

## Using machine learning with satellite data to monitor and quantify phytoplankton and sediment concentration in the Agulhas Bank river plume systems

River plumes play a major role in connecting the land to the sea. Riverine nutrient and sediment deposits into marine and estuarine environments help support phytoplankton growth and the formation of marine muddy ecosystems. Remote sensing can be used as a tool to monitor and quantify riverine sediment deposits and phytoplankton assemblages in the study region (Agulhas Bank). This study uses a synthetic dataset which models the inherent optical properties (IOPs) of phytoplankton, dissolved organic matter and sediment. The initial dataset consisted of guessed parameters which were used in a bio-optical model for phytoplankton, CDOM and sediment IOPs. In-situ aquatic and marine optical properties for the region were collected and added to the bio-optical model to create another cohort of synthetic data which better represent the optically complex region. This dataset was used to train and test a multi-layer perceptron model, an artificial neural network (ANN). The model output gave robust results of chl-a and suspended solid material concentrations. Access to higher computation resources can allow for the training of deeper neural networks with a larger synthetic dataset. This study is an example of the potential of using machine learning techniques and synthetic datasets to create aquatic monitoring remote sensing products. The trained model can be used with satellite data to routinely monitor the Agulhas bank river plume deposits and associated phytoplankton assemblages.