

Circum-Arctic Map of Permafrost and Ground-Ice Conditions, Version 2

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

Brown, J., O. Ferrians, J. A. Heginbottom, and E. Melnikov. 2002. *Circum-Arctic Map of Permafrost and Ground-Ice Conditions, Version 2*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.7265/skbg-kf16>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/GGD318>



National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

1.1 Format

The Circum-Arctic permafrost and ground ice map data set contains the following files:

permaice.avl = ESRI Shapefile legend file for permaice coverage based on NUM_CODE field in the polygon attribute table

permaice.dbf = attribute data

permaice.prj = projection info

permaice.shp = feature geometry

permaice.shx = feature geometry index

subsea.avl = ESRI Shapefile legend file for subsea coverage

subsea.dbf = attribute data

subsea.prj = projection info

subsea.shp = feature geometry

subsea.shx = feature geometry index

treeline.avl = ESRI Shapefile legend for treeline map

treeline.dbf = attribute data

treeline.prj = projection info

treeline.shp = feature geometry

treeline.shx = feature geometry index

llipa.byte = binary raster file, 0.5 degree by 0.5 degree version

llipa.hdr = header file used to bring the binary raster files into a GIS program

nhipa.byte = binary raster file, 12.5 km by 12.5 km EASE-Grid version

nhipa.hdr = header file

nlipa.byte = binary raster file, 25 km by 25 km EASE-Grid version

nlipa.hdr = header file

readpf.f = fortran program

Each datum within a file is a single byte. Numerical data values are listed in the table below.

Value	Definition
0	No information
1 - chf	Continuous permafrost extent with high ground ice content and thick overburden
2 - dhf	Discontinuous permafrost extent with high ground ice content and thick overburden
3 - shf	Sporadic permafrost extent with high ground ice content and thick overburden
4 - ihf	Isolated patches of permafrost extent with high ground ice content and thick overburden
5 - cmf	Continuous permafrost extent with medium ground ice content and thick overburden
6 - dmf	Discontinuous permafrost extent with medium ground ice content and thick overburden
7 - smf	Sporadic permafrost extent with medium ground ice content and thick overburden
8 - imf	Isolated patches of permafrost extent with medium ground ice content and thick overburden
9 - clf	Continuous permafrost extent with low ground ice content and thick overburden
10 - dlf	Discontinuous permafrost extent with low ground ice content and thick overburden
11 - slf	Sporadic permafrost extent with low ground ice content and thick overburden
12 - ilf	Isolated patches of permafrost extent with low ground ice content and thick overburden
13 - chr	Continuous permafrost extent with high ground ice content and thin overburden and exposed bedrock
14 - dhr	Discontinuous permafrost extent with high ground ice content and thin overburden and exposed bedrock
15 - shr	Sporadic permafrost extent with high ground ice content and thin overburden and exposed bedrock
16 - ihr	Isolated patches of permafrost extent with high ground ice content and thin overburden and exposed bedrock
17 - clr	Continuous permafrost extent with low ground ice content and thin overburden and exposed bedrock
18 - dlr	Discontinuous permafrost extent with low ground ice content and thin overburden and exposed bedrock
19 - slr	Sporadic permafrost extent with low ground ice content and thin overburden and exposed bedrock
20 - ilr	Isolated patches of permafrost extent with low ground ice content and thin overburden and exposed bedrock
21 - g	Glaciers
22 - r	Relict permafrost
23 - l	Inland lakes
24 - o	Ocean/inland seas
25 - ld	Land

Permafrost extent codes

c = continuous	(90-100%)
d = discontinuous	(50- 90%)
s = sporadic	(10- 50%)
i = isolated patches	(0 - 10%)

Ground ice content codes

h = high	(>20% for "f" landform codes) (>10% for "r" landform codes)
m = medium	(10-20%)
l = low	(0-10%)

Landform (terrain and overburden) codes

f	lowlands, highlands, and intra- and intermontane depressions characterized by thick overburden cover (>5-10m)
r	mountains, highlands ridges, and plateaus characterized by thin overburden cover (>5-10m) and exposed bedrock

1.2 Projection

Projection for the raster (*.byte) files is:

Projection: Lambert Azimuthal
 Units: meters
 Spheroid: defined
 Major Axis: 6371228.00000
 Minor Axis: 6371228.000

Parameters:
 radius of the sphere of reference: 6371228.00000
 longitude of center of projection: 0
 latitude of center of projection: 90
 false easting (meters): 0.00000
 false northing (meters): 0.00000

