

→ BALTIC FROM SPACE WORKSHOP

29–31 March 2017 | Helsinki, Finland

Development of new national monitoring service in Lithuania



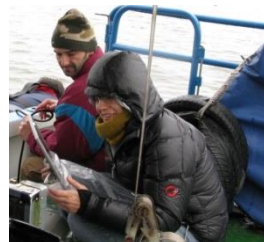
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Development of new national monitoring service in Lithuania

Team at Klaipeda University

Operational EO-based water quality and ecological processes



KLAIPEDA
UNIVERSITY

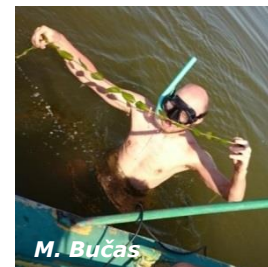


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G. Giordani



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M. Žilius
J. Petkuvienė
I. Vybernaitė-Lubienė



M. Bučas



M. Kataržytė

Ecosystem health and management, focus on the EU Directives

Remote Sensing of hydrophysical processes



I. Kozlov



T. Mingėlaitė



I. Dailidienė

OUTLINE

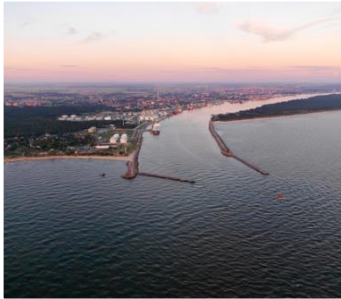
- Environment around us
- Ecological problems
- Environmental monitoring and EU legislations
- EO-based service in Lithuania – H2020 EOMORES
- H2020 EOMORES - EO-based service in LT
- EO-based activities at Klaipeda University
 - Cal/Val of EO-data
 - Monitoring of environment – potential components of service
- Main outcomes and future perspectives

The Lithuanian sector of the Baltic Sea

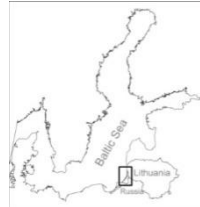


Environment around us...

COASTAL WATERS



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CURONIAN LAGOON

Ecological problems...



Environmental impacts

Eutrophication

Contaminants

Non-indigenous species

Commercially exploited fish

Underwater noise and physical disturbance

Marine litter

Coastal erosion and hydrographic changes

Dumping

Beach nourishment

Marine sectors



Shipping and ports



Fishing



Tourism



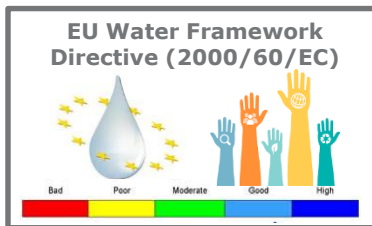
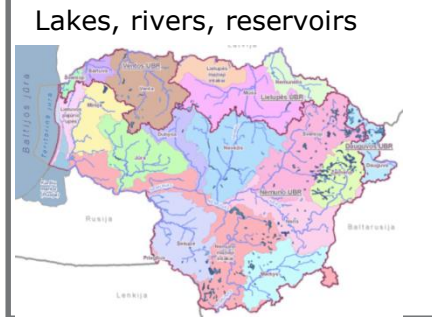
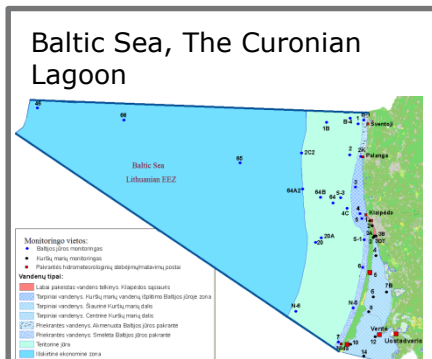
Industry, agriculture, households

River basin



Environmental monitoring and EU legislations

Environment Protection Agency of Lithuania/support of research institutions



Responsibilities:

- to assess the environmental characteristics, pressures and impacts;
- to develop the indicators with reference and target values/levels showing the good ecological status;
- to **upgrade monitoring programmes** for sustainable water resources protection and management promoting and developing the application of new and effective methods (models, satellite imagery);
- to restore the ecosystem into a balance and achieve or maintain Good Environmental Status;
- to protect the environment.

