SATELLITE DERIVED EUPHOTIC DEPTH ON THE GREAT BARRIER REEF: UNDERSTANDING PHYSICAL DRIVERS OF SPATIO-TEMPORAL PATTERNS OF WATER CLARITY

WEEKS Scarla[1], WERDELL Jeremy[2], LEE Zhongping[3], CANTO Marites[1], SCHAFFELKE Britta[4]

[1]University of Queensland, Brisbane, Australia.
[2]NASA Goddard Space Flight Center, Greenbelt, USA.
[3]Stennis Space Center Center, Mississippi, USA.
[4]Australian Institute of Marine Science, Townville, Australia.

s.weeks@uq.edu.au
Jeremy.Werdell@nasa.gov
zplee@ngi.msstate.edu
b.schaffelke@aims.gov.au
m.canto@uq.edu.au

Mapping of key environmental variables in space and time forms an integral component in the development of an early warning and assessment system for stress on the Great Barrier Reef (GBR). Detecting changes to the transparency of the water column is critical for understanding the exposure of the GBR to risk factors that cause coral bleaching, or are involved in nutrient/flood dynamics. In partnership with the NASA Ocean Biology Processing Group, we investigate the optimal, available operational algorithm for light attenuation through the water column across the scale of the GBR ecosystem. We implement and test the Lee quasi-analytical algorithm to determine euphotic depth in GBR waters. As a first order validation, we match GBR Secchi Depth data from the Australian Institute of Marine Science to Modis Aqua (2002-present) and SeaWiFS satellite data (1997-present). The results of the in situ Secchi / satellite data matchup show a simple bias offset between the in situ and satellite retrievals. We regress the in-situ data against the 10% euphotic depth level and use a Type II linear regression of log-transformed satellite and in situ data to adjust the match in satellite data retrievals. We implement a GBR-validated euphotic depth algorithm and generate satellite time series across the scale of the GBR ecosystem. We apply an Empirical Orthogonal Function Analysis to the dataset to determine the dominant modes of variation and compare the spatio-temporal patterns to the physical dynamics as interpreted from a 10 year sea surface temperature (SST) dataset.