTHOR Gruzdov, A.V.
NAME: Scheme of permafrost extent at the Kola Peninsula
PUB: Moscow, Nauka, 1988
SCALE: 1: 7 500 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.272
REGION: Kola Peninsula
LEGEND Southern limit of permafrost
LAT/LONG: 66°00-70°00/32°00-42°00
INSTITUTE: Moscow State University
NUMBER 00133

AUTHOR Ivanova, T.F., Lynov, V.A., Menshikov, L.A. et.al.
NAME: Scheme of Vozei tectonic structure disposition
PUB: Moscow, Stroiizdat, 1984
SCALE: 1:10 000 000
SOURCE: Geocryological conditions and their change forecast in primary development regions in the North, p.135
REGION: European North of the USSR
LEGEND Expansion
LAT/LONG: 64°00-70°00/55°00-65°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00134

AUTHOR Kachiurin, S.P.
NAME: Map of thermokarst extent in the USSR
PUB: Moscow, Academy of Sciences Publishers, 1961
SCALE: 1:15 000 000
SOURCE: Inset-map in monograph by Kachiurin, S.P. "Thermokarst in the USSR"
REGION: USSR
LEGEND Thermokarst on : wedge and segregation ice (contemporary and relict), hillocky terrain (contemporary and relict), thermokarst terraces, thermoabrasion, palsas, frost mounds
LAT/LONG: 38°00-82°00/20°00-170°00
INSTITUTE: Permafrost Institute
NUMBER 00135

AUTHOR Kaplin, T.N., Leibman, N.O.
NAME: Sketch - map of ice content in permafrost
PUB: Moscow, Stroyizdat, 1990
SCALE: 1:20 000 000
SOURCE: Climate for construction, reference book SNIP, p.51
REGION: USSR
LEGEND Lithological types of ground, ice content, macro-ice content, expansion types of ground ice
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: Gosstroi USSR
NUMBER 00136

AUTHOR Kaplina, T.N.
NAME: Occurrence and age of syngenesis and epigenesis permafrost in northern Yakutia lowland
PUB: Moscow, Nauka, 1986
SCALE: Large
SOURCE: "Permafrost formation and cryogenic processes forecast", p.10. In article by Kaplina, T.N. p.3-14
REGION: Northern Yakutia
LEGEND Syngenesis permafrost deposits (thick to 40m of Middle Pleistocene age, thick to 5m Holocene), syngenesis and epigenesis permafrost strata
LAT/LONG: 68°00-73°00/110°00-160°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00137

AUTHOR Kaplina, T.N., Kostolyndina, N.K., Leibman, M.O.
NAME: Ruggedness of edoma relief by alases in Cukochya-Konkovskii bar region
PUB: Moscow, Nauka, 1986
SCALE: Large
SOURCE: "Permafrost formation and cryogenic procecess forecast", p.52. In the article Kaplina, T.N.,Kostalyndina N.K., Leibman, M.O. p.51-60
REGION: Northern Yakutia
LEGEND Alas depths (3 ranges), dome-shaped edoma of different altitude (3 ranges)

LAT/LONG: 68°00-69°30/156°00-157°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00138

AUTHOR Kaplina, T.N., Kostalyndina N.K., Leibman, M.O.
NAME: Ruggedness of edoma relief by alases in Duvannyi dome region
PUB: Moscow, Nauka, 1986
SCALE: Large
SOURCE: "Permafrost formation and cryogenic processes forecast", p.54. In the article by Kaplina, T.N., Kostalyndina N.K., Leibman, M.O. p.51-60
REGION: Northern Yakutia
LEGEND Alas depths (3 ranges), dome-shaped edoma of different altitude (3 ranges)
LAT/LONG: 168°00-169°00/158°00-160°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00139

AUTHOR Kaplina, T.N., Kostalyndina N.K., Leibman, M.O.
NAME: Ruggedness of terrace edoma relief by alases of Chukochya and Bolshoi Konkovoi interfluve
PUB: Moscow, Nauka, 1986
SCALE: Large
SOURCE: "Permafrost formation and cryogenic processes forecast", p.56. In the article by Kaplina, T.N., Kostalyndina H.K., Leibman, M.O. p.51-60
REGION: Northern Yakutia
LEGEND Alas depths (3 ranges), altitude of terrace edoma
LAT/LONG: 69°00-71°00/156°00-161°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00140

AUTHOR Kaplina, T.N., Znamenskii, E.N.
NAME: Schematic map of cryogenic processes and frozen features
PUB: Moscow, Stroiizdat, 1990
SCALE: 1:20 000 000
SOURCE: Climate for construction, reference book SNIP p.50
REGION: USSR
LEGEND Cryogenic processes and frozen ground features
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: Gostroi USSR
NUMBER 00141

AUTHOR Kaplina, T.N., Kostalyndena N.K., Leibman M.O.
NAME: Sketch-map of relief levels in Kolyma lower course
PUB: Moscow, Nauka, 1986
SCALE: 1:5 000 000
SOURCE: "Permafrost formation and cryogenic processes forecast, p.52. In the article by Kaplina, T.N., Kostalyndina N.K., Leibman M.O. p.51-60
REGION: Northern Yakutia
LEGEND Terrace and dome-shaped edoma of different altitudes, bar and dome names
LAT/LONG: 68°00-71°00/155°00-162°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00142

AUTHOR Kashperuk, P.I., Trofimov, V.T., Firsov, N.G.
NAME: Depths of seasonal ground freezing and thawing
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000

SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.82
REGION: West Siberia
LEGEND Maximum natural depths of seasonal freezing and thawing
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Moscow State University
NUMBER 00143

AUTHOR Kashperuk, P.I., Trofimov, V.T., Firsov, N.G.
NAME: Seasonal freezing and thawing of ground types referring to lithological and moisture content
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.79
REGION: West Siberia
LEGEND Lithological composition, types of depth of thawing and their boundaries
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Moscow State University
NUMBER 00144

AUTHOR Kashperuk, P.I., Trofimov, V.T., Firsov, N.G.
NAME: Seasonal freezing and thawing of ground types referring to average annual temperature and amplitudes on surface groundmass
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.77
REGION: West Siberia
LEGEND Average annual temperature ground types and temperature amplitudes
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Moscow State University
NUMBER 00145

AUTHOR Katasonov, E.M.
NAME: Geomorphological map of Tumara drainage basin
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:300 000 000
SOURCE: "Conditions and permafrost development features in Siberia and North-East", p.8. In the article by Katasonov, E.M. p.5-24
REGION: Central Yakutia
LEGEND Surface with thermokarst lakes and depression
LAT/LONG: 63°45'-64°30'/129°00-130°00
INSTITUTE: Geocryological Institute
NUMBER 00146

AUTHOR Kaznacheeva, I.A.
NAME: Scheme of exogenesis processes and phenomena in Malo-Bolshezemel region
PUB: Moscow, Nauka, 1988
SCALE: 1:7 500 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.295
REGION: European North
LEGEND Cryogenic processes and phenomena (hillocky peatland, thermokarst, thermal erosion, polygonal wedge ice, neogenesis, syngenesis and epigenesis permafrost)
LAT/LONG: 65°00-69°00/52°00-64°00
INSTITUTE: SO NIIOSP
NUMBER 00147

AUTHOR Kaznacheeva, I.A.

NAME: Scheme of polygonal ground types extent associated with their relief forms in Malo-Boshezemesky region
PUB: Moscow, Nedra, 1988
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.297
REGION: European North
LEGEND Contemporary syngenesis and epigenesis wedge ice, buried wedge ice, pseudomorphs, microrelief in growth and stabilization phases
LAT/LONG: 66°00-69°00/48°00-64°00
INSTITUTE: SO NIIOSP
NUMBER 00148

AUTHOR Kaznacheeva, I.A., Sukhodolskii, S.E.
NAME: Zoning scheme of Malo-Bolshezemelsky region referring to discontinuous permafrost
PUB: Moscow, Nauka, 1988
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.278
REGION: European North
LEGEND Permafrost zone referring to expansion
LAT/LONG: 48°00-66°00/64°00-72°00
INSTITUTE: SO NIIOSP
NUMBER 00149

AUTHOR Khrustalev, L.H., Novikov, F.IA., Nadessdin, A.V., Maksimenko, A.S.
NAME: Sketch-map of natural complexes resistivity impact
PUB: Moscow, Nedra, 1988
SCALE: 1:15 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.343
REGION: European North
LEGEND Temperature, expansion, ice content, permafrost and unfrozen ground thermal characteristics, characteristics of resistance referring to the potential exhibit of thermokarst and heave
LAT/LONG: 65°00-74°00/32°00-68°00
INSTITUTE: SO NIIOSP
NUMBER 00150

AUTHOR Khrutskii, S.F., Afanasenko, V.E., Kondratieva, K.A.
NAME: Hydrogeological zoning scheme
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:1 000 000
SOURCE: Permafrost Studies, XII, p.60
REGION: Central Siberia
LEGEND Hydrogeological structures (cryogenic massif), taliks, watery characteristics, geological structure
LAT/LONG: 69°00-71°00/140°00-143°00
INSTITUTE: Moscow State University
NUMBER 00151

AUTHOR Khrutskii, S.F., Afanasenko V.E., Kondratieva, K.A.
NAME: Permafrost sketch-map
PUB: Moscow, Moscow University Published, 1972
SCALE: 1:1 000 000
SOURCE: Permafrost Studies, XII, p.55
REGION: Central Siberia
LEGEND Permafrost thickness, average annual temperature of ground, morphostructures, genesis and lithological content

LAT/LONG: 69°00-71°00/140°00-143°00
INSTITUTE: Moscow State University
NUMBER 00152

AUTHOR Koldysheva, R.IA.
NAME: Geocryological sketch-map of Tunkinskaya depression
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:1 500 000
SOURCE: "Reports of VIII All-Union Geocryological Conference", issue 3. Regional geocryology, p.140.In the report by Koldysheva, R.IA. p.137-142
REGION: Transbaikal
LEGEND Permafrost thickness, the depths of permafrost table in wells, boundaries of zone (real, assumed): zones without permafrost, permafrost thickness 4-40 m, 40-215 m with taliks islands
LAT/LONG: 51°00-52°00/101°00-104°00
NUMBER 00153

AUTHOR Koldysheva, R.IA.
NAME: Scheme (fragment) of aeration zone for permafrost
PUB: Moscow, Nauka, 1977
SCALE: 1:7 500 000
SOURCE: "Frozen ground and snow cover", p.169
REGION: Transbaikal
LEGEND Boundaries of continuous, discontinuous and island permafrost
LAT/LONG: 52°00-54°00/95°00-115°00
NUMBER 00154

AUTHOR Koldysheva, R.IA.
NAME: Sheme of general types of water exchange in permafrost aeration zone
PUB: Moscow, Nauka, 1977
SCALE: 1:7 500 000
SOURCE: "Frozen ground and snow cover", p.178
REGION: Transbaikal
LEGEND Infiltration type with rather high energy exchange in system "atmosphere-ground aeration zone-suprapermafrost waters-permafrost"
LAT/LONG: 53°00-54°00/95°00-115°00
NUMBER 00155

AUTHOR Kondrateva, K.A., Kudriavtsev, V.A.
NAME: Cryolithozone map of the USSR
PUB: Moscow, Enlightenment, 1980
SCALE: 1:35 000 000
SOURCE: Romanovskii, N.N. "Cold of the Earth: Textbook for student", p.18-19
REGION: The USSR
LEGEND Thickness, temperature, spreading. Ocean, shelf, northern, southern, subglacial cryolithozone. Relict cryolithozone, the boundary of syngenesisal freezing ground of "ice complex"
LAT/LONG: 38°00-82°00/20°00-170°00
INSTITUTE: Moscow State University
NUMBER 00156

AUTHOR Kondratieva, K.A., Khrutskii, S.F.
NAME: Air temperature amplitudes map for the Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.41

REGION: Central Siberia
LEGEND Southern and northern limit of permafrost zones, contemporary permafrost expansion
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00157

AUTHOR Kondratieva, K.A.
NAME: Average annual ground temperature inversion distribution in river valley
PUB: Moscow, Nedra, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.66
REGION: Central Siberia (Vilyui River)
LEGEND Average annual ground temperatures, lithological composition
LAT/LONG: 62°00-64°00/110°00-130°00
INSTITUTE: Moscow State University
NUMBER 00158

AUTHOR Kondratieva, K.A.
NAME: Central Siberia cryolithology map
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.88
REGION: Central Siberia
LEGEND Type of freezing, lithological composition, cryogenic structure, macro ice inclusions, volumetric ice content, expansion, southern limit of permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00159

AUTHOR Kondratieva, K.A.
NAME: Central Siberia engineering-geocryological regionalization map
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.391
REGION: Central Siberia
LEGEND Permafrost zone boundaries, region numbers (the table gives the characteristics of engineering-geocryology), the tendency fordevelopment of cryogenic processes as a result of construction
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00160

AUTHOR Kondratieva, K.A., Fotiev, S.M.
NAME: Central Siberia permafrost regionalization referring to types of permafrost zone structures
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.97
REGION: Central Siberia
LEGEND Stages of frozen, frost, cool, with saline ground water and practically anhydrous ground, boundaries of districts with different permafrost structure, geocryological zones, contemporary permafrost expansion
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University, PNIIIS, Gosstroi USSR
NUMBER 00161

AUTHOR Kondratieva, K.A.
NAME: Central Siberia regionalization referring to permafrost
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.130
REGION: Central Siberia
LEGEND Morphostructure and geocryological features, southern limit of contemporary permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00162

AUTHOR Kondratieva, K.A., Danilova, N.S.
NAME: Cryogenic age map (onset of ground freezing) in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.30
REGION: Central Siberia
LEGEND Pleistocene, Holocene, recent (seasonal freezing of soil), age of ground, southern limit of permafrost in Pliocene and in present
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University, PNIIIS, Gosstroi USSR
NUMBER 00163

AUTHOR Kondratieva, K.A., Oberman, N.G., Sukhodolskii, S.E.
NAME: European North of the USSR zoning scheme referring to subareal permafrost thickness and vertical structure
PUB: Moscow, Nauka, 1988
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.248
REGION: European North of the USSR
LEGEND Shallow down permafrost thickness; relict permafrost under unfrozen ground; permafrost thickness with cryopegs occurring under permafrost
LAT/LONG: 60°00-85°00/40°00-60°00
INSTITUTE: Moscow State University, PUGRO, PNIIIS, Gosstroi USSR
NUMBER 00164

AUTHOR Kondratieva, K.A.
NAME: Frozen and unfrozen ground expansion and their average annual temperature (°C)
PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.222
REGION: Central Siberia
LEGEND Permafrost expansion and temperature
LAT/LONG: 60°00-68°00/90°00-101°00
INSTITUTE: Moscow State University
NUMBER 00165

AUTHOR Kondratieva, K.A.
NAME: Geobotanical zones with dominant vegetation in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.47
REGION: Central Siberia
LEGEND Northern and southern geocryological zones boundary, southern limit of permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University

NUMBER 00166

AUTHOR Kondratieva, K.A., Kudriavtsev, V.A., Khrutskii, S.F.
NAME: Geocryological- hydrogeological map of southern Yakutia
PUB: Moscow, Moscow University Publishers, 1967
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, VII, p.100-101
REGION: Southern Yakutia
LEGEND Types of underground water referring to permafrost, permafrost expansion and thickness, water-bearing complexes and special forms of underground water accumulation and display
LAT/LONG: 55°00-60°00/120°-135°00
INSTITUTE: Moscow State University
NUMBER 00167

AUTHOR Kondratieva, K.A., Maksimova, L.N.
NAME: Geocryological map of Baikal-Patom region
PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Mountain territories of south USSR / edited by E.D. Ershov, p.68
REGION: Transbaikal
LEGEND Expansion, temperature, thickness
LAT/LONG: 57°00-61°00/110°00-116°00
INSTITUTE: Moscow State University
NUMBER 00168

AUTHOR Kondratieva, K.A.
NAME: Geotemperature map of Malaya and Bolshaya Botuobiya interfluve
PUB: Moscow, Nedra, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.237
REGION: Central Siberia
LEGEND Temperature, age of deposits
LAT/LONG: 62°00-63°00/114°00-115°00
INSTITUTE: Moscow State University
NUMBER 00169

AUTHOR Kondratieva, K.A.
NAME: Map of average annual ground temperatures and ice sheets in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.61
REGION: Central Siberia
LEGEND Average annual temperature of ground, geocryological zones boundary, southern limit of permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00170

AUTHOR Kondratieva, K.A., Dunaeva E.N.
NAME: Map of average annual permafrost temperature in the USSR
PUB: Moscow, Nedra, 1988
SCALE: 1:20 000 000
SOURCE: Inset-map in monograph "Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov"

REGION: USSR
LEGEND Seasonal frozen ground and permafrost expansion, temperature, boundaries of temperature and permafrost zone
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00171

AUTHOR Kondratieva, K.A., Kudriavtsev, V.A., Khrutskii, S.F.
NAME: Map of average annual ground temperature zoning of Yano-Indigirskii interfluvial
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:2 500 000
SOURCE: Permafrost Studies, XII, p.70
REGION: Central Siberia
LEGEND Average annual ground temperature zone, geological-genesis complexes
LAT/LONG: 67°30-73°00/138°00-144°00
INSTITUTE: Moscow State University
NUMBER 00172

AUTHOR Kondratieva, K.A.
NAME: Map of frozen ground features expansion in geology-genesis types and formation
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.124
REGION: Central Siberia
LEGEND Soil wedges, wedge ice, frost mounds, hillocky peatland, sheet ice, hillocky terrain, thermokarst, frost fracturing, cave ice, glaciers
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00173

AUTHOR Kondratieva, K.A.
NAME: Map of generalized permafrost zones thickness in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia \ edited by E.D. Ershov, p.105
REGION: Central Siberia
LEGEND Permafrost thickness in geocryological zones and shelf zone
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00174

AUTHOR Kondratieva, K.A.
NAME: Map of North-Siberia lowland permafrost zone thickness (m)
PUB: Moscow, Nedra, 1989
SCALE: 1:15 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.156
REGION: Central Siberia
LEGEND Permafrost thickness (8 ranges), permafrost with cryopegs boundary (permafrost thickness 100-300 and 0-100 m)
LAT/LONG: 70°00-75°00/85°00-130°00
INSTITUTE: Moscow State University
NUMBER 00175

AUTHOR Kondratieva, K.A.
NAME: Map of permafrost thickness in the USSR
PUB: Moscow, Nedra, 1988

SCALE: 1:20 000 000
SOURCE: Inset-map in monograph "Geocryology of the USSR. European territory of the USSR "/ edited by E.D. Ershov
REGION: USSR
LEGEND Thickness, permafrost zones boundaries : subareal, subglacial, southern limit of relict and contemporary permafrost
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00176

AUTHOR Kondratieva, K.A.
NAME: Map of permafrost expansion and thickness (m) of upper stage in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.104
REGION: Central Siberia
LEGEND Permafrost thickness in discontinuous and continuous permafrost zones (in valleys and on divide), permafrost zones boundaries
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00177

AUTHOR Kondratieva, K.A., Khrutskii, S.F.
NAME: Map of permafrost expansion and thickness (m) and cooling below 0° ground with cryopegs, bedding under permafrost layer
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.107
REGION: Central Siberia
LEGEND Thickness
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00178

AUTHOR Kondratieva, K.A.
NAME: Map of permafrost in the USSR
PUB: Moscow, Moscow University Publishers, 1978
SCALE: 1:35 000 000
SOURCE: General Permafrost Studies (Geocryology)/ edited by Kudriavtsev, V.A., p.14
REGION: USSR
LEGEND Expansion, temperature, thickness
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00179