- Operational data demand;
- Need of comprehensive data for development and testing of WQ indicators;
- Bottom-up conversation with end-users.

H2020 EOMORES - EO-based service in LT

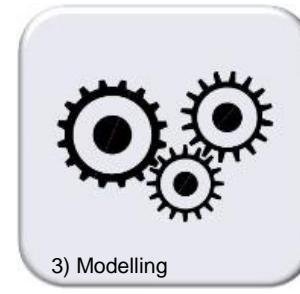
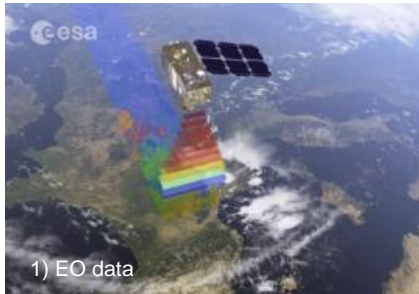
- operational monitoring and reporting services, for inland and coastal waters;
- User requirement based (any organisation interested/responsible for sustainable water quality management);
- based on high quality scientific know-how, observations and expertise;
- a combination of 3 components:
 - satellite data (1),
 - *in situ* data (2),
 - ecological models (3)



2016 12 - 2019 12



EOMORES



TARTU OBSERVATORY
space research centre



KLAIPĖDA
UNIVERSITY

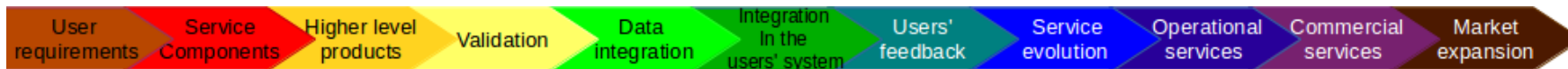
UNIVERSITY of
STIRLING



PML

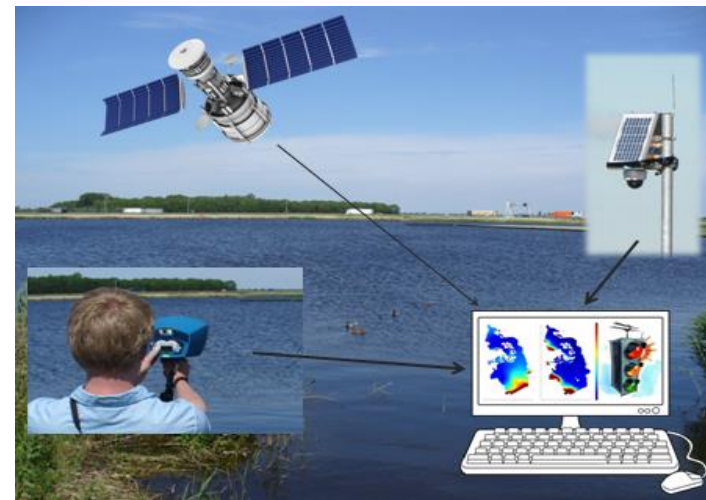
Plymouth Marine
Laboratory





- **Inventorisation of users' needs, determine direction of research**
- Research and development of the three components (1, 2, and 3)
- Research and development of integrated and higher level products
- **Validation**
- Integration in the (data) system of the users
- **Operationalisation**
- Prepare commercialization (after project)

