Monitoring water quality in the Baltic region

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Joint NASA LCLUC Science Team Meeting and GOFC-GOLD/NERIN, NEESPI Workshop Monitoring land cover and land use in boreal and temperate Europe

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Background

The Baltic Sea Basin on 1 April 2004, as seen from the SeaWiFS satellite NASA/Goddard Space Flight Center, GeoEye.
Legal basis for surface water quality monitoring

- National legislation;
- EU legislation:
- EC adopted an Integrated Maritime Policy for EU 2007
- Conventions (Helsinki Conv. on BS, Helsinki Conv. on Transboundary waters).
Main responsibilities of national authorities in operational surface water quality monitoring

- Development and implementation of the programmes for monitoring of water status within each river basin district;
- Development of **budget** proposals for the implementation of the monitoring programmes;
- **Co-ordination and arrangement** of implementation of the monitoring programmes;
- Maintainance of **data bases**
- **National and international reporting** (inc. EEA) on results of monitoring
Needs to revise water monitoring program according to Water Framework Directive.

- According to WFD water bodies as primary water management units must be nominated;
- Information on ecological quality status must be obtained;
- Risk assessment not to achieve at least good water ecological quality status until 2015 must be performed;
- Information on water bodies` ecological quality are prerequisite for establishment of management plans.
HELCOM is the governing body of the "Convention on the Protection of the Marine Environment of the Baltic Sea Area" (Helsinki Convention).

The Helsinki Commission, or HELCOM, works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental co-operation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden.
HELCOM responsibilities

- an **environmental policy maker** for the Baltic Sea area by developing common environmental objectives and actions;
- an **environmental focal point** providing information about (i) the state of/trends in the marine environment; (ii) the efficiency of measures to protect it and (iii) common initiatives and positions which can form the basis for decision-making in other international fora;
- a **body** for developing, according to the specific needs of the Baltic Sea, Recommendations of its own and Recommendations supplementary to measures imposed by other international organisations;
- a **supervisory body** dedicated to ensuring that HELCOM environmental standards are fully implemented by all parties throughout the Baltic Sea and its catchment area; and
- a **co-ordinating body**, ascertaining multilateral response in case of major maritime incidents.
Large regional programs

- **BALTEx** (since 1993), Phase II (2003-2012) has extended the scope of research to regional climate change, water management and biogeochemical cycles and transport processes in the regional Earth system.

- **BONUS** Baltic Sea research funding cooperation (since 2003)- ERA-NET instrument of the EU’s FP6. – Open call- *Development of a Methodology for Research Infrastructure Integration within the Framework of the Joint Baltic Sea Research Programme BONUS*
Global Monitoring for Environment and Security: EU, ESA and other partners
Finance sources for R&D in water monitoring

National Research projects (target financing and grants)

Applied projects directly from public authorities (Ministry of Environment, Defence, Internal affairs etc)

Research and development in cooperation with enterprises and public authorities (EU Cohesion Fund, Structural Funds etc)

International and bilateral collaboration contracts and projects
Estonian operational water monitoring programs

- Ground water monitoring
- Inland water bodies monitoring
- Coastal seawater monitoring
- Eutrophication monitoring
- Radon in ground water
Research institutes involved

- Tartu University
- Estonian Marine Institute
- Institute of Physics
- Tallinn Technical University, Marine Systems Institute
- University of Life Sciences
- Tartu Observatory
Estonian target financed project- “Remote sensing of optically complex waters” (A. Kuusk)
Validation MERIS products over large lakes and Baltic Sea coastal waters (A. Reinart)

Monthly mean Chl, September 2008
Optics and remote sensing of coastal and inland waters 2005-2010

- New remote sensing methodologies (analythical rather than band ratio type algoprithms, sun glint removal methods, etc.)
- Mapping benthic macroalgal cover with remote sensing
- Detecting and mapping of cyanobacterial bloom
Synoptic-scale variations of ice characteristics in the Gulf of Finland using remote sensing and numerical modelling™ 2008-2011.