AUTHOR Kondratieva, K.A., Kudriavtsev, V.A.
NAME: Map of permafrost zoning of the USSR
PUB: Moscow, Moscow University Publishers, 1979
SCALE: 1:40 000 000
SOURCE: Inset-map in monograph "Geocryological survey methods "/ edited by V.A. Kudriavtsev
REGION: USSR
LEGEND Northern and Southern permafrost zones (expansion, temperature, thickness), cryopeg zones, two layer stratas, the regular repetition of seasonal freezing soil zones
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00180

AUTHOR Kondratieva, K.A., Danilova, N.S., Baulin, V.V.
NAME: Map of permafrost age
PUB: Moscow, Nedra, 1988
SCALE: 1:20 000 000
SOURCE: Inset-map in monograph "Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov"
REGION: USSR
LEGEND Expansion and geological age, southern limit of permafrost in Pliocene, Pleistocene, present
LAT/LONG: 38°00-82°00/30°00-170800
INSTITUTE: Moscow State University, PNIIIS, Gosstroi USSR
NUMBER 00181

AUTHOR Kondratieva, K.A.
NAME: Map of Severnaya Zemlya average annual ground and glacial cover temperatures
PUB: Moscow, Nedra, 1989
SCALE: 1:2 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.136
REGION: The North Polar region
LEGEND Temperature in 6 ranges
LAT/LONG: 82°00-87°00/90°00-110°00
INSTITUTE: Moscow State University
NUMBER 00182

AUTHOR Kondratieva, K.A.
NAME: Map of Severnaya Zemlya glacial cover thickness
PUB: Moscow, Nedra, 1989
SCALE: 1:2 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.135
REGION: Central Siberia
LEGEND Thickness
LAT/LONG: 82°00-87°00/90°00-110°00
INSTITUTE: Moscow State University
NUMBER 00183

AUTHOR Kondratieva, K.A., Khrutskii S.F.
NAME: Map of snow cover thickness in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E. D. Ershov, p.45
REGION: Central Siberia
LEGEND Southern and northern limit of permafrost zones, temporary permafrost expansion, snow cover thickness
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00184

AUTHOR Kondratieva, K.A.
NAME: Map of Taimyr (northern part) permafrost zone thickness (m)
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.144
REGION: Central Siberia
LEGEND Permafrost thickness (7 ranges)
LAT/LONG: 74°00-78°00/80°00-115°00
INSTITUTE: Moscow State University

NUMBER 00185

AUTHOR Kondratieva, K.A.
NAME: Map of Taimyr (northern part) permafrost zone average annual ground temperatures
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.144
REGION: Central Siberia
LEGEND Temperature (4 ranges)
LAT/LONG: 74°00-78°00/80°00-115°00
INSTITUTE: Moscow State University
NUMBER 00186

AUTHOR Kondratieva, K.A.
NAME: Map of temperature macrozones in Central Siberia
PUB: Moscow, Nedra, 1989
SCALE: 1:35 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.67
REGION: Central Siberia
LEGEND Prevalent average annual temperatures of ground, permafrost zone boundaries, southern limit of permafrost
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00187

AUTHOR Kondratieva, K.A.
NAME: Map of Tungus-Vilyui region permafrost thickness (m)
PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.222
REGION: Central Siberia
LEGEND Thickness in southern (4 ranges)and northern (5 ranges) permafrost zones
LAT/LONG: 60°00-68°00/90°00-101°00
INSTITUTE: Moscow State University
NUMBER 00188

AUTHOR Kondratieva, K.A.
NAME: North-Siberia lowland average annual ground temperatute (°C)
PUB: Moscow, Nedra, 1989
SCALE: 1:15 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.151
REGION: Central Siberia
LEGEND Temperature (5 ranges)
LAT/LONG: 70°00-75°00/85°00-130°00
INSTITUTE: Moscow State University
NUMBER 00189

AUTHOR Kondratieva, K.A.
NAME: Permafrost and glaciers average annual temperatures (°C) map in Novaya Zemlya archipelago
PUB: Moscow, Nauka, 1988
SCALE: 1:3 500 000
SOURCE: Geocryology of the USSR. European territory of USSR / edited by E.D. Ershov, p.266
REGION: Novaya Zemlya
LEGEND Temperature spans in cold and warm years
LAT/LONG: 70°00-77°00/51°00-72°00

INSTITUTE: Moscow State University
NUMBER 00190

AUTHOR Kondratieva, K.A.
NAME: Permafrost and glaciers average annual temperatures (°C) map in Zemlya Frantsa Iosifa
PUB: Moscow, Nauka, 1988
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.263
REGION: Franz Jozef Land
LEGEND Temperature
LAT/LONG: 76°00-84°00/42°00-66°00
INSTITUTE: Moscow State University
NUMBER 00191

AUTHOR Kondratieva, K.A.
NAME: Permafrost and seasonal frozen ground expansion map
PUB: Moscow, Nauka, 1988
SCALE: 1:50 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.100
REGION: USSR
LEGEND Expansion
LAT/LONG: 38°00-82°00/20°00-170°00
INSTITUTE: Moscow State University
NUMBER 00192

AUTHOR Kondratieva, K.A., Gavrilov, A.V.
NAME: Permafrost zoning scheme of the USSR
PUB: Moscow, Nauka, 1988
SCALE: 1:40 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.159
REGION: USSR
LEGEND Figures are shown for the first and second order regions
LAT/LONG: 35°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00193

AUTHOR Kondratieva, K.A., Khrutskii, S.F.
NAME: Sketch-map of the permafrost zone base depth
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.102
REGION: Central Siberia
LEGEND Permafrost zones base bedding below or above sea level line
LAT/LONG: 50°00-75°00/80°00-135°00
INSTITUTE: Moscow State University
NUMBER 00194

AUTHOR Koniakhin, M.A.
NAME: Air temperature: air, mean winter day near surface distribution and oxygen-isotope content of contemporary wedge ice in territory of former USSR
PUB: Moscow, Moscow University Publisher, 1992
SCALE: 1:40 000 000
SOURCE: "Geoecology of the North (Introduction to Geocryoecology)"/ Edited by V.I. Solomatin, p.45
REGION: The U.S.S.R.
LEGEND Isotope-oxygenous content of recent wedge ice, mean temperature of mean winter air
LAT/LONG: 50°00-80°00/40°00-170°00

INSTITUTE: Moscow State University
NUMBER 00195

AUTHOR Koniakhin, M.A.
NAME: Sheet ice bedding conditions (territory of Bovanenkovo GKM)
PUB: Moscow, Moscow State University, 1992
SCALE: Large
SOURCE: "Geoecology of the North (Introduction to Geocryoecology)"/ Edited by V.I. Solomatin, p.47
REGION: West Siberia, Yamal Peninsula
LEGEND Contour lines of absolute height of sheet ice table. Absolute points of sheet ice base. Stripping sheet ice wells.
LAT/LONG: 70°00/70°00
INSTITUTE: Moscow State University
NUMBER 00196

AUTHOR Kononova R.S., Neizvestnov, IA.V., Tolstikhin, N.I.
NAME: Boundaries of seasonal cryopeg expansion in winter (World Ocean)
PUB: Moscow, Moscow University Publishers, 1971
SCALE: 1:200 000 000
SOURCE: Permafrost Studies, XI, p.78
REGION: The Globe
LEGEND Seasonal cryopegs
NUMBER 00197

AUTHOR Kostiaev, A.G.
NAME: Scheme of permafrost limit in Eurasia in maximum cold period
PUB: Moscow, Moscow University Publishers, 1965
SCALE: 1:80 000 000
SOURCE: "Ground ice", issue II / edited by A.I. Popov, p.12
REGION: Eurasia
LEGEND Southern limit of permafrost, southern limit of permafrost in Europe if glacial cover was absent, area of sedimentation with syngenesis freezing and formation of thick wedge ice, glaciers, periglacial zone of loess surface formations
LAT/LONG: 20°00-85°00/20°00-170°00
INSTITUTE: Moscow State University
NUMBER 00198

AUTHOR Kozlova, A.E.
NAME: Geomorphological sketch-map of Taz drainage basin
PUB: Moscow, Nauka, 1972
SCALE: 1:2 500 000
SOURCE: Inset-map in monograph "Natural conditions of the Tazovskii oil-gas containing region industrialization"
REGION: West Siberia
LEGEND Polygonal relief, frost mounds, thermokarst depressions
LAT/LONG: 62°30-68°00/78°00-84°00
INSTITUTE: Geographical Institute
NUMBER 00199

AUTHOR Kritsuk, L.N., Mel'nikov, E.S., Moskalenko, N.G.
NAME: Permafrost regionalization scheme for West Siberia referring to permafrost resistance to technological exposure (on landscape base)
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:15 000 000
SOURCE: "Questions of geocryological mapping", p.65. In the article by Kritsuk, L.N., Mel'nikov, E.S., Moskalenko, N.G. p.53-67

REGION: West Siberia
LEGEND Permafrost resistance at the expense of ice content, temperature and sheet ice
LAT/LONG: 60°00-74°00/60°00-85°00
INSTITUTE: VSEGINGEO
NUMBER 00200

AUTHOR Kudriavtsev, V.A., Kondratieva, K.A.
NAME: Geocryological map of USSR
SCALE: 1:2 500 000
REGION: USSR
LEGEND Complex of geological conditions, lithological composition, cryogenic structure, thickness, expansion, ice content, temperature, cryogenic processes and frozen ground features, depth of bedding and thickness of deposits with cryopegs
LAT/LONG: 40°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00201

AUTHOR Kudriavtsev, V.A., Baulin, V.V., Gruzdov, A.V. /edited by E.M.Sergeev
NAME: Map of permafrost conditions of Russian non-chernozem zone (exept Ural, Zaurale, Kaliningrad region)
PUB: Moscow, GUGK, 1984
SCALE: 1:1 500 000
REGION: Non-chernozem zone, Russia
LEGEND Genesis complexes, lithological composition, temperature, annual amplitude ground temperature fluctuations
LAT/LONG: 52°00-69°00/28°00-64°00
INSTITUTE: Moscow State University, Geological Ministry, Ministry of Education (Russia)
NUMBER 00202

AUTHOR Kudriavtsev, V.N., Kondratieva, K.A., Vitkina, N.Kh.
NAME: Seasonal freezing of soils type map
PUB: Moscow, Moscow University Publishers, 1962
SCALE: Large
SOURCE: Inset-map in symposium articles "Permafrost Studies, II"
REGION: Central Siberia
LEGEND Average annual ground temperature, the depth of seasonal freezing (natural and settlement), temperature amplitudes above soils, prevalent lithological composition of winter freezing layer
LAT/LONG: 52°00-58°00/95°00-104°00
INSTITUTE: Moscow State University
NUMBER 00203

AUTHOR Kudryashov, V.G., Trofimov, V.T.
NAME: Permafrost base in West Siberian platform
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. West Siberia / edited by E.D. Ershov, p.123
REGION: West Siberia
LEGEND Depth of permafrost base
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Moscow State University
NUMBER 00204

AUTHOR Kuznetsova, I.L., Parmuzin, S.IU., Rogatina, N.P.
NAME: Critical depth of lakes with different thermal resistance to snow cover (2 maps)
PUB: Moscow, Stroiizdat, 1987

SCALE: 1:15 000 000
SOURCE: "Recommendations to estimate the change of permafrost conditions in industrialization territories of West Siberia / PNIIIS,Gosstroi,USSR", p.22-23
REGION: West Siberia
LEGEND The depth of lakes with different thermal resistance (5 range)
LAT/LONG: 62°00-75°00/64°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00205

AUTHOR Kuznetsova, I.L., Parmuzin, S.IU., Rogatina N.P.
NAME: Critical snow cover thickness with different thermal resistance of vegetation in winter and summer (3 maps)
PUB: Moscow, Stroiizdat, 1987
SCALE: 1:15 000 000
SOURCE: "Recommendations to estimate the change of permafrost conditions in industrialization territories of West Siberia"/ PNIIIS, Gosstroi, USSR, p.18-20
REGION: West Siberia
LEGEND Critical snow cover thickness on places with clayey, sand soil and peat for different thermal resistance of vegetation cover
LAT/LONG: 60°00-80°00/60°00-85°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00206

AUTHOR Kuznetsova, I.L.
NAME: Engineering-geocryological sketch-map (fragments) of Yakutia region littoral lowlands
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: "Cryogenic processes and features". Collection scientific articles / edited by E.A. Vtyurina, p.52-53
REGION: North-East
LEGEND Ice content in the upper and lower horizon of sediments, wedge ice, thermokarst, thermoerosion, ice content (macro), cryopegs, geological genesis complexes
LAT/LONG: 64°00-74°00/130°00-162°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00207

AUTHOR Kuznetsova, I.L., Parmuzin, S.IU., Rogatina, N.P.
NAME: Regionalization map of the north of West Siberia referring to potential perennial freezing ground with removal of vegetation cover
PUB: Moscow, Stroiizdat, 1987
SCALE: 1:12 000 000
SOURCE: "Recommendation to estimate the change of permafrost conditions in industrialization territories of West Siberia/PNIIIS, Gosstroi, USSR, p.21
REGION: North of West Siberia
LEGEND Number of zones (explanation in text p.17-18)
LAT/LONG: 62°00-75°00/64°00-86°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00208

AUTHOR Kuznetsova, I.L.
NAME: Sketch-map of engineering-geocryological zonality in littoral lowlands
PUB: Moscow, Stroiizdat, 1984
SCALE: 1:10 000 000
SOURCE: "Cryogenic processes and features". Collection scientific articles / edited by Vtiurina, E.A., p.58
REGION: North-East

LEGEND Boundaries and numbers of engineering-geocryological zones, temperature zones
LAT/LONG: 67°00-74°00/130°00-162°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00209

AUTHOR Lakhtina, O.V., Sukhodolskaia, L.A.
NAME: Sketch-map of permafrost extent in Holocene climatic optimum
PUB: Moscow, Nauka, 1981
SCALE: 1:12 000 000
SOURCE: "History of permafrost development in Eurasia", p.123. In the article by Lakhtina, O.V., Sukhodolskaia, L.A. p.113-125
REGION: Transbaikal
LEGEND Permafrost spread
LAT/LONG: 50°00-58°00/102°45-120°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00210

AUTHOR Lakhtina, O.V., Sukhodolskaia, L.A.
NAME: Sketch-map of permafrost extent in Sartan stage
PUB: Moscow, Nauka, 1981
SCALE: 1:12 000 000
SOURCE: "History of permafrost development in Eurasia", p.120. In the article by Lakhtina, O.V., Sukhodolskoi L.A. p.113-125
REGION: Transbaikal
LEGEND Permafrost spread
LAT/LONG: 50°00-58°00/102°45-120°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00211

AUTHOR Leshchikov, F.N.
NAME: Geocryological map of Angaro-Ilimsk interfluve
PUB: Moscow, Nedra, 1989
SCALE: 1:1 500 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.327
REGION: Central Siberia
LEGEND Expansion, thickness, the depth of seasonal freezing and thawing, permafrost terrain: frost mounds, thermokarst pits and lakes, solifluction features, polygonal wedge ice and hillocky terrain, icings, content of deposits
LAT/LONG: 56°00-58°00/102°00-105°00
INSTITUTE: Permafrost Institute
NUMBER 00212

AUTHOR Leshchikov, F.N.
NAME: Hillocky terrain expansion in Priangare
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.331
REGION: Central Siberia
LEGEND Places with hillocky terrain, northern limit of permafrost terrain
LAT/LONG: 51°00-59°00/92°00-110°00
INSTITUTE: Permafrost Institute
NUMBER 00213

AUTHOR Leshchikov, F.N.
NAME: Map of seasonal freezing soil calculation of depths in the impact zone of the Boguchan reservoir

PUB: Moscow, Nedra, 1989
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.370
REGION: Central Siberia
LEGEND The depth of freezing in natural conditions and standards for silty sands and clay, permafrost expansion, content and genesis of deposits
LAT/LONG: 95°00-103°00/58°00-60°00
INSTITUTE: Permafrost Institute
NUMBER 00214

AUTHOR Leshchikov, F.N.
NAME: Scheme in permafrost conditions in Muisko-Kaundinskoi and Charscoi depressions and their mountain surroundings
PUB: Moscow, Nedra, 1989
SCALE: 1: 5 000 000
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.93
REGION: Transbaikal
LEGEND Thickness, temperature, expansion, cryogenic processes and frozen ground features
LAT/LONG: 56°00-58°00/110°00-119°00
INSTITUTE: Permafrost Institute
NUMBER 00215

AUTHOR Leshchikov, F.N.
NAME: Scheme of Angaro-Lensk permafrost region referring to the types of technogenic impact
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.373
REGION: Central Siberia
LEGEND Regions: without permafrost, pervasive and local permafrost degradation, short-term permafrost and ice lens formation, cryogenic processes activization under technogenic impact
LAT/LONG: 51°00-62°00/95°00-110°00
INSTITUTE: Permafrost Institute
NUMBER 00216

AUTHOR Leshchikov, F.N.
NAME: Scheme of permafrost conditions in Verhne-Angarscoi depression
PUB: Moscow, Nedra, 1989
SCALE: 1:1 500 000
SOURCE: Geocryology of the USSR. Mountain countries of the south USSR / edited by E.D. Ershov, p.90
REGION: Transbaikal
LEGEND Expansion, thickness, temperature, cryogenic processes and frozen ground features
LAT/LONG: 55°00-57°00/109°00-116°00
INSTITUTE: Permafrost Institute
NUMBER 00217

AUTHOR Leshchikov, F.N., Serov, A.G.
NAME: Sketch-map of calculated depths of seasonal freezing
PUB: Novosibirsk, Nauka, 1983
SCALE: 1:1 000 000
SOURCE: Leshchikov, F.N., Shats M.M., South Central Siberia permafrost, p.148
REGION: Central Siberia
LEGEND Expansion, genesis and content ground, calculation and natural depth of freezing
LAT/LONG: 57°00-60°00/97°00-103°00

INSTITUTE: Permafrost Institute
NUMBER 00218

AUTHOR Leshchikov, F.N.
NAME: Sketch-map of Barguzin lowland and surrounding permafrost
PUB: Moscow, Nedra, 1989
SCALE: 1:1 500 000
SOURCE: Geocryology of the USSR. Mountain contries of the south USSR / edited by E.D. Ershov, p.88
REGION: Transbaikal
LEGEND Expansion, thickness, temperature, depth of freezing and thawing cryogenic processes and frozen ground features, content of deposits
LAT/LONG: 53°00-55°00/108°00-112°00
INSTITUTE: Permafrost Institute
NUMBER 00219

AUTHOR Leshchikov, F.N.
NAME: Sketch-map of Srednego-Priangariya permafrost
PUB: Novosibirsk, Nauka, 1983
SCALE: 1:2 500 000
SOURCE: Leshchikov, F.N., Shats, M.M. South Central Siberia permafrost, p.135
REGION: Central Siberia
LEGEND Expansion, thickness, temperature, frozen ground features and permafrost terrain
LAT/LONG: 56°00-60°00/100°00-104°00
INSTITUTE: Permafrost Institute
NUMBER 00220

AUTHOR Leshchikov, F.N.
NAME: The depths (m) of seasonal freezing map in Angaro-Lenski region
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.326
REGION: Central Siberia
LEGEND Seasonal freezing of soils (5 ranges of the depth)
LAT/LONG: 52°00-60°00/105°00-107°00
INSTITUTE: Permafrost Institute
NUMBER 00221

AUTHOR Likhanov, B.N.
NAME: Sketch-map of physiographic regionalization
PUB: Moscow, Nauka, 1972
SCALE: 1:2 500 000
SOURCE: Inset-map in monograph"Natural conditions of the Tazovskii oil-gas containing region industrialization"
REGION: West Siberia
LEGEND Flat-topped bogs and palsa peatlands
LAT/LONG: 62°30-68°00/78°00-84°00
INSTITUTE: Geographical Institute
NUMBER 00222