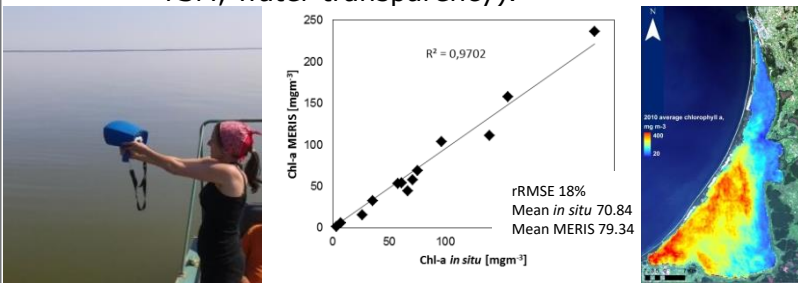
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Cal/Val of EO-data

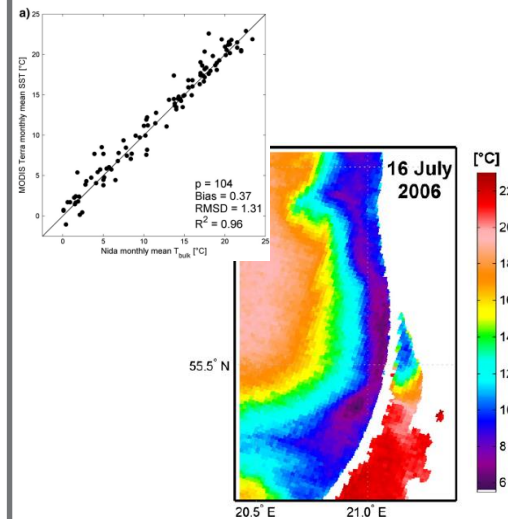
Optical data

- First attempt – cal/val of MERIS/Envisat data for retrieval of water quality parameters;
- New algorithm development, testing of standard products (i.e. MERIS Level 2);
- Achievements:
 - Chl-a and SCUM semi-empirical band-ratio algorithm for the Curonian Lagoon (Bresciani et al., 2014);
 - Chl-a products using FUB/Wew plug-in of BEAM software (Vaičiūtė et al., 2012);
 - Validation of other WQ parameters (CDOM, TSM, water transparency).



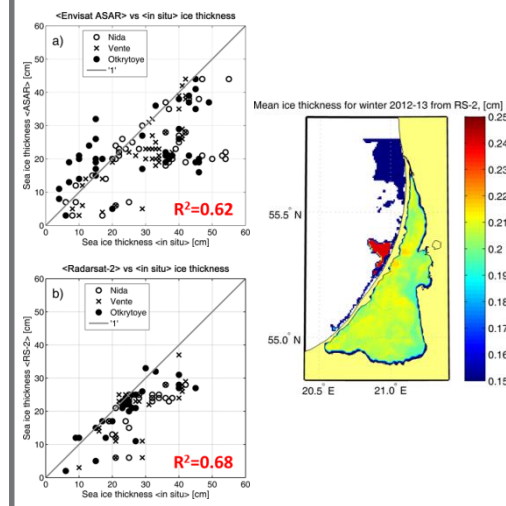
IR data

- First attempt – validation of MODIS/Aqua and MODIS/Terra derived SST products (Kozlov et al., 2012);



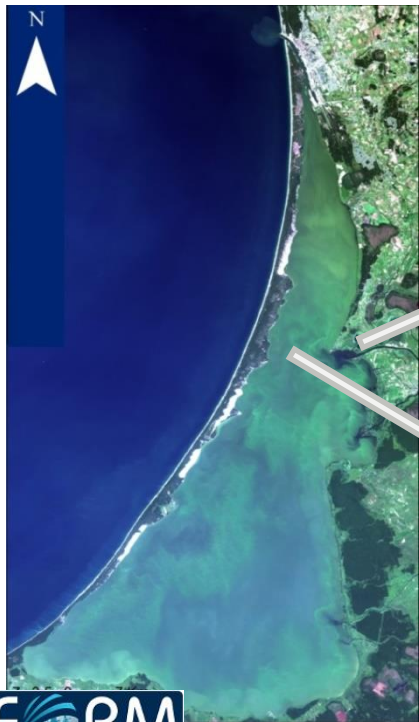
SAR

- First attempt – validation of SAR-derived sea ice thickness products for different SAR sensors (Kozlov et al., in prep.);

