Testing of MERIS Boreal and Eutrophic Lake Processors at Lake Säkylän Pyhäjärvi, Finland

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Two new lake water quality processors were released in July 2008 for the Envisat/MERIS instrument after the ESA project "Development of MERIS Lake Water Algorithms" was concluded [1]. The processors are included in the BEAM software package and they convert the TOA radiances measured by MERIS into products that include water quality parameters (chl a, TSM, and CDOM), atmospheric parameters, and atmospherically corrected water leaving reflectances. The processors use neural networks and are based on the architecture of the C2R processor developed by Roland Doerffer [2]. The bio optical models used in the development of the neural networks were parameterized using in situ data from Finnish (Boreal lakes processor) and Spanish (Eutrophic lakes processor) lakes.

A measurement raft was installed in Lake Säkylän Pyhäjärvi on May 18, 2009 (TEKES project Catchlake 2 [3]). The sensors at the raft measure water quality parameters (e.g. turbidity and chlorophyll a) and weather parameters.

We have processed time series of satellite images from summer 2009 with the Lakes processors and compared the results with in situ data from the raft. The total suspended matter (TSM) concentrations estimated from satellite data agree well with in situ turbidity. For chl a, a correction factor was necessary, but after the correction the agreement between in situ and satellite data was good.

The results also indicate the potential problems when time series of water quality data are compared.

References

[1] Koponen, S., A. Ruiz-Verdu, T. Heege, J. Heblinski, K. Sørensen, K. Kallio, T. Pyhälahti, R. Doerffer, C. Brockmann, and M. Peters (2008), Development of MERIS Lake Water Algorithms, Validation report, Version 1.01, 65 p. Available at: http://www.brockmann-consult.de/beam-wiki/display/LAKES/Home

[2] Doerffer R. and H. Schiller (2008): MERIS Regional Coastal and Lake Case 2 Water Project - Atmospheric Correction ATBD, GKSS Research Center 21502 Geesthacht, Germany. Version 1.0 18. May 2008.

[3] Project webpage: http://www.ymparisto.fi/default.asp?contentid=329288&lan=fi&clan=fi