AUTHOR Lurie, I.S.
NAME: Sketch-map of upper level permafrost ice content
PUB: Moscow, Moscow University Publishers, 1972
SCALE: 1:3 000 000
SOURCE: Permafrost Studies, XII, p.170
REGION: West Siberia (Tazovski peninsula)

LEGEND	Lithology and ice content, ground ice genesis types, average anuual ground temperature, permafrost expansion, genesis types and age deposits
LAT/LONG:	67°00-69°00/74°00-77°30
INSTITUTE:	Moscow State University
NUMBER	00223

AUTHOR	Mel'nikov, E.S.
NAME:	Landscape Regionalization scheme of northwest Siberia
PUB:	Yakutsk, Geocryological Institute Publishers, 1986
SCALE:	1:15 000 000
SOURCE:	"Questions of geogryological mapping", p.56. In the article by Kritsuk, L.N., Mel'nikov, E.S., Moskalenko, N.G., p.53-67
REGION:	West Siberia
LEGEND	Boundaries and indexed landscape provinces, subprovinces, districts. Geocryological conditions and their changes (tabl. 1, p.62-63)
LAT/LONG:	60°00-74°00/60°00-85°00
INSTITUTE:	VSEGINGEO
NUMBER	00224

AUTHOR	Mel'nikov, E.S., Moskalenko, N.G.
NAME:	Map of natural complexes in northwest Siberia for forecasting and planning of environment protection referring to construction
PUB:	Moscow, GUGK, 1991
SCALE:	1:1 000 000
REGION:	West Siberia
LEGEND	Geomorphology, age of deposits, lithological composition (upper horizon), temperature, expansion, cryogenic processes, characteristics of seasonal frozen and thawing layers, permafrost terrain, tolerance for technological effects
LAT/LONG:	50°00-70°30/60°00-90°30
INSTITUTE:	VSEGINGEO, Geological Ministry, USSR
NUMBER	00225

AUTHOR	Mel'nikov, E.S.
NAME:	Scheme of engineering-geological zoning of northern West Siberia
PUB:	Moscow, Moscow State University, 1977
SCALE:	1:7 500 000
SOURCE:	Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.147
REGION:	West Siberia
LEGEND	Engineering-geological provinces, genesis of deposits
LAT/LONG:	62°00-74°00/60°00-90°00
INSTITUTE:	VSEGINGEO
NUMBER	00226

AUTHOR	Mel'nikov, P.I.
NAME:	Geocryological sketch-map of Yakutia
PUB:	Novosibirsk, Nauka, 1974
SCALE:	1:25 000 000
SOURCE:	"General geocryology"/ Edited by Mel'nikov, P.I., Tolstikhin, N.I., p.99
REGION:	Central Siberia
LEGEND	Permafrost thickness, temperature, wedge ice, injected ice, injected-segregated ice, depths of seasonal thaw, continuous and discontinuous permafrost zones
LAT/LONG:	55°00-77°00/105°00-160°00
INSTITUTE:	Permafrost Insitute
NUMBER	00227

AUTHOR Mel'nikov, P.I.
NAME: Permafrost and landscapes map of Yakutsk Republic
PUB: Moscow, GUGK, 1991
SCALE: 1:2 500 000
REGION: Yakutia
LEGEND Expansion, temperature, ice content, cryogenic structure, thickness of seasonal frozen and thawed layers, lithogenic complexes, landscapes, permafrost and landscape
LAT/LONG: 56°30 - 77°00/106°00 - 163°00
INSTITUTE: Permafrost Insitute
NUMBER 00228

AUTHOR Mimeev, V.S., Ryashin, V.A.
NAME: Zoning of Transbaikal referring to depth of seasonal thawing and freezing
PUB: Moscow, Nedra, 1989
SCALE: 1:12 000 000
SOURCE: Geocryology of the USSR. Mountain territories south USSR / edited by E.D. Ershov, p.44
REGION: Transbaikal
LEGEND Lithological composition, depths of freezing and thawing
LAT/LONG: 51°00-58°00/103°00-120°00
NUMBER 00229

AUTHOR Molodykh, I.I.
NAME: Hillocky terrain extent and its engineering-geological parameters scheme
PUB: Moscow, Nauka, 1988
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.255
REGION: South of European part of the USSR
LEGEND Hillocky terrain in recent and ancient landscapes, forms, parameters and relative positions in plan
LAT/LONG: 45°00-52°00/25°00-37°00
NUMBER 00230

AUTHOR Neizvestnov, IA.V.
NAME: Hydrogeological basins of the Eurasia Arctic shelf in the Late Cenozoic (19-18 thousand years ago)
PUB: Leningrad, Nedra, 1983
SCALE: 1:150 000 000
SOURCE: "The primary problems of paleogeography in Late Cenozoic of the Arctic", p.183
REGION: Arctic shelf
LEGEND Hydrogeological artesian freezing basin
LAT/LONG: 68°00-90°00/20°00-160°00
NUMBER 00231

AUTHOR Nekrasov, I.A.
NAME: Baikalo-Amur main line. Geocryological map
PUB: Moscow, GUGK, 1979
SCALE: 1:2 500 000
REGION: Transbaikal
LEGEND Expansion, thickness, temperature, bedding of ground ice, type of permafrost, surface cover influence on temperature
LAT/LONG: 52°00-58°00/105°00-141°00
INSTITUTE: Permafrost Institute
NUMBER 00232

AUTHOR Nekrasov, I.A., Zabolotnik, S.I.
NAME: Geocryological map of Amur area
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:2 500 000
SOURCE: Regional geocryological research in East Asia / edited by I.A. Nekrasov, p.112
REGION: Far East of USSR
LEGEND Expansion, temperature, thickness, cryogenic structure
LAT/LONG: 48°00-56°00/120°00-135°00
INSTITUTE: Permafrost Institute
NUMBER 00233

AUTHOR Nekrasov, I.A., Mikova, A.I.
NAME: Morphology and temperature at the Kolyma River headstream
PUB: Novosibirsk, Nauka, 1975
SCALE: 1:3 000 000
SOURCE: Inset-map in monograph "Regional and special geocryological investigations "/ Edited by V.S. Iakupov, I.V. Klimovskii
REGION: East Siberia
LEGEND Permafrost thickness, temperature, taliks
LAT/LONG: 59°00-64°00/145°00-157°00
INSTITUTE: Permafrost Institute
NUMBER 00234

AUTHOR Nekrasov, I.A., Mikova, A.I.
NAME: Morphology and temperature of permafrost at the Kolyma River
PUB: Novosibirsk, Nauka, 1975
SCALE: 1:2 000 000
SOURCE: Regional subject and geocryological investigations, p.20
REGION: East Siberia
LEGEND Thickness, expansion and temperature
LAT/LONG: 60°00-69°00/145°00-160°00
NUMBER 00235

AUTHOR Nekrasov, I.A., Mikova, A.I.
NAME: Permafrost zone thickness and temperature of Arkagala River system
PUB: Novosibirsk, Nauka, 1975
SCALE: Large
SOURCE: "Regional and special geocryological investigations "/ Edited by V.S. Iakupov, I.V. Klimovskii, p.7
REGION: East Siberia
LEGEND Permafrost thickness and temperature
LAT/LONG: 62°00-70°00/145°00-150°00
INSTITUTE: Permafrost Institute
NUMBER 00236

AUTHOR Nekrasov, I.A., Mikova, A.I.
NAME: Permafrost zone thickness and temperature in northern part of Seimchano- Buyundinskoi depression and its moutain surroundings
PUB: Novosibirsk, Nauka, 1975
SCALE: Large
SOURCE: "Regional and special geocryological investigations "/ Edited by V.S. Iakupov, I.V. Klimovskii, p.11
REGION: East Siberia
LAT/LONG: 62°00-64°00/150°00-155°00
INSTITUTE: Permafrost Insitute
NUMBER 00237

AUTHOR Nekrasov, I.A., Zabolotnik, S.I.
NAME: Sketch-map of seasonal thaw depths zoning in Amur area
PUB: Yakutsk, Permafrost Institute Publishers, 1983
SCALE: 1:2 500 000
SOURCE: Regional geocryological reseach in East Asia / edited by I.A. Nekrasov, p.122
REGION: Far East of USSR
LEGEND Range of variations of depth of seasonal thawing sandy and clayey soils
LAT/LONG: 48°00-56°00/120°00-135°00
INSTITUTE: Permafrost Institute
NUMBER 00238

AUTHOR Nekrasov, I.A.
NAME: Sketch-map of permafrost zone in Northern Hemisphere
PUB: Novosibirsk, Nauka, 1974
SCALE: 1:50 000 000
SOURCE: Inset-map in monograph "The general geocryology"/ Edited by Mel'nikov, P.I., Tolstikhin, N.I.
REGION: Northern Hemisphere
LEGEND Continuous, discontinuous permafrost and permafrost islands
LAT/LONG: 25°00-90°00/
INSTITUTE: Permafrost Institute
NUMBER 00239

AUTHOR Nevecheria, V.L.
NAME: Regionalization map of southwestern Siberian South referring to rate of frost heaving processes in ground
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:15 000 000
SOURCE: "Reports of VIII All-Union Geocryological Conference", no.3. Regional geocryology, p.56.In the report by Nevecheria, V.L. p.53-59
REGION: West Siberia
LEGEND Districts: a) with high rate, b) with average rate, c.) with low rate of frost heaving processes in ground; boundaries of districts
LAT/LONG: 50°00-58°00/72°00-92°00
INSTITUTE: Siberian Institute of Power Engineering
NUMBER 00240

AUTHOR Nevecheria, V.L.
NAME: The distribution of the frost-susceptible ground near the West Siberian railways
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:7 500 000
SOURCE: "Reports of VIII All-Union Geocryological Conference", no. 3. Regoinal geocryology, p.58. The report by Nevecheria, V.L. pp .53-59.
REGION: West Siberia
LEGEND Frost-susceptible ground
LAT/LONG: 52°00-58°00/78°00-90°00
INSTITUTE: Siberian Institute of Power Engineering
NUMBER 00241

AUTHOR Nikitenko, F.A.
NAME: Scheme of engineering-geological zoning of West Siberia platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia", p.246
REGION: West Siberia

LEGEND Expansion, provinces of structure denudation plains
LAT/LONG: 51°00-74°00/60°00-90°00
NUMBER 00242

AUTHOR Novikov, V.P., Svitoch, A.A.
NAME: Geomorphological scheme of Aion Island
PUB: Moscow, Nauka, 1980
SCALE: 1:1 500 000
SOURCE: "Recent deposits and paleogeography of Pleistocene in Chukchi", p.178
REGION: Chuckchee
LEGEND Fluvio-lacustrine plain, active reworking by thermokarst processes, thermokarst depression
LAT/LONG: 69°00-70°00/167°00-170°00
INSTITUTE: Pacific Ocean Geographical Institute
NUMBER 00243

AUTHOR Oberman, N.G.
NAME: Hydrogeology zoning scheme of European North of the USSR
PUB: Moscow, Nauka, 1988
SCALE: 1:20 000 000
SOURCE: Geocrylogy of the USSR. European territory of the USSR / edited by E.D. Ershov, p.221
REGION: European North and Northern Urals
LEGEND Hydrogeological structures referring to permafrost expansion
LAT/LONG: 60°00-85°00/40°00-60°00
NUMBER 00244

AUTHOR Oberman, N.G.
NAME: Permafrost scheme of Trans-Urals
PUB: Moscow, Nauka, 1981
SCALE: 1:20 000 000
SOURCE: "History of permafrost development in Eurasia", p.62. In the article by Oberman, N.G. p.60-73
REGION: European North
LEGEND Permafrost zones: thick, two-layer and relict permafrost; thick permafrost with sheet ice and basal cryopegs; boundaries: zone, permafrost spread, thickness; sheet ice, frost mounds
LAT/LONG: 66°00-70°00/58°00-66°00
NUMBER 00245

AUTHOR Oberman, N.G.
NAME: Scheme of Ural permafrost
PUB: Moscow, Nedra, 1988
SCALE: 1:5 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D.Ershov, p.303
REGION: Northern and Polar Ural
LEGEND Seasonal frozen ground and permafrost zones, permafrost-temperature zonations (expansion, thickness, temperature)
LAT/LONG: 61°00-70°00/56°00-68°00
NUMBER 00246

AUTHOR Oberman, N.G.
NAME: Zoning scheme of Malo-Bolshezemelsky region referring to permafrost structure and thickness
PUB: Moscow, Nauka, 1988
SCALE: 1:3 500 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.284

REGION: European North
LEGEND Territory with prevailing relict permafrost, unfrozen ground, places with cryopeg, depth of permafrost base isolines
LAT/LONG: 65°00-69°00/52°00-64°00
NUMBER 00247

AUTHOR Ospennikov, E.N., Chizhova, N.E.
NAME: Map of areal extent for geological processes and phenomena and forecasting their development for construction
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:5 000 000
SOURCE: Ospennikov, E.N., Trush, N.I., Chizhov, A.B., Chizhova, A.B. Exogenesis geological processes and phenomena (South Yakutia), p.198-199
REGION: South Yakutia
LEGEND Cryogenic processes and features
LAT/LONG: 57°00-69°00/123°00-128°00
INSTITUTE: Moscow State University
NUMBER 00248

AUTHOR Ospennikov, E.N.
NAME: Map of rock stream expansion in Aldano-Timpton interfluve territory
PUB: Moscow, Nedra, 1989
SCALE: 1:2 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.305
REGION: Central Siberia
LEGEND Rock streams areal extent
LAT/LONG: 55°00-60°00/122°00-130°00
NUMBER 00249

AUTHOR Parmuzin, S.IU.
NAME: Map of permafrost resistence referring to potential thermokarst development
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:10 000 000
SOURCE: "Questions of geocryological mapping", p.83. In the article by Parmuzin, S.IU. p.78-85
REGION: West Siberia
LEGEND Places with potential thermokarst development. Southern limits : wedge ice and sheet ice spread
LAT/LONG: 60°00-74°00/64°00-88°00
INSTITUTE: Moscow State University
NUMBER 00250

AUTHOR Pavlova, O.P.
NAME: Geocryological sketch-map of eastern part of Baikal mountain country
PUB: Moscow, Nauka, 1975
SCALE: 1:2 500 000
SOURCE: Inset-map in monograph "Neotectonic, permafrost and ground water formation"
REGION: Transbaikal
LEGEND Scheme of geocryological regionalization, content and structure of permafrost, spreading, temperature, thickness, icings
LAT/LONG: 55°00-60°00/110°00-130°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00251

AUTHOR Pavlova, O.P.
NAME: Scheme of icings and springs locations on alluvial fan of Verkhnii Sakukan River, April 1971

PUB: Moscow, Nauka, 1975
SCALE: Large
SOURCE: "Neotectonic, permafrost and ground water", p.45
REGION: Transbaikal
LEGEND Icings, springs, southern limit of permafrost
LAT/LONG: 56°00-60°00/118°00-120°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00252

AUTHOR Pizhankova, A.I., Chizhov, A.B.
NAME: Map of Southern Yakutia permafrost regionalization
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.196
REGION: Central Siberia
LEGEND Temperature, expansion, genesis and age of deposits
LAT/LONG: 55°00-60°00/120°00-135°00
INSTITUTE: Moscow State University
NUMBER 00253

AUTHOR Popov, A.G., Kostiaev, A.G.
NAME: Sketch-map of Mesopleistocene periglacial features in Asia
PUB: Moscow, Moscow University Publishers, 1962
SCALE: 1:40 000 000
SOURCE: Inset-map in monograph "Questions of geographical geocryology and periglacial morphology"/ edited by Popov, A.I.
REGION: Asia
LEGEND Type of cryolithogenesis, area of sedimentation, southern limit of permafrost, seasonal freezing, permafrost neogenesis, ice-wedge polygons, flat-topped polygonal peatland, ground wedges, alasses, hillocky terrain
LAT/LONG: 40°00-80°00/40°00-170°00
INSTITUTE: Moscow State University
NUMBER 00254

AUTHOR Popov, A.I., Rozenbaum, G.E., Tumel, N.V.
NAME: Cryolithogenesis processes zoning scheme of the USSR
PUB: Moscow, Moscow University Publishers, 1985
SCALE: 1:60 000 000
SOURCE: Popov, A.I., Rozenbaum, G.E., Tumel, N.V., Cryolithology, p.215
REGION: USSR
LEGEND Ocean and continental sectors of polar, subpolar, boreal and subboreal zones
LAT/LONG: 40°00-80°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00255

AUTHOR Popov, A.I.
NAME: Cryolithology map (permafrost region)
PUB: Moscow, GUGK, 1985
SCALE: 1:4 000 000
SOURCE: 1982
REGION: USSR
LEGEND Cryogenic structure, types of cryogenesis, type of ground
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00256

AUTHOR Popov, A.I.
NAME: Geocryological-geological zoning map of the USSR
PUB: Moscow, Moscow University Publishers, 1958
SCALE: 1:15 000 000
SOURCE: Inset-map in "Geographical Faculty scientific works in the International Geophysical Year", N 1. In report by Popov, A.I., p.239-264
REGION: USSR
LEGEND Numbers and regions names (geocryological information in text)
LAT/LONG: 43°00-32°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00257

AUTHOR Popov, A.I.
NAME: Geocryological sketch-map of West Siberia
PUB: Novosibirsk, Nauka, 1990
SCALE: 1:8 000 000
SOURCE: Nekrasov, and others "Geocryological investigatios history in West Siberia", p.25
REGION: West Siberia
LEGEND Expansion (zones and subzones), azonal and abnormal permafrost conditions, short-term and sporadic permafrost zone
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: Moscow State University
NUMBER 00258

AUTHOR Popov, A.I.
NAME: Global frost areas map
PUB: Moscow, Higher Institutes, 1973
SCALE: 1:200 000 000
SOURCE: Popov, A.I., Tushinskii, G.K. "Geocryology and glaciology. Teaching aid for university of the USSR", p.47
REGION: Global
LEGEND Permafrost and glacial covers, areas of systematic seasonal freezing, short-term and nonsystematic freezing
INSTITUTE: Moscow State University
NUMBER 00259

AUTHOR Popov, A.I.
NAME: Ground ice
PUB: Moscow, GUGK, 1971
SCALE: 1:6 000 000
SOURCE: Tyumen region atlas, vol.1, p.15
REGION: West Siberia
LEGEND Type of freezing, frozen earth material, pure ice in the ground, lithological composition
LAT/LONG: 56°00-73°00/60°00-87°00
INSTITUTE: Moscow State University
NUMBER 00260

AUTHOR Popov, A.I.
NAME: Map of ground ice in the northern European part of the USSR and Siberia
PUB: Moscow, Higher Institutes, 1973
SCALE: 1:10 000 000
SOURCE: Inset-map in monograph "Geocryology and glaciology. Teaching aid for universities of the USSR"
REGION: USSR
LEGEND Genesis types of ground ice in sediment deposits and original rocks (migration, wedge ice, hydrolaccoliths, ice cores in peat mounds), limits of temperature zone by Kudriavtsev,

V.A., southern limit of permafrost
LAT/LONG: 50°00-85°00/35°00-170°00
INSTITUTE: Moscow State University
NUMBER 00261

AUTHOR Popov, A.I.
NAME: Map of permafrost on European territory of the USSR and Siberia
PUB: Moscow, Moscow University Publishers, 1962
SCALE: 1:2 500 000
SOURCE: Inset-map in monograph "Questions of geographical geocryology and periglacial morphology"/ edited by A.I. Popov
REGION: The USSR
LEGEND Genesis types of ground ice in unconsolidated sediments and indigenous ground, wedge ice, migration ice, ice cores of pingo, frost blisters, ice in cracks of crystalline and metamorphic rocks, age of permafrost
LAT/LONG: 40°00-80°00/40°00-170°00
INSTITUTE: Moscow State University
NUMBER 00262