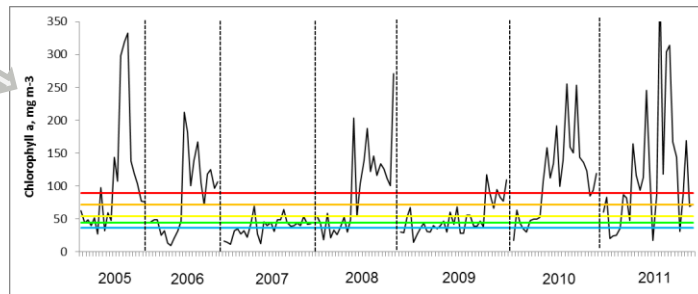
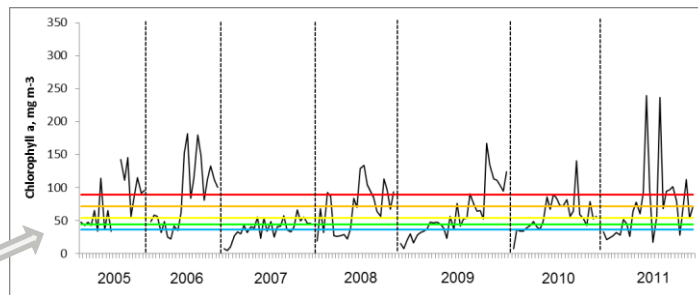


EO-based activities at Klaipeda University

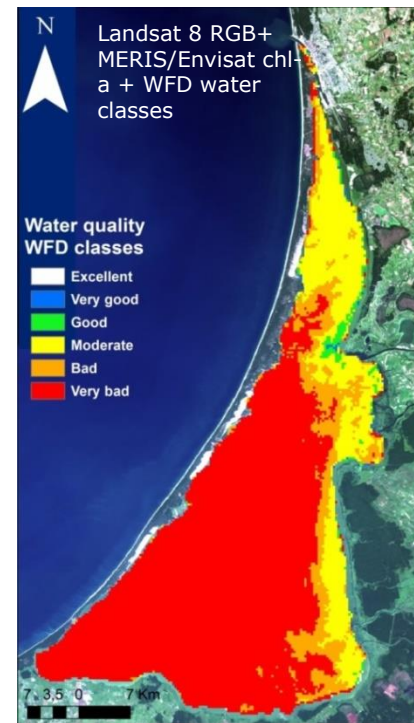
Water Quality



Time series of chl-a



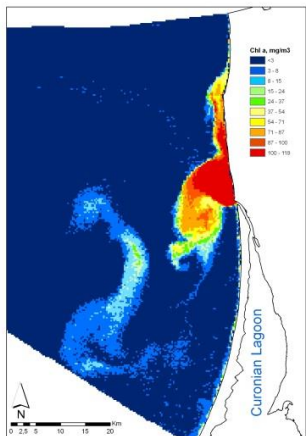
Thematic maps



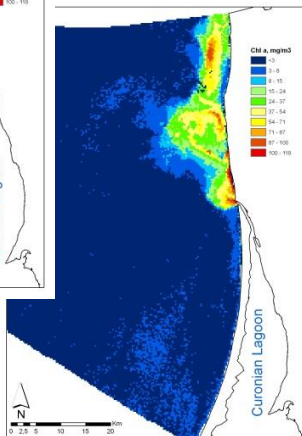
EO-based activities at Klaipeda University

