Diversity II
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Brockmann Consult, Germany
Dramatic environmental problems affecting our planet have mobilised governments, scientists and environmental organisations over the world.

As a result, several **Multilateral Environmental Agreements (MEAs)** have been signed that aim at reducing environmental degradation.

The **United Nations Conference on Environment and Development** (UNCED), also known as the ‘Earth Summit’, held in Rio in 1992. It resulted in the definition of the ‘**Agenda 21**’ plan of actions and the subsequent signature of different multilateral agreements such as

- the UN Convention to Combat Desertification (**UNCCD**),
- the UN Convention on Biodiversity (**CBD**)
- the UN Framework Convention on Climate Change (**UNFCCC**).
ESA and International Environmental Conventions

- UNFCCC, UN Framework Convention on Climate Change
- UNCCD, UN Convention to Combat Desertification
- CBD, UN Convention on Biodiversity
- Ramsar, Intergovernmental Convention on Wetlands
- WHC, World Heritage Convention
CBD
UN Convention on Biological Diversity

http://www.cbd.int/
 sept 2002, 2nd earth summit, johannesburg “achieve by 2010 a significant reduction in the rate of biodiversity loss”

year 2010, international year of biodiversity

may 2010, global biodiversity outlook 3 “2010 targets have not been met” “state of biodiversity: collective failure”

sept 2010, unga 65th session “first high level meeting on biodiversity”

oct 2010, uncbd cop-10, nagoya “new strategic plan for the coming decade with a 2020 mission and a 2050 vision”

june 2012: rio+20 earth summit united nations conference on sustainable development (uncsd)
Five main pressures continue to affect biodiversity and are either constant or increasing in intensity:

- Habitat loss
- Unsustainable use and overexploitation of natural resources
- Climate change
- Invasive alien species
- Pollution

**BUT ....**

- Some 170 countries have national biodiversity strategies and actions plans
- Important progress in developing mechanisms for research, monitoring and assessment of biodiversity
- The real benefits of biodiversity, and the costs of its loss, are progressively reflected within economic systems and markets.
“...Technological advances, refined methodologies and growing databases make our systems for monitoring biodiversity increasingly effective.... Remote sensing is without a doubt one of the indispensable tools for detecting changes in multiple facets of biodiversity over time...”

UN-CBD Secretariat Technical Series No. 32,
“Sourcebook on Remote Sensing and Biodiversity Indicators”
<table>
<thead>
<tr>
<th>CBD Focal Areas</th>
<th>Headline Indicators</th>
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</table>
| Status and trends of the components of biological diversity | - Trends in extent of selected biomes, ecosystems & habitats  
- Change in status of threatened species  
- Coverage of protected areas |
| Sustainable use                                      | - Area of forest, agricultural and aquaculture ecosystems under sustainable management |
| Threats to biodiversity                              | - Trends in invasive alien species (IAS)                                             |
| Ecosystem integrity and ecosystem goods and services | - Connectivity / fragmentation of ecosystems  
- Water Quality of freshwater ecosystems               |

CBD global headline indicators to assess progress towards the 2010 biodiversity target

*UNCBD COP VII, decision VII/30*
Contribute to the CBD programs of work on the biological diversity of respectively inland water and drylands ecosystems,

global assessment of the availability of freshwater and of its quality with the provision of key observations over large perennial inland waters (lakes and reservoirs)

assessment of the status and trends of the biological diversity in dry and sub-humid lands.
Specific Objectives

• Produce and deliver a number of Earth Observation (EO) application products
  – Parameters:
    • Inland Waters
      – availability of freshwater
      – quality of freshwater, reflected in its water constituents such as chlorophyll-a and/or suspended matter concentration, as well as by its temperature
    • Drylands and sub-humid lands
      – Net Primary Productivity (NPP), and/or related indices on the vegetative/biomass productivity
      – Rain use efficiency and/or related indices on the land/vegetation conditions (status and degradation)
  – Status maps, associated change maps, status indicators and trend indicators aggregated at different spatial and temporal levels
Dimension of the Work