AUTHOR Popov, A.I.
NAME: Permafrost terrain
PUB: Moscow, GUGK, 1971
SCALE: 1:6 000 000
SOURCE: Tyumen region atlas, vol.1, p.15
REGION: West Siberia
LEGEND Polygonal ground (rising and descending development), frost mounds, nivation relief, solifluction features, grounds
LAT/LONG: 56°00-73°00/60°00-87°00
INSTITUTE: Moscow State University
NUMBER 00263

AUTHOR Popov, A.I.
NAME: Sketch-map of cryological-geomorphological phenomena in the USSR
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:25 000 000
SOURCE: Inset-map in proceedings"Reports on International Permafrost Conference"
REGION: USSR
LEGEND Ice-wedge polygons. Polygonal-wedge ice with thermokarst, flat-topped polygonal peatlands, alasses, ground wedge polygons, etc.
LAT/LONG: 50°00-80°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00264

AUTHOR Popov, A.I., Kostiaev, A.G.
NAME: Sketch-map of Neopleistocene and contemporary periglacial features in Asia
PUB: Moscow, Moscow University Publishers, 1962
SCALE: 1:40 000 000
SOURCE: Inset-map in monograph"Questions of geographical geocryology and periglacial morphology"/ edited by A.I. Popov
REGION: Asia
LEGEND Type of cryolithogenesis, southern limit of permafrost, seasonal freezing, permafrost neogenesis, ice-wedge polygons, flat-topped polygonal peatlands, ground wedges, alasses
LAT/LONG: 40°00-82°00/30°00-170°00
INSTITUTE: Moscow State University
NUMBER 00265

AUTHOR Popov, A.I.
NAME: Sketch-map of cryological geomorphological features in the USSR
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:2 500 000
SOURCE: Inset-map in Collection scientific articles "Permafrost International Conference reports "/ edited by Tsitovich, N.A.
REGION: The USSR
LEGEND Type of cryolithogenesis, ice wedge polygons, ground wedges, hillocky terrain, flat-topped polygonal peatlands, stone sorted polygons, solifluction features, frost mounds
LAT/LONG: 38°00-82°00/20°00-170°00
INSTITUTE: Moscow State University
NUMBER 00266

AUTHOR Popov, A.I.
NAME: Sketch-map of permafrost in West Siberia
PUB: Moscow, Moscow University Publishers, 1969
SCALE: 1:5 000 000
SOURCE: Permafrost Studies, IX, p.10-11
REGION: West Siberia
LEGEND Pure ice in the ground (content, genesis, cryogenic structure, freezing types), frozen earth material (content, genesis, age, cryogenic structure, freezing types, ice content)
LAT/LONG: 64°00-72°00/60°00-83°00
INSTITUTE: Moscow State University
NUMBER 00267

AUTHOR Popov, A.I.
NAME: Sketch-map of the Northern Eurasia in Mesopleistocene
PUB: Moscow, Moscow University Publishers, 1965
SCALE: 1:40 000 000
SOURCE: "Ground ice", issue II / edited by A.I. Popov, p.37
REGION: Eurasia
LEGEND Area of maximum permafrost extent in Northern Eurasia in the Pleistocene, permafrost boundaries on continental areas, relict shore line
LAT/LONG: 40°00-80°00/70°00-170°00
INSTITUTE: Moscow State University
NUMBER 00268

AUTHOR Ravdonekas, O.V.
NAME: Map-scheme of permafrost base near Ust-Port settlement
PUB: Moscow, Nedra, 1985
SCALE: Large
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.99
REGION: The Yenisei North
LEGEND Isolines of permafrost base
LAT/LONG: 69°30/84°30
NUMBER 00269

AUTHOR Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.
NAME: Chemical hydrological zoning scheme
PUB: Moscow, Moscow University Publishers, 1970
SCALE: 1:1 000 000
SOURCE: Permafrost Studies, X, p.42
REGION: Central Siberia
LEGEND Places of fresh water and brackish water expansion and ground ice with sulphate magnesium-calcium content
LAT/LONG: 68°00-70°00/140°00-144°00

INSTITUTE: Moscow State University
NUMBER 00270

AUTHOR Romanovskii, N.N., Kondratieva, K.A.., Kudriavtsev, V.A.
NAME: Scheme of Cenozoic deposits extent in Uyandinskaya superimposed basin
PUB: Moscow, Moscow University Publishers, 1970
SCALE: 1:500 000 000
SOURCE: Permafrost Studies, X, p.82
REGION: Central Siberia
LEGEND Thermokarst lake, alasses recent beds, solifluction deposits, thermokarst lakes, genesis and age deposits
LAT/LONG: 68°00-70°00/140°00-142°00
INSTITUTE: Moscow State University
NUMBER 00271

AUTHOR Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.
NAME: Scheme of hydrogeological zoning and icings location: Selenyakhski hydrogeological cryogenic massif, Polousnensko-Tuostachcki hydrogeological cryogenic massif
PUB: Moscow, Moscow University Publishers, 1970
SCALE: Large
SOURCE: Permafrost Studies, X, p.52
REGION: Central Siberia
LEGEND The icings can be distinguished by special feature of ground-water recharge, individual hydrolaccoliths, places with open talik, geological structure
LAT/LONG: 68°00-70°00/140°00-144°00
INSTITUTE: Moscow State University
NUMBER 00272

AUTHOR Romanovskii, N.N., Kondratieva, K.A., Kudriavtsev, V.A.
NAME: Scheme of permafrost thickness spreading
PUB: Moscow, Moscow University Publishers, 1970
SCALE: Large
SOURCE: Permafrost Studies, X, p.36
REGION: Central Siberia
LEGEND Permafrost thickness, open taliks, boundaries of different permafrost thickness expansion, geological-tectonic structure
LAT/LONG: 68°00-70°00/140°00-144°00
INSTITUTE: Moscow State University
NUMBER 00273

AUTHOR Rozenberg, L.I.
NAME: Scheme of Kuraiskoi lowland permafrost
PUB: Moscow, Nauka, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.233
REGION: Southern Siberia (Altai)
LEGEND Expansion, genesis of deposits
LAT/LONG: 49°30-50°30/87°00-89°00
NUMBER 00274

AUTHOR Rozenberg, L.I. (using maps by N.I. Trush and K.A. Kondrateva)
NAME: Scheme of Kuznetsk highland permafrost spreading
PUB: Moscow, Nauka, 1989
SCALE: Large
SOURCE: Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D.

	Ershov, p.252
REGION:	Southern Siberia
LEGEND	Expansion, temperature, thickness
LAT/LONG:	50°00-55°00/85°00-90°00
NUMBER	00275
AUTHOR	Rozenberg, L.I. (using map by N.I. Trush)
NAME:	Scheme of permafrost of Tuva Central area
PUB:	Moscow, Nauka, 1989
SCALE:	1:7 500 000
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.280
REGION:	Southern Siberia (Tuva)
LEGEND	Expansion, temperature, thickness
LAT/LONG:	50°00-55°00/90°00-100°00
NUMBER	00276
AUTHOR	Rozenberg, L.I. (using maps by M.M. Shats and N.I. Trush)
NAME:	Scheme of permafrost in Altai
PUB:	Moscow, Nauka, 1989
SCALE:	1:3 000 000
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.231
REGION:	Southern Siberia (Altai)
LEGEND	Expansion, temperature, thickness
LAT/LONG:	48°00-53°30/81°00-89°00
NUMBER	00277
AUTHOR	Rozenberg, L.I.
NAME:	Scheme of seasonal frozen ground and permafrost in Enisey ridge
PUB:	Moscow, Nauka, 1989
SCALE:	1:3 000 000
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, P.290
REGION:	Southern Siberia
LEGEND	Expansion, temperature, thickness
LAT/LONG:	55°00-62°00/93°00-100°00
NUMBER	00278
AUTHOR	Rozenberg, L.I. (using map by N.I. Trush)
NAME:	Scheme of seasonal frozen ground and permafrost extent in East Sayan
PUB:	Moscow, Nauka, 1989
SCALE:	1:7 500 000
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D. Ershov, p.267
REGION:	Southern Siberia (Easten Sayan)
LEGEND	Expansion, temperature, thickness, dynamic short-term permafrost, seasonal freezing of ground
LAT/LONG:	51°00-54°00/92°00-99°00
NUMBER	00279
AUTHOR	Rozenberg, L.I. (using map by N.I.Trush)
NAME:	Scheme of West Sayan permafrost extent
PUB:	Moscow, Nauka, 1989
SCALE:	1:7 500 000
SOURCE:	Geocryology of the USSR. Mountain countries of the southern USSR / edited by E.D.

Ershov, p.261
REGION: Southern Siberia (Western Sayan)
LEGEND Expansion, temperature, thickness
LAT/LONG: 53°00-54°00/91°00-93°00
NUMBER 00280

AUTHOR Sendek, S.V., Barbashinov, G.L.
NAME: Okhotsk Sea shore geocryology
PUB: Novosibirsk, Nauka, 1975
SCALE: 1:1 000 000
SOURCE: "Regional and special geocryological investigations "/ Edited by V.S. Iakupov, I.V. Klimovskii, p.19
REGION: East Siberia
LEGEND Permafrost expansion, thickness, taliks
LAT/LONG: 59°00-61°00/151°00-155°00
NUMBER 00281

AUTHOR Sergeev, E.M.
NAME: Engineering- geological map of West Siberian platform
PUB: Moscow, GUGK, 1972
SCALE: 1:1 500 000
REGION: West Siberia
LEGEND Formations, genesis complexes, lithological composition of upper complex, permafrost conditions, expansion, temperature, thickness, ice content, cryogenic processes, permafrost terrain
LAT/LONG: 50°00-70°30/60°00-90°30
INSTITUTE: Moscow State University, Geological Ministry, the Second Hydrogeological Department
NUMBER 00282

AUTHOR Severskii, I.V., Severskii, E.V.
NAME: Scheme of deep seasonal freezing of soil area in Central Asia mountains and south-eastern Kazakhstan
PUB: Yakutsk, Geocryological Institute Publishers, 1986
SCALE: 1:7 500 000
SOURCE: "Questions of geocryological mapping", p.36. In the article by Severskii, I.V., Severskii, E.V. p.29-38
REGION: Central Asia, southeastern Kazakhstan
LEGEND Deep seasonal freezing of soil areas and their boundaries
LAT/LONG: 37°00-44°00/70°00-83°00
NUMBER 00283

AUTHOR Shats, M.M., Leshchikov, F.N.
NAME: Map of permafrost in the southern part of Central Siberia
PUB: Novosibirsk, Nauka, 1983
SCALE: 1:2 500 000
SOURCE: Insert-map in monograph "South Central Siberia permafrost" by Leshchikov, F.N., Shats, M.M.
REGION: Central Siberia
LEGEND Seasonal frozen and permafrost grounds
LAT/LONG: 53°00-61°00/90°00-110°00
INSTITUTE: Permafrost Institute
NUMBER 00284

AUTHOR Shats, M.M.
NAME: Sketch-map of permafrost expansion in the Krasnoyarsk region south
PUB: Novosibirsk, Nauka, 1980

SCALE: 1:5 000 000
SOURCE: Permafrost studies in development of regions of the USSR, p.122
REGION: Central Siberia
LEGEND Seasonal frozen ground, permafrost (islands, discontinuous, sporadic)
LAT/LONG: 52°00-56°00/89°00-95°00
INSTITUTE: Permafrost Institute
NUMBER 00285

AUTHOR Sheko, A.I., Fotiev, S.M.
NAME: Map of permafrost zoning of Baikalo-Amur main line zone
PUB: Moscow, GUGK, 1988
SCALE: 1:3 000 000
SOURCE: Atlas of geological maps of Baikalo-Amur main line zone
REGION: Baikal, Transbaikal, Amur regions
LEGEND Expansion, temperature, thickness, depth of seasonal freezing and thaw, cryogenic processes
LAT/LONG: 52°00-58°00/105°00-141°00
INSTITUTE: Tsentrogeologiya
NUMBER 00286

AUTHOR Shevchenko, V.K.
NAME: Map of permafrost zoning of Transbaikal
PUB: Moscow, Nedra, 1989
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. Mountain territories south USSR / edited by E.D. Ershov, p.63
REGION: Transbaikal
LEGEND Expansion, temperature, thickness
LAT/LONG: 51°00-80°00/103°00-120°00
NUMBER 00287

AUTHOR Sheveleva, N.S.
NAME: Geocryological sketch-map of the Yenisei-North region
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:1 500 000
SOURCE: Inset-map in monograph "Reports of VIII All-Union Geocryological Conference", issue3.Regional geocryology
REGION: The Yenisei-North
LEGEND Type of freezing, ice content, cryogenic strusture, thaw settlement, permafrost thickness, temperature, spreading; age, lithological composition and genesis of deposits; regionalization
LAT/LONG: 67°20-70°00/84°00-92°00
INSTITUTE: PNIIS, Gosstroi, USSR
NUMBER 00288

AUTHOR Sheveleva, N.S.
NAME: Sketch-map of permafrost temperature in Central Siberia
PUB: Moscow, Nedra, 1975
SCALE: 1:20 000 000
SOURCE: Fotiev, S. M., Danilova, N.S., Sheveleva, N.S. Permafrost conditions of Central Siberia, p.110
REGION: Central Siberia
LEGEND Temperature isolines of grounds on base of layer with annual temperature fluctuations
LAT/LONG: 52°00-80°00/78°00-138°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00289

AUTHOR Sheveleva, N.S.
NAME: Temperature of permafrost, sketch-map of the Yenisei-North
PUB: Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE: 1:5 000 000
SOURCE: "Reports of VIII All-Union Geocryological Conference", no. 3. Regional geocryology, p.78. In the report by Sheveleva, N.S. p.71-80
REGION: The Yenisei-North
LEGEND Isotherms
LAT/LONG: 67°20-70°00/84°00-92°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00290

AUTHOR Shpolianskaia, N.A.
NAME: Permafrost (spreading, temperature)
PUB: Moscow, GUGK, 1971
SCALE: 1:4 000 000
SOURCE: Tyumen region atlas, publish 1, p.14
REGION: West Siberia
LEGEND Expansion, temperature
LAT/LONG: 56°00-73°00/60°00-87°00
INSTITUTE: Moscow State University
NUMBER 00291

AUTHOR Shpolianskaia, N.A.
NAME: Permafrost in Kazan epoch
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:25 000 000
SOURCE: Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.108
REGION: West Siberia
LEGEND Active freezing areas, initial permafrost degradation areas, southern limit of permafrost, permafrost thickness and temperature
LAT/LONG: 55°00-72°00/60°00-85°00
INSTITUTE: Moscow State University
NUMBER 00292

AUTHOR Shpolianskaia, N.A.
NAME: Permafrost in maximum glacial epoch
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:25 000 000
SOURCE: Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.104
REGION: West Siberia
LEGEND Active freezing areas in the divides, areas of glaciation, areas of freezing in river valleys, permafrost thickness and temperature, southern limit of permafrost
LAT/LONG: 50°00-72°00/50°00-85°00
INSTITUTE: Moscow State University
NUMBER 00293

AUTHOR Shpolianskaia, N.A.
NAME: Permafrost in thermic maximum stage
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:25 000 000
SOURCE: Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.109
REGION: West Siberia

LEGEND	Disequilibrium, equilibrium, relict permafrost, southern limit of permafrost, northern forest boundary, permafrost thickness and temperature on the depth of annual temperature fluctuations, the depth of relict permafrost table and base
LAT/LONG:	55°00-72°00/60°00-85°00
INSTITUTE:	Moscow State University
NUMBER	00294

AUTHOR	Shpolianskaia, N.A.
NAME:	Permafrost in Zyriansk glaciation epoch
PUB:	Moscow, Moscow University Publishers, 1981
SCALE:	1:25 000 000
SOURCE:	Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.108
REGION:	West Siberia
LEGEND	Glaciation areas, active freezing places on the divides and river valleys, disequilibrium permafrost, southern limit of permafrost, permafrost thickness and temperature
LAT/LONG:	55°00-72°00/60°00-85°00
INSTITUTE:	Moscow State University
NUMBER	00295

AUTHOR	Shpolianskaia, N.A.
NAME:	Permafrost map
PUB:	Yakutsk, Yakutskoe knizh. izd-vo, 1966
SCALE:	1:7 500 000
SOURCE:	Inset-map in monograph "Reports of VIII All-Union Geocryological Conference", issue 3. Regional geocryology
REGION:	Transbaikal
LEGEND	Temperature, thickness, spreading
LAT/LONG:	49°00-53°00/103°00-118°00
INSTITUTE:	Moscow State University
NUMBER	00296

AUTHOR	Shpolianskaia, N.A.
NAME:	Quaternary changes in permafrost
PUB:	Moscow, GUGK, 1971
SCALE:	1:16 000 000
SOURCE:	Tyumen region atlas, p.15
REGION:	West Siberia
LEGEND	Temperature, thickness, southern limit of permafrost
LAT/LONG:	56°00-73°00/60°00-87°00
INSTITUTE:	Moscow State University
NUMBER	00297

AUTHOR	Shpolianskaia, N.A.
NAME:	Seasonal freezing and thawing
PUB:	Moscow, GUGK, 1971
SCALE:	1:4 000 000
SOURCE:	Tyumen region atlas, p.15
REGION:	West Siberia
LEGEND	Depths and dates freezing and thawing
LAT/LONG:	56°00-73°00/60°00-87°00
INSTITUTE:	Moscow State University
NUMBER	00298

AUTHOR	Shpolianskaia, N.A.
NAME:	Seasonal freezing and thawing dynamics

PUB: Moscow, GUGK, 1971
SCALE: 1:12 000 000
SOURCE: Tyumen region atlas, publish 1, p.15
REGION: West Siberia
LEGEND Depths and dates of freezing and thawing
LAT/LONG: 56°00-73°00/60°00-87°00
INSTITUTE: Moscow State University
NUMBER 00299

AUTHOR Shpolianskaia, N.A.
NAME: Seasonal freezing and thawing of soils in West Siberia
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:12 000 000
SOURCE: Shpolianskaia, N.A. "West Siberian permafrost region and the tendency for development", p.40
REGION: West Siberia
LEGEND Depths of seasonal thaw and freezing in permafrost and unfrozen ground and organic soils
LAT/LONG: 55°00-74°00/65°00-85°00
INSTITUTE: Moscow State University
NUMBER 00300

AUTHOR Shpolianskaia, N.A.
NAME: Sketch-map of permafrost in West Siberia
PUB: Moscow, Nauka, 1976
SCALE: 1:12 000 000
SOURCE: "Questions of global cryology", p.51
REGION: West Siberia
LEGEND Areas of untouched and closed contemporary and relict permafrost, deep bedding of relict permafrost; zones: permafrost expansion, permafrost steady-state conditions, permafrost degradation, forecast to the end of century
LAT/LONG: 60°00-74°00/55°00-90°00
INSTITUTE: Moscow State University
NUMBER 00301

AUTHOR Shpolianskaia, N.A.
NAME: West Siberian North Regionalization scheme referring to the Ob River run off shortening influence under the permafrost
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:10 000 000
SOURCE: Shpolianskaia, N.V. "West Siberian permafrost region and the tendency for development", p.146
REGION: West Siberia
LEGEND Southern limit of permafrost in ground and peatlands, southern limit of relict permafrost
LAT/LONG: 60°00-72°00/60°00-80°00
INSTITUTE: Moscow State University
NUMBER 00302