Water Quality

Chl-a concentration in the coastal waters of the Baltic Sea



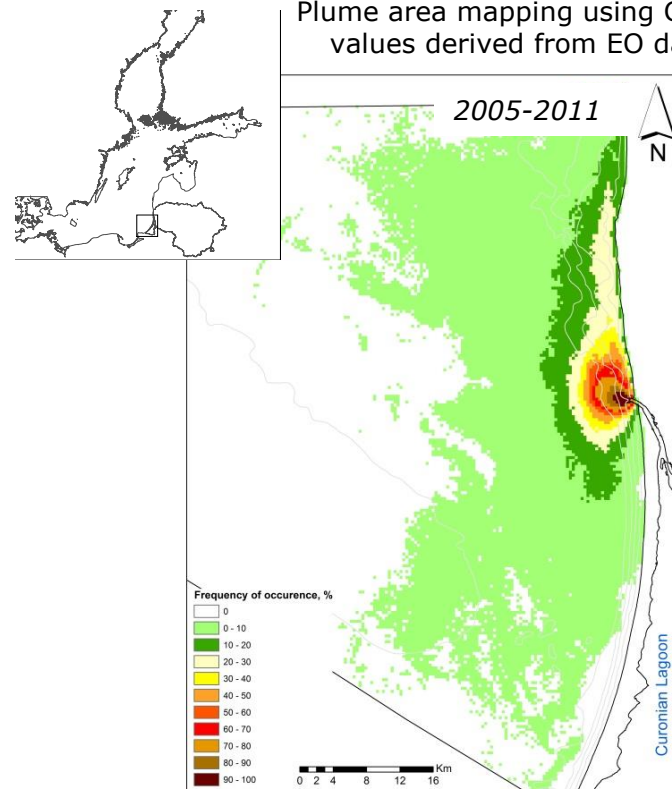
2010-07-21



2010-08-11



Plume area mapping using CDM values derived from EO data



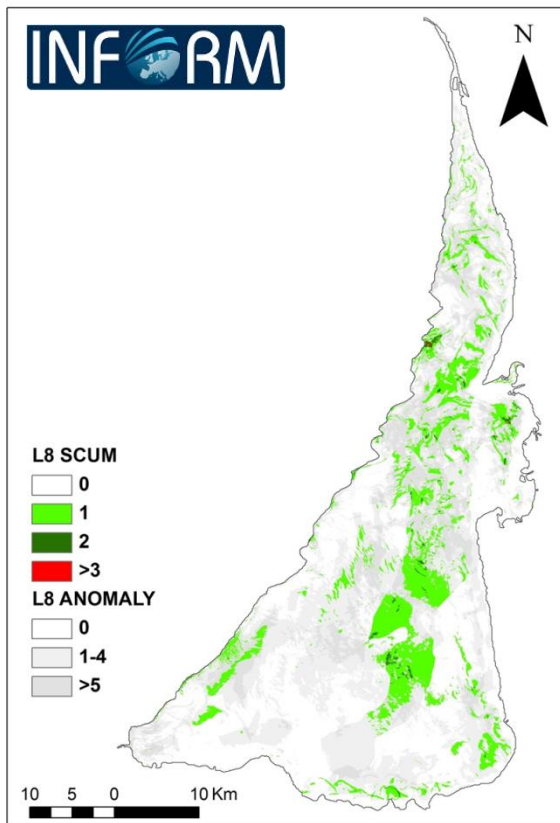
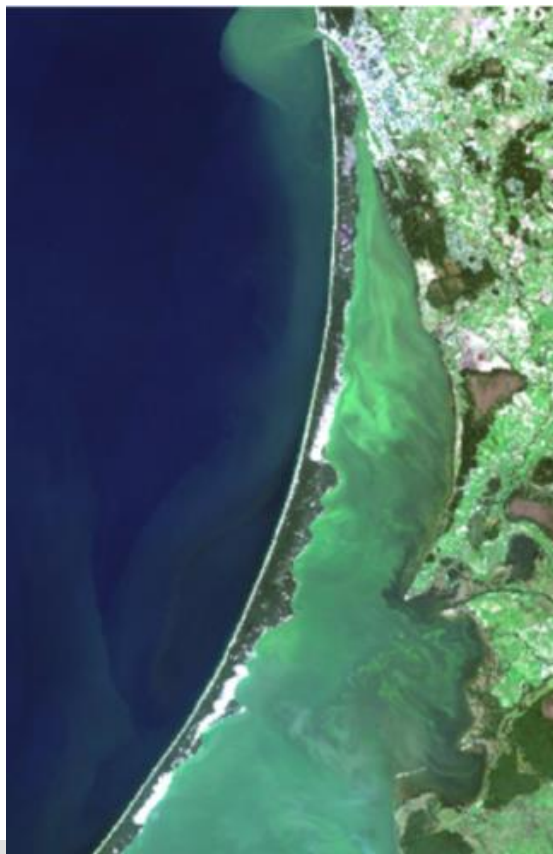
Cyanobacteria SCUM



