

## Early and Middle Eocene radiolarian assemblages in the eastern equatorial Pacific Ocean (IODP Leg 320 Site U1331)

Shin-ichi Kamikuri<sup>1\*</sup>, IODP Leg 320/321 (PEAT) member<sup>1</sup>

<sup>1</sup>Faculty of Education, Ibaraki University

Quantitative faunal analyses of radiolarians were used to reconstruct paleoceanographic conditions spanning the interval from Zones RP8 (early Eocene) to RP16 (middle Eocene) in pelagic sequences recovered at Integrated Ocean Drilling Program (IODP) Site U1331 in the eastern equatorial Pacific Ocean. On the basis of relative abundance data from the low to high latitudes reported in the previous literature, paleoceanographic indices were identified: (1) species indicative of warmer conditions include *Stylosphaera coronata coronata*, *Phormocyrtis embolum*, *Dendrospyrus didiceros*, *Phormocyrtis cf. proxima*, and *Thyrsochyrtis triacantha*; (2) species indicative of cooler conditions include: the *Lophocyrtis aspera* group, the *Lithocyclia ocellus* group, *Hexacontium sp. A*, *Hexacontium sp. B*, *Thecosphaerella glebulenta*, and *Lithelius sp. A*.

Two warming and at least six cooling events in the early to middle Eocene were identified from radiolarian assemblage variations. The paleoclimatic trends can be summarized as follows: warming in C23n.2n to C21r (~51.5-49.0 Ma), and C18n (40.2-39.0 Ma); cooling in C21r (48.5-47.8 Ma), lower C20r (46.2-45.2 Ma), top C20r to C20n (44.0-43.0 Ma), top C20n to C19r (43.0-41.7 Ma), C19n to C18r (41.7-40.2 Ma), C18n.1n (39.0-38.5 Ma). These cooling events corresponded to the ELi and BLi events, which were identified in benthic foraminiferal  $\delta^{18}O$  of the Southern Ocean.

In general, radiolarian and opal mass accumulation rates (MARs) in the eastern equatorial Pacific had higher values in cooling conditions during the middle Eocene. The changes in biological productivity in the eastern equatorial Pacific were associated with cooling of tropical surface water.

The change in relative abundance of radiolarians and  $CaCO_3$  content at Site U1331 indicated that middle Eocene carbonate events (Carbonate Accumulation Events [CAEs]; Lyle et al, 2005) coincided with the cooling events of tropical surface water. At least CAE-2 and CAE-3 were associated with high biological productivity as well as cooling.

Keywords: Equatorial Pacific Ocean, Middle Eocene, Radiolaria, IODP