

"See the Sea" - Multi-User Information System Ocean Processes Investigations Based on Satellite Remote Data



O. Lavrova, E. Loupian, M. Mityagina, A. Strochkov, I. Uvarov, T. Bocharova
Space Research Institute, Russian Academy of Sciences

ABSTRACT

The principal aim of multi-user information system "See the Sea" (STS) is to provide researchers with access and analysis tools for information derived from remote sensing data (online and archived) tailored for investigation of various processes in ocean and atmosphere above it. The main advantage of STS is its facilities for comprehensive description of various processes and phenomena, estimation of their quantitative and qualitative characteristics, and utilizing different analysis tools. The following subsystems have been built within STS:

- data collection from various sources and data processing to obtain information products necessary for ocean processes/phenomena investigation;

- management of satellite data and information products archives providing versatile search and fast selection of datasets required for analysis and processing;

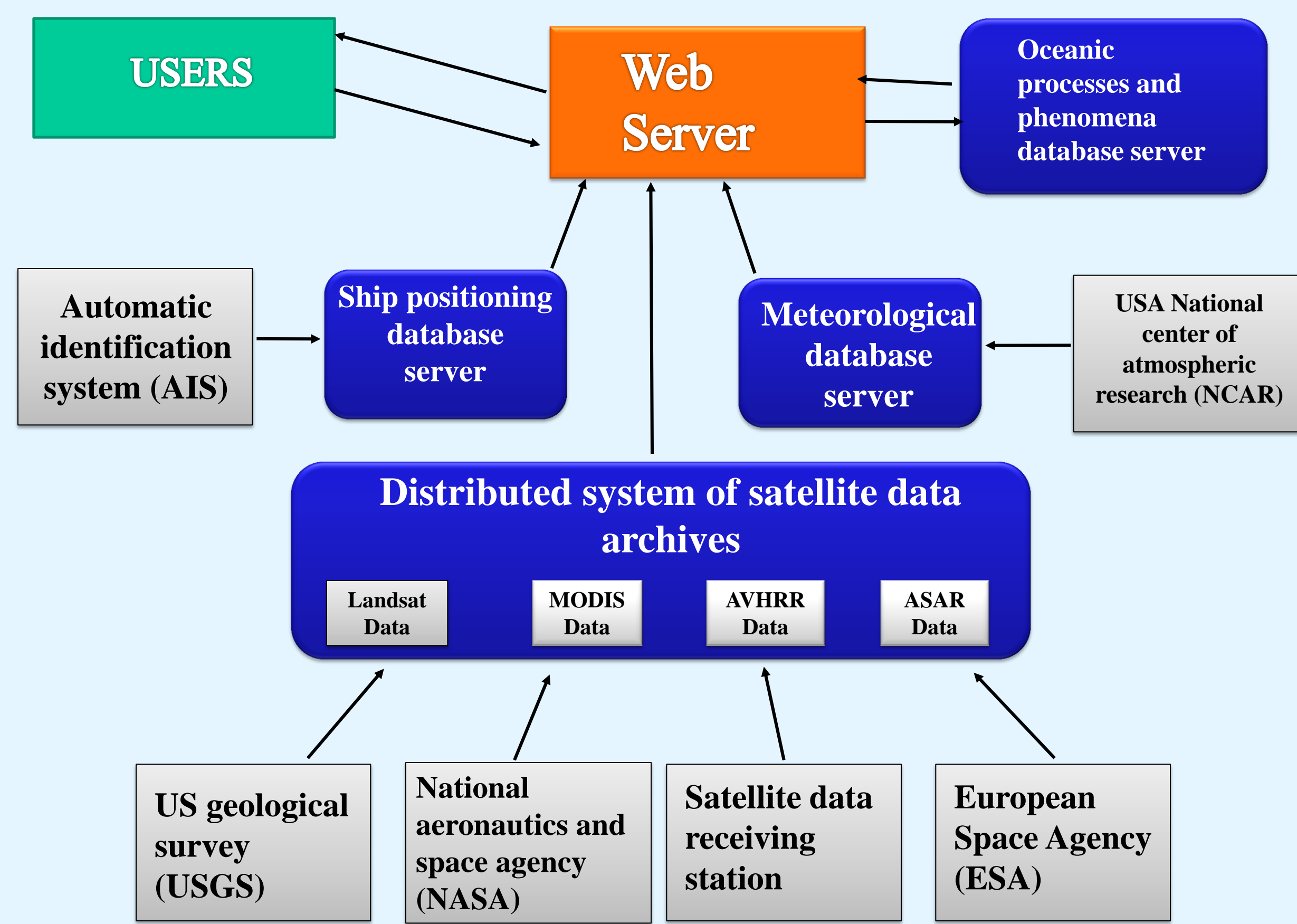
- data interface subsystem providing:

- easy search and selection of data within predefined geographical regions and time periods for particular processes/phenomena observed;

- data analysis facilities, including analysis of spatial and temporal distributions, different parameters and their interrelations required for ocean dynamics modeling purposes.

STS is designed to handle the following main types of data: satellite data, including those of various radar sensors, Russian Earth-observation sensors of high and low resolution, and meteorological sensors; data of ground meteorological stations; cartographic data. STS is an open system capable to incorporate in future any required information (altimeter, buoy, contact data, etc.).

