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Surface Productivity and bottom water circulation changes in the Eastern equatorial Pacific

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Integrated Ocean Drilling Program Expedition 320/321 Pacific Equatorial Age Transect (PEAT I and II) was carried out to recover complete paleoceanographic recored in the Eastern equatorial Pacific during Cenozoic. Especially clarifying accumulations of biogenic carbonates and carbonate compensation depth (CCD) fluctuations were one of the highest priorities in these expeditions. The cruise we attended (PEAT II) were recovered cores from two locations (Sites 1337 and 1338) to understanding equatorial paleoceanography since middle Miocene in the Pacific. In this study, we performed geochemical analysis in order to reveal the bottom water hydrography in the eastern Equatorial Pacific from the middle Miocene to Holocene.

The cores U1337 and U1338 were pelagic sediments composed of calcareous chalk with laminated diatom bulbs. Inorganic carbon (IC) and total organic carbon (TOC) was analyzed shipboard using coulometry and CHN analyzer. IC contents of core was 0-99% and 30-90 % through the cores in U1337 and U1338, respectively and indicated mostly good preservation of calcium carbonates. On the other hand, the carbonate crash representing anomalous decreasing of carbonate accumulation was detected both sites at Middle-Late Miocene (ca. 11-9 Ma), and it affected more strongly in U1337 rather than U1338. TOC contents was mostly very low (˜0.1 %) through both cores but showed 0.3 - 0.5 % in some layers that were indicated laminated diatom concentrated layers. It suggested that frequent productivity changes had occurred during middle - late Miocene.

Trace metal analysis was performed for benthic foraminifers in core U1338 to understand deepwater temperatures and other geochemical properties. Cibicidoides mundulus and Oridorsalis umbonatus were used for Mg, Sr, Mn/Ca analysis. Mg/Ca showed that 0.4 - 1.5 mmmol/mol through the core. This fluctuation showed similar trend with global d18O fluctuations of benthic foraminifera. It suggests that bottom water temperature was affected with global climate changes related to ice volume effects.

Keywords: PEAT, Eastern equatorial Pacific, Middle Miocene, CCD, benthic foraminifera, bottom water circulation