

Retrieval of pCO₂ for Baltic sea with remote sensing approaches

Shuping Zhang ¹, Anna Rutgersson ¹, Petra Philipson ²

¹ Department of Geosciences, Uppsala University, Uppsal , Sweden

² Brockmann Geomatics Sweden AB, Kista, Sweden

Abstract: The concentration of carbon dioxide (CO₂) in the atmosphere has been steadily increasing due to human activities such as fossil fuel consumption. Oceans uptake a significant share (~25%) of the anthropogenic CO₂ emitted to the atmosphere. Remote sensing has great potential in mapping the sea surface CO₂. Remote Sensing product of the proxies the physical and biological characteristics of the oceans like sea surface temperature (SST) can be adopted in mapping sea surface pCO₂.

The Baltic Sea is a typical representative of marginal sea of high dynamic, and its role in global CO₂ air-sea exchange are insufficiently understood. In this study we aim to estimating pCO₂ in the Baltic Sea with remote sensing data and generating the map of pCO₂ in the Baltic Sea from 2002 to 2016. The machine learning approaches (e.g. Random Forest) are be employed to retrieve pCO₂. Ship measurements of CO₂ are used as training the model and the mooring measurements of pCO₂ are used to validate the generated pCO₂ maps. We found out that the pCO₂ in the Baltic Sea show spatial and temporal variations. The output of this study provides input for further understanding of the air-sea CO₂ fluxes in the Baltic Sea.