General System Architecture



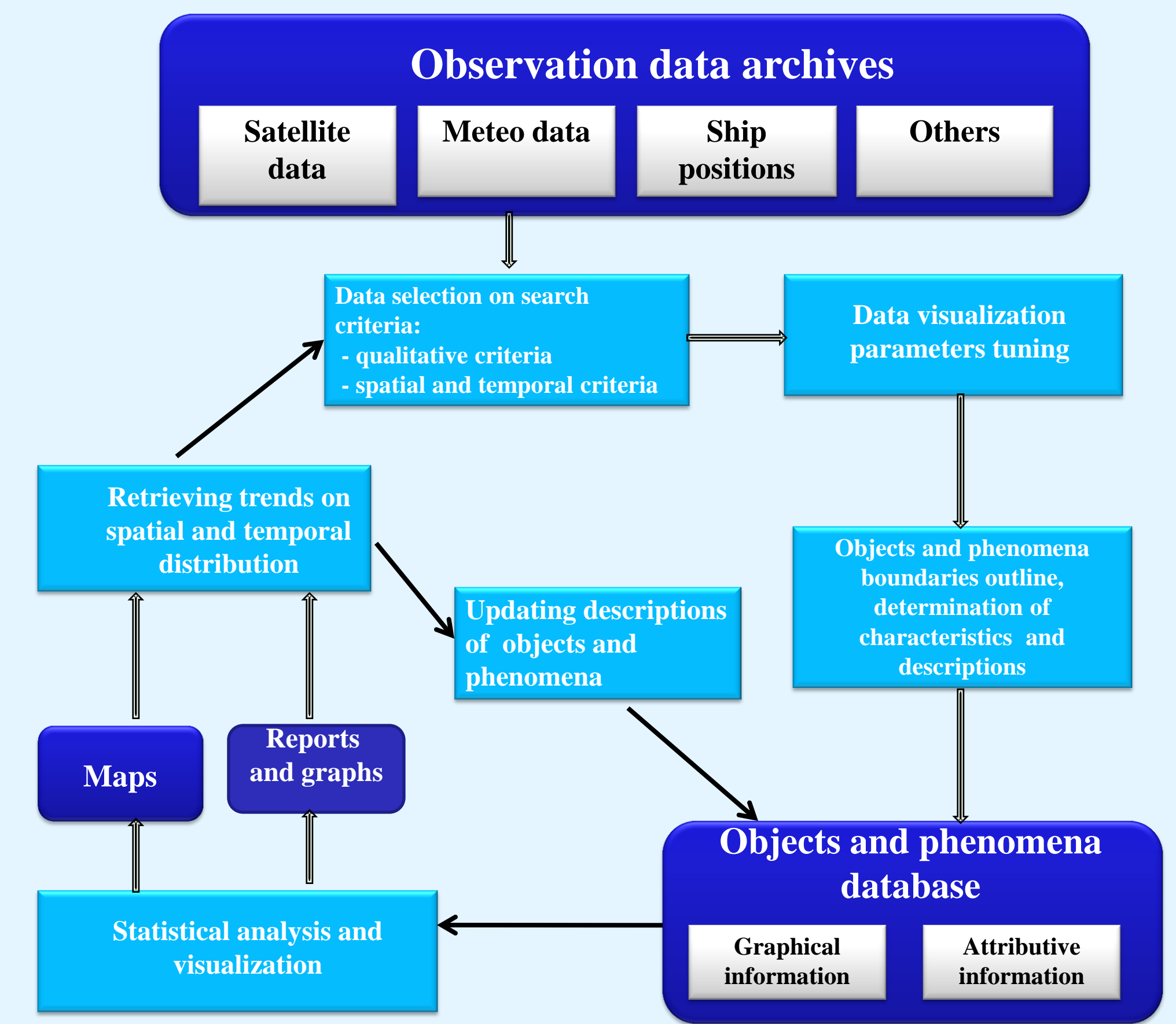
The prototype STS has successfully undergone tests for the following case studies:

- investigation of vortex structures and frontal zones in selected regions;
- detection of areas worst affected by oil products and other anthropogenic pollution;
- accumulation of statistics on spatial, seasonal and interannual variations of dynamics processes in coastal zone affecting pollution drift.

