International Perspectives, Activities, Initiatives

Carsten Brockmann
Brockmann Consult GmbH

• Consultancy company
• Providing services to science and environmental monitoring stakeholders
• Environmental Data
  – Environmental Informatics Department
  – Geo-information Services Department
• 30 employees
• Located close to Hamburg, Germany
• + 7 people Brockmann Geomatics Sweden
Overview

- **ESA:** *development of new applications, serving user needs, development of European EO service sector*
  - CoastColour (2010 – 2012)
  - Ocean Colour CCI (2011 – 2013)
  - World Bank Lake Titikaka (2011)
  - MarCoast (until end of 2012)

- **European Union:** *basic research and application oriented R&D projects*
  - Aquamar (2010 – 2013)
  - Freshmon (2011 – 2013)
  - Cobios (2011 – 2013)

- **Other:** *national or user funding*
  - JärviWiki (Finland)
  - MarCoast (after 2012)

**Total project costs ~ 25-30M€**
MERIS Lakes

• ESA project

• Development of algorithms for processing of MERIS products over inland waters

• Main achievements
  – In-situ measurement protocol
  – Dedicated algorithms for AC and in-water processing
    • Eutrophic lakes
    • Boreal lakes
    • Generic Case2Regional algorithm
  – Application Demonstration with MERIS FR data

• Consortium lead by Technical University Helsinki (Sampsa Koponen)
  – Team composed of
    • TKK – in-situ measurements, experts for boreal lakes
    • GKSS (R. Doerffer) – algorithm development (Case2R)
    • University Madrid – in-situ measurements eutrophic lakes (Spain)
    • Brockmann Consult – C2R and MERIS Lakes Processors
• ESA Data User Element Project

• Foster the availability and exploitation of MERIS FR over coastal areas

• Algorithm development
  – Cloud screening, coastal pre-processing
  – Atmospheric correction (coastal aerosols, Rrs in AC)
  – IOP inversion for Optical Water classes (T. Moore)

• Validation
  – User supplied in-situ data

• Data Provision
  – > 100TB MERIS FR products online

• Forum for Coastal Ocean Colour User Community
CoastColour Sites

60 users, increasing, > 80,000 MERIS FRS Products
MarCoast & Aquamar

- MarCoast = European Network of Water Quality Service Providers
  - 14 private and public service providers
- Setting-up supported by ESA
  - User and national funding after 2012
- Portfolio
  - Classical WQ parameters
    - Chl, tsm, CDOM, turbidity, SST
  - User tailored products
- Key elements
  - Robust and redundant processing chains
  - Validation and quality requirements
  - User federation
  - Operational services, long term reliable
- Aquamar = EU R&D project to prepare next generation service portfolio
  - New services, improved validation, new dissemination techniques
Percentile P90 in Belgian WFD Waters

HAB Risk

Tine Series Analysis Tool (BEAM)
• Strategic partnership for improved basin-scale Water quality parameter retrieval from optical Signatures
  – In-situ techniques for the observation of optically complex waters
  – Remote sensing techniques
  – Ecological mapping through optical signatures
  – Data management and processing

• Marie Curie Industry-Academia Partnerships and Pathways (IAPP)
  – Coordinated by Tartu Observatory (EE, Anu Reinart)
  – Partners are SYKE (Fi), Brockmann Geomatics (S), Water insight (NL), Stockholm University (S), Brockmann Consult (D)
WP3: D3.1 Manuscript about atmospheric correction for publication in Remote Sensing of Environment

Iterative atmospheric correction of MODIS over the Swedish Great Lakes applied to water quality monitoring

Peter Land, Jamie Shutler Remote Sensing Group, Plymouth Marine Lab. United Kingdom; Niklas Strömbeck, Strömbeck Consulting, Sweden; Donald C Pierson, New York City Dept. Environmental Protection, USA, Anu Reinart, Tartu Observatory, Estonia; Susanne Kratzer, Department of Systems Ecology, Stockholm University, Sweden;


Climatological distribution of CSPIM in g/m3 estimated from retrievals of RRS (748) using the Lakes model. The Pålgrunden field station is marked with a cross.
Global Lakes

- UK research project
- 5 years duration (2012 – 2017)

Objectives
- Investigate state of lakes
- Investigate response to climate change
- Realisation of a 20 years time series of ecological parameters and Lake Water Surface Temperature
- Link to auxiliary data on catchment land use and meteorological forcing

Work programme
- Strong in-situ component
- Focuss on MERIS data, later Sentinel 3
- Link with ecosystem model

Coordinator: A. Tyler, Univ. Stirling
• Objectives:

  – support the implementation of the new 2011-2020 biodiversity strategic plan of the Convention of Biological Diversity, and more specifically, to contribute to the assessment and monitoring of the Aichi 2020 Biodiversity Targets of the CBD

  – Provide a global assessment of the availability of freshwater water and of its quality with the provision of key observations over a number of large perennial inland waters (natural lakes and water reservoirs)
Work Programme

• For 300 globally distributed Lakes and Reservoirs
  – > 500km²
  – Biodiversity priority list
• Inland Water Quantity
  – Surface water extend (ASAR [LC-CCI])
  – Surface water height (RA-2 [Rivers and Lakes])
• Inland Water Quality
  – Chl-a, TSM, CDOM, turbidity, IOPs (MERIS)
  – Lake Surface Temperature (AATSR [ARC-Lake])
  – Combined biodiversity indicators
• Validation
  – EO data validation
  – Indicators together with CBD (experts)
• Start 2\textsuperscript{nd} half 2012
  – 2 years duration
GLASS

• **Global Lakes Sentinel Services**
• **EU R&D Project**
  – Duration 3 years (2013 – 2015)
  – Total project costs 2.5M€ (2M EU contribution)
• **Objectives**
  – Setting-up a system to be able to handle the hughe amount of Sentinel 2 and Sentinel 3 data
  – Generation and distribution of lake water quality products (globally)
• **Key challenges**
  – Algorithmic: SIOPs, AC incl. adjacency effect, cyano bacteria, data mining
  – Data volumes - suitable IT infrastructure
    • S2: 1 TB per day (L1)
    • S3: 2 TB per day (L1+L2)
• **Coordinator:** Steef Peters, Water Insight NL
  – SYKE (Fi), EOMAP (D), Free Uni. Amst. (NL), BC (D), CNR (I), Tartu Obs (EE), BG (S)
### Who is Doing What?

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<th>Area</th>
<th>Algorithm Development</th>
<th>Application</th>
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**Gaps I:**
- In-situ radiometry
- Aerosol measurements
- AC development and validation

**Gaps II:**
- Uncertainty characterisation
- Cross project harmonisation