MAIRES

Monitoring Arctic land and sea ice using Russian and European Satellites

Call identifier: FP7-SPACE-2010-1 (SPA.2010.3.2-01)
Work Programme topics addressed: **Small size SICA Collaborative Project**

Proposal submitted 08 December 2009
Contract signed 13 May 2011
Project start: 01 June 2011
Duration 3 years

Consortium:

Nansen Environmental and Remote Sensing Center (NERSC)
JOANNEUM RESEARCH Forschungsgesellschaft mbH (JR)
Scientific foundation Nansen International Environmental and Remote Sensing Centre (NIERSC)
Moscow State University of Geodesy and Cartography (MIIGAiK)
Subcontractor: Research Center for Operative Earth Monitoring (NTs OMZ)

Project officer: Gabriella Soos, Research Executive Agengy, European Commission

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Objectives

- The overall objective of the MAIRES proposal is to develop methodologies for satellite monitoring of Arctic glaciers, sea ice and icebergs. The proposal will demonstrate the benefits of combining Earth Observation data from European and Russian satellites for operational mapping, interpretation and forecast of land and sea ice variations in the Eurasian Arctic with subsequent applications in the socioeconomic sector. The results of the proposal will contribute to improved understanding of changes in land and sea ice in response to climate change in the Arctic.

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Specific objectives

- to establish cooperation between ongoing GMES projects and Russian actors in the area of Arctic ice observation from space;
- to develop a method for estimation of glacier elevation changes by use of differential interferometry and altimetry data;
- to develop sea ice analysis methods using high-resolution SAR images and Russian high-resolution optical images;
- to develop iceberg detection methods using a combination of high-resolution SAR and optical images;
- to document inter-annual and decadal changes in land and sea ice variables based on the EO-products developed in the project;
- to disseminate EO-based products for/of monitoring land and sea ice to users and stakeholders.

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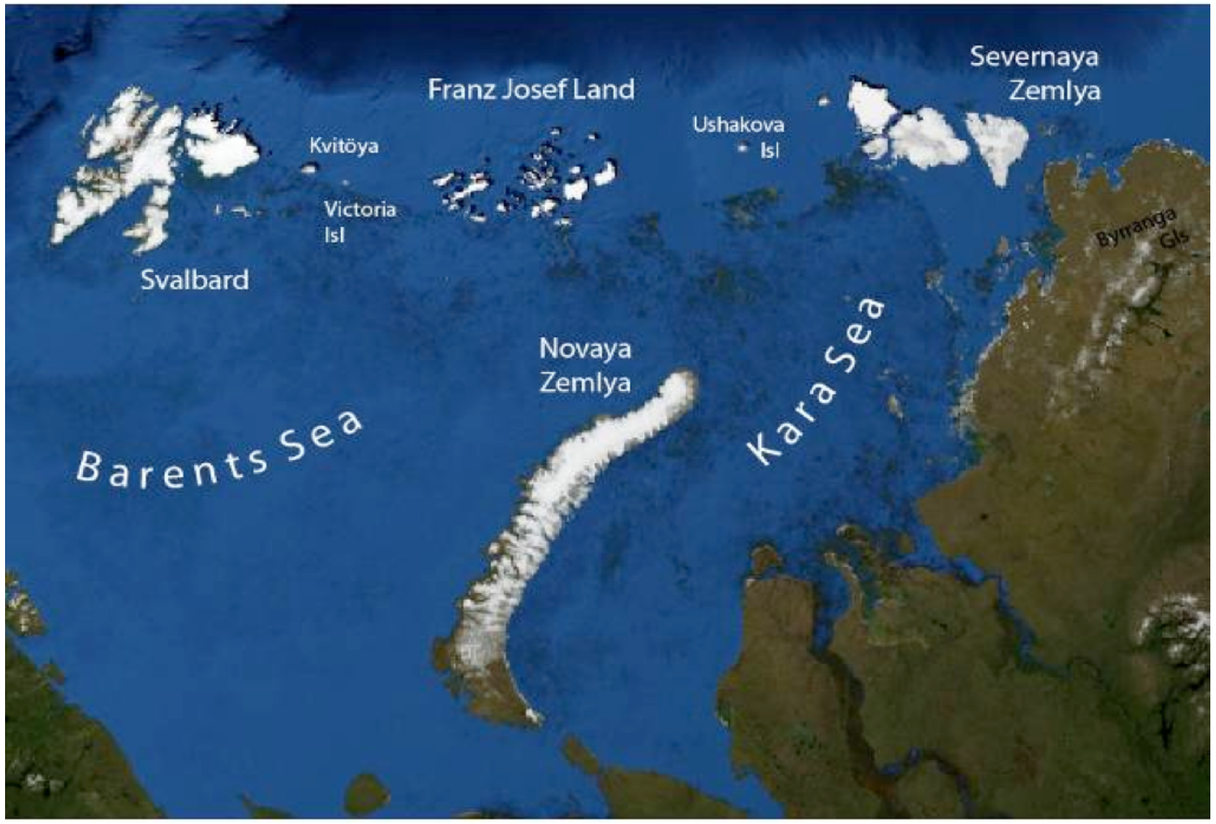
Study areas in MAIRES

