

Interannual chlorophyll variability in the Northeastern Tropical Pacific Ocean: An eddy-resolving ocean model study

SASAI, Yoshikazu^{1*}, Hideharu Sasaki¹

¹Japan Agency for Marine-Earth Science and Technology

An eddy-resolving coupled physical-biological ocean model has been employed to investigate the seasonal and interannual variability of the chlorophyll in the northeastern tropical Pacific during 2000-2007. The seasonal variability of the surface chlorophyll concentration in the model agrees well with satellite ocean color data, except for the equatorial region. High chlorophyll levels off the Gulf of Tehuantepec, Papagayo, and Panama in winter and in the Costa Rica Dome in summer are well reproduced. Production in these areas is controlled by the supply of nitrate rich-waters through vertical mixing and coastal and open ocean upwelling. The variability of the thermocline depth is strongly connected to the seasonal variability of surface chlorophyll. El Nino Southern Ocean (ENSO) variability has a marked effect on the marine ecosystem. The model reproduces the variability of chlorophyll corresponding to the observed ENSO variability. During cold SST anomaly phases (2000, 2001 and 2007), the chlorophyll concentration is considerably higher than other years (2002-2006). Chlorophyll variance is largest off the Gulf of Papagayo and over the Costa Rica Dome where the changes to chlorophyll levels are related to changes in the supply of nitrate rich-waters through vertical mixing and upwelling.

Keywords: Marine ecosystem, Northeastern Tropical Pacific, ENSO, High-resolution ocean model