Abstract

In central Europe, many inland water bodies suffer from anthropogenic eutrophication. Main drivers are increased nutrient loads and Climate Change. This may cause e.g. Harmful Algal Blooms. As phosphorus limits algal growth usually, most measures against eutrophication focus on reducing external loads and internal mobilization of phosphorus.

Eutrophication results in an increasing phytoplanktonic biomass. The concentration of chlorophyll-a (Chl-a) is a proxy for this. It can be quantified with laboratory methods, probes and remote sensing techniques. Remote sensing enables a large-scale, low-disruptive and cost-effective monitoring. With its high spatial resolution and high revisit frequency, the Sentinel-2 mission of ESA's (European Space Agency) Copernicus programme is highly suitable for this.

This thesis explores how Sentinel-2 data can be used for monitoring the success of nutrient reduction measures in small eutrophic lakes. Sentinel-2 images of Lake *Barleber I* near Magdeburg and the ponds *Mühlenteich* and *Püttseer Teich* on the island of Fehmarn were analysed between 2016 and 2024. Two resampling resolutions and two means of pixel value aggregation were compared. The Case 2 Regional CoastColour processor (C2RCC) was used to determine Chl-a concentrations. The results were validated using field sampling of Chl-a.

All resampling resolutions and all means of pixel value aggregation achieved good agreement between Sentinel-2-based data and field data. Though, the agreement varied interannually. The performance differed more between the water bodies than between the methods. Meteorological interferences, especially sun glint, caused most of the errors in the Sentinel-2 Chl-a data.

For future applications, the removing of interferences needs to be improved. Besides, field sampling will remain essential for monitoring the success of nutrient reduction measures in the future because of the need for validation, because of the remaining uncertainties and because of the limitations of a mono-parametric indicator.