AUTHOR Shpolianskaia, N.A.
NAME: West Siberian permafrost spreading, temperature and thickness
PUB: Moscow, Moscow University Publishers, 1981
SCALE: 1:12 000 000
SOURCE: Shpolianskaia, N.A. "West Siberian permafrost region and the tendency for development", p.8
REGION: West Siberia
LEGEND Areas, zones, types referring to permafrost expansion, temperature and thickness,

	single-layer and two-layer permafrost, southern limit of permafrost
LAT/LONG:	58°00-74°00/65°00-85°00
INSTITUTE:	Moscow State University
NUMBER	00303

AUTHOR	Slavianskii, A.M., Shpakov, O.N.
NAME:	Okhotsk Sea shore geocryology
PUB:	Novosibirsk, Nauka, 1975
SCALE:	1:1 000 000
SOURCE:	"Regional and special geocryological investigations"/ Edited by V.S. Iakupov, I.V. Klimovskii, p.19
REGION:	East Siberia
LEGEND	Permafrost expansion, thickness, taliks
LAT/LONG:	59°00-61°00/150°00-151°30
NUMBER	00304

AUTHOR	Solomatin, V. I.
NAME:	Scheme of geocryological zonality
PUB:	Novosibirsk, Nauka, 1986
SCALE:	1:50 000 000
SOURCE:	Solomatin, V.I. "Petrogenesis of ground ice", p.203
REGION:	USSR
LEGEND	Boundaries: geocryological zone, natural zonality
LAT/LONG:	50°00-80°00/40°00-170°00
INSTITUTE:	Moscow State University
NUMBER	00305

AUTHOR	Solomatin, V.I.
NAME:	Cryolithozone landscape structure
PUB:	Moscow, Moscow University Publishers, 1992
SCALE:	1:80 000 000
SOURCE:	"Geoecology of the North (introduction in geocryoecology)"/ Edited by V.I. Solomatin, p.19
REGION:	Northern Hemisphere
LEGEND	Boundary of cryolithozone, types and subtypes: subarctic, boreal, subboreal
LAT/LONG:	40°00-90°00/
INSTITUTE:	Moscow State University
NUMBER	00306

AUTHOR	Solomatin, V.I.
NAME:	Scheme of regionalization of cryolithozone in Eurasia
PUB:	Novosibirsk, Nauka, 1986
SCALE:	1:50 000 000
SOURCE:	Solomatin, V.I. "Petrogenesis of ground ice", p.206
REGION:	The USSR
LEGEND	Boundaries: geocryological zone, morphostucture, natural zonality
LAT/LONG:	50°00-80°00/40°00-170°00
INSTITUTE:	Moscow State University
NUMBER	00307

AUTHOR	Solovev, P.A.
NAME:	Alas valley is in a primitive state of development on Lena River
PUB:	Moscow, Academy of Sciences Publishers, 1963
SCALE:	1:10 000
SOURCE:	"Conditions and permafrost development features in Siberia and North-East", p.84. In the article by Solovev, P.A. p.80-90
REGION:	Central Yakutia

LEGEND Polygon wedge ice thawing, bed of thermokarst depression, limit of icy complex, polygonal system in depression, slope brow of alas valley
LAT/LONG: 60°00-68°00/120°00-140°00
INSTITUTE: Geocryological Institute
NUMBER 00308

AUTHOR Solovev, P.A.
NAME: Lithological composition of ground at a depth of 2 m in the Yakutsk district
PUB: Yakutsk, Yakutsk Republican Printing Plant, 1958
SCALE: Large
SOURCE: "Transactions of the North-East Permafrost Institute department", no. 1, p.182. In the article by Solovev, P.A. p.179-191
REGION: Yakutia
LEGEND Average annual temperature geoisotherms at the depth of 10 m, lithological composition
LAT/LONG: 62°30/129°30
INSTITUTE: Permafrost Institute
NUMBER 00309

AUTHOR Solovev, P.A.
NAME: Mature alas valley of Kokhara River
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:100 000 000
SOURCE: "Conditions and permafrost development features in Siberia and North-East", p.83. In the article by Solovev, P.A. p.80-90
REGION: Central Yakutia
LEGEND Thermokarst is in a primitive state of development, alas depression, lake depression on alas valley floor
LAT/LONG: 60°00-68°00/120°00-140°00
INSTITUTE: Geocryological Institute
NUMBER 00310

AUTHOR Solovev, P.A.
NAME: The geoisotherms arrangement dependent on the age of Yakutsk town construction
PUB: Yakutsk, Yakutsk Republican Printing Plant, 1958
SCALE: Large
SOURCE: "Transaction of the North-East Permafrost Institute department", no. 1, p.184. In the article by Solovev, P.A. p.179-191
REGION: Yakutia
LEGEND Geoisotherms, geomorphological levels, places of building
LAT/LONG: 62°30/129°30
INSTITUTE: Permafrost Institute
NUMBER 00311

AUTHOR Solovev, V.A., Telepnev, E.V.
NAME: Sketch-map of arctic shelf cryolithozone
PUB: Leningrad: Nedra, 1983
SCALE: 1:10 000 000
SOURCE: "The primary problems of paleogeography of the Late Cenozoic in the Arctic", p.188
REGION: Arctic shelf
LEGEND Predominant unfrozen cryolithozone with cryopegs. Relict permafrost islands in area of extent of above zero temperature ground on ocean bed, cryopegs, predominant continuous permafrost, island permafrost
LAT/LONG: 68°00-84°00/20°00-162°00
NUMBER 00312

AUTHOR Soloviev, V.A.

NAME: Forecast map of Laptev and East-Siberian seas Arctic shelf permafrost
PUB: Yakutsk, Permafrost Insitute Publishers, 1979
SCALE: 1:10 000 000
SOURCE: Permafrost zone of Arctic shelf, p.36
REGION: Arctic shelf of the USSR
LEGEND Expansion and thickness of relict and contemporary permafrost
LAT/LONG: 70°00-80°00/108°00-170°00
INSTITUTE: Permafrost Institute
NUMBER 00313

AUTHOR Soloviev, V.A.
NAME: Ground with cryopegs expansion and permafrost in Arctic Ocean and Barents sea shelf zones
PUB: Moscow, Nauka, 1988
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.260
REGION: Barents Sea
LEGEND Ground thickness with seasonal and perennial cryopegs, permafrost and seasonal frozen ground with cryopegs, sporadic and continuous permafrost thickness less than 50 m, relict ground ice
LAT/LONG: 64°00-82°00/30°00-75°00
NUMBER 00314

AUTHOR Soloviev, V.A., Michaluk, U.N.
NAME: Laptev Sea and East-Siberian Sea shelf in late Cenozoic
PUB: Leningrad, PGO "Sevmorgeologia", 1982
SCALE: 1:20 000 000
SOURCE: Hydrogeological and permafrost conditions of Arctic and Continental shelf of Eurasia, p.25
REGION: East Arctic shelf of the USSR
LEGEND Areas of the longest period of Pleistocene freezing, areas of short duration of freezing before Holocene, boundaries of the sea advance
LAT/LONG: 70°00-80°00/108°00-180°00
NUMBER 00315

AUTHOR Soloviev, V.A., Ginsburg, G.D.
NAME: Map of research areas location in Enisei-Khatanga and Leno-Anabar depression
PUB: Moscow, Nedra, 1989
SCALE: 1:20 000 000
SOURCE: Geocryology of the USSR. Central Siberia / edited by E.D. Ershov, p.156
REGION: Central Siberia
LEGEND Permafrost zone thickness (established and assumed)
LAT/LONG: 70°00-75°00/85°00-130°00
INSTITUTE: Permafrost Institute
NUMBER 00316

AUTHOR Spesivtsev, V.I., Leshchikov, F.N.
NAME: Sketch-map of permafrost conditions in upper part of Kulenga River
PUB: Novosibirsk, Nauka, 1983
SCALE: Large
SOURCE: Leshchikov, F.N., Shats, M.M. South Central Siberia permafrost, p.140
REGION: Central Siberia
LEGEND Expansion, temperature, thickness, depth of seasonal freeze and thaw, cryogenic processes and permafrost terrain
LAT/LONG: 56°00-59°00/105°00-107°00
INSTITUTE: Permafrost Institute

NUMBER 00317

AUTHOR Sukhodolskii, S.E.
NAME: European North-East zoning scheme referring to conditions of paragenesis association between ground water and permafrost
PUB: Moscow, Nauka, 1982
SCALE: 1:7 500 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.135
REGION: North-East European part of the USSR
LEGEND Condition types: platform, submontane. Condition grades: northern, southern. Condition facies : water-chemical delay, water-thermal delay, water-thermal intensive. Index of hydrogeocryological district
LAT/LONG: 65°00-67°00/56°00-58°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00318

AUTHOR Sukhodolskii, S.E., Kaznacheeva, I.A., Kondratieva, K.A., Oberman, N.G., Soloviev, V.A.
NAME: European North of the USSR zoning scheme referring to discontinuous permafrost
PUB: Moscow, Nauka, 1988
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.229
REGION: European North of the USSR
LEGEND Expansion
LAT/LONG: 60°00-85°00/40°00-60°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00319

AUTHOR Sukhodolskii, S.E.
NAME: European North of the USSR zoning referring to permafrost age
PUB: Moscow, Nauka, 1988
SCALE: 1:10 000 000
SOURCE: Geocryology of the USSR. European territory of the USSR / edited by E.D. Ershov, p.212
REGION: North of European part of the USSR
LEGEND Age and genesis of permafrost, permafrost expansion, vertical structure
LAT/LONG: 64°00-76°00/32°00-72°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00320

AUTHOR Sukhodolskii, S.E.
NAME: Geocryological scheme of Yanei-ti-vis head stream
PUB: Moscow, Nauka, 1982
SCALE: Large
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.117
REGION: North-East European part of the USSR
LEGEND Permafrost thickness, open talik, thermokarst lakes, surface springs
LAT/LONG: 65°00-67°00/56°00-58°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00321

AUTHOR Sukhodolskii, S.E.
NAME: Geocryological zones European North- East
PUB: Moscow, Nedra, 1985
SCALE: 1:5 000 000
SOURCE: Baulin, V.V. "Permafrost in oil-gas containing regions of the USSR", p.86
REGION: European North-East
LEGEND Permafrost zones, of continuous and discontinuous permafrost

LAT/LONG: 66°00-70°00/52°00-66°00
INSTITUTE: PNIIIS, Gosstroi, USSR
NUMBER 00322

AUTHOR Sukhodolskii, S.E.
NAME: Map of native taliks in North-East European part of the USSR
PUB: Moscow, Nauka, 1982
SCALE: 1:5 000 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.110
REGION: North-East European part of the USSR
LEGEND Under interblock depression taliks, under drainage line taliks, under temporary stream valley taliks: closed, open, saline water interapermafrost taliks, intrapermafrost taliks in Cenozoic deposits, permafrost zones boundaries
LAT/LONG: 48°00-66°00/64°00-70°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00323

AUTHOR Sukhodolskii, S.E., Kondratieva, K.A.
NAME: Map of permafrost expansion and average annual temperature in North-East European part of the USSR
PUB: Moscow, Nauka, 1982
SCALE: 1:5 000 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.30
REGION: North-East European part of the USSR
LEGEND Permafrost average annual temperature and taliks, permafrost expansion, permafrost zones and zonal boundaries, index geocryological zones
LAT/LONG: 48°00-66°00/64°00-70°00
INSTITUTE: Moscow State University, PNIIIS, Gosstroi USSR
NUMBER 00324

AUTHOR Sukhodolskii, S.E.
NAME: North-East European part of the USSR permafrost thickness map
PUB: Moscow, Nauka, 1982
SCALE: 1:5 000 000
SOURCE: Sukhodolski S.E. "Underground water and permafrost paragenesis", p.42
REGION: North-East European part of the USSR
LEGEND Permafrost thickness (14 ranges), unfrozen ground, depth of relict permafrost table
LAT/LONG: 48°00-66°00/64°00-70°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00325

AUTHOR Sukhodolskii, S.E., Parmuzin, S.IU., Streletskaia, I.D.
NAME: Sketch-map of geocryological zoning of Bovanenkovo tectonic structure territory
PUB: Moscow, Stroiizdat, 1984
SCALE: Large
SOURCE: Geocryological conditions and their change forecast in the primary development regions of the North, p.69
REGION: West Siberia
LEGEND Geocryological regions and subregions (types of freezing, genesis, age, ice content, lithological composition, temperature, depth of thaw, depth of sheet ice table, cryogenic processes and frozen ground features)
LAT/LONG: 70°00-71°00/68°00-69°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00326

AUTHOR Sumgin, M.I.

NAME: Southern limit of permafrost in West Siberia plain on evidence from some scientists
PUB: Novosibirsk, Nauka, 1990
SCALE: 1:8 000 000
SOURCE: Nekrasov, I.A., *et. al.* "Geocryological investigations history in West Siberia", p.12
REGION: West Siberia
LEGEND Boundaries by Vild (1882), Yachevskomu (1989), Shtini and Mushketov (1925), Shostakovich (1928), Berg (1931), Evdokimov-Rokotovski (1931), Sumginu (1931)
LAT/LONG: 62°00-74°00/60°00-90°00
NUMBER 00327

AUTHOR Svitoch, A.A., Khorev, V.S.
NAME: Geomorphological scheme of Anadyr lowland southern shore
PUB: Moscow, Nauka, 1980
SCALE: Large
SOURCE: "Recent deposits and paleogeography of Pleistocene in the Chukchi Sea", p.47
REGION: Chukchi Sea
LEGEND Solifluction slopes
LAT/LONG: 63°00-65°00/175°00-180°00
INSTITUTE: Pacific Ocean Geographical Insitute
NUMBER 00328

AUTHOR Svitoch, A.A.
NAME: Geomorphological scheme of the shore (northern Konergino settlement)
PUB: Moscow, Nauka, 1980
SCALE: Large
SOURCE: "Recent deposits and paleogeography of Pleistocene in the Chukchi Sea", p.9
REGION: Chukchi Sea
LEGEND Places of active wedge ice thawing
LAT/LONG: 65°00-68°00/180°00-175°00
NUMBER 00329

AUTHOR Tolstikhin, O.N.
NAME: Hydrogeological scheme
PUB: Novosibirsk, Nauka, 1974
SCALE: 1:12 000 000
SOURCE: Inset-map in monograph "Icing and underground water of the North-East USSR" by Tolstikhin, O.N.
REGION: North-East of USSR
LEGEND Cryogenic basins, hydrogeological massifs and structures
LAT/LONG: 60°00-75°00/125°00-170°00
INSTITUTE: Permafrost Institute
NUMBER 00330

AUTHOR Tomirdiaro, S.V.
NAME: Contemporary extent of Neopleistocene icy complex (edoma) and Holocene lake-alas plains (East-Siberian lowland)
PUB: Moscow, Nauka, 1980
SCALE: 1:20 000 000
SOURCE: Tomirdiaro, S.V. "Ice complex of East-Siberia in Neopleistocene and Holocene", p.26
REGION: North-East
LEGEND Holocene thermokarst lake-alas plain, large icy complexes and relict Neopleistocene plain
LAT/LONG: 62°00-74°00/130100-170°00
NUMBER 00331

AUTHOR Tomirdiaro, S.V., in base of map by Velichko A.A.
NAME: General permafrost-glacial condition in Neopleistocene

PUB: Moscow, Nedra, 1978
SCALE: 1:400 000 000
SOURCE: Tomirdiaro, S.V. "Natural processes and industrialization of territory in permafrost zone", p.8
REGION: Global
LEGEND Limits of permafrost in Neopleistocene and at present, limits of glaciations, sea ice, Neopleistocene sea ice cover
NUMBER 00332

AUTHOR Tomirdiaro, S.V., Shilo, N.A.
NAME: Geocryological-geomorphological sketch-map of North-East of the USSR
PUB: Moscow, Nedra, 1978
SCALE: 1:15 000 000
SOURCE: Tomirdiaro, S.V. "Natural processes and industrialization of territory of permafrost zone", p.4
REGION: North-East
LEGEND Polygonal wedge ice (active, degradation, stable), degradation island permafrost, solifluction lobes, larger icings, annual temperature of ground isotherms in upper part of permafrost
LAT/LONG: 55°00-80°00/125°00-170°00
NUMBER 00333

AUTHOR Tomirdiaro, S.V.
NAME: Permafrost-landscape sketch-map of Anadyr lowland
PUB: Magadan, Knizh. izd-vo, 1972
SCALE: 1:5 000 000
SOURCE: Tomirdiaro, S.V. "Perennial frost and industrialization of the mountain countries and lowlands, the Magadan area and Yakutia", p.64
REGION: North-East
LEGEND The landscapes: alas, undulating-morainic, kettlehole-lake on different geomorphological levels
LAT/LONG: 62°00-67°00/168°-178°00
NUMBER 00334

AUTHOR Tomirdiaro, S.V.
NAME: Scheme of glacier, loesses and loessial-glacial plains in the Northern Hemisphere
PUB: Magadan, Knizh. izd-vo, 1972
SCALE: 1:200 000 000
SOURCE: Tomirdiaro, S.V. "Perennial frost and industrialization in mountain countries and lowlands, the Magadan area and Yakutia", p.6
REGION: Northern Hemisphere
LEGEND Contemporary limit of permafrost in Eurasia and North America, loessial-glacial plains, loessial surface formations, glaciers, assumed zone of marine glaciation"
NUMBER 00335

AUTHOR Tomirdiaro, S.V.
NAME: Sketch-map of frost-glacial condition in the Northern Hemisphere
PUB: Magadan, Academy of Sciences Publishers, 1971
SCALE: 1:300 000 000
SOURCE: "Periglacial processes", no.38, p.139
REGION: Global
LEGEND Contemporary limit of permafrost zone
NUMBER 00336

AUTHOR Trofimov, V.T., Badu, IU.B, Vasilchuk, IU.K.
NAME: A change of macro-ice content in deposits of Mamont and Olenii peninsula (active growth

	of polygon wedge ice)
PUB:	Moscow, Moscov' University Publishers, 1986
SCALE:	1:1 000 000
SOURCE:	"Engineering-geological conditions of Gydan Peninsula", p.184
REGION:	West Siberia, Gydan Peninsula
LEGEND	Situation in different periods: on boundary of Pleistocene and Holocene, at present time, macro-ice content shown in scale map
LAT/LONG:	71°00-72°30/76°30-78°30
INSTITUTE:	Moscow State University
NUMBER	00337

AUTHOR	Trofimov, V.T., Badu, IU.B., Vasilchuk, IU.K.
NAME:	Permafrost extent and contemporary trend of polygonal ice wedge development in territory of Gydan Peninsula
PUB:	Moscow, Moscow University Publishers, 1986
SCALE:	1:3 000 000
SOURCE:	"Engineering-geological conditions of Gydan Peninsula", p.183
REGION:	West Siberia, Gydan Peninsula
LEGEND	Zones of combined extent of relict and contemporary wedge ice, subzones of contemporary syngenesis and epigenesis polygonal wedge ice, degradation of wedge ice as a result of activity of erosion and temperature rise
LAT/LONG:	67°30-74°00/73°00-84°00
INSTITUTE:	Moscow State University
NUMBER	00338

AUTHOR	Trofimov, V.T., Gruzdov, I.V., Tyrtikov, A.P.
NAME:	Permafrost thickness (m)
PUB:	Moscow, Nauka, 1972
SCALE:	1:2 500 000
SOURCE:	"Natural conditions of the Tazovskii oil-gas containing region industrialization", p.86
REGION:	West Siberia
LEGEND	Permafrost thickness (5 ranges)
LAT/LONG:	63°00-68°00/78°00-87°00
INSTITUTE:	Moscow State University
NUMBER	00339

