SENSITIVITY STUDY FOR THE RETRIEVAL OF OCEANIC PHYTOPLANKTON BY PHYTODOAS USING THE FULL ATMOSPHERE-OCEAN RADIATIVE TRANSFER MODEL SCIATRAN

T. DINTER[1,2], V. ROZANOV[2], A. WOLANIN[2], B. TAYLOR[1], A. BRACHER[1,2], AND J.P. BURROWS[2]

[1]*Alfred-Wegener-Insitute for Polar and Marine Research, Germany*
[2]*Institute of Environmental Physics, University of Bremen, Germany*

Global information on the quantitative distribution of major phytoplankton functional types (PFTs) of the world ocean is important for understanding the marine phytoplankton's role in the global marine ecosystem and its impact on global climate.

In this study an improved Phytoplankton Differential Optical Absorption Spectroscopy (PhytoDOAS) method for the retrieval of major PFTs from satellite measurements utilizing the hyper spectral instrument SCIAMACHY (Scanning Imaging Absorption Spectrometer for Atmospheric Cartography) is introduced [*Bracher et al.,* 2009]. This specialized PhytoDOAS method combines the fit algorithm with radiative transfer calculations based on a look-up table approach. For this purpose the full coupled atmospheric-ocean radiative transfer model SCIATRAN is used. SCIATRAN provides calculations of radiation between 175 to 2400 nm [*Rozanov et al.,* 2002]. Recently the model is extended for a coupled atmosphere-ocean system to include calculations of the light field inside the ocean body with constituents [*Blum et al.,* 2012]. All optical relevant parameters can be considered (absorption, elastic and inelastic scattering). Three different forms of inelastic scattering as transpectral processes in oceanic waters are included in the model: Vibrational-Raman-Scattering, fluorescence of chl-a and CDOM. In comparisons of SCIATRAN calculations with in-situ radiation measurements above and below the water surface, the model demonstrates the ability to reproduce realistic light field conditions in complex oceanic systems and shows quite good agreement. Further an extensive sensitivity study with SCIATRAN shows the applicability and error ranges of the PhytoDOAS method.

REFERENCES

Bracher, A., Vountas, M., Dinter, T., Burrows, J.P., Röttgers, R., Peeken, I.: Quantitative observation of cyanobacteria and diatoms from space using PhytoDOAS on SCIAMACHY data. *Biogeosciences*, 6, 751-764, 2009.

V. Rozanov, M. Buchwitz, K.-U. Eichmann, R. de Beek, and J.P. Burrows (2002): "SCIATRAN - a new radiative transfer model for geophysical applications in the 240-2400nm ..." Adv. in Space Res. 29, 1831.1835

Blum, M., Rozanov, V.V., Burrows, J.P., Bracher, A., Coupled ocean-atmosphere radiative transfer model ...". Advances in Space Research (2012), doi: 10.1016/j.asr.2012.02.012

Alfred-Wegener-Insitute for Polar and Marine Research, Bussestrasse 24, D-27570 Bremerhaven, Germany, E-mail: tdinter@awi.de

Institute of Environmental Physics, University of Bremen, NW1, Otto-Hahn-Allee 1, D-28334 Bremen, Germany