A circumpolar dataset of grounded lake ice

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This document is the product guide for the version 1 release of the circumpolar bottom fast lake ice. It has been developed within the FWF Project COLD Yamal (I1401-N29) (cooperation of Zentralanstalt für Meteorologie und Geodynamik, TU Wien and Russian Academy of Science, Earth Cryosphere Institute) and its circumpolar version compiled for the PAGE21 project (FP7 – ENV - 2011 GRANT AGREEMENT NO: 282700), a project coordinated by the Alfred –Wegener -Institute for Polar and Marine Research.

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1 Contents

2 Dataset overview

This dataset provides an account of grounded lake ice in the arctic. It is based on ENVISAT ASAR data (~120m) from April 2008 aggregated to a 50 km grid.

Millions of lakes cover vast areas of the Arctic Tundra landscape and thus represent an important part of the hydrosphere and cryosphere. A large number of them are relatively shallow, with a maximum depth of a few meters only. Depending on their depths, they either freeze entirely to the bottom, or maintain areas of liquid water beneath the top ice layer in winter. Synthetic aperture radars (SARs) provide day and night acquisitions that are independent of cloud cover and can observe large parts of the earth within a relatively short time period. 51 Envisat Advanced Synthetic Aperture Radar (ASAR) Wide Swath Mode (WSM) scenes acquired in April 2008 with circumpolar coverage were used to map the extent of areas of the lakes, where they completely freeze to the bottom and areas where water remains in liquid form under the top ice layer. Lake areas were classified as "frozen to the bottom" or "not frozen to the bottom". The lake outlines were extracted from the high resolution GlobeLand30 dataset of the National Geomatics Center of China. River channels have been removed and only objects larger than 28.000m² considered. For each of the lakes the percentage of lake area frozen to the bottom was calculated. It has been verified over central Yamal.
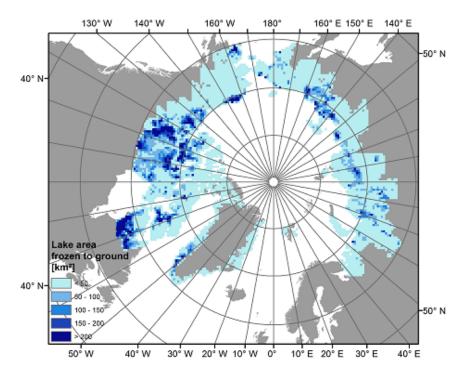

Figure 1: Visualization of LAF. Grey areas correspond to regions without records

3 Data specification

3.1   File naming

File name: OOO_SSSSS_PPP_VVV_YYYYMM_ROI.EEE

Where
  OOO="organisation", e.g. TUW
  SSSSSS="sensor and mode" e.g. ENVISAT ASAR WS - ASARWS
  PPP="product" - BFI Bottom fast ice
  VVV="product version"
  YYYYMM= "acquisition date"
  ROI="region/site of interest" - ARC for arctic
  EEE="file extension", e.g. csv

3.2   Data Description

Table 1: Description of the bottom fast ice dataset

Subject	Specification
Variable	Bottom fast ice
Coverage	Circumpolar, minimum North of tree line; southern extent depends of ASAR WS Scene extent, see Figure 1
Time period	Based on April 2008 (one acquisition per pixel taken into account)
Coordinate system	Polar Stereographic
Spatial resolution	50km
Data format	CSV
Data fields	X : centre X coordinate Y: centre y coordinate PLAF: Percentage of lake area frozen to the ground, 0 – 100, Integer LAF: Lake area frozen to the ground in km², Integer LAN: Lake area not frozen to ground km², Integer
Other data codes	NaN for no data or masked

4 Known issues

The performance of bottom fast ice detection is limited in case of deeper lakes. In order to exclude false detections, the larger lakes in Northern Canada and around the Putorana Plateaux in Russia have been set to unfrozen by default. Bottom fast ice may anyway occur along their margins.
The original of the lake dataset used for pre-selection also includes river courses. These have been mostly manually removed. Some may still be contained in the dataset.

5 Data access and contact information

Data can be accessed via PANGAEA (http://doi.pangaea.de/xx) and should be cited as:
Bartsch, Annett; Pointner, Georg; Dvornikov, Yuri (2015): Circumpolar dataset of bottom fast lake ice. Department of Geodesy and Geoinformation, TU Vienna.

For questions about the dataset, contact Annett.Bartsch@zamg.ac.at.

Additional information on the projects can be found at cold.zgis.net and www.page21.eu