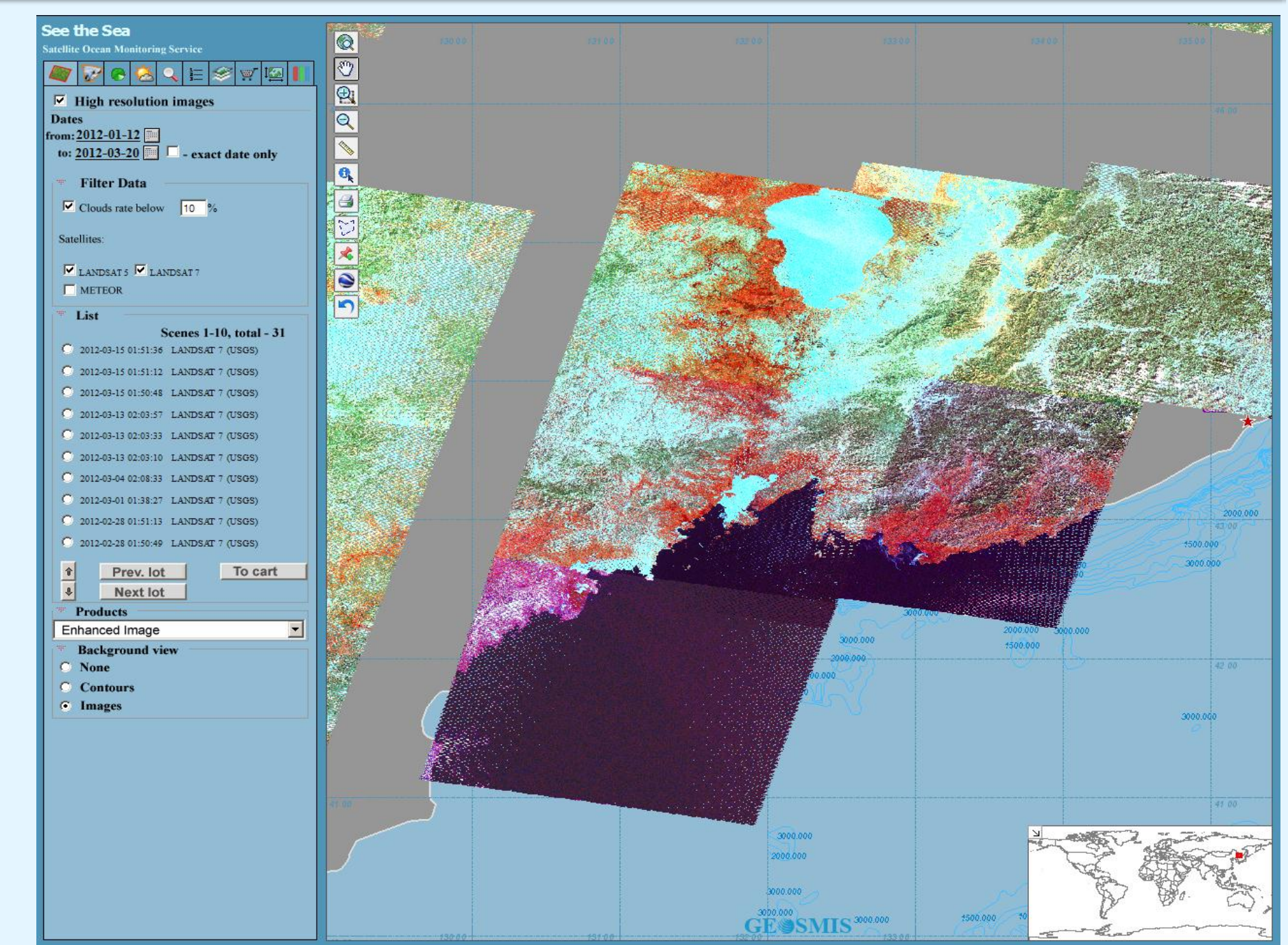
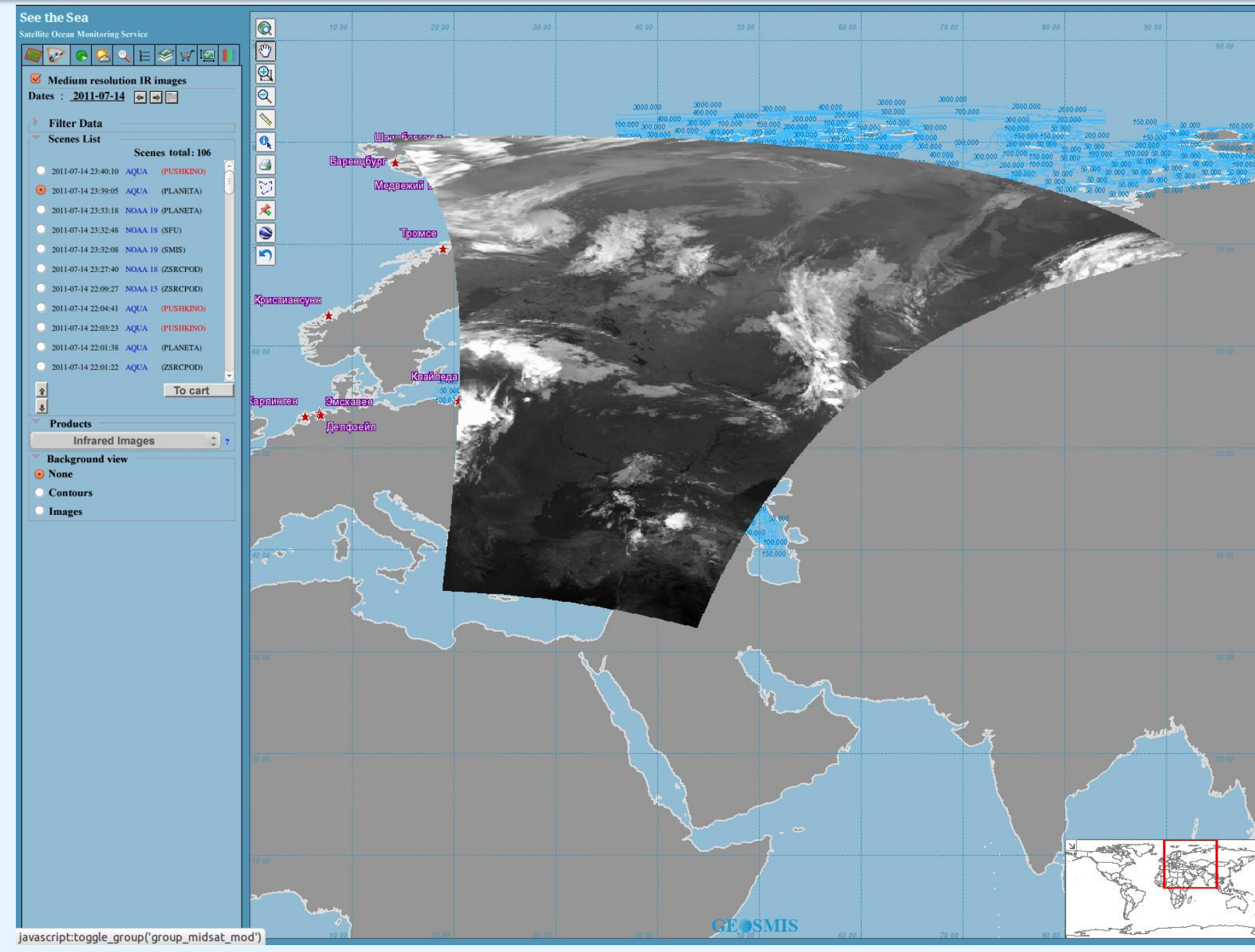
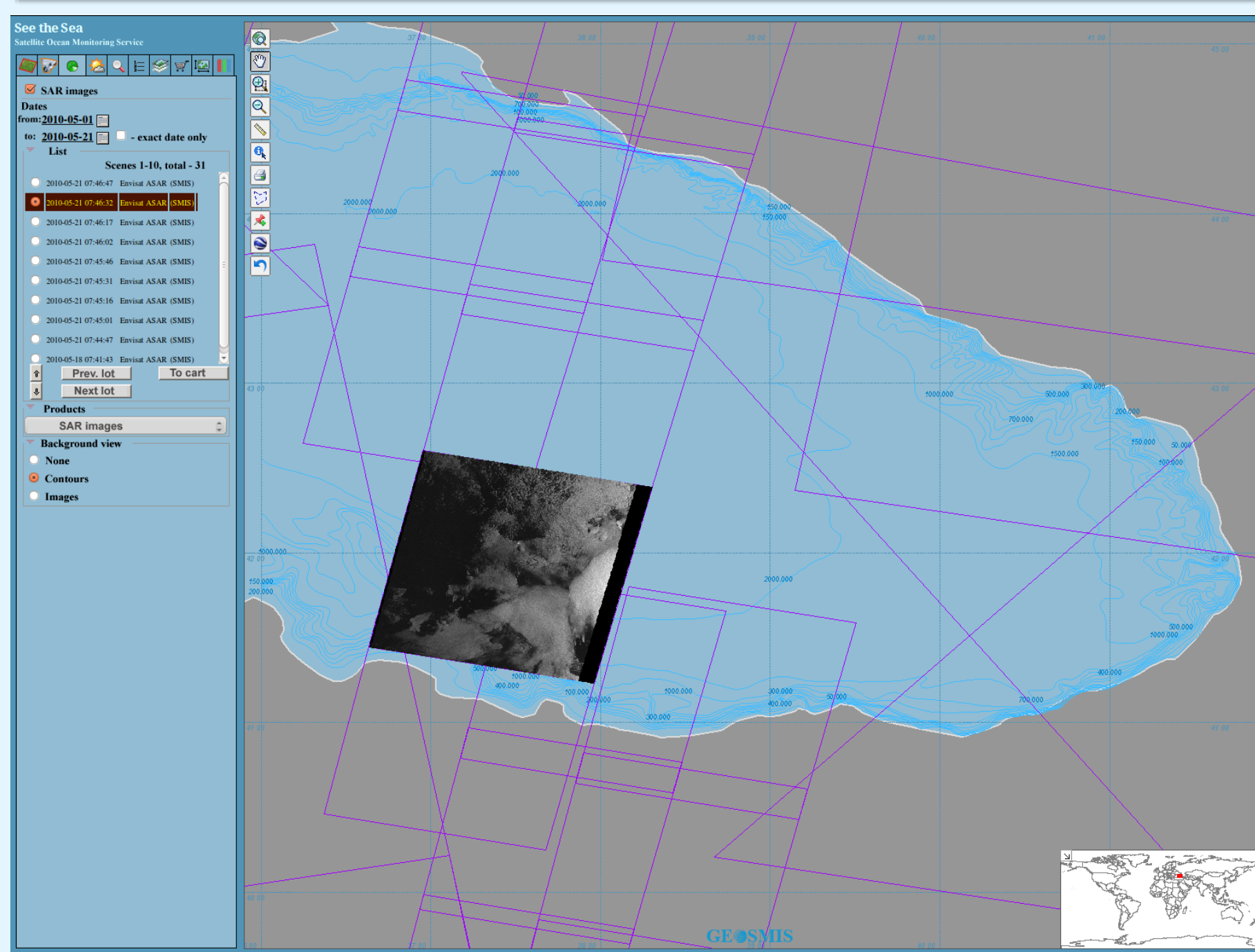
STS teaching classes have been held for students and doctoral students of the Oceanology Chair, Geography Faculty of the Lomonosov Moscow State University and doctoral students in related sciences of Space Research Institute RAS and Geophysical Center RAS.

