



## Session Overview

### Session

#### Water: Inland, Coastal and Wetlands I - Parallel Session

Time: Thursday, 22/May/2014: 9:10am - 11:10am

Session Chair: Carsten Brockmann, Brockmann Consult GmbH

Session Chair: Samantha Lavender, Pixalytics Ltd

Location: Magellan (Building 1)

ESRIN - Building 1

### Presentations

20 min

#### Sentinel-2 Red-Edge Bands Capabilities on Retrieving Chlorophyll-a in Turbid Water, Case Study: Lake Burullus, Egypt

Maha Tawfik<sup>1</sup>, Hanan Farag<sup>1</sup>, MhdSuhyb Salama<sup>2</sup>

<sup>1</sup>National Water Research Center, Egypt; <sup>2</sup>Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, Neatherlands

Using earth observations to detect water quality parameters, among which is the chlorophyll-a (chl-a), in water bodies constitutes a great benefit, especially when this water body is an almost closed lake. Lake Burullus in Egypt is considered as a natural protection area. The lake suffers from deterioration of the water quality and ecological services. In addition, eutrophication affects the Lake biodiversity that urges consideration of regular monitoring for better understanding and detection of the hotspot.

It was confirmed that the red-edge bands reflected the variations in both chlorophyll content and leaf structure. Lower absorption by chlorophyll in the red-edge region makes the use of such a band reduce the saturation effect, and the reflectance is still sensitive to chlorophyll absorption at its moderate-to-high values. Sentinel-2, which will be launched in 2015, is equipped with the Multi Spectral Instrument (MSI) incorporating two spectral bands in the red-edge region.

The two indices Normalized Difference Chlorophyll Index (NDCI) and Normalized Difference Vegetation Index (NDVI) were examined in retrieving chl-a over lake Burullus. MERIS and Rapideye red-edge bands were substituted in NDCI and NDVI indices formula. The objective of this paper is to examine the significance of the red-edge bands on Sentinel-2 for retrieving chlorophyll in turbid inland water.

The developed model calibrated using field measurements simultaneous with MERIS images acquisition dates and validated on another dataset using Rapideye image. A quadratic function accurately explained the variance in the simulated data for a chl-a range of 8.0–105.0 mgm<sup>-3</sup>. The results showed that NDCI could retrieve chl-a concentration with accuracy higher than NDVI where R<sup>2</sup> for the developed function was 0.89 and 0.81, P < 0.005, respectively. This proved the effectiveness of red-edge bands in detecting chl-a in turbid water, and confirms the ability of Sentinel-2 for the detection chlorophyll in productive inland water bodies with a relatively high phytoplankton content.