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Dissolution control on planktonic foraminiferal micro-scale distributions: Two case studies from the NW Pacific Paleocene deposits

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Various oceanographic parameters have been shown to be important in determining the composition of planktonic foraminiferal assemblages, including temperature, thermocline structure, surface stratification, seasonality and upwelling. Carbonate dissolution processes are of primary importance in deep waters as they influence the presence or absence of foraminifera and the preferential dissolution of certain species. With the aim to understand how the patterns of distributions of Paleocene planktonic foraminifera are influenced by dissolution, a detailed study was performed on deposits from the Shatsky Rise (Northwest Pacific) recovered during Ocean Drilling Program Leg 198. A pulse of intense carbonate dissolution caused by an abrupt shoaling in the depth of the lysocline and calcite compensation depth (CCD) is observed during the early late Paleocene and at the Paleocene/Eocene boundary.

The early late Paleocene sedimentological record is marked by a prominent 5- to 25 cm-thick dark brown clay-rich calcareous nannofossil layer, which falls in the lower part of planktonic foraminifera Zone P4. The dissolution at the Paleocene/Eocene boundary affects a 3-to 4 cm-thick interval of yellowish calcareous ooze and an overlying 3-to 5cm-thick brown clayey calcareous ooze, and is associated to the negative carbon isotope excursion (CIE) that identifies the Paleocene/Eocene Thermal Maximum event (PETM).

A high-resolution centimeter-scale quantitative analysis of the planktonic foraminiferal assemblages was performed in these two time-intervals in order to:

1) evaluate the susceptibility to dissolution of the species within genera at different water depths;
2) compare the dissolution effects on the same taxa at different time-intervals; and
3) figure out significant changes in faunal composition, even though the original faunal composition was altered by dissolution.

Results show that low-latitude tropical and subtropical planktonic foraminiferal species vary in their susceptibility to dissolution. In general, when the dissolution rate of carbonate exceeded the rate of supply of calcium

carbonate, an increase in foraminiferal dissolution and fragmentation is observed. Planktonic foraminifera from the early late Paleocene interval are characterized by a low-diversity, largely dissolved assemblage dominated by representatives of the genus *Igorina*. The abundance of igorinids is emphasized by the rarity and/or absence of the other genera and by the low number of total specimens (often <300 specimens) in the residues that contain common to abundant test fragments of morozovellids. Among the igorinids, *I. tadjikistanensis,* and *I. pusilla,* are the most dissolution-resistant taxa and are the only species recorded in the dissolution interval. Conversely, *Igorina albeari*, morozovellids, acarininids, globanomalinids, subbotinids, and chiloguembelinids are interpreted as more dissolution-susceptible taxa.

The 3-to 8 cm-thick dissolution interval at the Paleocene/Eocene boundary is characterized by a high diversity planktonic foraminiferal assemblage dominated by specimens of the genera *Morozovella,* and *Acarinina,* whereas a marked decrease in abundance is observed in the subbotinids group. Dissolution results in breakage of *Morozovella* tests and poor preservation of certain species of morozovellids, acarininids and subbotinids. It also highlights significant variations in dissolution susceptibility of various species without overprinting the major changes in faunal composition and test sizes observed across the Paleocene/Eocene boundary.

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