SEVENTH FRAMEWORK PROGRAMME



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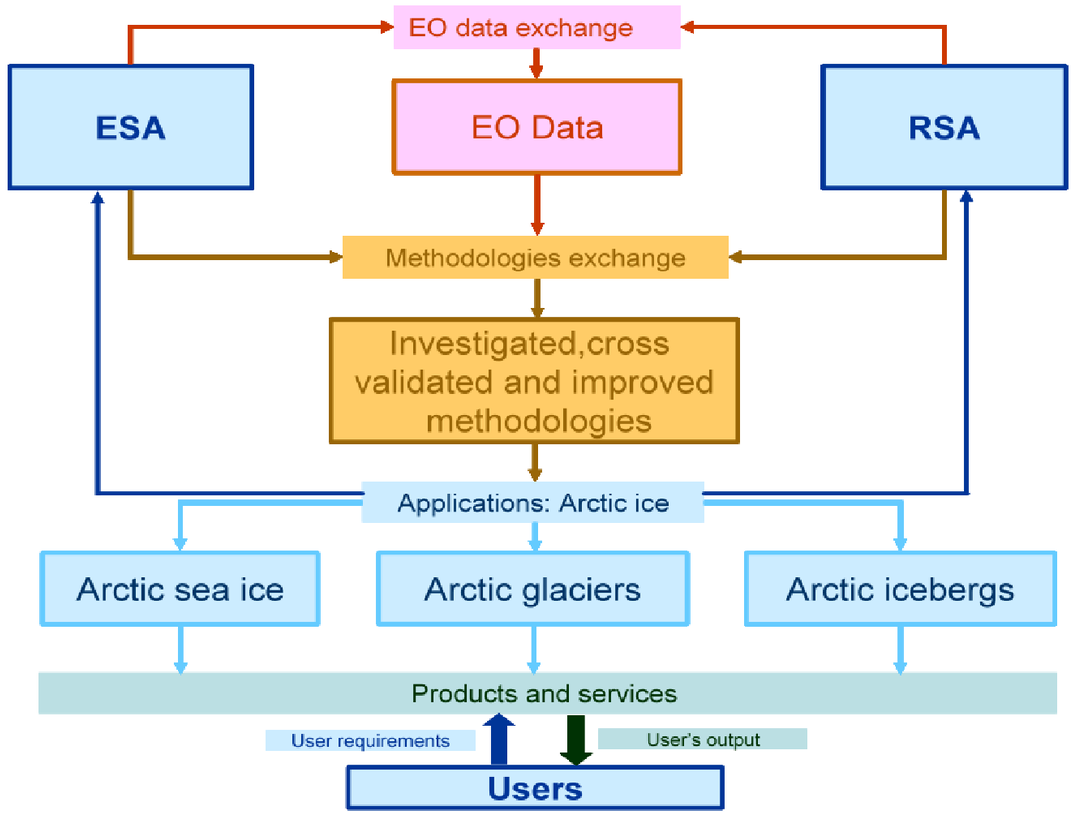
MAIRES structure



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MAIRES Database: Map of satellite data coverage in the study areas