• Spatial extension
  – 300 large perennial inland waters
  – ≥20 dryland areas, globally distributed, 10 million km²

• Temporal coverage
  – 10 years of ENVISAT data: 2002 - 2012

• Instruments
  – Optical visible, optical thermal, active and passive microwave sensors:
    • ENVISAT: MERIS, AATSR, RA-2 and ASAR
    • Complemented by selected HR products
    • Preparing Sentinel 2, Sentinel 3 and Proba-V
The 6 cornerstones of our Approach

1. Link biodiversity users and EO experts

2. Selection of best algorithms

3. Software and production

4. Validation

5. Communication and product dissemination

6. Preparing the future
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6. Preparing the future
1. Link biodiversity users and EO experts

- Diversity User Bureau (DUB)
- User Consultation meetings
- Promotion activities
- Analysis of documentation and comments received
SIDC EVENT
SPACE OBSERVATIONS FOR INLAND WATER BIODIVERSITY

Organised by the European Space Agency with the participation of the CBD Secretariat, the Ramsar Secretariat and the GEP Biodiversity Observation Network (GEO-BON)

Tuesday, 16th October 2012
time 10:15-19:45
room 106 - Level 1

Inland water ecosystems encompass one of the most threatened world’s habitats. In some areas, depletion and pollution of important water resources have gone beyond the point of no return. In recent years, the use of satellites Earth Observations has revealed a key tool and unique information source to support the biodiversity community in different domains of application. The side event will show how satellite observations can contribute to the assessment and monitoring of biodiversity in freshwater and in particular in wetlands and in large permanent inland waters (estuaries, lakes and river reservoirs).

With the participation of David Seidel (CBD Secretariat), Nick Davidson (Ramsar Secretariat), Ian Harrison (GEO-BON), Mar Pekan (European Space Agency) and Per Watten (Swedish delegation and member of the Diversity 12 project)

Food and drink will be served during the event (courtesy of ESA)

DIVERSITY II

diversity inland waters
diversity drylands

Letter of Invitation — User participation

As an integral part of the DIVERSITY II Project, the European Space Agency (ESA) wishes to invite you and your organization to participate as a user in the DIVERSITY II User Group (DUG). Your input will ensure the primary objective of the project, which is to supply the Diversity communities with ESA-based products and tools with appropriate indicators that will aid their work.

What is it for you? All participants of the DUG are guaranteed access to the final data and products produced by the project. User groups will also have access to intermediate products. DUG participants will also receive project progress updates and be kept abreast with discussions and decisions made during the project execution.

Role of DUG. The primary role of the DUG is to provide user requirements, feedback and comments to products and documents to ESA and the project consortium. As a collaborating user, your participation will be acknowledged and you will be invited to provide feedback and comments, as required, in the best of your ability.

Participation as a user is a role suitable for those users who are willing to provide ongoing support during the project. This will include attending DUG meetings and to provide and disseminate report service on and contribute to:

- optimization and synthesis of data requirements;
- determination of data and to assess data availability (including users);
- evaluation of DIVERSITY II products, e.g. geo-information maps and indicators;
- User group meetings (June 2012);
- User feedback;
- dissemination of DIVERSITY II products;

These users are also expected to commit the 2018 with initiatives.

From the DUG, 2-4 personal organizations will be invited to the Project Team to form part of a User Group (UG), which will have executive powers to represent user interests during the project.

"Inland Waters” and “Drylands” Products Requirements

User Questionnaire

Get free access to 10 years of geophysical remote sensing products of your study site. Provide us with your expertise about biodiversity indicators. Benefit from future product enhancements based on your suggestions.

Purpose of collecting Product Requirements

The Earth Observation (EO) and biodiversity organizations that wish to participate in the Diversity II project are invited to provide user requirements to the European Space Agency (ESA) and the project consortium. This provides an excellent opportunity for interested organizations to influence the project outputs to ensure their usefulness for the user community.

All participants who provide requirements and support will be given access to all data project information and services produced by the project. These services will be available through a Volkan Portal and the Comet Interface.