Proposals are elaborated for building, based on the technologies and prototype STS developed, a multi-user environment providing remote sensing data handling facilities for experts and institutions engaged in world ocean studies.

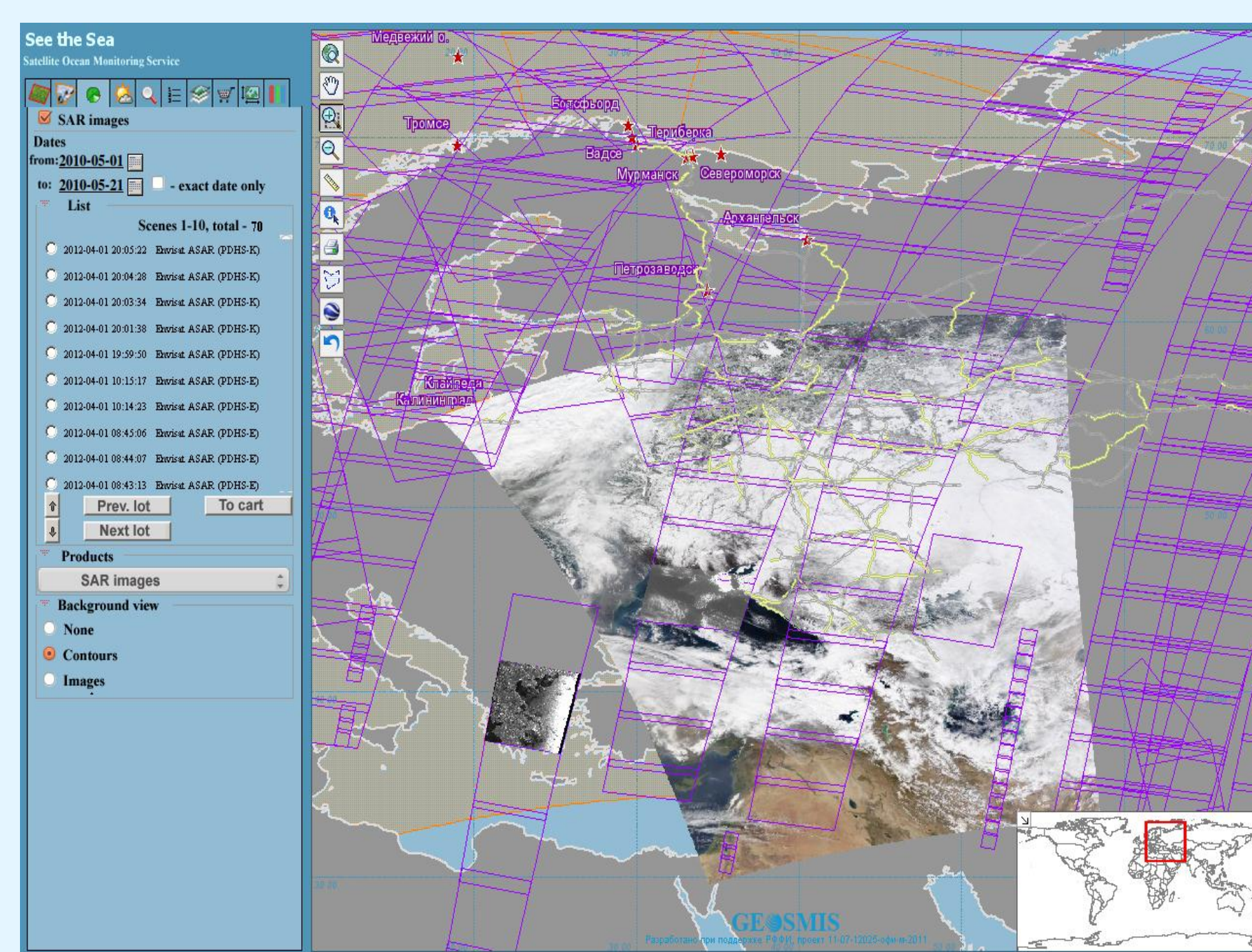
Researcher's Workflow



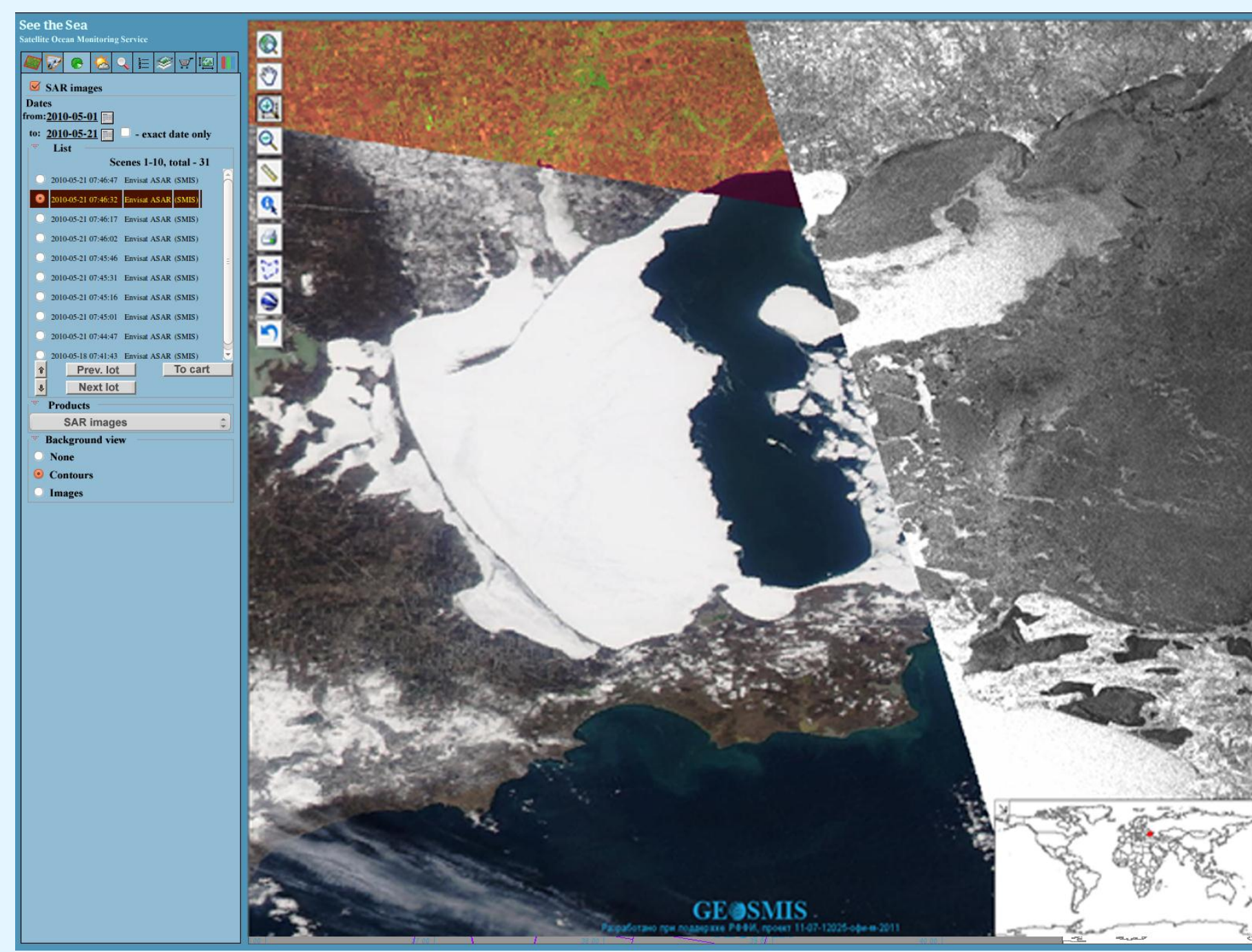
The Principal Features of the "See the Sea" Multi-User Information System