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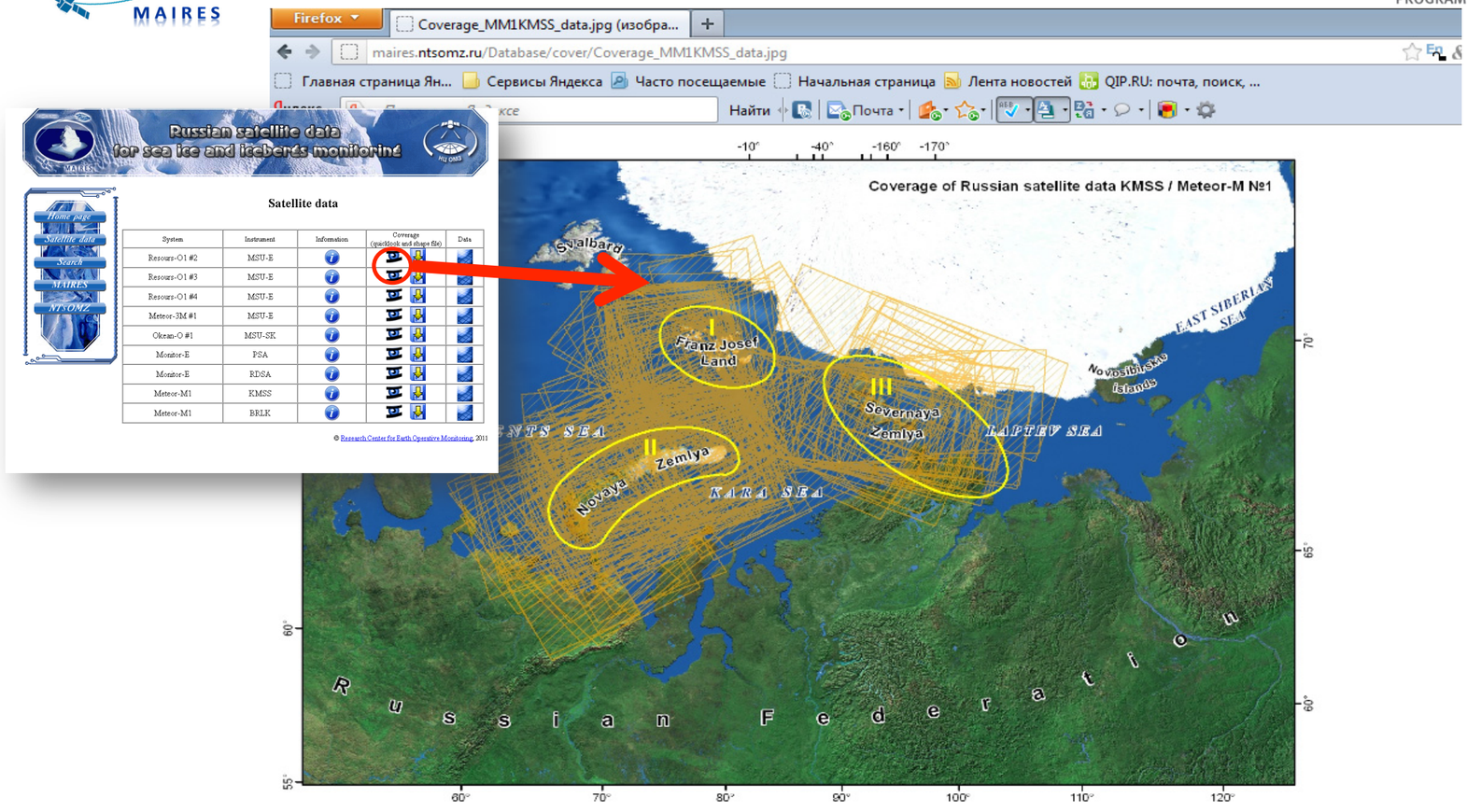

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ENVISAT ASAR data archive 2003-2012