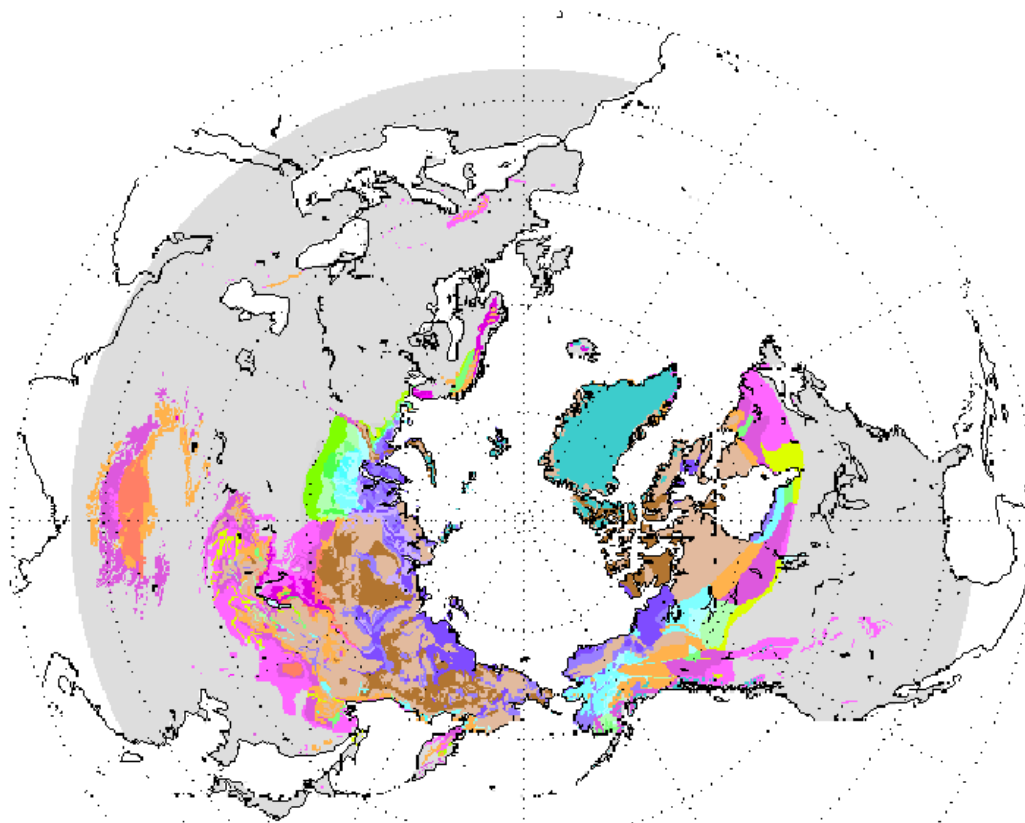
Projection of the shapefiles is:

Projection: Lambert Azimuthal
 Datum: none
 Units: meters
 Spheroid: defined
 Major Axis: 6370997.00000
 Minor Axis: 0.00000

Parameters:
 radius of the sphere of reference: 6370997.00000
 longitude of center of projection: 180
 latitude of center of projection: 90
 false easting (meters): 0.00000
 false northing (meters): 0.00000

1.3 Spatial Coverage


25°N - 90°N, 180°W-180°E



Legend for EASE-Grid Permafrost and Ground Ice Map

Permafrost Extent (percent of area)	Ground Ice Content (visible ice in the upper 10-20 m of the ground; percent by volume)				
	Lowlands, highlands, and intra- and intermontane depressions characterized by thick overburden cover (>5-10m)			Mountains, highlands, ridges, and plateaus characterized by thin overburden cover (<5-10 m) and exposed bedrock)	
	High (>20%)	Medium (10-20%)	Low (0-10%)	High to medium (>10%)	Low (0-10%)
Continuous (90-100%)	Ch	Cm	Cl	Ch	Cl
Discontinuous (50-90%)	Dh	Dm	Dl	Dh	Dl
Sporadic (10-50%)	Sh	Sm	Sl	Sh	Sl
Isolated Patches (0-10%)	Ih	Im	Il	Ih	Il

Variations in the extent of permafrost are shown by the different colors; variations in the amount of ground ice are shown by the different intensities of color. Letter codes assist in determining to which basic permafrost and ground ice class any particular unit belongs. Letter codes are defined in the documentation that accompanies the data files.

 Ice caps and glaciers

2 DATA ACQUISITION AND PROCESSING

2.1 Processing Steps

The investigators initialized the Eurasian section of the map at the United Nations Environmental Programme/Global Resource Information Data Base (UNEP/GRID)-Arendal in Norway. The Norwegian Mapping Authority scanned and vectorized the polygon arcs, and georeferenced, corrected, and attributed the vectorized map at UNEP/GRID-Arendal.

The North America and Greenland sections were also initialized at UNEP/GRID-Arendal. The investigators manually digitized permafrost boundaries with a Root Mean Square (RMS) error of approximately 1 mm. Any coastline not coinciding with a permafrost unit was digitized as a generalized line. They digitized glacial boundaries as generalized lines and attributed closed polygons. They updated and corrected North America and Greenland at the Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire, and the United States Geological Survey (USGS) in Woods Hole, Massachusetts. They superimposed digital coastline and glacial boundaries using Arc/Info's Identity command, and corrected and updated attributes. Finally, they joined the data set of North America and Greenland with the compiled Eurasian area.

The investigators refined the full map at CRREL and USGS by appending digital coastlines and country lines to the map region south of 50°N. These data only extend down to 25°N, the limit of Northern Hemisphere permafrost. Finally, they superimposed digital data sets of select deep, large lakes with no underlying permafrost.

2.2 Data Source

Following are input data used in processing the digital map:

- The original 1:10,000,000 paper map "Circum-Arctic map of permafrost and ground-ice conditions" (Brown et al. 1997).
- Environmental Systems Research Institute (ESRI):
 - Coastline arc data north and south of 50°N ("cntry95.shp")
 - Country arc data south of 50°N ("cntry95.shp")
 - Digital Chart of the World data set generalized by UNEP/GRID-Arendal
 - Eurasian lakes polygon data set from the Digital Chart of the World.
- USGS: Alaskan deep lakes polygon data set.
- Canadian Soil Information System: Canadian deep lakes polygon data set ("Hydro" coverage).
- Geological Survey of Canada: Glacier arc data set.

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5 DOCUMENT INFORMATION

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