Micropaleontology as a tool for biostratigraphic and paleoecological reconstructions at Fantangisña seamount in the NW Pacific Ocean (IODP Expedition 366).

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The Izu-Bonin Mariana (IBM) convergent margin is situated in the NW Pacific Ocean (12°N to 35°N) and is considered, so far, the only location where recent episodes of serpentinite mud volcanism occurred. The southernmost sector of the IMB is represented by the Mariana forearc, which hosts a high number of large serpentinite mud volcanic bodies, located between the trench and the Mariana volcanic arc. Among them, Fantangisña seamount was drilled during International Ocean Discovery Program (IODP) Expedition 366. Cored lithologies include serpentinite mud deposits covered by pelagic layers and underlain by nannofossil-rich forearc sediments and volcanic ash/tephra layers deposits. Importantly, Fantangisña seamount is situated in the tropical Pacific Ocean, at low latitudes (16° N) within the latitudinal range of the North Equatorial Current (NEC).
An integrated calcareous nannofossil and planktonic foraminifera biostratigraphic study was firstly performed on Site U1498A, located on the most stable southern flank of the seamount. The obtainment of bioevents allowed to generate a valid age-depth model which permits for the definition of the latest phase of activity of Fantangisña serpentinite mud volcano, recorded between 6.10 (Late Miocene, Messinian) and 4.20 (Early Pliocene, Zanclean), 4 Ma later than the age suggested by a previous work (10.77 Ma). Moreover, the emplacement is coeval with the inception of the rifting in the Mariana Trough recorded at 7-6 Ma.

Successively, a study on Early to Late Pleistocene benthic and planktonic foraminifera assemblages was performed at Site U1498A. Cluster analyses on the planktonic foraminifera resulted in two major clusters based on thermocline-dwelling species (e.g., Globorotalia spp.) to mixed-layer dwellers (e.g., G. ruber, G. glutinata) ratio, which suggest variations of the depth of the thermocline (DOT). These changes can be linked to fluctuations in the intensity of the NEC. Specifically, we recorded the existence of a deep and stable thermocline with a stronger NEC during the interval of the Early-Middle Pleistocene Transition (EMPT). In contrast, both thermocline and NEC weakened during the Middle-Late Pleistocene, within the post-EMPT interval. Changes in the intensity of the NEC could be related to ENSO climate variability (El Niño/La Niña).
Planktonic foraminifera diversity indicates that the serpentinite mud activity in the area did not affect the distribution of planktonic assemblages. Moreover, the preservation of the planktonic tests could be enhanced by rapid burial under the serpentinite mud flow layers. High diversity (99 taxa) was found for benthic foraminifera prior to and after the serpentinite mud flow activity indicating oligotrophic and well-oxygenated bottom-water conditions. Conversely, benthic forms were severely affected by the volcanic production (serpentinite mud flows release and gas outpouring).