3rd Science for the Environment Conference
Aarhus Denmark 1-2 October 2015

SATELLITE BASED MONITORING OF CHLOROPHYLL A IN LAKES

Lars Boye Hansen (1), Rikke Margrethe Closter(1), Silvia Huber(1), Hanne Kaas(1), Henrik Andersson(1), Torben Bramming Jørgensen(2) og Martin Søndergaard(3)

(1) DHI GRAS and DHI, Agern Allé 5, 2970 Hørsholm, Denmark. (2) Limfjordssekretariatet, Stigsborg Brygge 5, 9400 Nørresundby, Denmark. (3) Department of Bioscience, Aarhus University, Vejlsøvej 25, 8600 Silkeborg, Denmark

ABSTRACT

To enhance the knowledge of the ecological state and development of the lakes in Denmark, a beta-version of a satellite based management tool has been developed. The tool is able to give first impressions of the lakes' current state and development over time (Chlorophyll a).

The tool can provide valuable supplementary information for lakes that are either monitored with a low frequency (year/season) or not monitored at all. In addition, the management tool provides the opportunity to describe the horizontal variation of the chlorophyll a concentration in the lakes.

Currently, freely available Landsat 8 satellite data with a horizontal spatial resolution of 30x30 m feeds into the tool. This satellite overpasses the same point in Denmark every 16 days. The reflectance data is translated to chlorophyll a concentrations by an algorithm developed on simultaneous (max ± 2 days difference) satellite and in-situ data from 2013 and 2014. The risk of misinterpretation of the chlorophyll level is reduced by a criteria based quality control related to lake specific and general criteria. It is estimated that currently it can be used directly for approximately 400 out of 689 Danish lakes larger than 5 ha.

To incorporate the tool into the future Danish lake management activities it will be relevant to include the data from the new Sentinel-2 satellites, scheduled for launch in 2015 and 2016.These satellites have a higher spatial resolution (10x10 m), are spectrally better suited which enables a more accurate determination of the chlorophyll concentrations and they have a higher temporal frequency as they overpass Denmark every 2-3 days enabling up to 18-27 images in the period April-September. This will further increase the possibility of inclusion of between 1 and 5 ha in the tool and enable better description of the seasonal variation and occurrences of algal blooms.