

Observation of the rapid increase of deep-sea oxygen levels in the Eastern Equatorial Pacific after 1998/1999 El-Nino/La-Nina events

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The long-term oceanographic observation program had been carried out at KOMO station (Korea deep-Ocean Monitoring station: 131°20'W, 10°30'N) for 20 years (1994~2014) in the Eastern Equatorial Pacific in order to understand the interannual and interdecadal natural variability of oceanographic conditions. Physico-chemical water properties (e.g., temp., salinity, dissolved oxygen, Chl-a, nutrients, etc.) were measured using CTD casting once a year between July and August. Total particle fluxes were also measured using the sediment trap with monthly resolution in the selected years (1997 and 2003~2012). Based on our observation, the variation of oxygen minimum zone (OMZ) thickness seems to be linked with interannual variation of physical, biological, and chemical properties in the overlying water without any significant decadal shift. However, dissolved O₂ levels in the deep-sea (below 2000m-deep) were significantly increased from 2003/2004. This rapid increment could be related with the regime shift after 1998/1999 El-Niño/La-Niña events in the Pacific Ocean because drastic decrease in the depth-integrated Chl-a accompanied with the dominance of smaller sized primary producers appeared in 2000. This shift also well corresponded with organic mass fluxes which were significantly lower in the early 2000s than in the late 1990s. This observation suggest that O₂ levels in the deep-water column could be more strongly coupled with overlying water primary productions and organic matter inputs than those in the shallow water (including OMZ) which may also be significantly affected by physical processes (i.e., trade winds, current) in this region.