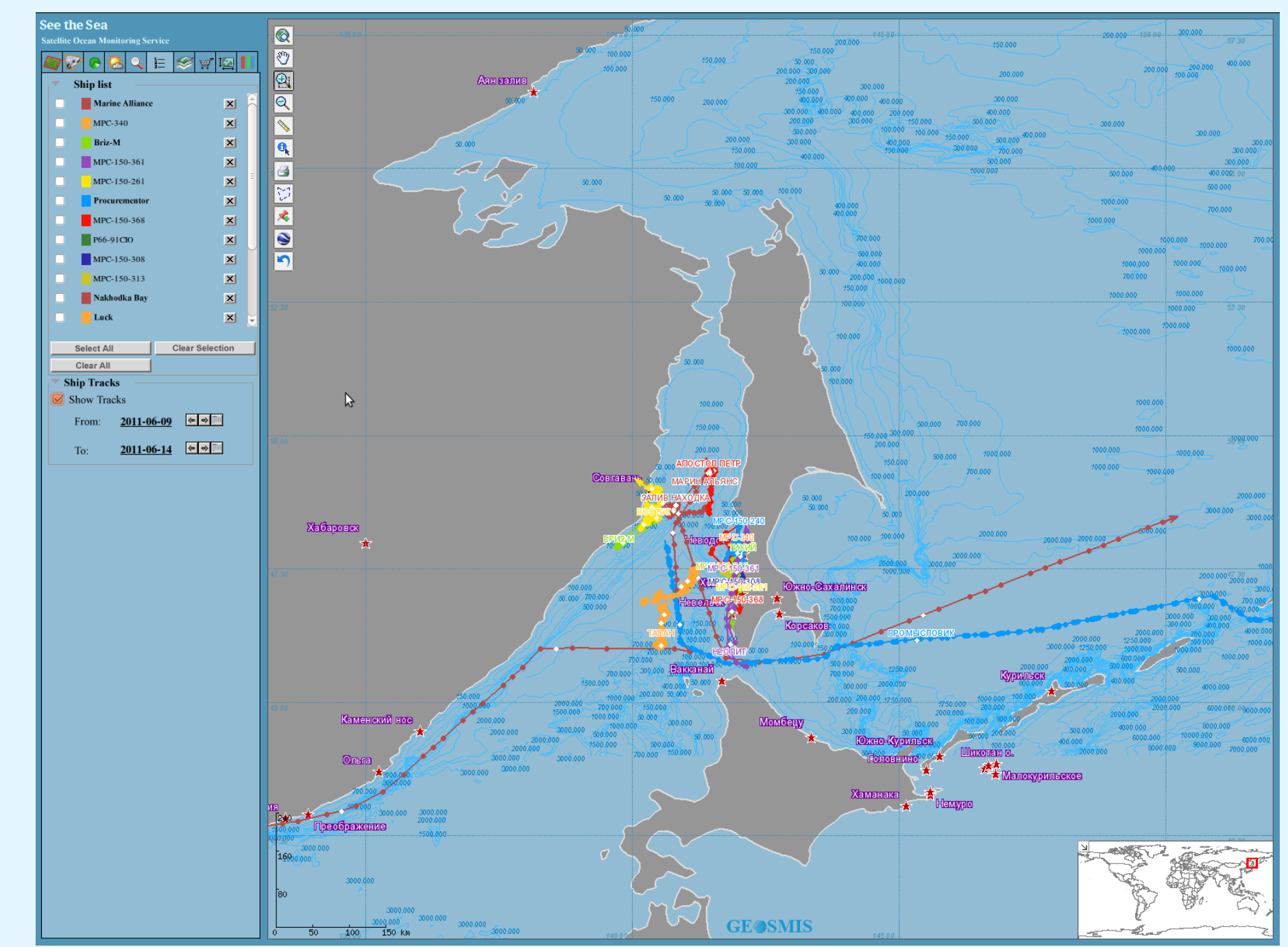
Looking up for available satellite imagery using the cartographic interface