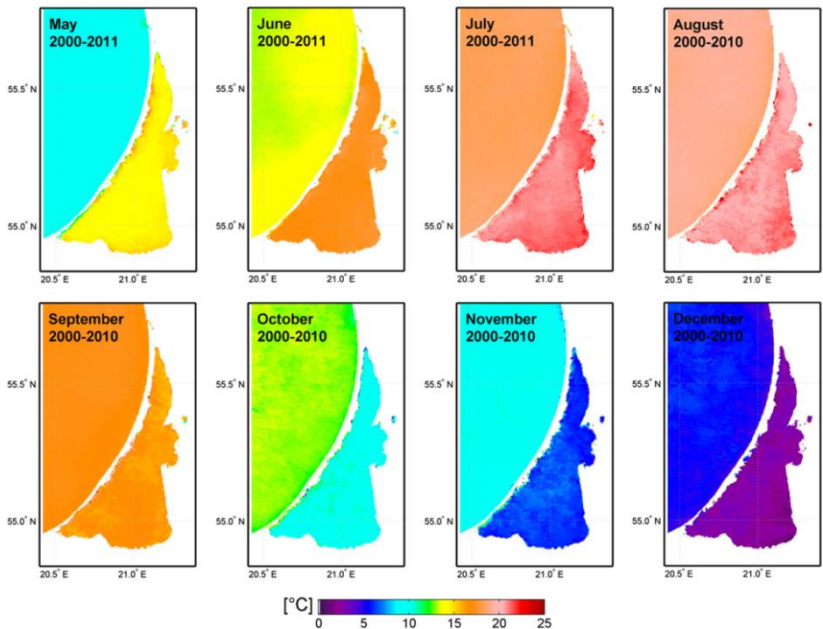
Fish kill



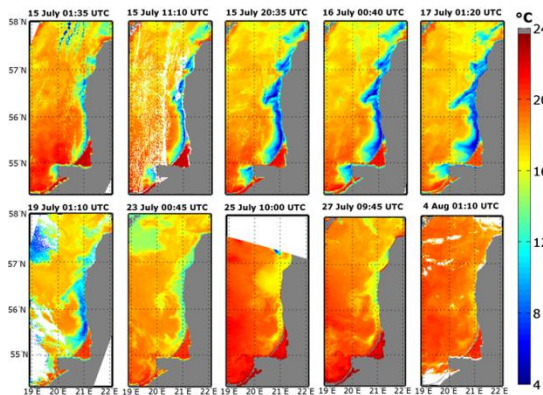
Anoxia



SST mapping



SST - key parameter defining hydrological and ecological state of the SE Baltic and the Curonian Lagoon waters (Kozlov et al., 2012).



