**Retrieval of color producing agents in Case 2 waters using Landsat 8**

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Abstract

New approaches need to be considered to solve the current high demand for color producing agent (CPA) retrievals over Case 2 waters. Standard retrieval algorithms are known to fail over highly turbid Case 2 waters because they were developed specifically for the Case 1 waters. Landsat 8 provides an improved signal-to-noise ratio (SNR) and a new spectral coastal aerosol band in the blue. This additional information provides means to tackle this retrieval endeavor. A look-up-table (LUT) and spectrum-matching methodology was implemented to simultaneously retrieve CPAs, taking advantage of Landsat 8's new features. A LUT of spectral remote-sensing reflectances (Rrs) with different concentration of CPAs was produced using the in-water radiative transfer model Hydrolight. A model-based empirical line method (MoB-ELM) algorithm was developed to atmospherically correct the Landsat 8 imagery and allow direct comparison with the LUT of Rrs. This MoB-ELM atmospheric correction algorithm uses pseudo-invariant features (PIFs) from the image, ground-truth data and the Hydrolight model.

The retrieval algorithm was applied over two Landsat 8 scenes and shows a root mean squared error (RMSE) as a percentage of range of about 10% for Chlorophyll-*a* and total suspended solid (TSS), and about 5% for colored dissolved organic matter (CDOM) when compared with ground-truth data. The CPA concentration maps exhibit expected trends of low concentrations in clear water and higher concentrations in turbid water. These results show that the Landsat 8 satellite can be utilized over Case 2 waters as long as a careful atmospheric correction is applied.

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