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Deriving inherent optical properties and associated inversion-uncertainties in the Dutch Lakes

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Abstract. Remote sensing of water quality in inland waters requires reliable retrieval algorithms, accurate atmospheric correction and consistent method for uncertainty estimation. In this paper, the GSM semi-analytical inversion model is modified for inland waters to derive inherent optical properties (IOPs) and their spectral dependencies from air and space borne data. The modified model was validated using two data sets from the Veluwe and the Vecht Dutch lakes. For the Veluwe lakes, the model was able to derive a linear relationship between measured concentrations and estimated IOPs with R^2 values above 0.7 for chlorophyll-*a* (Chl-*a*) and up to 0.9 for suspended particulate matters (SPM). In the Vecht lakes, the modified model derived accurate values of IOPs. The R^2 values were 0.89 for Chl-*a* and up to 0.95 for SPM. The RMSE values were 0.93 mg m^{-3} and 0.56 g m^{-3} for Chl-*a* and SPM respectively. Finally, the IOPs of the Veluwe lakes are derived from multi-spectral, ocean color and hyperspectral airborne data. Inversion-uncertainties of the derived IOPs were also estimated using a standard nonlinear regression technique. The study shows that inversion-uncertainties of remote sensing derived IOPs are proportional to water turbidity.

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