Evaluation of the Coupled Atmosphere-Ocean Radiative Transfer Model SCIATRAN Employing *In-Situ* and Satellite Remote Sensing Measurements

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The radiative transfer model SCIATRAN [*V. Rozanov et al.*, 2002; *A. Rozanov et al.*, 2005, 2008] was originally developed for modelling radiative transfer in the atmosphere for the purpose of trace gas retrieval. However, in order to augment the use of satellite remote sensing measurements (e.g. highly spectrally resolved satellite data from the instrument SCIAMACHY on board the satellite ENVISAT) for an improved retrieval of different PFTs (Phytoplankton Functional Types) and various trace gases (e.g. BrO, NO2, and glyoxal) over oceanic waters, SCIATRAN has been extended to include the radiative transfer within the water.

The extension of SCIATRAN has been done by enlarging the data bases to include the specific properties of the water constituents. Leading to the coupled version, the extension additionally required the implementation of the radiative processes at the air-water interface (reflection and refraction), as well as the IOPs of natural waters, such as the total spectral absorption coefficient of sea water [*Pope & Fry*, 1997; *Morel & Maritorena*, 2001; *Prieur & Sathyendranath*, 1981] and the different scattering (phase) functions of small and large particles and pure seawater [e.g. *Shifrin*, 1988].

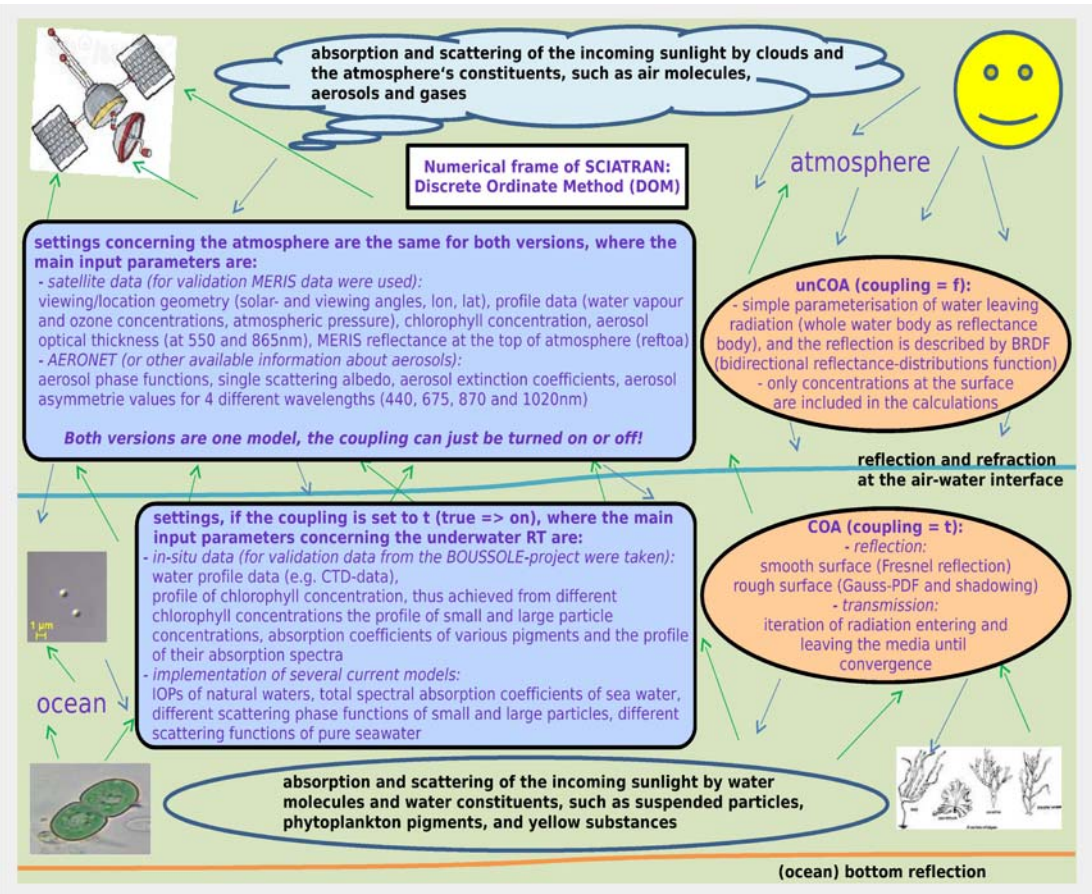

Figure 1: Scheme of the coupled ocean-atmosphere radiative transfer and its inclusion into SCIATRAN (COA: coupled version, unCOA: uncoupled version)

To test the extended version of SCIATRAN, several comparisons of SCIATRAN for both cases (i.e. flag for coupling is set to both, true and false, without changing any settings for the atmospheric part, but, if applicable, additional water profile settings) to satellite and *in-situ* measurements have been made.

The following figure shows one example of the results for a day, when MERIS and AERONET (station: Villefranche) measurements, and also *in-situ* data from the BOUSSOLE project were available.

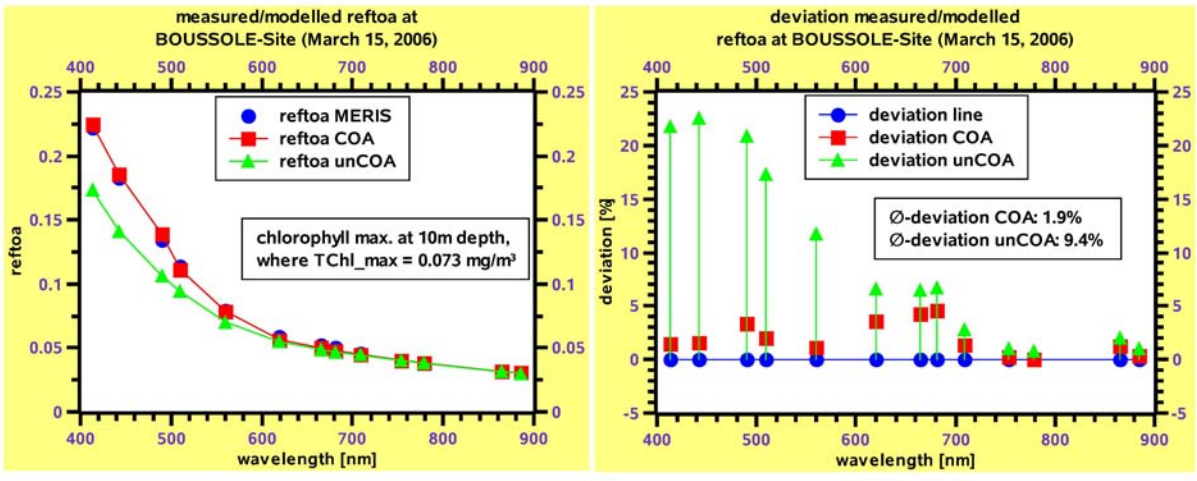

Figure 2: Comparison of SCIATRAN modeled to MERIS measured reftoa (MERIS: instrument also on board ENVISAT, reftoa: reflectance at the top of atmosphere)

CONCLUSION

Figure 2 shows that the coupled SCIATRAN version yields better results the more detailed the data are due to the less necessity of modeling.

Nevertheless, since satellite measurements are affected by sun glint, clouds or dim air, there are still problems analysing the results, even if collocated satellite measurements and aerosol data are available for given *in-situ* data.

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