AUTHOR	Trofimov, V.T., Gruzdov, I.V., Tyrtikov A.P.
NAME:	Scheme of distribution of average annual temperature of perennial frozen and unfrozen ground
PUB:	Moscow, Nauka, 1972
SCALE:	1:2 500 000
SOURCE:	"Natural conditions of the Tazovskii oil-gas containing region industrialization", p.89
REGION:	West Siberia
LEGEND	Average annual temperature of ground (4 ranges)
LAT/LONG:	63°00-68°00/78°00-87°00
INSTITUTE:	Moscow State University
NUMBER	00340

AUTHOR	Trofimov, V.T., Badu, IU.B., Vasilchuk, IU.K.
NAME:	Scheme of engineering-geological regionalization of Gydan Peninsula
PUB:	Moscow, Moscow University Publishers, 1986
SCALE:	1:3 000 000
SOURCE:	"Engineering-geological conditions of Gydan Peninsula", p.197
REGION:	West Siberia, Gydan Peninsula
LEGEND	Engineering-geological subzones, areas (description of permafrost conditions in monograph)

LAT/LONG: 67°30-74°00/73°00-84°00
INSTITUTE: Moscow State University
NUMBER 00341

AUTHOR Trofimov, V.T.
NAME: Scheme of engineering-geological regionalization of Taz drainage basin
PUB: Moscow, Nauka, 1972
SCALE: 1:2 500 000
SOURCE: "Natural conditions of the Tazovskii oil-gas containing region industrialization", p.36
REGION: West Siberia
LEGEND Engineering-geological regions and their indexes (explanations in text p.35-37: permafrost spread)
LAT/LONG: 63°00-68°00/78°00-87°00
INSTITUTE: Moscow State University
NUMBER 00342

AUTHOR Trofimov, V.T.
NAME: Scheme of engineering-geological zoning of West Siberia platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.248
REGION: West Siberia
LEGEND Expansion, geological-genesis complexes
LAT/LONG: 51°00-74°00/60°00-90°00
INSTITUTE: Moscow State University
NUMBER 00343

AUTHOR Trofimov, V.T., Datsko, L.T.
NAME: Scheme of ground type in West Siberian platform
PUB: Moscow, Moscow University Publishers, 1977
SCALE: 1:10 000 000
SOURCE: Trofimov, V.T. "Regularities of spatial variability for engineering-geological conditions in West Siberia platform", p.184
REGION: West Siberia
LEGEND Unfrozen ground, permafrost, permafrost in the lowermost layer of ground and unfrozen ground in upper part of section, ice content
LAT/LONG: 62°00-74°00/60°00-90°00
INSTITUTE: Moscow State University
NUMBER 00344

AUTHOR Trofimov, V.T., Gruzdov, I.V., Tyrtikov, A.P.
NAME: Scheme of permafrost and unfrozen ground on different geomorphological levels
PUB: Moscow, Nauka, 1972
SCALE: 1:2 500 000
SOURCE: "Natural conditions of the Tazovskii oil-gas containing region industrialization", p.82
REGION: West Siberia
LEGEND Permafrost extent, geomorphological levels, lines of schematic geocryological sections
LAT/LONG: 63°00-68°00/78°00-87°00
INSTITUTE: Moscow State University
NUMBER 00345

AUTHOR Trofimov, V.T., Firsov, N.G.
NAME: West- Siberian platform zoning scheme referring to contemporary exogenesis geological processes and phenomena
PUB: Moscow, Moscow University Publishers, 1986

SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.179
REGION: West Siberia
LEGEND Contemporary processes and phenomena of extent zone in permafrost region (continuous and discontinuous permafrost expansion)
LAT/LONG: 50°00-72°00/60°00-92°00
INSTITUTE: Moscow State University
NUMBER 00346

AUTHOR Trush, N.I., Chizhova, N.E.
NAME: Geocryological map of Aldano-Timpton interfluve
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:2 000 000
SOURCE: Ospennikov, E.N., Trush, N.I., Chizhov, A.B., Chizhova, N.I. Exogenesis geological processes and phenomena, p.24
REGION: South Yakutia
LEGEND Expansion, temperature, thickness, ice content, cryogenic structure, cryogenic phenomena, lithological composition of grounds
LAT/LONG: 57°00-69°00/123°00-128°00
INSTITUTE: Moscow State University
NUMBER 00347

AUTHOR Tsitovich, N.A.
NAME: Map of the depth of seasonal freezing of loam, loamy sand and clay in the USSR by normatives and specifications
PUB: Moscow, Academy of Sciences Publishers, 1958
SCALE: 1:30 000 000
SOURCE: Tsitovich, N.A. "Foundations in permafrost", p.14
REGION: European part of the USSR and West Siberia
LEGEND Isoline of normative depths of freezing loam, loamy sand and clay
LAT/LONG: 40°00-68°00/24°00-84°00
NUMBER 00348

AUTHOR Tumel, V.F.
NAME: Map of permafrost in the USSR
PUB: Moscow, Academy of the USSR, 1946
SCALE: 1:8 000 000
SOURCE: Permafrost Studies, 1(1), p.5-11
REGION: USSR
LEGEND Expansion, northern boundaries of area with temperature at the depth of 10 m above a -5, -3, -1°C, thickness
LAT/LONG: 40°00-82°00/30°00-170°00
NUMBER 00349

AUTHOR Vasilchuk, IU.K.
NAME: A correlation between oxygen-18 content in contemporary wedge ice (formed in Eurasian permafrost over the last 100 years) and summary of winter temperature
PUB: Moscow, Nauka, 1991
SCALE: 1:35 000 000
SOURCE: Vasilchuk, IU.K. "Late Quaterary syngenesis permafrost strata of the North of Eurasia: structure, oxygen-isotope content and conditions of formation", abstract thesis, p.16
REGION: North of Eurasia
LEGEND Southern limit of contemporary active growth wedge ice
LAT/LONG: 60°00-80°00/40°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR

SCALE: 1:7 500 000
SOURCE: West-Siberian platform exodynamic (spatial-temporal regularities) / edited by V.T. Trofimov, p.179
REGION: West Siberia
LEGEND Contemporary processes and phenomena of extent zone in permafrost region (continuous and discontinuous permafrost expansion)
LAT/LONG: 50°00-72°00/60°00-92°00
INSTITUTE: Moscow State University
NUMBER 00346

AUTHOR Trush, N.I., Chizhova, N.E.
NAME: Geocryological map of Aldano-Timpton interfluve
PUB: Moscow, Moscow University Publishers, 1980
SCALE: 1:2 000 000
SOURCE: Ospennikov, E.N., Trush, N.I., Chizhov, A.B., Chizhova, N.I. Exogenesis geological processes and phenomena, p.24
REGION: South Yakutia
LEGEND Expansion, temperature, thickness, ice content, cryogenic structure, cryogenic phenomena, lithological composition of grounds
LAT/LONG: 57°00-69°00/123°00-128°00
INSTITUTE: Moscow State University
NUMBER 00347

AUTHOR Tsitovich, N.A.
NAME: Map of the depth of seasonal freezing of loam, loamy sand and clay in the USSR by normatives and specifications
PUB: Moscow, Academy of Sciences Publishers, 1958
SCALE: 1:30 000 000
SOURCE: Tsitovich, N.A. "Foundations in permafrost", p.14
REGION: European part of the USSR and West Siberia
LEGEND Isoline of normative depths of freezing loam, loamy sand and clay
LAT/LONG: 40°00-68°00/24°00-84°00
NUMBER 00348

AUTHOR Tumel, V.F.
NAME: Map of permafrost in the USSR
PUB: Moscow, Academy of the USSR, 1946
SCALE: 1:8 000 000
SOURCE: Permafrost Studies, 1(1), p.5-11
REGION: USSR
LEGEND Expansion, northern boundaries of area with temperature at the depth of 10 m above a -5, -3, -1°C, thickness
LAT/LONG: 40°00-82°00/30°00-170°00
NUMBER 00349

AUTHOR Vasilchuk, IU.K.
NAME: A correlation between oxygen-18 content in contemporary wedge ice (formed in Eurasian permafrost over the last 100 years) and summary of winter temperature
PUB: Moscow, Nauka, 1991
SCALE: 1:35 000 000
SOURCE: Vasilchuk, IU.K. "Late Quaterary syngenesis permafrost strata of the North of Eurasia: structure, oxygen-isotope content and conditions of formation", abstract thesis, p.16
REGION: North of Eurasia
LEGEND Southern limit of contemporary active growth wedge ice
LAT/LONG: 60°00-80°00/40°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR

PUB: Moscow, Nauka, 1973
SCALE: 1:80 000 000
SOURCE: "Natural process in Pleistocene", p.174
REGION: North America
LEGEND Assumed permafrost zones, contemporary permafrost zone
LAT/LONG: 30°00-80°00/00°00-160°00
INSTITUTE: Geographical Institute
NUMBER 00355

AUTHOR Velichko, A.A.
NAME: Cryogenic area of Northern Hemisphere in third stage of Pleistocene
PUB: Moscow, Nauka, 1973
SCALE: 1:150 000 000
SOURCE: "Natural process in Pleistocene", p.114
REGION: Northern Hemisphere
LEGEND Sea glaciation, permafrost, ice cover glaciation
LAT/LONG: 40°00-90°00/
INSTITUTE: Geographical Institute
NUMBER 00356

AUTHOR Velichko, A.A.
NAME: Degradation of sea ice and permafrost in passing from the third stage of Pleistocene to present time
PUB: Moscow, Nauka, 1973
SCALE: 1:200 000 000
SOURCE: Inset-map in the monograph by Velichko, A.A. "Natural process in Pleistocene"
REGION: Global
LEGEND Areas of degradation: permafrost, sea ice, limits of cover ice, permafrost, pack ice, sea ice, relict permafrost
INSTITUTE: Geographical Institute
NUMBER 00357

AUTHOR Velichko, A.A.
NAME: Marine cover ice spread, permafrost and regression of the ocean in upper Pleistocene (the third stage)
PUB: Moscow, Nauka, 1973
SCALE: 1:200 000 000
SOURCE: "Natural process in Pleistocene", p.173
REGION: Global
LEGEND Limits: permafrost, sea ice, pack ice, area of ocean regression (northern permafrost zone)
INSTITUTE: Geographical Institute
NUMBER 00358

AUTHOR Velichko, A.A.
NAME: Relict permafrost degradation in Eurasia
PUB: Moscow, Nauka, 1973
SCALE: 1:80 000 000
SOURCE: "Natural process in Pleistocene", p.130
REGION: USSR and Eastern Europe
LEGEND Zone of degradation on the land and on the sea, contemporary permafrost, contemporary sea ice spread, limit of permafrost
LAT/LONG: 40°00-80°00/00°00-170°00
INSTITUTE: Geographical Institute
NUMBER 00359

AUTHOR Velichko, A.A.

NAME: Scheme of relict permafrost ("periglacial") morphosculpture on Russian plain
PUB: Moscow, Nauka, 1973
SCALE: 1:5 000 000
SOURCE: "Natural process in Pleistocene", p.111
REGION: European part of the USSR
LEGEND Southern limits of contemporary and Pleistocene permafrost zones, cryogenic relief in permafrost zone: relict cryogenic and thermokarst relief, contemporary polygon relief, hillocky terrain, thermokarst, relict thermokarst
LAT/LONG: 40°00-70°00/30°00-60°00
INSTITUTE: Geographical Institute
NUMBER 00360

AUTHOR Vologodski, G.P., Gerakov, N.N., Doronina, M.A., Zaikova, Z.I., Zarubin, N.E., Palshin, G.B., Portnova, V.P.
NAME: Engineering-geological conditions of Transbaikal region
PUB: Moscow-Irkutsk, 1967
SCALE: 1:3 500 000
SOURCE: Atlas Zabaikale, p.16-17
REGION: Transbaikal
LEGEND Cryogenic processes
LAT/LONG: 58°30'-49°50'/100°00-140°00
INSTITUTE: Siberia and Far East Institute Academy of Science of the USSR
NUMBER 00361

AUTHOR Vtiurin, B.I.
NAME: Sketch-map for total evident ice content of permafrost in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.172
REGION: USSR
LEGEND Ice content in percent to a depths of - 5m, 10m, 20m, 30m, 50m, districts of ice sheets expansion, frost mounds, wedge ice, glaciers
LAT/LONG: 38°00-80°00/30°00-190°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00362

AUTHOR Vtiurin, B.I.
NAME: Sketch-map for total evident ground ice reserves in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.174
REGION: USSR
LEGEND Reserves of various types of ice
LAT/LONG: 38°00-80°00/30°00-190°00
INSTITUTE: pacific Ocean Institute of Geography
NUMBER 00363

AUTHOR Vtiurin, B.I.
NAME: Sketch-map for ice wedges extent in USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.142
REGION: USSR
LEGEND Wedge ice expansion in percent of area, boundaries: contemporary permafrost, relict permafrost and expansion of wedge ice
LAT/LONG: 38°00-82°00/30°00-170°00

INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00364

AUTHOR Vtiurin, B.I., Shum'skii, P.A.
NAME: Sketch-map of injective ice extent
PUB: Moscow, Academy of Sciences Publishers, 1963
SCALE: 1:40 000 000
SOURCE: "Permafrost International Conference reports "/ edited by Tsitovich, N.A., p.45
REGION: The USSR
LEGEND Southern limit of permafrost, frost mounds (seasonal, perennial) on lake taliks and springs, relict sheet ice and injective ice (existence and assumed)
LAT/LONG: 38°00-82°00/20°00-170°00
INSTITUTE: Geographical Institute
NUMBER 00365

AUTHOR Vtiurin, B.I.
NAME: Sketch-map of permafrost with various structures
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.166
REGION: USSR
LEGEND Permafrost (epigenesis and syngenesis types), polygenesis, two horizon permafrost
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00366

AUTHOR Vtiurin, B.I.
NAME: Sketch-map of massive ice extent in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:25 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.136
REGION: USSR
LEGEND Frost mounds, sheet ice, wedge ice, cave ice, buried ice, unknown origin ice, glaciers
LAT/LONG: 38°00-82°00/30°00-190°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00367

AUTHOR Vtiurin, B.I.
NAME: Sketch-map the extent of permafrost with various structures
PUB: Moscow, Nedra, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.102
REGION: USSR
LEGEND Syngenesis and epigenesis permafrost
LAT/LONG: 38°00-82°00/30°00-170°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00368

AUTHOR Vtiurin, B.I.
NAME: Sketch-maps of area and volumetric macro-ice content at the expanse of wedge ice in the USSR
PUB: Moscow, Nauka, 1975
SCALE: 1:50 000 000
SOURCE: Vtiurin, B.I. Ground ice in the USSR, p.179-180
REGION: USSR
LEGEND Ice area in percent, volumetric macro-ice content on the different depths (to 30m)

LAT/LONG: 38°00-80°00/30°00-190°00
INSTITUTE: Pacific Ocean Institute of Geography
NUMBER 00369

AUTHOR Vtiurina, E.A.
NAME: General map of seasonal frozen ground
PUB: Moscow, Nauka, 1984
SCALE: 1:30 000 000
SOURCE: Inset-map in monograph "Seasonal frozen ground" by Vtiurina, E.A.
REGION: USSR
LEGEND Types of seasonal frozen ground of northern, intermediate and southern zones
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00370

AUTHOR Vtiurina, E.A.
NAME: General map of seasonal cryogenic ground
PUB: Moscow, Nauka, 1984
SCALE: 1:30 000 000
SOURCE: Inset-map in monograph "Seasonal frozen ground" by Vtiurina, E.A.
REGION: USSR
LEGEND Northern, transitional, intermediate, southern seasonal frozen ground and their combinations
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00371

AUTHOR Vtiurina, E.A.
NAME: Sketch-map of cryogenic structure of seasonal frozen ground
PUB: Moscow, Nauka, 1984
SCALE: 1:30 000 000
SOURCE: Inset-map in monograph "Seasonal frozen ground" by Vtiurina, E.A.
REGION: USSR
LEGEND Type of seasonal frozen ground, cryogenic structure, present wedge ice, icing, lake, glacial, river buried ice
LAT/LONG: 38°00-80°00/20°00-170°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00372

AUTHOR Vtiurina, E.A.
NAME: Sketch-map of landscapes of Bolshezemel tundra
PUB: Moscow, TSINIS, 1971
SCALE: Large
SOURCE: "Geocryological and hydrogeological research for engineering investigations", Transactions of PNIIIS, vol. 8, p.100
REGION: European North
LEGEND Peatlands, spot medallions, frost mounds
LAT/LONG: 65°00-70°00/45°00-65°00
INSTITUTE: PNIIIS, Gosstroi USSR
NUMBER 00373

AUTHOR Zhigarev, L.A.
NAME: Map-scheme of permafrost of East-Siberian Sea and Chukchi Sea
PUB: Moscow, Nauka, 1981
SCALE: 1:12 000 000
SOURCE: Inset-map in Collection articles "History of permafrost development in Eurasia". In the

	article by Zhigarev, L.A. p.181-191
REGION:	North-East USSR
LEGEND	Permafrost and seasonal supercooled ground, relict permafrost, contempopary and relict permafrost extent in sea shore zone, isolines of the depth of zero annual amplitude, limit of permafrost complexes
LAT/LONG:	65°00-76°00/135°00-170°00
INSTITUTE:	Moscow State University
NUMBER	00374
AUTHOR NAME:	Zhigarev, L.A., Parmuzin, O.IU.
	Thermal stablity of permafrost for cold and warm climatic rhythms for different snow and vegetation cover thicknesses (18 maps)
PUB:	Moscow, Moscow University Publishers, 1992
SCALE:	1:20 000 000
SOURCE:	"Geoecology of the North (Introduction in geocryoecology)"/ Edited by V.I. Solomatin, p.190-192
REGION:	The North of West Siberia
LEGEND	Thermal stability of permafrost for cold and warm climatic rhythms for different snow and vegetation cover thicknesses
LAT/LONG:	66°00-73°00/60°00-84°00
INSTITUTE:	Moscow State University
NUMBER	00375

RUSSIAN PERMAFROST MAP INVENTORY
INDEX BY SCALE

Numbers given refer to citations given in the inventory, p.33-113

SCALE: 1:1 000 000 —1:1 500 00

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SCALE: 1:8 000 000 — 1:10 000 000

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SCALE: 1:12 000 000 — 1:16 000 000

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SCALE: 1:20 000 000 — 1:25 000 000

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SCALE: 1:30 000 000 — 1:40 000 000

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SCALE: 1:50 000 000 — 1:80 000 000

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SCALE: 1:100 000 000 — 1:500 000 000

00089, 00310, 00231, 00356, 00259, 00197, 00357, 00123, 00358, 00335, 00146, 00336, 00332, 00105, 00271

SCALE: LARGE (No scale given)

00051, 00373, 00119, 00122, 00126, 00127, 00104, 00137, 00138, 00139, 00140, 00158, 00169, 00196, 00203, 00085, 00207, 00083, 00269, 00329, 00328, 00022, 00326, 00321, 00317, 00311, 00079, 00309, 00029, 00272, 00077, 00076, 00064, 00236, 00237, 00054, 00273, 00252, 00052, 00040, 00275, 00274

APPENDIX 6

LIST OF INSTITUTIONS IN RUSSIA AND THE COMMONWEALTH OF INDEPENDENT STATES INVOLVED IN STUDIES OF PERMAFROST AND SEASONALLY-FROZEN GROUND

Compiled by M. Liebman with additional entries extracted from "Spravochnik Organizatsti Nauchno-Tekhnicheskoi Sfery", All-Russian Scientific and Technical Information Center, Moscow, 1994, translated by R.G. Barry. We have included telephone numbers where available. However they may be incomplete. Please contact an international operator before placing a call.