The technical requirements for the products are derived from the Earth Observation data and expert knowledge of data for natural and land cover parameters. These parameters will be used to identify biodiversity indicators. The definition of these indicators, as well as the tailoring of the product products will be based on the response from participating and supporting organizations.

The requirements that you specify in this questionnaire will be used as input to tailor the Diversity products, including status and change maps, trend analysis and biodiversity indicators. To generate higher level status and trend indicators, we also need information on requirements for aggregations of data.

The completion of this information and the level of detail required will directly impact the products produced and their ability to meet the user needs of the Inland Water and Dryland biodiversity communities. Therefore, kindly respond to 50% of all sections of the Diversity II user requirement questionnaire as accurately and thoroughly as possible.
The 6 cornerstones of our Approach

1. Link biodiversity users and EO experts
2. Selection of best algorithms
3. Software and production
4. Validation
5. Communication and product dissemination
6. Preparing the future
Major environmental problems in lakes and reservoirs

After UNEP
Water Quantity: Water Level

Coverage of RLH products, Rivers and Lakes Project

Time series Lake Victoria for the parameters height difference (red) and volume difference (blue)

- CFI Product, easy readable
- Information provided: time, height difference to reference, volume difference
- Quality unknown → QC needs to be developed, implemented and tested
- Lack of coverage in Northern Europe
Water Quantity: Extent

Standard Water Mask

MERIS tie point grid: GTOPO30 based, AMORGOS precise geolocation not applicable

Beam Processor: SRTM based, AMORGOS improvements taken into account

SAR Water Bodies

Water surfaces are temporal variable
In radar backscatter (wind induced roughness)

Analysis of ASAR WS full mission Dataset

Original resolution: 150
Consolidated product at 300m, matching MERIS FR
Lake Water Surface Temperature

LWST in BEAM

Example for LSWT, CHI2, ERR_LSWT, VAR_LSWT, Lake Victoria
Provisional Inland Waters Processing Chain

1. Subsetting (childgen)
2. Geometric Correction (AMORGOS)
3. Radiometric correction (BEAM Smile Correction, Calibration)
4. Land-water masking (SAR Water Bodies or SRTM)
5. Cloud screening (BEAM IdePix + temporal filter + more?)
6. Adjacency Correction (probably BEAM ICOL)
7. Atmospheric Correction (to be investigated)
8. Optical Water Type Classification (to be investigated)
9. Retrieval of Chl-a, TSM, YS, turbidity, Secchi Depth (to be investigated: CC, BEAM FUB-WeW, 2 or 3 band ratio algos, Case2R, Forward-NN ...)
10. Collocation with CFI data: Water extent, height, Lake ST (ARC from AATSR)
11. Indicator 1: Spatial and temporal integration, change indicators (BEAM/Calvalus Mosaicing, Binning, BEAM time series tool)
12. Indicator 2: Combined Biodiversity Indicators Calculation (to be defined)
13. Map generation
14. Time series, Trend retrieval
15. QC
Atmospheric Correction over Water

- **Challenges:**
  - Large range of aerosol types, including absorbing aerosols
  - Large range of aerosol optical thickness
  - Strong contrasts between land and water → adjacency effect
  - Shadowing effect of mountains
  - Surface reflection of neighbourhood, especially from mountains
  - Water reflectance
    - CDOM dominated waters → very low signal in short wavelength bands
    - Sediment loaded waters → high reflection in the red – NIR
    - Eutrophic water → largely variable SIOPs across lakes
    - Bottom reflection

- Aerosol models are critical
  - CoastColour results
  - NASA mixture model
- Different technical approaches
  - CoastColour neural network
  - SeaDAS NIR/SWIR method
  - FUB NN inversion (correlations)
- Method intercomparison
  - Validation with Aeronet
CoastColour AC: Rio de la Plata

L1b RGB

SeaDAS l2gen L2 3 reprocessing

Case2R

L1b band 13 (865nm)
Comparison CC – standard 3RP
CoastColour AC Validation

All MERMAID Samples

TOTAL RHO CCNN VS. IN SITU

AAOT Northern Adriatic Sea

TOTAL RHO MEGS VS. IN SITU

Acknowledgement to all MERMAID PIs for in-situ data (full list see hermes.acri.fr/mermaid) and ESA, ACRI-ST, ARGANS for access to the MERMAID system.
Lake Balaton
In-Water Retrieval

- **Optical Water Type Classification**
  - Potential to direct the algorithm (e.g. method selection, band selection, weighted merging, ...)

