

IGARSS Abstract

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The MODIS time series of suspended calcium carbonate in the global ocean

Calcium carbonate is a critical component to the biogeochemical cycle of carbon on Earth. This is because its biological precipitation is associated with the production of CO₂ and strong decreases in the chemical alkalinity of the ocean. One major source of calcium carbonate is from ubiquitous, single-celled marine plants called coccolithophores, which produce micrometer-sized scales called coccoliths. These calcium carbonate coccoliths are released from the cells whereupon they can be found suspended at concentrations of 10² -10⁵ per mL throughout the world ocean. Their high refractive index makes them strong light scatterers and strong contributors to water leaving radiance across the visible light spectrum. We have derived algorithms to estimate suspended calcium carbonate concentrations (hereafter referred to as particulate inorganic carbon or PIC) for use with MODIS data. The algorithm uses 440nm and 550nm normalized water-leaving radiance to iteratively derive both ocean chlorophyll and PIC concentrations. Central to the algorithm is the PIC-specific backscattering coefficient for coccoliths, which has been derived from numerous measurements in the laboratory and field. The PIC algorithm has been validated using ship measurements from around the globe. After a brief description of the algorithm and its potential sources of error, I will show some global views of PIC concentration from made from seasonal MODIS composites and the implications to the global carbon budget. I will end by showing a global animation of PIC concentration in the surface ocean for the first five years of the MODIS-AQUA mission.