



Mapping photosynthetically available radiation at the sea surface using GOCI

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Photosynthetically available radiation (PAR) controls the composition of marine ecosystem by affecting the growth of phytoplankton, thus estimating PAR at the ocean surface accurately is important to understand the marine ecological environment. Although many studies have been attempted to estimate PAR employing ocean colour satellite data since 2003, previous studies using data from the polar orbit systems had spatial and temporal limitations to estimate accurate daily PAR. Here, we estimate daily PAR from Geostationary Ocean Colour Imager (GOCI) which collects data eight times a day at an hour interval in daytime and compare it with in-situ measurement and MODIS-based daily PAR.

The algorithm we developed in this study, employed GOCI visible bands (centred at 412, 443, 490, 555, 660, 680 nm) which belongs to the range of PAR by calculating albedo at the layer of clouds and the sea surface to estimate daily PAR. The resultant value was validated by comparing the in-situ measurements acquired from an ocean research station, Socheongcho between February and May 2015, which showed a similar pattern with somewhat GOCI-base PAR's overestimations. The comparison with the results from MODIS, a polar orbit system showed that a good agreement with each other was illustrated at clear sky conditions, while MODIS showed some over- or underestimations at cloudy conditions with irregular patterns. This study shows that GOCI can estimate effectively the daily PAR with its advantages of acquiring data more frequently than other polar orbit ocean colour satellites by reducing the uncertainties induced by insufficient images to map the daily PAR at ocean surface.