Session: B3 Oral presentation

Variability of chlorophyll associated with ENSO and its possible biological feedback in the Equatorial Pacific

Jong-yeon Park [†];
[†] Korea Ocean Research and Development Institute, South Korea
Leading author: jylovesu@kordi.re.kr

The relationship between oceanic phytoplankton and climate variability has been given increasing attention with the accumulation of satellite-derived chlorophyll data over the past decade. This study examines the dominant variability of phytoplankton and its associated tropical climate systems, in particular, the El Niño-Southern Oscillation (ENSO). The analysis, using 148 months of chlorophyll data, reveals that the first two leading modes of tropical chlorophyll anomalies are linked to the mature phase and the transition phase of the ENSO cycle. When El Niño events occur, both insufficient nutrient supply (suppressed equatorial upwelling) and reduced surface solar radiation (enhanced convective activity) can cause a decrease in chlorophyll. The effect of reduced surface solar radiation on the chlorophyll concentration is stronger in the western Pacific than in the eastern Pacific, and this regional difference induces a distinctly asymmetric response of ocean chlorophyll to El Niño and La Niña in the western Pacific. All these features are generally represented well in a coupled ocean, ice and ecosystem model. A linear statistical analysis shows that the dominant variability of chlorophyll associated with ENSO contributes to the radiant feedback over the equatorial Pacific by altering the surface shortwave albedo. The decreased chlorophyll concentration during El Niño tends to induce radiant cooling at the ocean surface