- **Inversion methods**
  - General: Spectral matching by neural network (CoastColour, Case2R, FUB), LUT search (Mobley), PCA inversion (Neumann)
  - Specific: colour ratio, single band (e.g. for very high sediment loading)
  - Most critical: bio-optical model
    - Specific Inherent Optical Properties (e.g. Brando)
    - Flexible component model (CoastColour: 5 components)

- **Diversity requires fully automated procedures**
  - Intercomparison of candidates over 10 lakes during experimental analysis
  - Candidates: CoastColour, FUB, red-NIR ratios, CDOM band ratios (pre-selection will be discussed this Thursday)
Indicators

• **Absolute Indicators**
  – “In-depths” lakes
  – Good characterisation available (SIOPs for WQ, LWST, height)
  – Indicators based on absolute values

• **Relative Indicators**
  – General approach, applicable to all lakes
  – Not sufficient in-situ characterisation available for absolute quantities
  – Indicators based on relative differences
  – Classification into “low – moderate – high” for each parameter possible
  – Introduced uncertainty is assumed to be a bias → trends are reliable

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<th>Lake Category</th>
<th>Chlorophyll (mg/m3)</th>
<th>Transparency (m)</th>
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<td>Mean</td>
<td>Max</td>
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<td>Ultra-Oligotrophic</td>
<td>&lt;1.0</td>
<td>&lt;2.5</td>
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<tr>
<td>Oligotrophic</td>
<td>&lt;2.5</td>
<td>&lt;8.0</td>
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<tr>
<td>Mesotrophic</td>
<td>2.5–8</td>
<td>8–25</td>
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<tr>
<td>Eutrophic</td>
<td>8–25</td>
<td>25–75</td>
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<tr>
<td>Hypertrophic</td>
<td>&gt;25</td>
<td>&gt;75</td>
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<tr>
<th>Lake</th>
<th>Chla Status</th>
<th>Secchi Depth Status</th>
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<td>SD</td>
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<tr>
<td>Name</td>
<td>Chla</td>
<td>SD</td>
</tr>
</tbody>
</table>
Lake Bolmen area

Chl a, July means, 2010-11

Trophic state classification

OECD, 1982
Water Quality

Water Constituents
Data source: MERIS Full Resolution
Parameters: Turbidity, Secchi Disk depth, chlorophyll-a concentration, suspended sediment concentration, yellow substance absorption; quality indicator; variance of parameter during averaging interval
Spatial resolution: 300m
Temporal averaging: daily / monthly / yearly (currently under discussion with users)

Lake Surface Water Temperature
Data source: AATSR (ARC Lake dataset)
Parameters: Lake Surface Water Temperature (LSWT), Uncertainty estimate for lake surface temperature, Chi-squared (goodness of fit measure for OE retrieval); Variance of LSWT over averaging period/area over averaging period/area
Spatial resolution: 0.05 degree grid / Lake-mean
Temporal averaging: None / Climatology / Timeseries

Water Quantity

Water Level
Data source: Radar Altimeter (River and Lakes database)
Parameters: Water height difference to reference level, water volume difference
Spatial resolution: one or more points per lake (crossing points of altimeter tracks)
Temporal averaging: time series

Water Extent
Data source: ASAR WS (LC-CCI processing) + MERIS Full Resolution
Parameters: land-water mask
Spatial resolution: 300m
Temporal averaging: 1 map derived from 10 year time series; for some areas a seasonal climatology is available; temporal variability from combination with optical data
Indicators: First level indicators