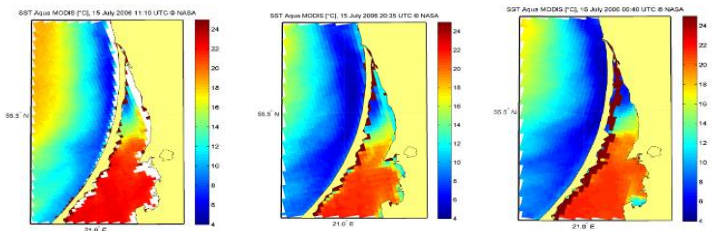
Development of a major coastal upwelling event in SE Baltic Sea in summer 2006

Duration up to several weeks;

SST drop up to 14 °C

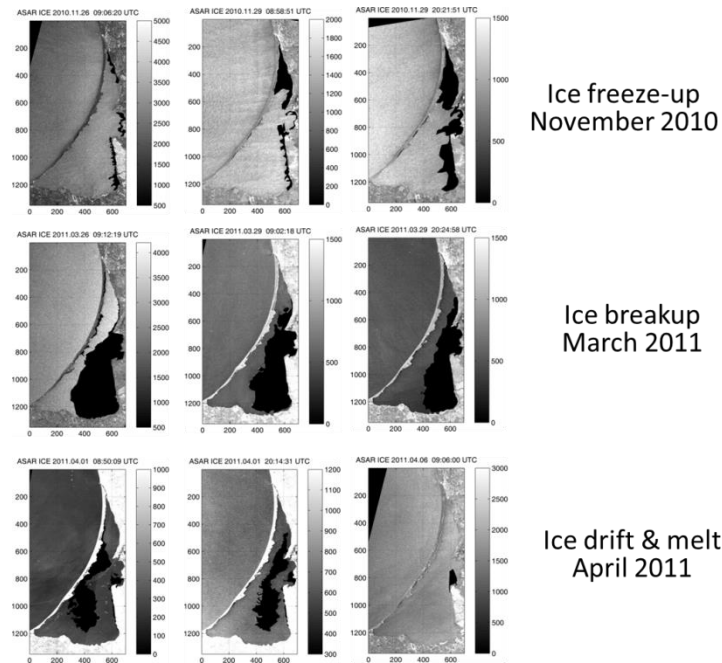
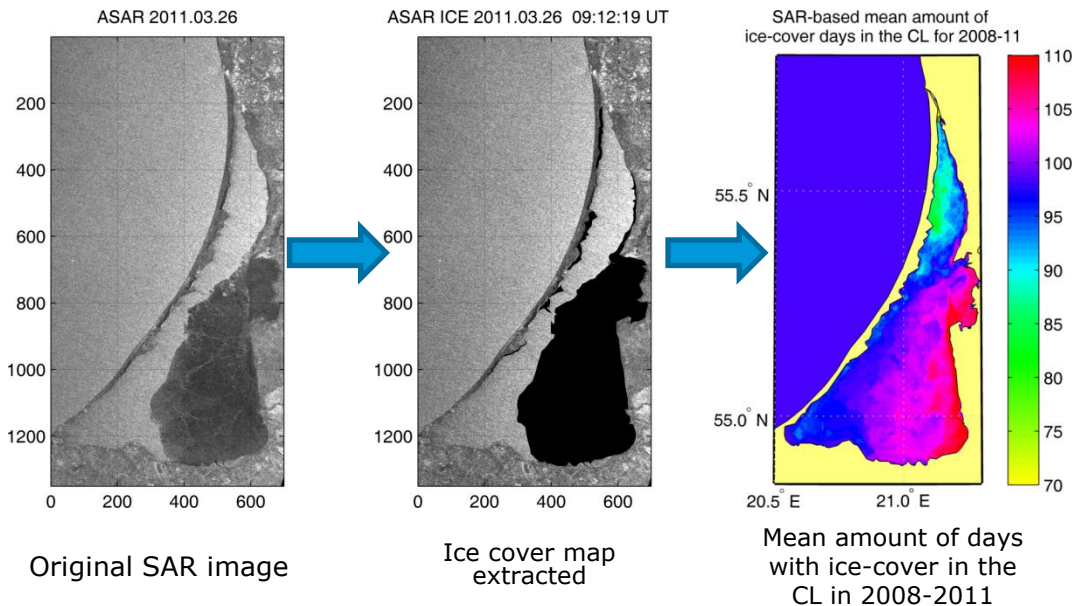
Upwelling events are also accompanied by salinity increase, air temperature drop, marine fog formation and has an impact on the pelagic environment.