INSTITUTE: All-Russia Federal Institute for Planning and Research
CITY: 319922 Kharkhov
ADDRESS: Prosp. Pravdy, 10
COUNTRY: UKRAINE
PHONE: 94-0687

INSTITUTE: All-Russia Gold and Rare Metal Research Institute (VNII-1)
CITY: 685000, Magadan
ADDRESS: Gagarina str., 12
COUNTRY: RUSSIA
PHONE: 2-5739

INSTITUTE: All-Russia Institute for Natural Protection and Reservations (VNIIpriroda)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Peshkov, Andrei Sergeevich
CITY: 113628, Moscow
ADDRESS: Znamenskoe-Sadky
COUNTRY: RUSSIA
PHONE: (095)423-0311

INSTITUTE: All-Russia Oil Geological Prospecting Research Institute (VNIGRY)
CITY: 191104, St. Petersburg
ADDRESS: Litejny Prospekt, 39,
COUNTRY: RUSSIA

INSTITUTE: All-Russia Research and Planning-Surveying Institute for Pipeline Hydrotransport (VNIIPI Gidrotruboprovod)
CITY: 125422, Moscow
ADDRESS: Solomennoi Storozhki Prosp., 12
COUNTRY: RUSSIA
PHONE: (095) 257-9852

INSTITUTE: All-Russia Research Institute for Hydrogeology and Engineering Geology (VSEGINGEO)
CITY: 142452, Moscow Region
ADDRESS: Noginsky District, Pos Zeleny
COUNTRY: RUSSIA
PHONE: (095)521-1101

INSTITUTE: All-Russia Research Institute for Hydrometeorological Information World Data Center-B (VNIIGMI-MCD)
CITY: 249020, Moscow Region
ADDRESS: Obninsk, Koroleva str., 6
COUNTRY: RUSSIA
PHONE: (08439)255-2194

INSTITUTE: All-Russia Research Institute for Survey Methods and Techniques (VITR)
CITY: 199106, St. Petersburg
ADDRESS: Vesel'naya, 6
COUNTRY: RUSSIA
PHONE: (812) 217-5049

INSTITUTE: Arctic and Antarctic Research Institute
CONTACT: Ivanov, Vladimir
CITY: 199226, St. Petersburg
ADDRESS: Bering str., 38
COUNTRY: RUSSIA
PHONE: (812) 352-26-88

INSTITUTE: Bashkirskiy State Scientific and Planning Insitute for the Oil Industry (Bashnipineft')
CITY: 450077, Ufa
ADDRESS: Lenina str., 86
COUNTRY: RUSSIA

INSTITUTE: Byelorussion Research Institute for Geological Survey (Byel NIERI)
CITY: 22060, Minsk GSP
ADDRESS: Staroborisovskiy Prop. 14
COUNTRY: BYELORUS

INSTITUTE: Center for International Projects (CMP)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Tikhanov, Sergei Eduardovich
CITY: 107078, Moscow
ADDRESS: Kedrov str., 8-1
COUNTRY: RUSSIA
PHONE: (095)207-4929

INSTITUTE: Chita Branch of the All-Russia Research, Planning and Construction Institute of Mining and Metallurgy of Non-ferrous Metals
CITY: 672078 Chita
ADDRESS: Lermontova str., 2
COUNTRY: RUSSIA

INSTITUTE: Chita Institute of Natural Resources
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Malchikova, Irina
CITY: 672014, Chita
ADDRESS: Nedorezov str., 16, ChIPR
COUNTRY: RUSSIA
PHONE: (30222)6-2233

INSTITUTE: Chita Polytechnical Institute
MINISTRY: Ministry for Higher Education, RF
CITY: 672076, Chita
ADDRESS: Kalinin str., 17
COUNTRY: RUSSIA
PHONE: (30222)3-1825

INSTITUTE: Coal Institute
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CITY: 650610, Kemerovo
ADDRESS: Rukavishnikova str., 21
COUNTRY: RUSSIA
PHONE: 28-1329

INSTITUTE: DalGiprotrans
MINISTRY: Ministry for Transport Construction
CONTACT: Solodovnikov, Boris Ivanovich
CITY: 680628, Khabarovsk
ADDRESS: Sheronov str., 56
COUNTRY: RUSSIA
PHONE: (4210)38-4860

INSTITUTE: Deep-Sea Oceanological Institute (TOL DVO RAN)
MINISTRY: Far Eastern Branch of the Russian Academy of Sciences
CITY: 690032 Vladivostok
ADDRESS: Radio str., 7
COUNTRY: RUSSIA
PHONE: 9-6500

INSTITUTE: Dokuchaev Soil Institute
MINISTRY: Academy for Agriculture
CONTACT: Naumov, Evgeny Mikhailovich
COUNTRY: RUSSIA
PHONE: (095) 230-8302

INSTITUTE: Far Eastern Research Institute for Planning-Surveying and Technological Construction (Dal'NIIS)
CITY: 690106, Vladivostok
ADDRESS: Borodinskaya, 14
COUNTRY: RUSSIA
PHONE: 6-0077

INSTITUTE: Federal Center for Geoecological Systems (FCGS)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Gavrilov, Vsevolod Valerianovich
CITY: 101000 Moscow
ADDRESS: Central Post Office, P.O.Box 785
COUNTRY: RUSSIA
PHONE: (095)254-4933

INSTITUTE: Federal Scientific Center for Problems of Ecological Risk (Ecorisk)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Kharchenko, Sergei Grigorievich
CITY: 103064, Moscow
ADDRESS: Obukh str., 10, INTEKO
COUNTRY: RUSSIA

INSTITUTE: Fundamentproekt
MINISTRY: Ministry for Construction RF
CONTACT: Minkin, Mark Abramovich
CITY: 125843, Moscow
ADDRESS: Volokolamskoe Shosse, 1
COUNTRY: RUSSIA
PHONE: (095)158-9538

INSTITUTE: Geofond
MINISTRY: All-Russia Geological Archive
CITY: 123806, Moscow
ADDRESS: 3 Magistralnaya str, 38
COUNTRY: RUSSIA

INSTITUTE: Geographical Institute of the Kazakh Republic (IGAN RK)
CITY: 480100, Alma-Ata
ADDRESS: Pushkina str., 99
COUNTRY: KAZAKHSTAN
PHONE: 61-8869

INSTITUTE: Geographical Institute of the Russian Academy of Sciences (IGAN RF)
CITY: 109017 Moscow
ADDRESS: Staromonetny Per., 29
COUNTRY: RUSSIA
PHONE: (095) 128-2854

INSTITUTE: Geological Geophysical Institute of the Uzbek Academy of Sciences (IGIGAN Ruz)
CITY: 017, Tashkent
ADDRESS: Suleimanovoy str., 33
COUNTRY: UZBEKISTAN
PHONE: (3912) 33-7741

INSTITUTE: Geological Institute of the Estonia Academy of Sciences
CITY: 200101, Tallinn
ADDRESS: Estonia Boul., 7
COUNTRY: ESTONIA
PHONE: 60-5120

INSTITUTE: Gidroproekt
CITY: 125813, Moscow
ADDRESS: GSP, Volokolamskoe Shosse, 2
COUNTRY: RUSSIA

INSTITUTE: Gidroproekt. Bratsk Department
CITY: 665705, Irkutsk Region, Bratsk
ADDRESS: Gydrostroitelei str., 57
COUNTRY: RUSSIA

INSTITUTE: Gidroproekt. East-Siberian Department
CONTACT: Pochekutov, K.E.
CITY: 660607, Moscow
ADDRESS: Prospekt Mira, 94
COUNTRY: RUSSIA

INSTITUTE: Gidrospetsgeologia
CITY: 123436, Moscow
ADDRESS: Marshal Rybalko str., 4
COUNTRY: RUSSIA

INSTITUTE: Giprogor
CITY: 125124, Moscow
ADDRESS: 1st Yamskoe Pole, 15
COUNTRY: RUSSIA

INSTITUTE: Giprotyumenneftegaz
CITY: 625000, Tyumen
ADDRESS: Respublika str., 62
COUNTRY: RUSSIA

INSTITUTE: Giprotyumenneftegaz. Nizhnevartovsk Branch
CITY: 626440, Nizhnevartovsk
ADDRESS: Chapaev str., 36a
COUNTRY: RUSSIA

INSTITUTE: Hydrometeorological Research Institute of the Russian Federation (Gidromet-tsentr RF)
CITY: 234353, Moscow
ADDRESS: Bol'shevistskaya, 9-13
COUNTRY: RUSSIA
PHONE: (095) 255-2222

INSTITUTE: Institute for Biological Problems of the North (IBPS DVO RAN)
MINISTRY: Far Eastern Branch of the Russian Academy of Sciences
CITY: 685000, Magadan
ADDRESS: Prosp. Kal Marxa, 24
COUNTRY: RUSSIA
PHONE: 2-0166

INSTITUTE: Institute for Earth Cryosphere
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Melnikov, Vladimir Pavlovich
CITY: 625033, Tyumen
ADDRESS: P.O. Box 2774
COUNTRY: RUSSIA
PHONE: (3452)24-5267

INSTITUTE: Institute for Ecological Problems of Nature Usage
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CONTACT: Ignatiev, Aleksei Evgenievich
CITY: 125319, Moscow
ADDRESS: Kochkovsky proezd, 3
COUNTRY: RUSSISA

INSTITUTE: Institute for Problems in Mechanics
MINISTRY: Russian Academy of Sciences
CITY: 117526, Moscow
ADDRESS: Prosp. Vernadskogo, 101
COUNTRY: RUSSIA
PHONE: (095) 434-2210

INSTITUTE: Institute for Problems in the Use of Natural Rsource and Ecology (IPIPRE AI RB)
MINISTRY: Russian Academy of Sciences
CITY: 220114, Minsk
ADDRESS: Staroborisovskiy Route, 10
COUNTRY: BYELORUS
PHONE: 64-2161

INSTITUTE: Institute for Problems of Industrial Ecology of the North
MINISTRY: Kola Scientific Branch of the Russian Academy of Sciences
CITY: 184200 Apatity
ADDRESS: Fersman str., 14
COUNTRY: RUSSIA

INSTITUTE: Institute for Problems of Northern Development (IPOS SO RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Cibulsky, Vladimir Romanovich
CITY: 625033, Tyumen
ADDRESS: P.O. Box 2774
COUNTRY: RUSSIA

INSTITUTE: Institute for Soil Sciences and Photosynthesis (IPFS)
MINISTRY: Russian Academy of Sciences
CONTACT: Gilichinsky, David Abramovich
CITY: 142292, Moscow Region
ADDRESS: Pushchino
COUNTRY: RUSSIA
PHONE: (2777)3-2604

INSTITUTE: Institute of Geography
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Alekseev, Vladimir Romanovich
CITY: 664033, Irkutsk
ADDRESS: Ulan-batorskaya str., 1
COUNTRY: RUSSIA
PHONE: (3952)46-2639

INSTITUTE: Institute of Oil and Gas Problems
MINISTRY: Russian Academy of Sciences
CITY: 117917, Moscow
ADDRESS: GSP-1, Leninsky Prospect,65, IPNG
COUNTRY: RUSSIA
PHONE: (095)135-8286

INSTITUTE: Institute of the Earth's Crust (IK RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Leshchikov, Fedor Nikolaevich
CITY: 664033, Irkutsk
ADDRESS: Lermontov str., 128
COUNTRY: RUSSIA
PHONE: (3952)46-5568

INSTITUTE: Institute YakutNIIPROalmaz
MINISTRY: Industrial and Research Joint Company "Yakutalmaz"
CONTACT: Novik, Pavel Evgenievich
CITY: 678170, Sakha (Yakutia) Republic
ADDRESS: Lenin str., 39
COUNTRY: RUSSIA
PHONE: (41136)2-2849

INSTITUTE: IrkutskGiprotrans
MINISTRY: Ministry for Transport Construction, RF
CITY: 664007, Irkutsk
ADDRESS: Dekabrskikh Sobytii str., 49
COUNTRY: RUSSIA
PHONE: (3952)4-1774

INSTITUTE: Kiev Construction Bureau. Main Office of Mechanized Construction
CITY: 252033, Kiev
ADDRESS: Tarasovskaya, 9
COUNTRY: UKRAINE
PHONE: 224-4930

INSTITUTE: LenGidroproekt
CITY: 197136, St. Petersburg
ADDRESS: prosp. Shchorsa, 77/79
COUNTRY: RUSSIA

INSTITUTE: LenGiprotrans
MINISTRY: Ministry for Transport Construction
CONTACT: Mamzelev, Anatoly Petrovich
CITY: 196105, St. Petersburg
ADDRESS: Moskovsky prospect, 143
COUNTRY: RUSSIA
PHONE: (812)298-8777; (812)298-9388

INSTITUTE: Main A.V.Voeikov Geophysical Observatory (GGO)
MINISTRY: Ministry for Environmental Protection and Natural Resources, RF
CITY: 194018, St. Petersburg
ADDRESS: Karbyshev str., 7
COUNTRY: RUSSIA

INSTITUTE: Melnikov's Permafrost Institute (IMZ SO RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Kamenskii, Vyacheslav
CITY: Mikhailovich
ADDRESS: 677010 Yakutsk
COUNTRY: RUSSIA

INSTITUTE: Melnikov's Permafrost Institute. Chita Division
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Salnikov, Pavel Ivanovich
CITY: 672010, Chita-10
ADDRESS: P.O.Box 539
COUNTRY: RUSSIA
PHONE: (30222)3-9270

INSTITUTE: Melnikov's Permafrost Institute. Igarka Permafrost Research

MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Karpov, Egor Gavrilovich
CITY: 663200, Igarka
ADDRESS: Bolshoi Theater str., 13, INIMS
COUNTRY: RUSSIA
PHONE: (operator)2-4170

INSTITUTE: Melnikov's Permafrost Institute. North-East Permafrost Research
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Perlshtein, Georgy Zakharovich
CITY: 685000 Magadan
ADDRESS: Gorkogo str., d.20a
COUNTRY: RUSSIA

INSTITUTE: Melnikov's Permafrost Institute. Viluiskaya Permafrost Research Station
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CONTACT: Velikin, Sergei Aleksandrovich
CITY: 678185, Sakha (Yakutia) Republic
ADDRESS: Pos.Chernyshevskii, VNIMS, 2-6
COUNTRY: RUSSIA
PHONE: (operator)7-12

INSTITUTE: Mining Institute for Northern Affairs of the Yakutsk Science Center (IGDS YANTs SO RAN)
MINISTRY: Siberian Branch of the Russian Academy of Sciences
CITY: 677891, Yakutsk, GSP
ADDRESS: 50 Lyet VLKSM, 26
COUNTRY: RUSSIA
PHONE: 3-5916

INSTITUTE: Moscow Engineering-Construction Institute
CONTACT: Kudoyarov, L.I.
CITY: 129337, Moscow
ADDRESS: Yaroslavskoe Shosse, 26
COUNTRY: RUSSIA

INSTITUTE: Moscow Institute of Railways
MINISTRY: Ministry of Railways
CONTACT: Ashpiz, Evgeny Samuilovich
CITY: Moscow
ADDRESS: Obraztsov str., 15, MIIT
COUNTRY: RUSSIA
PHONE: (095)284-2241

INSTITUTE: Moscow State University. Faculty of Geography. Cryolithological and Glaciological Department
MINISTRY: Ministry for Higher Education
CONTACT: Konishchev, Vyacheslav Nikolaevich
CITY: 119899, GSP-3, Moscow
ADDRESS: Leninskie Gory
COUNTRY: RUSSIA
PHONE: (095)939-3673

INSTITUTE: Moscow State University. Faculty of Geology. Geocryological Department
MINISTRY: Ministry for High Education
CONTACT: Ershov, Eduard Dmitrievich
CITY: 119899, GSP-3, Moscow
ADDRESS: Leninskie Gory
COUNTRY: RUSSIA
PHONE: (095)939-1281

INSTITUTE: MosGiprotrans
MINISTRY: Ministry for Transport Construction
CONTACT: Isakov, Yurii
CITY: Moscow
ADDRESS: Korchagin str., 2
COUNTRY: RUSSIA

INSTITUTE: Nizhny Novgorod Branch of the State Planning Institute "SANTEX (Sanitation) Project"
CITY: 603005, Nizhny Novgorod
ADDRESS: Dzerzhinskogo, 26
COUNTRY: RUSSIA

INSTITUTE: Northeastern Complex Research Institute (SVKNII DVO RAN)
MINISTRY: Far-Eastern Branch of the Russian Academy of Sciences
CITY: 685000 Magadan
ADDRESS: Portovaya, 16
COUNTRY: RUSSIA
PHONE: 3-0923

INSTITUTE: Novokuznetsk Complex Research and Planning-Surveying
MINISTRY: All-Russia Research and Planning-Survying Institute for Pipeline Hydrotransport
CITY: 654000 Kemerovskaya Oblast
ADDRESS: Novokuznetsk, Prosp. Kommunarov, 2
COUNTRY: RUSSIA

INSTITUTE: Novosibirsk Branch. (SibCNIIS)
MINISTRY: All-Russian Research Institute for Transport Construction
CITY: 630056, Novosibirsk
ADDRESS: Sofilskaya, 18
COUNTRY: RUSSIA
PHONE: 45-0214

INSTITUTE: Pechora State Research and Planning Institute for the Oil Industry (Pechoripineft)
CITY: 410720 Saratov
ADDRESS: Revolyutsii, 7
COUNTRY: RUSSIA
PHONE: 24-1513

INSTITUTE: Polyarnouralgeologia (Polar Urals Geology)
MINISTRY: Geological Survey, RF
CONTACT: Oberman, Naum Grigirievich
COUNTRY: RUSSIA

INSTITUTE: Production and Research Institute for Engineering Survey and Construction (PNIIIS)
MINISTRY: Ministry for Construction RF
CONTACT: Baulin, Vladimir
CITY: Moscow
ADDRESS: Okruznoy proezd, 18
COUNTRY: RUSSIA
PHONE: (095) 366-2554

INSTITUTE: Production and Research Institute for Engineering Survey and Construction (PNIIIS)
MINISTRY: Ministry for Construction
CITY: 181201 Pskovskaya Oblast
ADDRESS: Postal Branch Rodina
COUNTRY: RUSSIA
PHONE: 6-7251

INSTITUTE: Research Institute of Foundations and Underground Structures (NIIOSP)
MINISTRY: Ministry for Construction RF
CONTACT: Sadovsky, Andrei Vladimirovich
CITY: Moscow
ADDRESS: 2 Institutskaya str., 6
COUNTRY: RUSSIA
PHONE: (095)174-8354

INSTITUTE: Research Institute of Foundations and Underground Structures (NIIOSP). Norilsk Department
MINISTRY: Ministry for Construction, RF
CONTACT: Grebenets, Valerii Ivanovich
CITY: 663316, Norilsk
ADDRESS: Oktyabrskaya str., 28
COUNTRY: RUSSIA
PHONE: (operator)5-3201

INSTITUTE: Research Institute on Transport Construction
MINISTRY: Ministry of Transport Construction
CONTACT: Cernant, Aleksandr Alfredovich
CITY: 129329 Moscow
ADDRESS: Kolskaya str., 1, CNIIS
COUNTRY: RUSSIA
PHONE: (095)180-9398

INSTITUTE: St. Petersburg Branch of the State Republican Institute for Planning Municipal Water Supply and Sewage
CITY: 198096, St. Petersburg
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APPENDIX 7

INTERNATIONAL ARCTIC ENVIRONMENTAL DATA DIRECTORY

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In 1986 NOAA sponsored a workshop, with federal and academic representatives for the U.S. and Canada, to identify and focus interest in the establishment of a system to identify the existence of and provide access to environmental data for the Arctic. The U.S. Geological Survey took the initiative to organize a representative group to develop a plan for the Arctic Environmental Data Directory, AEDD. This AEDD Working Group designed and implemented an Arctic-wide, on-line database of data set descriptions, based on and hosted by the USGS-Reston Environmental Science Data Directory, ESDD. The primary focus of the incorporation of directory enteries into the AEDD was on U.S.-held data sets, and on improving the quality of the descriptions in the AEDD. During 1994 the AEDD was moved to a PC-based system hosted by the USGS-Anchorage. The "new" AEDD is fully searchable using WAIS and World Wide Web software. The next project identified by the AEDD Working Group is to convert the existing AEDD descriptions to the DIF (Directory Interchange Format) used by the Global Change Master Directory. Future efforts will focus on obtaining additional data descriptions for inclusion in the directory. The primary benefit of the AEDD to the Arctic research community is the ability to search for available data using keywords and obtain contact information to order copies of the data.