First level indicators are derived from the basic parameters above by spatial and temporal aggregation in order to indicate trends.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Indicator for</th>
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<tbody>
<tr>
<td>Chla</td>
<td>Eutrophication</td>
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<tr>
<td>TSM</td>
<td>Physical disturbance</td>
</tr>
<tr>
<td>Yellow Substance</td>
<td>Contamination</td>
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<tr>
<td>Turbidity</td>
<td>Physical disturbance and/or contamination</td>
</tr>
<tr>
<td>Secchi Depth</td>
<td>Physical disturbance and/or contamination</td>
</tr>
<tr>
<td>Temperature</td>
<td>Eutrophication</td>
</tr>
<tr>
<td>Volume and extend</td>
<td>Physical disturbance, rain fall</td>
</tr>
</tbody>
</table>

Map/Indicator   Derived from                       Classification
Mean <Parameter> Epoch 1 Mean from period 2004-S2006 Low, moderate, high parameter concentrations/transparency
Mean <Parameter> Epoch 2 Mean from period 2007 – 2009 Low, moderate, high parameter concentrations/transparency
Mean <Parameter> Epoch 3 Mean from period 2010-2012 Low, moderate, high parameter concentrations/transparency
Lake Status      Classification Poor, moderate, high status

Trend <Parameter> Epoch 1/2 Mean(2004-2006)/ Mean(2007-2009) 0-0.8 = negative diversity trend (NegDiv) 0.8-1.2 = No change (NoChange) 1.2+ = positive diversity trend (PosDiv)

Trend <Parameter> Epoch 2/3 Mean (2007-2009)/ Mean (2010-2012) 0-0.8 = negative diversity trend (NegDiv) 0.8-1.2 = No change (NoChange) 1.2+ = positive diversity trend (PosDiv)

Trend <Parameter> Epoch 1/3 Mean (2004-2006)/ Mean (2010-2012) 0-0.8 = negative diversity trend (NegDiv) 0.8-1.2 = No change (NoChange) 1.2+ = positive diversity trend (PosDiv)

Lake Trend       T1 and T2 POS, NEG, STABLE, UNCERTAIN

Indicators: Second level indicators

Second level indicators combine several of the above water quality and water quantity parameters, complement them with additional information such as land use, and derive a value added product that relates to biodiversity data. These second level indicators will be defined and developed during the first phase of the project.
Dryland Algorithms

• Atmospheric correction
  – LandCover CCI algorithm (Round Robin result)

• EO based dryland vegetation condition assessments
  – NPP through green biomass approximated by MERIS NDVI
    • Linkage to heritage datasets from AVHRR
  – NPP through fAPAR
    • Better relationship to NPP
  – Studying relationship to SVAT model results

• Link between NPP and RUE proxies and biomass

• Combined Biodiversity Indicators in Drylands
NDVI trend and residual trend

(a) Trend of NDVI 93-00/07-09, based on calendar year averages

(b) Trend of NDVI 93-00/07-09, based on biggest 6-month NDVI Sum (93-00)

(c) Trend of NDVI-SWI residuals 93-00/07-09, based on calendar year averages

(d) Trend of NDVI-SWI residuals 93-00/07-09, based on calendar year averages with superimposed MARS crop mask of Africa (V2.2) – crops shown in a brown tone
Dryland test sites
The 6 cornerstones of our Approach

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4. Validation
5. Communication and product dissemination
6. Preparing the future
Processing Graph

- Soil moisture data
- Hydro-met. data
- MERIS FRS 2002-2012
- Water level CFI
- Water height CFI
- Lake water temperature CFI

**Processed at GeoVille premises using ERDAS**

- Soil subsets of soil-moisture data
- Hydro-met. data pre-processing
- MERIS FRS 2002-2012 pre-processed EO data
- Water level CFI
- Water height CFI
- Lake water temperature CFI

- Pre-processed soil-moisture data
- Pre-processed hydro-met data
- MERIS FRS 2002-2012 pre-processed EO data
- Subsetting, geom. corr., cloud screening, AC, other (e.g. BRDF)

**Dryland L2/L3 processing**

- Dryland L2/L3 processing
- Monthly vegetation indices (NDVI, FAPAR)
- Dryland L2/L3 processing
- Water quality products (Chl-a, TSM, ...)