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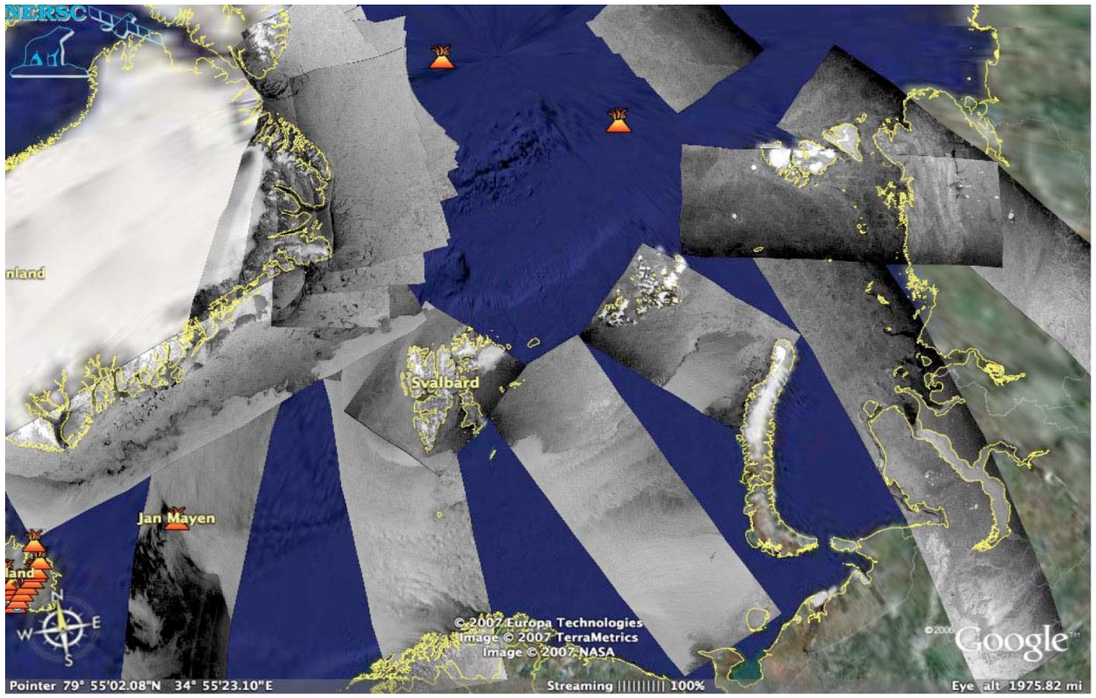

Mosaic of ASAR Wideswath images obtained during a 1-week period in February 2007

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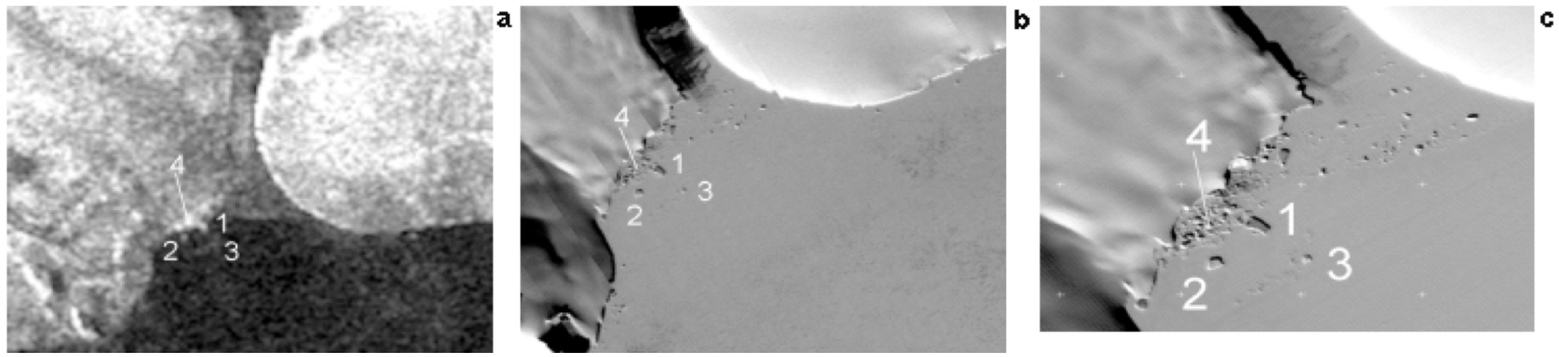
Iceberg observation from ENVISAT SAR, Landsat and Monitor-E images in Franz Josef Land



Images of icebergs in fastice of FJL. a) ENVISAT ASAR subimage for April 5, 2006, b) Landsat subimage for April 14, 2006, c) “Monitor-E” subimage for April 7, 2006.

