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Variation of optical properties at Lucinda Jetty Coastal Observatory and its input into an optical model of coastal waters in Great Barrier Reef region.

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The water column optical properties from an observation station located at the end of a 5.8 km long jetty in the coastal waters of the Great Barrier Reef World Heritage Area (18.52 S, 146.39 E) were studied. Due to the location of the Lucinda Jetty Coastal Observatory (LJCO), at the interface of large riverine nutrient and sediment sources and clear open ocean waters, it is an optically variable and interesting region. LJCO is the only Southern Hemisphere ocean colour validation site integrated into NASA's AERONET-OC global network of ground-based radiometers.
LJCO has a 3 years long time series (2014-2016) of continuous in-water optical measurements of absorption (AC-S), scattering (AC-S) and backscattering (BB-9) spectra together with water-leaving radiance spectra (SeaPRISM) acquired above the water surface and concentration of water components (WQM). Further HPLC and spectrophotometrically-retrieved absorption and scattering were determined fortnightly. These detailed bio-optical observations are rarely available as a time-series for model assessment. We use these data to quantify the relationship between optical properties and water constituents and to developing a more accurate optical model for coastal, optically complex water like GBR model. Pigment analysis show that studied area is dominated by alternatively freshwater and oceanic phytoplankton species depending on weather condition, tides and season. Absorption spectra at 440 nm and 550 nm are dominated by detritus but also have a significant CDOM contribution, which influences reflectance values in that range of spectrum and negatively affects wavebands used in satellite and remote algorithms for water constituents. These emergent features are compared to the model outputs, demonstrating when the model produces accurate optical signals with realistic process representation.