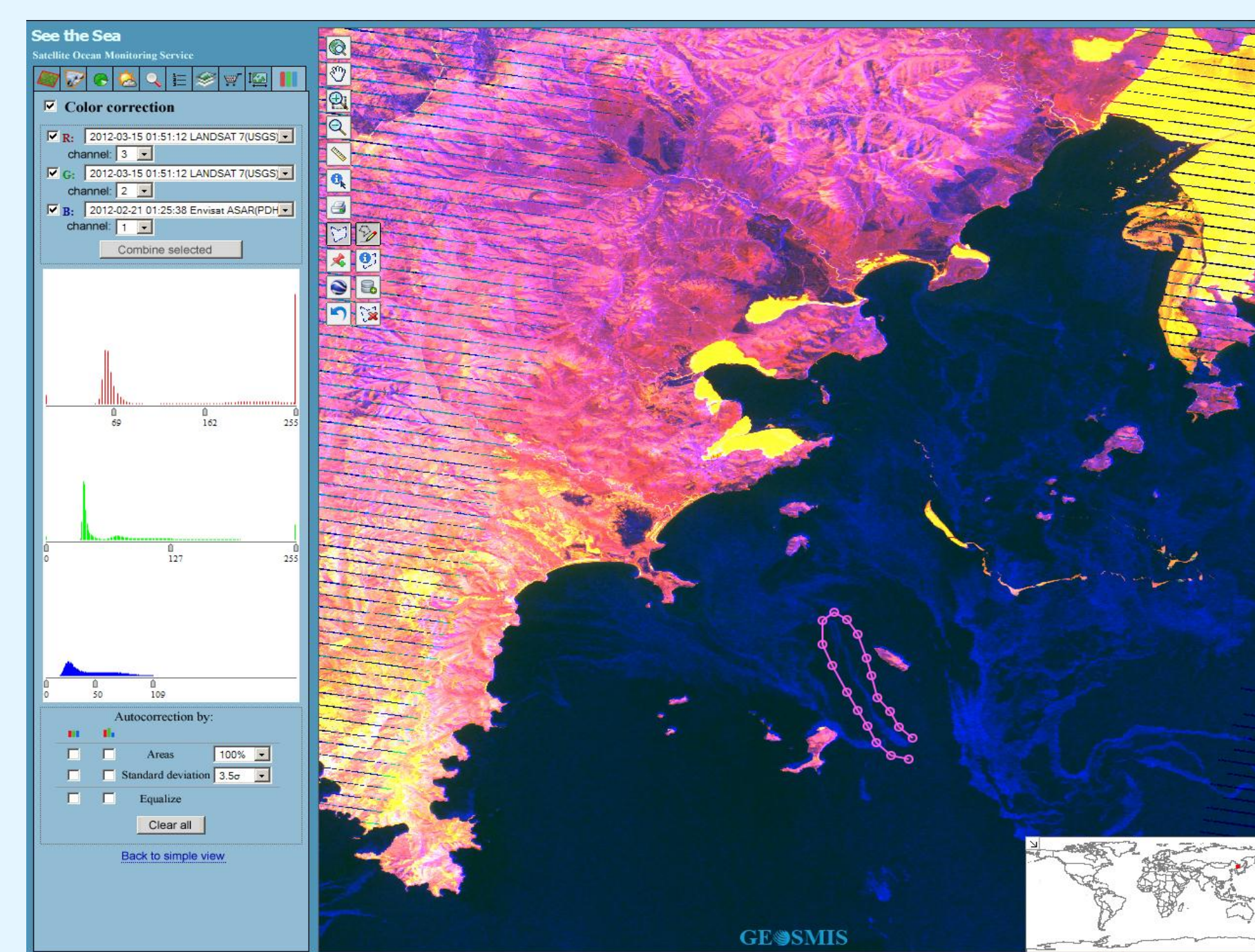
Displaying available satellite data coverage



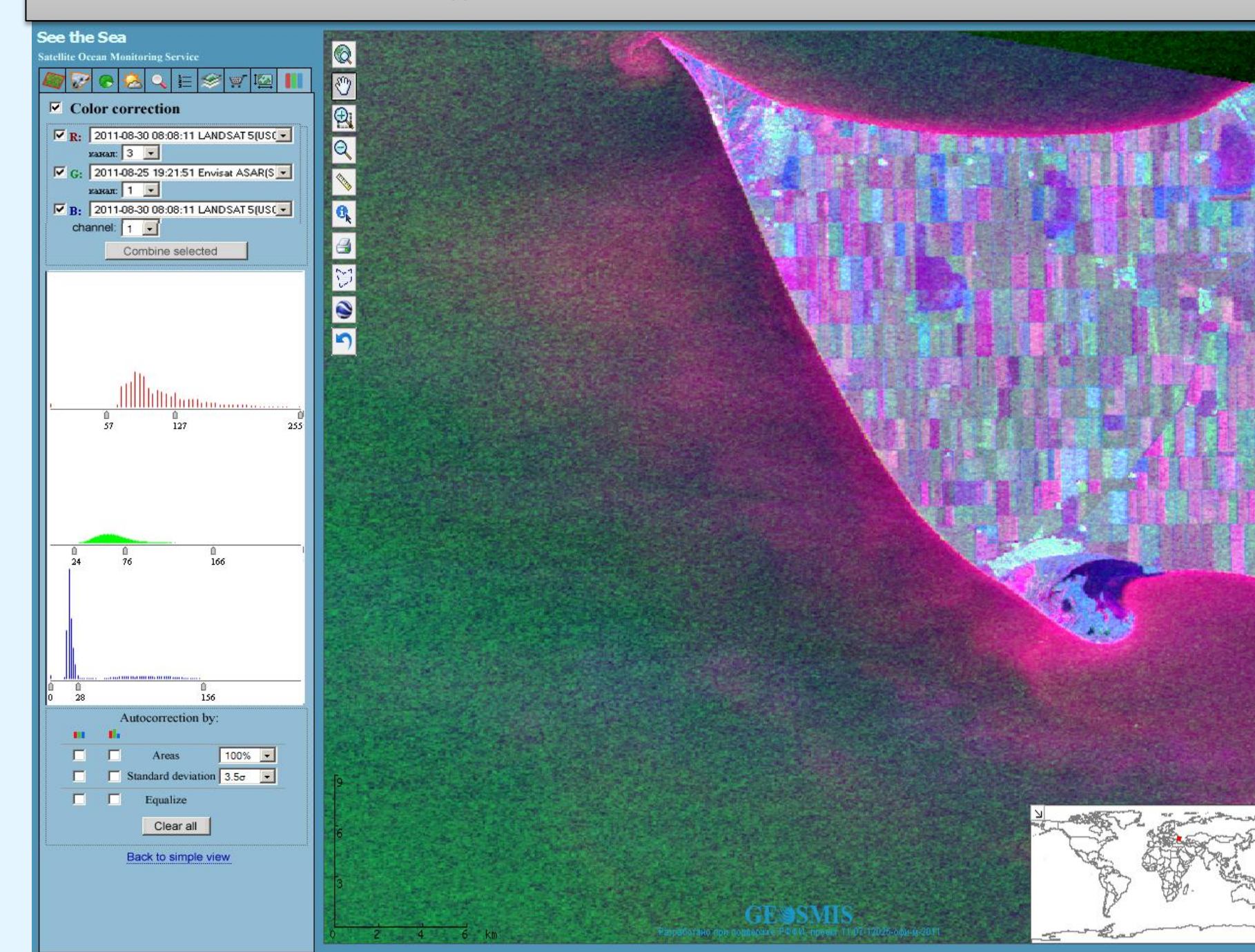
Joint visualization of MODIS, LANDSAT and ASAR Envisat data



