Solar Transmission and Radiant Heating in the Equatorial Indian Ocean

Abstract

Air-sea heat and momentum fluxes in the equatorial Indian Ocean are believed to play essential roles in MJO control. Ocean radiant heating is a dominant term in tropical air-sea heat budgets. In addition to supplying thermal energy to the ocean, solar radiation, through its vertical divergence, plays a primary role in the diurnal (mixed layer) stratification process influencing both daytime EKE dissipation and setting up nighttime upper ocean convection. In situ upper ocean solar heat flux data are presented. These direct measurements of in-water solar flux divergence, or solar attenuation, allow variations in solar forcing of upper ocean mixed layer stratification to be accurately quantified. Solar attenuation depends primarily on upper ocean chlorophyll biomass concentration in open ocean waters. Chlorophyll biomass depends largely on the availability of light and nutrients. In situ ocean chlorophyll and nutrient data that inform on bio-physical feedbacks are also presented. The data show relatively low chlorophyll concentration values near 0.15 mg m^{-3} with a single episodic increase to 0.4 mg m^{-3} that influenced on the depth distribution of ocean radiant heating.