**Lakes L2 processing**

- Lakes L2 processing
- Water quality maps and indicators processing
- Lakes status and change maps, lake indicators (Map L3)
- Lakes water extent and water height status and change maps (Map L1, L2)
- Lake surface temperature map (Map L4)

**Lakes combined indicator processing**

- Lakes combined indicator processing
- Combined lakes indicators (Ind L5, L6)

- Spatial clustering by different criteria
- Analysis and derivation of indicators
- NPP temporal aggregation and RUE derivation
- Aggregated dryland indicators (Ind D3)
- Dryland indicators (Map D1, D2)
- NPP, RUE status, change and trend maps (Map D1, D2)
- Lakes status and change maps, lake indicators (Map L3)
- Lakes water extent and water height status and change maps (Map L1, L2)
- Lake surface temperature map (Map L4)
- Combined lakes indicators (Ind L5, L6)
The 6 cornerstones of our Approach

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Validation Strategy

1. Methodology / Protocols
   – Preprocessing: reference to literature (GlobCover) and other projects (LC-CCI, Globalbedo); verification on samples
   – Inland water
     • Match-up analysis, satellite intercomparison
     • radiometry: MVT / MERMAID protocol
     • IOPs, concentrations: MVT / MERMAID / MERIS Lakes protocols
   – Drylands
     • Fluxnet data
   – Combined biodiversity Indicators
     • Relating production to biodiversity databases

2. In-depth validation
   – 10 lakes with high quality in-situ data available
   – 5 dryland sites

3. Full product set
   – Cooperation with and feedback from users
# Validation Plan

## Algorithm validation

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## Pre-processing

- **Geometry**
  - BC (literature, sample verification)
- **Atm. Corr.**
  - BC (LC-CCI, sample verification)

## Geobiochem. processing

- **in water (abs, scatt, ...)**
  - BG + BC + Consultants (comparison with simulated and in-situ)
- **dryland (NDVI, fAPAR, ...)**
  - BC + Geoville (literature, verification)

## Indicators I (status, change)

- **Chl, transpar.**
  - BG + BC + CIBIO (comp. w. in-situ)
- **NPP, RUE**
  - Geoville + consultants + CIBIO (comp. w. ref. data)

## Indicators II

- **combined lakes indicators.**
  - CIBIO (plausibility checks)
- **aggregated dryland indicators.**
  - CIBIO (plausibility checks)
# Provisional List of Validation Sites (Inland Waters)

<table>
<thead>
<tr>
<th>Lake</th>
<th>Country</th>
<th>biodiversity priority</th>
<th>ARC lake size / km²</th>
<th>expert</th>
<th>in-situ data availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandrina</td>
<td>Australia</td>
<td>-</td>
<td>x 570</td>
<td>Arnold Dekker, CSIRO</td>
<td>AOPs, IOPs, concentrations (tbc) (+SIOPs for algorithm calibration tbc)</td>
</tr>
<tr>
<td>Balaton</td>
<td>Hungary</td>
<td>x</td>
<td>x 590</td>
<td>worldlakes database</td>
<td>chl concentration</td>
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<tr>
<td>Constance</td>
<td>Austria, Switzerland, Germany</td>
<td>-</td>
<td>x 540</td>
<td>FP7 Freshman project (BC being participant)</td>
<td>AOPs, IOPs, concentrations (+SIOPs for algorithm calibration)</td>
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<tr>
<td>Erie</td>
<td>Canada, USA</td>
<td>x</td>
<td>x 25 657</td>
<td>Steve Grebb (consultant)</td>
<td>IOPs, concentrations (AOPs and SIOPs tbc)</td>
</tr>
<tr>
<td>Inari</td>
<td>Finland</td>
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<td>x 1050</td>
<td>Sampsa Koponen, SYKE (consultant)</td>
<td>AOPs, IOPs, concentrations</td>
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<td>Mälaren</td>
<td>Sweden</td>
<td>-</td>
<td>x 1140</td>
<td>Petra Philipson (team)</td>
<td>AOPs, IOPs, concentrations (+SIOPs for algorithm calibration)</td>
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<tr>
<td>Michigan</td>
<td>USA</td>
<td>x</td>
<td>x 58 000</td>
<td>Steve Grebb (consultant)</td>
<td>Concentrations, probably also AOPs, IOPS and SIOPs</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>Nicaragua</td>
<td>-</td>
<td>x 8150</td>
<td>Dr. S. Spitzy, Univ. Hamburg (CoastColour)</td>
<td>Concentrations</td>
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Inland Water Products Validation

