

Lake User Consultation Meeting

19 - 20 May 2014, Frascati, Italy



Diversity II

Space Observations for
Inland Water Biodiversity



GloboLakes
Global Observatory of Lake Responses to Environmental Change

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Global Observatory of Lake
Responses to Environmental Change

The **Lake User Consultation Meeting** is an opportunity for stakeholders of lake ecosystems to:

- familiarize themselves with Earth observation products and opportunities for inland water monitoring
- align product properties with their requirements
- express suggestions and concerns for further elaboration of the product specifications
- understand how these products can be used to assess lake condition responses to environmental change

The participants are also invited to join on the following days the **Lake Remote Sensing meetings** organized by EU projects and the Water Session of the *SENTINEL-2 for Science Workshop*.

Lake User Consultation Meeting Programme

19th May (Villa Grazioli)

Monday morning:

- Welcome
- Presentations of the host projects
- Presentations of participants' activities

Monday afternoon:

- Presentation of Diversity II Level1 indicators
- Presentation of Diversity II Level2 indicator concepts
- Presentation of GloboLakes' activities
- Discussion/feedback/summary

20th May (ESRIN)

Tuesday morning:

- *SENTINEL-2 for Science Workshop* - keynotes

Tuesday afternoon:

- Hands-on experience with Lakes products and tools

Complementary Lake Remote Sensing meetings

21th May

- Science community discussion on algorithms for inland water remote sensing

22th May (ESRIN)

- *SENTINEL-2 for Science Workshop* - Water: Inland, Coastal and Wetlands

Global Observatory of lake Responses to Environmental Change (Globolakes)

Globolakes is a 5-year project funded by the UK's Natural Environment Research Council. Led by the University of Stirling, the consortium includes the universities of Dundee, Glasgow and Reading and the research institutions of the Centre of Ecology and Hydrology and the Plymouth Marine Laboratory (PML). The project's overarching ambition is to understand how lakes are responding to environmental change through the analysis of two decades of Earth observation data (SeaWiFS, MERIS, MODIS) for over 1000 lakes globally, whilst also providing a near real time processing for these target lakes (Sentinel 3 OLCI and Sentinel 2 MSI). The ability to monitor such a large number of lakes in a consistent manner, at a high temporal frequency, and at a global scale, along with associated data on catchment and climate conditions, will facilitate a paradigm shift in our understanding of how lakes are responding to environmental change.

Algorithm Validation

The project is collecting bio-optical data from UK and European lakes to help develop and validated algorithms for the retrieval of in-water constituents. The research team are also the custodians of the LIMNADES database: a community-wide repository for bio-optical and satellite matchup data to support algorithm validation studies as part of Globolakes and other international projects.

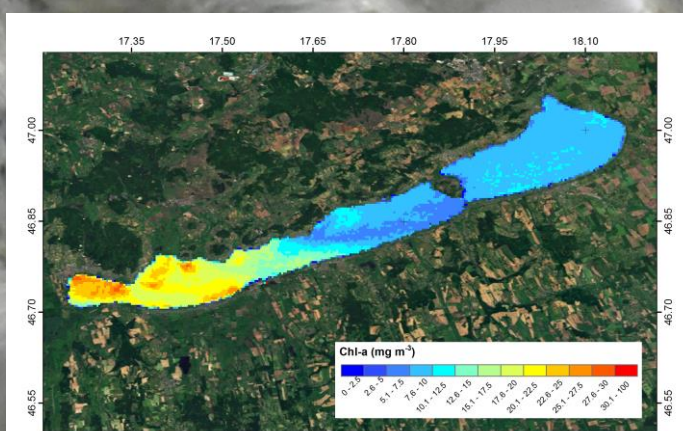


Fig 1. Chl-a concentrations in Lake Balaton on the 22nd August 2010, derived from MERIS.

Assessing coherence in lake response

The Arc-Lakes surface water temperature (LWST) data are being used to develop and test procedures for estimating coherence in lake response to environmental change. The Figure 2 illustrates temporal coherence in LWST for 256 lakes. In this example, clusters of coherent lakes were determined using a clustering approach applied to time series of weekly data over a period of 5 years. State space and functional clustering approaches will be used on over 1000 lakes for a 20 year time series of standardized water constituent data.

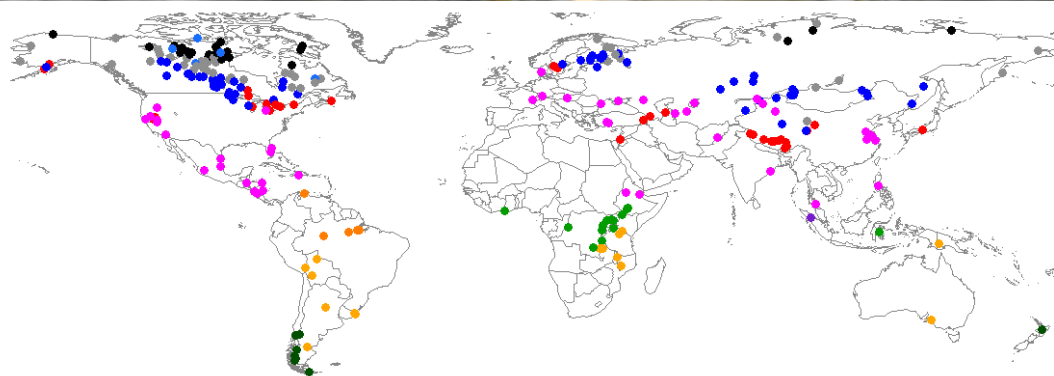


Fig 2. State space approach showing 11 distinct clusters of lake surface water temperature.

