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Oral Session 6
08:30–09:50

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EXTENDING THE OPERATIONAL LAND IMAGER FOR FRESHWATER RESEARCH: RETRIEVAL OF AN ORANGE CONTRA-BAND FROM PAN AND MS BANDS

The Operational Land Imager (OLI) onboard Landsat 8 has found successful application in fresh and coastal water remote sensing. Its radiometric specification and high spatial resolution can resolve optical variability in small water bodies. However, the limited multispectral (MS) band set restricts the number of parameters that can be retrieved. One relevant information that cannot be directly retrieved is the presence of cyanobacteria. This identification capability has been demonstrated for sensors with a band centered near 620 nm, the absorption peak of the diagnostic pigment phycocyanin (PC). While OLI lacks such a MS band in the orange region, this information is contained in its panchromatic band. This study explores the extraction of that information by a scaled difference with the MS bands. A set of 369 in situ spectra acquired in diverse lakes in Belgium and The Nederlands was used to develop and test a retrieval algorithm based on multilinear regression. The algorithm achieved a mean absolute percentage error of 3.19% and a bias of -0.76%. The robust retrieval of the orange reflectance contra-band in optically diverse environments was tested against the freshwater Optical Water Types, showing that a correction is necessary only for very clear waters (Chla < 1 mg/m^3). Finally, the retrieved band is shown to convey independent information from the adjacent MS bands when PC to Chla ratio increases above unity. An example application to OLI imagery is presented over a cyanobacteria bloom in lake Erie. The present method is distributed in the ACOLITE atmospheric correction code.

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