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Generation of digital elevation models from topographic maps

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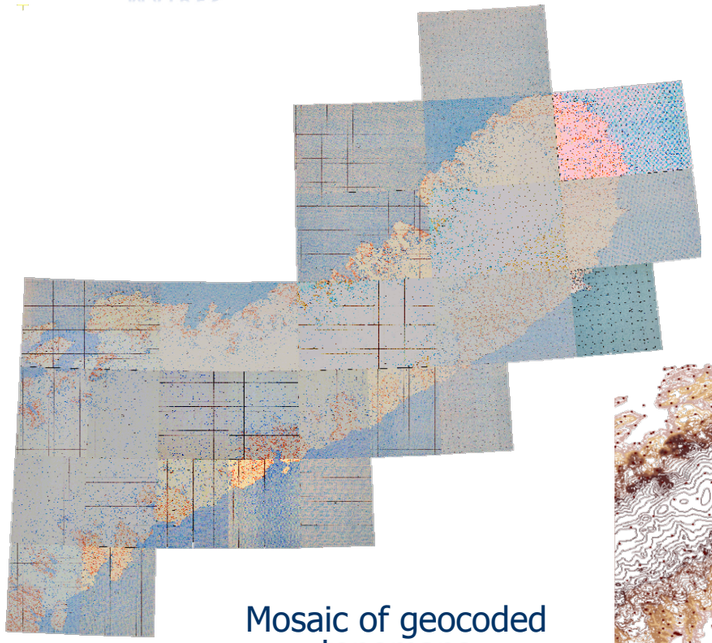
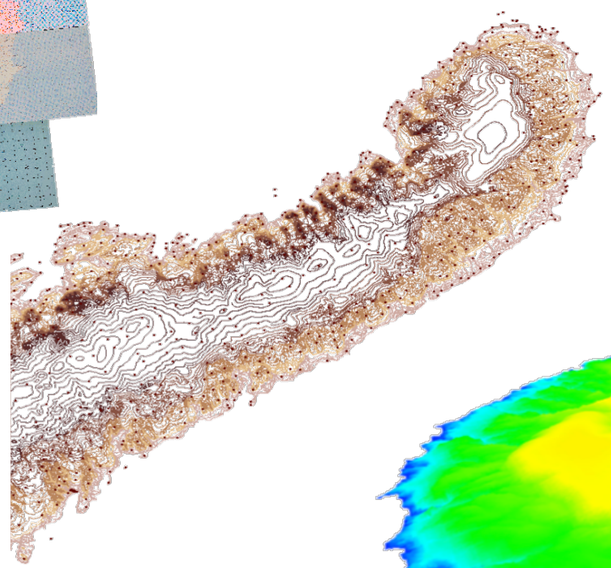
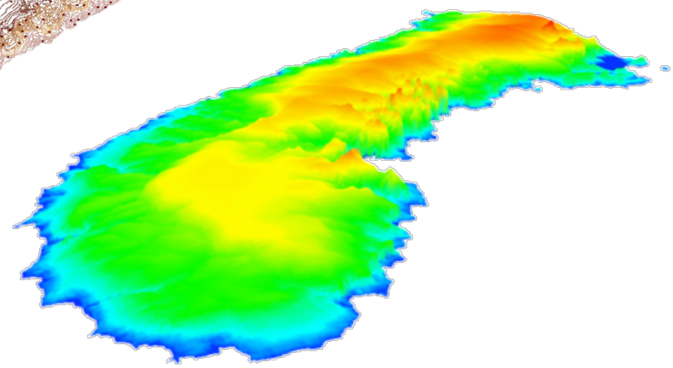


Mosaic of geocoded topomaps



Contour lines and height points



3D-view

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Digital elevation model from Interferometric data processing