Upwelled waters inflows to the Curonian Lagoon



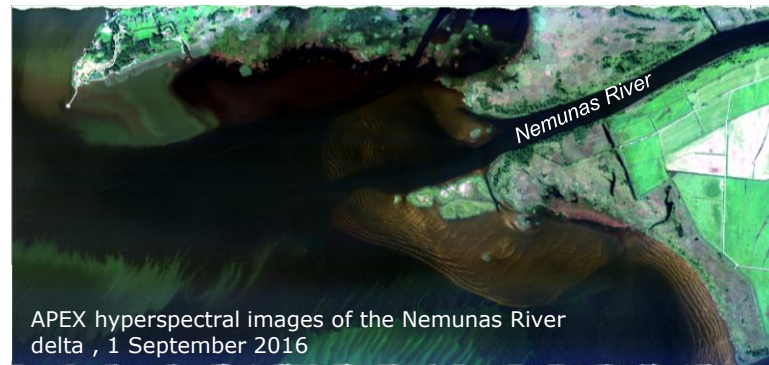
Ice cover mapping

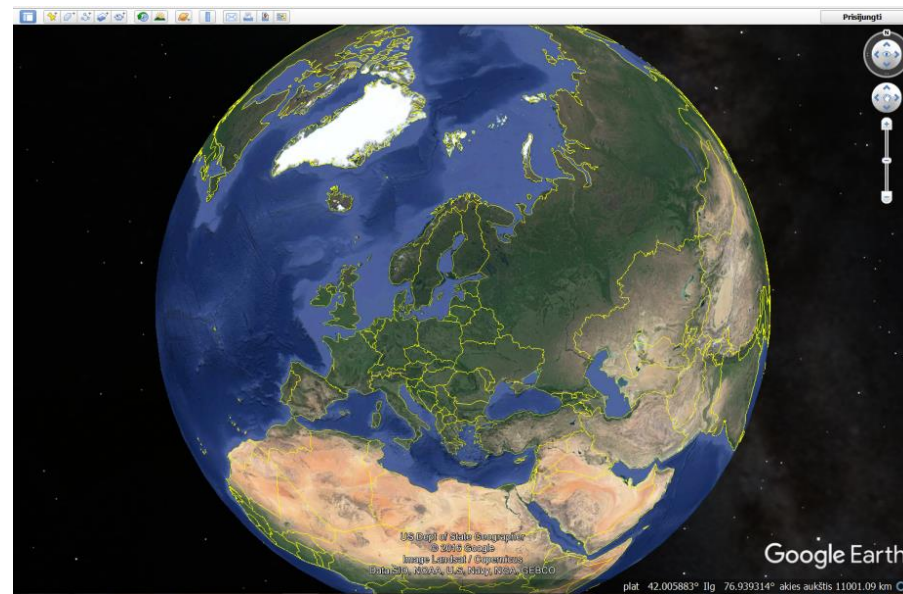
Analysis of spatial ice cover changes in the Curonian Lagoon from SAR data



Main outcomes and future perspectives

- Demand of comprehensive dataset for:
 - Monitoring of ecological status;
 - Development and testing of new and integrated WQ indicators;
- Where we are:
 - In the progress of EO-based products development and application
 - new scopes – monitoring of macrophyte and coastal vegetation, SSS, floods, etc.;
 - new data sources and approaches – COPERNICUS, hyperspectral imagery;
 - new regions of interest (lakes, reservoirs, sea port area).
 - In the discussion with users – engagement, education, development/testing of indicators
 - bottom-up cooperation is extremely important.





Do you imagine a world without remote sensing?