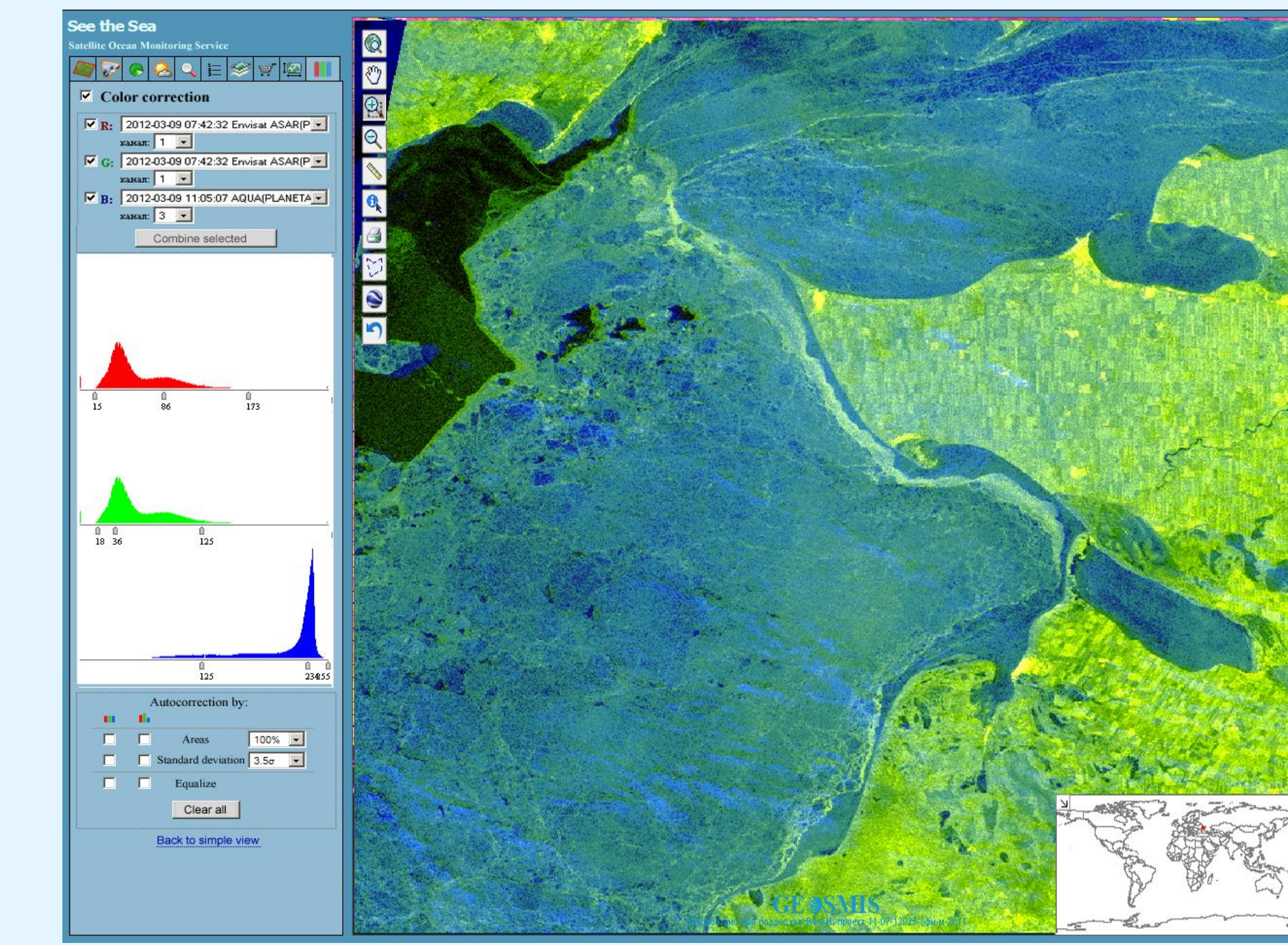
Displaying vessel tracks



LANDSAT-7 ETM+ and ASAR Envisat



LANDSAT-7 ETM+ and ASAR Envisat



MODIS/Aqua and ASAR Envisat

Using RGB composition for joint visualization of multiple satellite images

Acknowledgments: SAR data were obtained under the ESA projects C1P.6342, AO Bear 2775 and C1P.1027
The work was supported by the the RFBR grant # 13-07-12017-ofi-m