Upwelling events and the related nutrient transport in the Gulf of Finland™ 2009-2012

Oil pollution, waves (with TUT and EMHI)
Applied projects:

Marine Systems Institute at TUT 4 ongoing projects for monitoring the suspended matter distribution during the dredging operations for Heltermaa harbour, Muuga Harbour, Naissaar island, Paldiski South Harbor

Muuga harbour 9.09.2009, MERIS FRS product TSM (case-2 processor)
Ongoing International Cooperation Projects

- Research
- Education
- Environmental Monitoring
- Business & Entrepreneurship
- Space Policy
- Public Awareness
International collaboration projects in TTU:

FP7 SAFEWIN “Safe Navigation in Dynamic Ice Conditions” contractor Helsinki University of Technology, Prof. Pentti Kujala

FP7 GMES Core (61 partners)

BALTEX etc oceanographic studies
International collaboration projects in TU EMI

INTERREG-IVA
Spatial planning in archipelago waters by high spatial resolution remote sensing (HISPARES) 2010-2012

Creating GIS-tool for adequate spatial planning in shallow coastal waters using high spatial resolution remote sensing and biological modelling.
“Strategic partnership for improved basin-scale Water quality parameter retrieval from optical Signatures”

FP7 Marie Curie Industry-Academia Partnerships and Pathways (IAPP) (2010-2014)

Focuses on long-term cooperation between three excellent research groups and three successful and quickly developing enterprises.
Incorporation and facilitation of RS activities in TO

FP7 Capacities Programme
Research potential of Convergence Regions

Exposé the Capacity of Estonian Space Research and Technology through High Quality Partnership in Europe

EstSpacE March 2008 - Feb 2011
International collaboration projects in TO:

- 2008-2010: ESA ‘Technical Assistance for the validation of MERIS products in lake Vänern and coastal waters of the north-western Baltic Sea (Sweden)’ (Stockholm University)

- 2008-2010: Swedish National Space Board “Operatinoal use of dedicated marine satellite data to nowcast and forecast algae blooms (HABs)” (SMHI)

- 2010-2013: ESA PEC “Services based on optical radiometry applications for aquatic environment - ORAQUA” (SMEs Hohenheide, Interspectrum)
Creation of regional networks

Coordinator:
Assoc. Prof. Susanne Kratzer, Stockholm University, Sweden

Organizing committee:
Prof. Matti Leppäranta, Helsinki University, Finland
Dr. Anu Reinart, Tartu Observatory, Estonia
Dr. Piotr Kowalczuk, IOPAS, Poland
Dr. Are Folkestad, NIVA, Norway

Advisory Group
Dr. Roland Doerffer, GKSS Research Centre, Germany
Prof. Ian Robinson, National Oceanography Centre (NERC), UK
Dr. Samantha Lavender, Plymouth University, UK
Dr. Curtis Mobley, Sequoia Scientific, Inc, USA

Partners - groups: Denmark – 1, Finland - 2, Island - 1, Norway – 2, Sweden - 2, Estonia - 2
Ventspils and Tartu cooperation in space technologies related research and training.

Objective: increase the quality of space related education, research and industrial capacity via co-operation among research, highest education establishments and business support institutions in Kurzeme region (Latvia) and South Estonia region (Estonia).
Utilizing the existing potential of Nordic-Baltic dimension in critical satellite technologies and applications. Foster the establishment of strong and long-term relations between firms, institutions and universities from Baltic States and experienced European space organizations.

**Expected impact:**
1) Contribution to European space programmes and markets
2) Future cooperation and adhesion to ESA
3) Increased space capacities in emerging space countries

**Target groups for knowledge dissemination:**
public, policy-makers, research community, enterprises
DORISnet FP7 3rd Space Call Support Action
Fostering downstream activities and links with regions

- Improving regional participation in the GMES programme
- Providing Education and training
- Providing a tool in support of the European downstream industry

Coordinator - CEON Promotion Center for Communication, Earth Observation and Navigation Services