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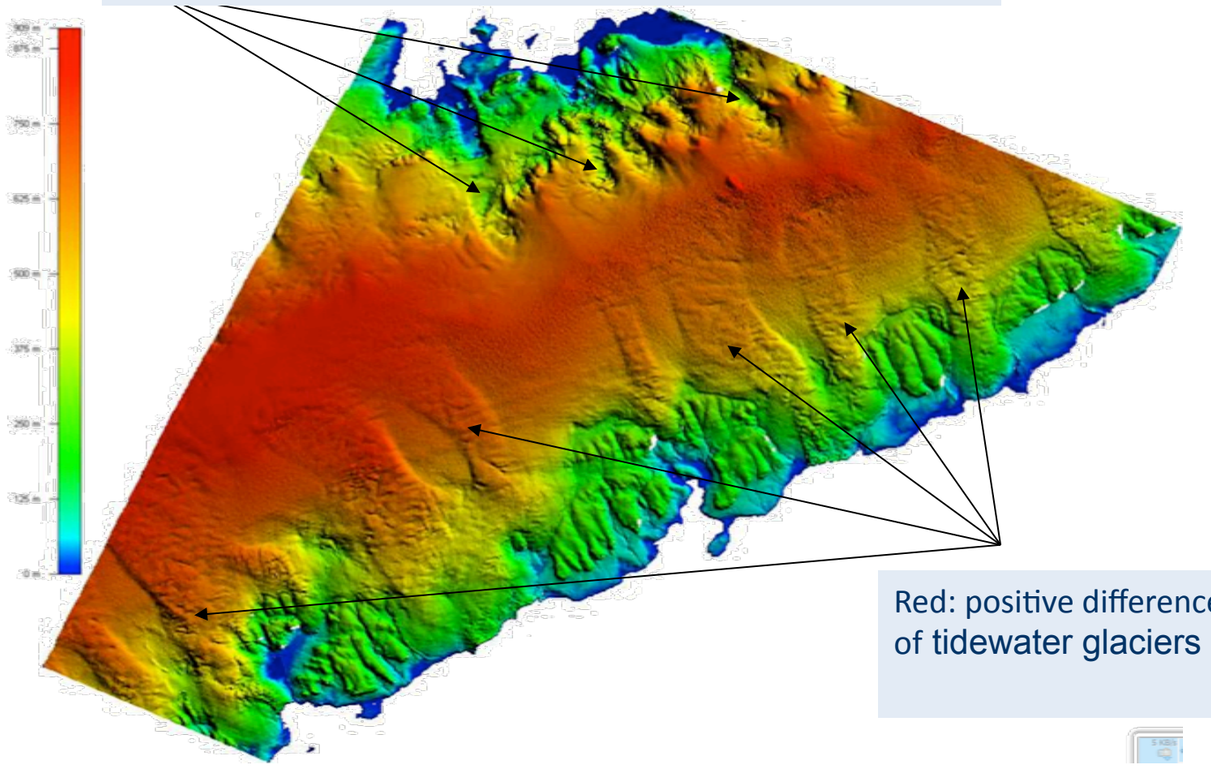
Blue: negative difference in height of tidewater glaciers



Red: positive difference in height of tidewater glaciers

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Dissemination

- Project web sites: Official site (http://maires.nersc.no), Data dissemination sites: http://sat.nersc.no/ for ENVISAT ASAR data, http://dib.joanneum.at/maires/ for land ice data and http://maires.ntsomz.ru/Database/index.php for Russian satellite data
- Scientific publications: planned in both English and Russian referee journals
- Promotion, education and workshop for users: preparation of material to show data analysis, methodologies and scientific results
- Coordination with other related projects, especially other GMES projects

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Challenges

The main challenges of the MAIRES project are:

Establish online data archives for different types of EO data, with search and downloading facilities. This is a large job which goes on continuously.

No coordinated data acquisition between ESA and RKA. This means that it is difficult find enough EO data from both agencies for studies of the Arctic climate

Lack of in situ data from land and sea ice for validating results from satellite data analysis

Many analysis tools and algorithms exist for dedicated satellite data types (SAR, altimeter, etc.) , and it is very demanding to obtain and learn to use many different processing systems.

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