The **Diversity II** project will contribute to the work of the Convention on Biological Diversity by assessing biological diversity in two important ecosystems of the Earth, **Inland Waters** and **Drylands** using satellite data.

Inland Water products

The Diversity II project aims to provide water quality and water quantity indicators for the assessment of biodiversity in a number of large perennial inland waters.

As part of the project a set of prototype products of Earth Observation derived parameters for 10 test sites and the 2002 to 2012 investigation period have been generated. These products consist of 1st level indicators, representing status and trend of eutrophication, physical disturbance and contamination.

The prototype products, now accessible on the project website, shall demonstrate to the user community the potential of Earth Observation and facilitate the discussion on its exploitation.

At a later stage a set of 2nd level indicators will be composed from the 1st level and additional auxiliary data, based on identified biodiversity drivers.

Product application showcase: Lake Nicaragua, Nicaragua

Observing trends in phytoplankton community dominance

Lake Nicaragua is an obvious example for a rich biotope being increasingly threatened by anthropogenic influence, such as overfishing, intensifying land use, but mostly sewage and other pollution. Evidence that the lake's dominant cyanobacteria have declined in recent years are all the more surprising.

With more than 40 species of fish, and a connection to the Caribbean Sea through the San Juan River, Lake Nicaragua is not only the largest lake in Central America, but also a biodiversity hotspot. It's habitat to a diverse group of cichlids and many species associated with marine ecosystems.

In the scope of ESA's Diversity II project, several hundred images acquired by ENVISAT MERIS between 2002-2012 were used to estimate water quality parameters in Lake Nicaragua. Contrary to expectations, a decrease in cyanobacteria dominance was observed towards the end of this time series. Such decrease may be related to decreasing nutrient concentrations, but more likely to a change in the ratio of available nitrogen and phosphorous, or other changes in chemical conditions.

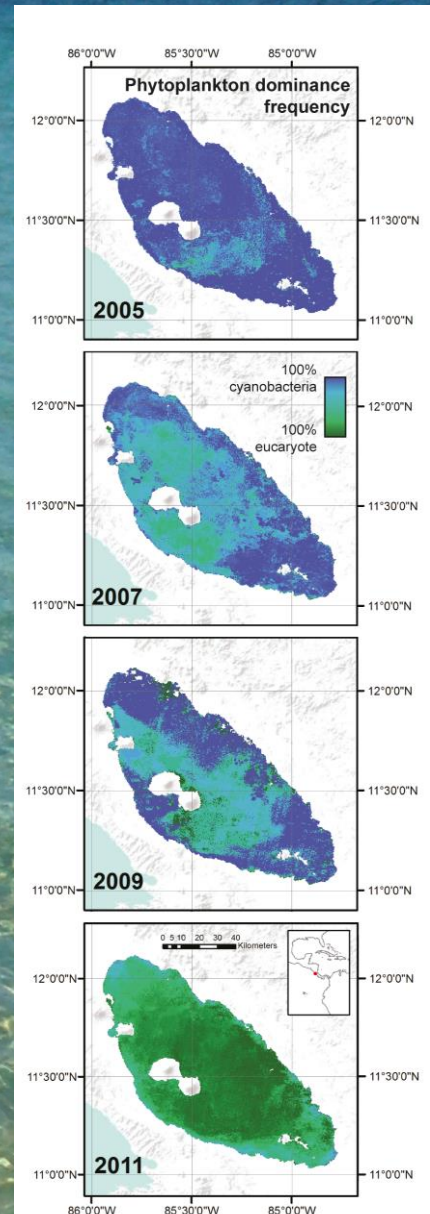


Fig 3. The relative frequencies of cyanobacteria and eucaryote dominance observations have shifted in Lake Nicaragua during recent years.

Registration and accommodation

Registration

There is no registration fee, but it is essential that you register in advance, info@diversity2.info

The **SENTINEL-2 for Science Workshop** requires a separate **registration**, please visit <http://seom.esa.int/S2forScience2014>

Venue locations

ESRIN

http://www.esa.int/About_Us/ESRIN

Via Galileo Galilei
00044 Frascati (Roma)
Italy

Villa Grazioli

<http://www.villagrazioli.com>

Via Umberto Pavoni 19
00046 Grottaferrata (Roma)
Italy

More information

For more info about the *Lakes User Consultation Meeting*, please visit <http://www.diversity2.info/ucm>

For more info about the *SENTINEL-2 for Science Workshop*, please visit <http://seom.esa.int/S2forScience2014>

Accommodation

Booking instructions for accommodation can be found on the *SENTINEL-2 for Science Workshop* website http://seom.esa.int/S2forScience2014/page_registration.php

<http://www.diversity2.info/ucm>