

Changes in the Oligocene planktic foraminiferal depth habitat related to thermocline deepening in the eastern equatorial Pacific

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Planktic foraminiferal depth habitat is a key to accurate reconstruction of paleoceanographic records. Oligocene-Pliocene long-ranging species *Dentoglobigerina venezuelana* lived in the mixed-layer (shallower) in the eastern equatorial Pacific during the early Oligocene while the same species calcified within thermocline depth (deeper) during the late Oligocene and Miocene. The exact timing of its depth habitat change and possible relationships with Oligocene climate dynamics are still unknown.

Here we reveal successive isotopic record of *D. venezuelana* along with *Paragloborotalia siakensis* group (mixed-layer dweller) by using sediments at IODP Site U1334 in the eastern equatorial Pacific throughout the Oligocene. Two-step depth habitat changes of *D. venezuelana* are recognized: 1) from upper to lower mixed-layer (~27.4 Ma), and 2) lower mixed-layer to thermocline depth (~26.3 Ma). In addition, planktic foraminiferal faunal assemblage also experienced significant change from dominant thermocline (deeper) species to abundant mixed-layer (shallower) species, suggesting depth habitat shifts of *D. venezuelana* was closely related with thermocline deepening in the eastern equatorial Pacific.

Multiple sites (Sites U1334, U1333, and 1218) comparison of first isotopic shift (~27.4 Ma) revealed southward depth habitat change of *D. venezuelana* within ~200 kyr, implying thermocline deepening occurred with reduced steepness in the eastern equatorial Pacific. Consequently, we advocate global warming condition during the late Oligocene likely caused thermocline deepening with upwelling decrease in the eastern equatorial Pacific, guiding *D. venezuelana* to adapt deeper depth in the water column.

Keywords: eastern equatorial Pacific, Oligocene, depth habitat, planktic foraminifera, oxygen-carbon isotope ratio