Comparison of different MERIS Case II processors for the water quality estimation on the coastal waters of Finland

Attila Jenni[(1)], Koponen Sampsa[(2)], Kallio Kari[(1)], Lindfors Antti[(3)], Kaitala Seppo[(1)], Seppälä Jukka [(1)]

[(1)]*Finnish Environment Institute, PO BOX 140, 00251, Helsinki, Finland, firstname.lastname@ymparisto.fi (except kari.y.kallio@ymparisto.fi)*

[(2)] *Department of Radio Science and Engineering, Helsinki University of Technology, PO BOX 3000, FIN-02015 HUT Finland, Sampsa.Koponen@tkk.fi*

[(3)] *Luode Consulting Oy, FI-21600 Parainen, Finland, antti.lindfors@luode.net*

Three different MERIS Case II water processors [1,2,3] of the BEAM software were evaluated on the coastal waters of Finland. Boreal, Case II Regional and Eutrophic processors have been developed for different types of coastal or inland (Case II) waters. Chlorophyll-a (chl-a), total suspended matter (TSM), absorption of colored dissolved organic matter ($a_{CDOM}(443)$) and attenuation depth ($Z90_{max}$) products of BEAM processors were compared with in situ data. In addition, also algorithms based on reflectances, absorption of pigments (a_{pig}), total absorption (a_{tot}) and scattering of TSM (b_{TSM}) from different BEAM processors were compared against field measurements. The in situ data consisted of intensive monitoring station data of the Finnish environmental administration during years 2006-2008 and data from specific campaign days with flow-through system of Luode Consulting Oy. Also the processors were compared to the operationally used method developed at the Finnish Environment Institute. SeaPrism data from Helsinki Lighthouse were used to compare reflectances from different atmospheric correction processors.

The preliminary comparison shows that BEAM lakes processor Boreal lakes is able to estimate the TSM with R^2 0.7 and RMSE 0.82 FNU at the coast of Finland. C2R processor proved to be the best for chl-a concentration. However, the accuracy of the chl-a estimations was lower with all processors (R^2 ranged from 0.6 to 0.32 and RMSE from 1.7 to 12 μg/l). Especially on the spring bloom season the chl-a products need further development. Z90max product of BEAM BOREAL processor can be used for Secchi disk depth estimation with reasonable accuracy (R^2 0.51).

References

[1] Doerffer, R. and H. Schiller (2008a), MERIS Regional Coastal and Lake Case 2 Water Project Atmospheric Correction ATBD, Algorithm Theoretical Basis Document (ATBD), GKSS Research Centre 21502 Geesthacht. Version 1.0, 18 May, 2008.

[2] Doerffer, R. and H. Schiller (2008b), Lake Water Algorithm for BEAM, Algorithm Theoretical Basis Document (ATBD), GKSS Research Centre 21502 Geesthacht. Version 1.0, 10 June, 2008.

[3] 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.