Species range maps from International Union for Conservation of Nature (IUCN)
Inland Water Products Validation

- Species range maps
- World Lake Database
- Other projects

Biodiversity indicators (species richness, number of endemics, concentrations of chlorophyll, etc)

Diversity-Inland Water products (DEL-2)

Validation

Diversity II products quality report (DEL-7)
Validation: Issues to be addressed

- Changes/trends indicators: species data unavailable
- Coarse diversity data: IUCN range polygons
- Available databases: Fishbase, Global Biodiversity Information Facility (GBIF), National Atlases
The 6 cornerstones of our Approach

1. Link biodiversity users and EO experts
2. Selection of best algorithms
3. Software and production
4. Validation
5. Communication and product dissemination
6. Preparing the future
User Interaction Means

- Web Portal
  - Project Information
  - Algorithms and Products
  - Validation results
  - Online handbook
  - Biodiversity stories
  - Web GIS (ArcGIS Server)
- Support ESA at COP 11 and 12
- Promotional events
- Participation in conferences

www.diversity2.info
The 6 cornerstones of our Approach

1. Link biodiversity users and EO experts

2. Selection of best algorithms

3. Software and production

4. Validation

5. Communication and product dissemination

6. Preparing the future
Sustainability – 2020 is the goal!

• Sentinel 2 and 3 potential
• Proba-V
  – Proba-V and SYN branch of S3; complementarity
• Cost – benefit analysis
  – Preparing a sustainable continuation in order to support CBD strategic plan until 2020
  – Costs of operational production
  – User assessment
• Enlarging the user group
• Service continuation
  – NPP VIIRS to bridge to S3
  – OCM2?
• Recommendations for additional R&D work
Milestones

• Kick-off: September 2012
• March 2013: Preliminary selection of algorithms
• June 2013:
  – Proof of concept: validation on 10 lakes and 3 dryland sites
  – User Consultation Meeting
• October 2013:
  – Processing chain ready
  – In-depth validation
• February/March 2013: User Consultation Meeting
• April 2014
  – Production ready
  – User handbook (biodiversity stories)
  – Quality assessment by users
• August 2014 project finish
Link with GloboLakes

• Frequent, mutual exchange of information, advice, recommendations

• EO data algorithms, SW, products: Diversity ↔ GloboLakes

• In-situ data, validation: GloboLakes ↔ Diversity
## Diversity Meeting, Stirling

### Thursday 13.12.2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Welcome &amp; logistics</td>
<td>Brockmann, Tyler</td>
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<td>09:10</td>
<td>Tour de Table</td>
<td>all</td>
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<td>09:15</td>
<td>Diversity II short overview</td>
<td>Brockmann</td>
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<td>09:25</td>
<td>GloboLakes, summary of WS</td>
<td>Tyler</td>
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<tr>
<td>09:45</td>
<td><strong>Users and User Requirements</strong></td>
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<td>09:45</td>
<td>User Work Plan</td>
<td>Philipson</td>
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<td>10:00</td>
<td>Requirements engineering (RB TOC, Questionnaire etc)</td>
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<td>10:15</td>
<td>Requirements for Swedish Lakes</td>
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<td><strong>Break</strong></td>
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<td>GEO Inland water WG, North American Lakes</td>
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<td>Dryland users</td>
<td>Brito</td>
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<td>12:25</td>
<td><strong>Lunch</strong></td>
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<td>Algorithms and processing overview</td>
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