The International Arctic Environmental Data Directory (ADD) effort was initiated at a workshop, organized by the USGS-hosted AEDD and UNEP/GRID, in Arendal, Norway, in September 1993. The goal of ADD is to provide a comprehensive compilation of existing sources of Arctic environmental data. The objectives of ADD are:

1. To establish the International Arctic Environmental Data Directory (ADD) as an authoritative, high-quality, and user-friendly directory of environmental data sources covering the circum-polar Arctic.

2. To assess the quality and reliability of data-set descriptions by means of a set of internationally agreed-upon, well-defined criteria, specifically the DIF (Directory Interchange Format) data description format of the Global Change Master Directory.

3. To provide access to the ADD internationally using the Internet and appropriate international standards. This will link the directory components into a consistent, high quality data and information source for the international Arctic community.

4. To identify and form working relationships with institutions that hold Arctic environmental data, inform them about the ADD, and seek to reference their data in the ADD.

5. To seek advice and counsel from, and develop feedback mechanisms with, the international Arctic science and user community to establish and maintain relevance of the ADD to key environmental issues.

6. To develop and implement a process using agreed upon standards to identify, gather, and maintain data set descriptions in the ADD which are consistent, complete, accurate, and timely to meet the needs of the user community.

7. To publish and disseminate ADD to promote the preservation and use of Arctic environmental data and information.

The ADD user community encompasses researchers in governmental agencies and academia, public interest groups and the private sector, the interested public, educators at all levels, and decision and public policy makers.

The ADD Steering Committee has defined Arctic environmental sciences as ". . . the broad spectrum of disciplines investigating the physical, biological, and cultural resources and environments of the Arctic."

The Steering Committee has recommended the ADD Council consist of a Data Manager Group, with one representative from each country participating in ADD, and the Advisory and User Group, with representatives from major Arctic monitoring and research organizations. The ADD Council will appoint the ADD Executive Committee, a group of five persons providing circum-Arctic geographic representation. The main task of the Executive Committee is to plan and carry out activities of the ADD, with recommendations from the ADD Council.

ADD is seeking strong involvement with institutions in Russia. A workshop is planned (in Fall 1995) in Moscow, to focus on accessibility of Russian data holdings and development of data directories. The Ministry of Environment Protection, Moscow, has offered to host the workshop and the USGS and UNEP/GRID have offered support.

As an active member of the AEDD Working Group, WDC-A for Glaciology is maintaining a close interest and involvement in the development of ADD. It will seek to ensure that the IPA GGD is entered into the AEDD/ADD system and that the operating procedures for the GGD are commensurate with those of the ADD and other international information systems.

ACRONYMS

ACSYS	Arctic Climate System Study
ADD	International Arctic Environmental Data Directory
AEDD	Arctic Environmental Data Directory
AMIP	Atmospheric Model Intercomparison Project
ARCSS	Arctic System Science
CLIMEX	Climate Extremes of the Past
CNIIIS	Ministry for Transport Construction (Russian)
COMNAP	Council of Managers of National Antarctic Programs
CRREL	Cold Regions Research and Engineering Laboratory
DIF	Directory Interchange Format
DZAA	Depth of Zero Annual Amplitude
ESDIM	Earth Science System Data and Information Management
GCM	General Circulation Model
GCMD	Global Change Master Directory
GD	Glaciological Data
GEWEX	Global Energy and Water Experiment
GGD	Global Geocryological Database
GISP	Greenland Ice Sheet Program
GLOCOPH	Global Palaehydrology Database Project
GRID	Global Resources Information Database
IASC	International Arctic Science Committee
IGBP	International Geosphere Biosphere Program
INQUA	International Union for Quaternary Research
IPA	International Permafrost Association
IPFS	Institute for Soil Sciences and Photosynthesis (Russia)
IPNG	Institute of Oil and Gas Problems (Russia)
ITEX	International Tundra Experiment
IUGG	International Union of Geodesy and Geophysics
LAII	Land/Atmosphere/Ice Interactions
NGD	National Geocryological Database
NIIOSP	Research Institute of Foundations and Underground Structures (Russia)
NOAA	National Oceanic and Atmospheric Administration
NSF	National Science Foundation
NSIDC	National Snow and Ice Data Center
OAII	Ocean/Atmosphere/Ice Interactions
PAGES	Past Global Environmental Changes

PALE	Paleoenvironments of Arctic Lakes and Estuaries
PNIIIS	Production and Research Institute for Engineering Survey and Construction (Russia)
RF	Russian Federation
RGD	Regional Geocryological Database
SCAR	Scientific Committee on Antarctic Research
SHEBA	Surface Heat Budget of the Arctic
UKMO	United Kingdom Meteorological Office
UNEP	United Nations Environment Program
VNIIGMI	All-Russia Research Institute for Hydrometerological Information
WAIS	Wide Area Information Servers
WCMC	World Conservation Monitoring Center
WG	Working Group
WGMS	World Glacier Monitoring Service

BOOK NOTES

Geotermiya Merzloy Zony Litosfery Severa Azii. (The Geothermal Regime of the Frozen Zone of the Lithosphere in Northern Asia) by V.T. Balobayev, Nauka Press, Novosibirsk, 1991, 193 pp. ISBN-5-02-029996-0.

This monograph by Dr. Veniamin Balobayev, Deputy Director of the Permafrost Institute in Yakutsk, provides a detailed treatise on the thermophysical controls of temperature regime at the surface, in the upper lithosphere, and at depth in frozen rock strata. Throughout, the mathematical expressions of the physical relationships are fully presented, together with observational material. In the foreword, the author traces the twentieth century worldwide development of geophysics and study of ground temperature regimes. Nineteenth century observations on ground temperature in Siberia by A. Middendorf are noted, as well as technical advances in measurements at the Yakutsk Permafrost Institute in the 1960s to 1980s under I.V. Mel'nikov's leadership. The author himself published extensively during this period.

Chapter 1 treats the surface energy budget and atmospheric influences, illustrated by a range of climatic maps and diagrams for northeastern Siberia, before proceeding to describe ground temperature conditions. Chapter 2 discusses the principles of ground heat flow and the role of soil properties, snow cover, and vegetation. Mean ground temperature conditions along the Lena River and elsewhere are described and data tables are included for a selection of localities. Chapter 3 follows a similar treatment for deep ground temperatures in frozen and unfrozen material. Ground heat flux is characterized for the structural zones of northern Asia and western Siberia, including the influence of surface and structural inhomogenieties, and the thickness distribution is mapped. The final chapter examines the non-stationary cryolithozone in the past, present and future. Temperature profiles and cross-sections are shown and methods for reconstructing past conditions are detailed. Pleistocene and Holocene geothermal parameters are calculated and there is a brief discussion on possible future conditions associated with anthropogenic influences. There is a 16 page bibliography of Russian and Western literature. The book contains much information on permafrost conditions and the geothermal regime in northern Asia that would be of great interest to western scientists.

Osnovy Kriogeneza Litosfery (Principles of the Cryogenesis of the Lithosphere) by N.N. Romanovskiy, Moscow University Press, 1993, 336 pp. ISBN-5-211-02379-X

This text by Professor Nikolai Romanovskiy is developed from courses in geology and geocryology taught at Moscow State University. It is aimed at advanced students in those fields, as well as hydrogeologists, exploration geologists, geographers, mining and petroleum engineers, and construction workers. The author previously published monographs on patterned ground formation

and ground water in the permafrost zone. Following an outline of historical development of studies of ground freezing and thawing and the associated surface phenomena, or cryogenesis, there are chapters on the climate and geomorphic factors determining the zonal and altitudinal characteristics of permanently and seasonally frozen ground, and periglacial phenomena. Chapter 4 deals with the formation and composition of syngenetic and epigenetic frozen ground, thermokarst complexes, including taber soils and alas depressions, and sediments deformed by cryoturbation and ice wedge growth. Chapter 5 addresses the processes of permafrost development and characteristics of permafrost thickness in relation to ground heat flow and thermal regime, drawing particularly on V.T. Balobayev's work. The influence of structural and hydrogeological conditions, glacial history, and Arctic marine transgressions and regressions is also treated and the relationship of these factors to gas hydrate occurrence is examined. The final three chapters describe the characteristics of cryogenetic processes and permafrost in the Eurasian platform area, in mountain areas, and offshore in the Arctic shelf seas, respectively. Here, specific regional information is presented and illustrated with maps and cross-sections.

The book is illustrated by some 89 figures, including a few half-tone photographs. Most of the diagrams are schematic, in keeping with the textbook character of the work. Surprisingly, it contains only seven tables of numerical information. There is a brief index and a list of 132 references, all but 13 of them to Russian sources. Focusing as it does primarily on northern and eastern Russia, the book provides an up-to-date and useful overview of Russian geocryological research. An English translation would be useful to western readers in the field.

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Source, Drew Rothrock
University of Washington

	Variable	Satellite - present			EOS	Other	Status/availability	CLIMATE MONITORING				Priority-	Priority-
		Sensors	spatial resolution	time resolution	sensors	data sources	of data set	Global field: Spatial resolution	Global field: Temporal resolution	Accuracy needed (rms)	Accuracy available (rms)	Monitor	Process/ short term/ validation
	Ice mass balance												
1	Ice extent	SSMI	25 km	daily	AMSR, MPMR	SAR, MODIS	good	25 km	daily	20 km	20 km	1	1
2	Ice concentration	SSMI	25 km	daily	AMSR, MPMR	SAR	needs developmt	25 km	daily	1%	4 - 7%	1	2
3	Multiyear ice concentration	SSMI	25 km	daily	AMSR, MPMR	SAR	needs developmt	25 km	daily	3%	30%	2	3
4	Ice displacement	SAR,AVHRR,SSMI	5 km	2/week	MODIS	buoys	needs coverage	25 km	daily	1 km	300 m	2	1
5	Ice deformation (%)	SAR,AVHRR,SSMI	5 km	2/week	MODIS		needs developmt	25 km	daily	0.5%	0.1%	2	1
6	Ice thickness distribution					sonar, models, SAR	sparse data	200 km	weekly	thickness: 10%	thickness: 50%	1	1
										area: 3%	area: 30%		
	Ice growth / melt rate f(h)					models							
7	Snow thickness					climatology	sparse data	100 km	weekly	5 cm	20 cm	1	1
8	Ocean heat flux to ice					climatology, models	almost no data	100 km	weekly	5 Wm**-2	-	1	2
9	Sea surf. temp. nr. ice edge	AVHRR	20km	daily	MODIS		poor	25 km	daily	0.5 K		2	2
	Also requires: surface SW, LW sensible and latent heat fluxes and surface temp.												
	Surface radiative flux												
10	Surface albedo	AVHRR	1 km	daily	MODIS	climatology	needs developmt	100 km	twice daily	0.05	0.1	1	1
11	Ice extinction coeff't					field observations	sufficient	-	-	-	-		3
12	Ice surface temperature	AVHRR,TOVS	1, 100 km	daily	MODIS, AIRS	buoys, stations, models	needs developmt	100 km	twice daily	1 K	2 K	2	1
13	Atmos. temperature profile	TOVS	100 km	daily	AIRS,AMSU	stations, models	needs developmt	100 km	twice daily	1 K	3 K	1	1
14	Atmos. humidity profile	TOVS	100 km	daily	AIRS,AMSU,MHS	stations, models	needs developmt	100 km	twice daily	20%	50%	1	1
15	Cloud fraction	AVHRR, TOVS	1, 100 km	daily	MODIS	climatol., stations, models	needs developmt	100 km	twice daily	5%	30%	1	1
16	Cloud optical depth	AVHRR	1 km	daily	MODIS	aircraft	needs developmt	100 km	twice daily	15%		2	1
17	Cloud particle phase	AVHRR	1 km	daily	MODIS	aircraft	needs developmt	100 km	twice daily	-		2	1
18	Cloud effective particle radius	AVHRR	1 km	daily	MODIS	aircraft	needs developmt	100 km	twice daily	25%		2	1
19	Cloud top temperature	AVHRR, TOVS	1, 100 km	daily	AIRS,AMSU,MODIS	models	needs developmt	100 km	twice daily	5 K	10 K	2	1
20	Cloud top pressure	TOVS	100 km	daily	AIRS,AMSU,MHS	models	needs developmt	100 km	twice daily	50 mb	100 mb	3	1
21	Atmos. ice crystal precip.				GLAS	aircraft	needs climatol.	-	-	-	-	3	2
22	Atmos. aerosol				GLAS	aircraft	needs climatol.	-	-	-	-	2	2
	Surface turbulent heat flux												
23	Wind stress					NWP analyses, s. pressure	good	100 km	twice daily	N m^-2		1	1
24	Surface/air temp. difference	TOVS	100 km	daily	AIRS,AMSU	models	needs developmt	100 km	twice daily	0.2 K	1 K	2	2
25	Surface temp. distribution	AVHRR	1 km	daily	MODIS	models	needs developmt	100 km	twice daily	0.3 K^2		3	2
26	Surface roughness					laser, survey	sparse data	-	-	-	-	2	2
27	Near-surface humidity					climatology, NWP analyses				10%	10%	3	
	Ice momentum bal'c												
28	Wind velocity, 10 m					NWP analyses, s. pressure	good	25 km	daily	1 m/s		1	1
	Also requires: atmospheric pbl stability (from sensible heat flux), surface roughness, ice mass, internal ice stress gradient, surface currents, ice bottom roughness, ocean mixed layer stability												
						NWP = Numerical Weather Prediction							
	Assumptions about spatial and temporal resolution of global fields for climate monitoring:											*Priorities*	
	1. Ocean GCMs can run at 1/4 degree or 25 km resolution											*1. Critical*	
	2. Ice variables generally needed weekly, except during seasonal changes and near ice edge.											*2. Important*	
	3. Heat flux variables should capture diurnal cycle, but vary slowly spatially.											*3. Useful*	
	4. For difficult variables, we'd be lucky to get coarse data.												

GCOS/GTOS

[redacted] RECOMMENDED VARIABLES [redacted]

FOR TERRESTRIAL CLIMATE-RELATED OBSERVATIONS

(WMO, 1995)

BIOPHYSICAL PROPERTIES OF VEGETATION	OBSERVATION TYPE	FREQUENCY	SPATIAL RESOLUTION	STATUS
Fire product	AVHRR/MODIS	DAILY	1 Km	RA
Leaf area index (LAI)	OPTICAL; AVHRR	MONTHLY	1 Km	R; RA
Net primary productivity (NPP)	EDDY FLUX; AVHRR	DAILY → ANNUAL	$10 m^2 \rightarrow 1 Km^2$	O; RA
Net ecosystem productivity (NEP)	BIOMASS SAMPLING (SF)	CONTINUOUS → ANNUAL	Sites at 10-100 Km interval	R
Biomass – above-ground	EDDY CORRELATION (SF)	[redacted]	$0.01 - 1 Km^2$	O
Biomass – below-ground	SF	5yr		
Necromass				
Roughness – surface	SF	5yr	1-10m at 1-10Km interval	R
Spectral vegetation index				
Vegetation structure				
LAND COVER/LAND USE				
Land cover				
Land use				
SOIL PROPERTIES				
Soil moisture				
Soil carbon				
Soil total nitrogen				
Soil phosphorus				
Soil bulk density				
Soil particle size distribution				
Soil surface state				
Rooting depth				
HYDROLOGY				
Atmospheric water content near the surface (relative humidity)				
Discharge				
Evapotranspiration				
Surface water storage fluxes				
Ground water storage fluxes				

O = Operational
R = Research
RA = Research algorithm
SF = Specialized field observation

Precipitation
Runoff to land/ocean – transport of biogeochemicals

CRYOSPHERIC PROPERTIES

Sea ice
Sea ice motion
Snow cover area and snow water equivalent
Ice sheet mass balance
Ice sheet surface balance
Ice sheet extent and topography
Glaciers and ice caps
Lake and river freeze-up and break-up (timing)
Permafrost – active layer
Permafrost – thermal state

RADIATION (AND RELATED VARIABLES)

Aerosols
Radiation incoming
Radiation reflected – short-wave
Radiation – fraction of photosynthetically active radiation (FPAR)
Radiation – outgoing long-wave
Cloud cover
Temperature-air

TRACE GASES

Methane (CH_4)
Carbon dioxide (CO_2)

ANCILLARY VARIABLES

Topography
Wind speed

GLACIOLOGICAL DATA SERIES

Glaciological Data, which supercedes *Glaciological Notes*, is published by the World Data Center-A for Glaciology (Snow and Ice) several times per year. It contains bibliographies, inventories, and survey reports relating to snow and ice data, specially prepared by the Center, as well as invited articles and brief, unsolicited statements on data sets, data collection and storage, methodology, and terminology in glaciology. Contributions are edited, but not refereed or copyrighted. There is a $15 shelf stock charge for back copies.

Scientific Editor: Roger G. Barry
Technical Editor: Ann M. Brennan

The following issues have been published to date:

GD- 1, ***Avalanches***, 1977

GD- 2, ***Arctic Sea Ice***, 1978

GD- 3, ***World Data Center Activities***, 1978

GD- 4, ***Glaciological Field Stations***, 1979, Out of Print

GD- 5, ***Workshop on Snow Cover and Sea Ice Data***, 1979

GD- 6, ***Snow Cover***, 1979

GD- 7, ***Inventory of Snow Cover and Sea Ice Data***, 1979

GD- 8, ***Ice Cores***, 1980, Out of Print

GD- 9, ***Great Lakes Ice***, 1980, Out of Print

GD-10, ***Glaciology in China***, 1981

GD-11, ***Snow Watch*** 1980, 1981

GD-12, ***Glacial Hydrology***, 1982

GD-13, ***Workshop Proceedings: Radio Glaciology; Ice Sheet Modeling***, 1982

GD-14, ***Permafrost Bibliography***, 1978-1982, 1983

GD-15, ***Workshop on Antarctic Climate Data***, 1984

GD-16, ***Soviet Avalanche Research; Avalanche Bibliography Update***: 1977-1983, 1984

GD-17, ***Marginal Ice Zone Bibliography, 1985*** Out of Print

GD-18, ***Snow Watch '85***, 1986

GD-19, ***Tenth Anniversary Seminar; Passive Microwave Users Workshop; Microwave Radiometry Bibliography***, 1987

GD-20, ***Workshop on the U.S. Antarctic Meteorological Data Delivery System***, March 1988

GD-21, ***Permafrost Bibliography Update, 1983-1987***, April 1988

GD-22, ***Northern Libraries Colloquy***, August 1988

GD-23, ***Ice Core Update 1980-1989; Permafrost Data Workshop***, December 1989

GD-24, ***Passive Microwave Research; Microwave Bibliography Update 1988-1991***, January 1992

GD-25 ***Snow Watch '92. Detection Strategies for Snow and Ice***, 1993

GD-26 ***Permafrost Bibliography Update, 1988-1992***, 1993

GD-27 ***Permafrost and Climatic Change: An Annotated Bibliography***, (June, 1994)

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