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High resolution planktonic foraminifera analyses across the Paleocene/Eocene boundary at Shatsky Rise, Pacific Ocean

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The latest Paleocene to earliest Eocene sediments from two Ocean Drilling Program Holes 1209B (water depth 2387m) and 1210B (water depth 2573m) recovered from Shatsky Rise were studied to obtain a detailed planktonic foraminifera record across the Paleocene-Eocene transition in the subtropical Pacific Ocean. At these sites the Paleocene yellowish brown calcareous ooze is overlain by a thin dark brown clay seam (~ 2mm) at 196.42 mbsf in Hole 1209B and at 184.31 mbsf in Hole 1210B which corresponds to the base of the Paleocene-Eocene Thermal Maximum (PETM) and to the Paleocene/Eocene boundary. The PETM was an interval of rapid global warming ~55 Ma ago associated with transformation of fauna and flora ecosystems and changes in carbon cycling. At Shatsky Rise, the onset of the PETM is marked by the abrupt onset of the negative carbon isotope excursion (CIE) which lies just below the sharp lithologic contact between more carbonate-rich ooze overlying clay-rich ooze. In the upper part of the PETM interval, the clay-rich ooze gradually becomes more carbonate rich and carbon isotope values gradually increase.

A high-resolution centimeter-scale quantitative analysis of the planktonic foraminiferal assemblages was performed in order:

1) to document the composition of the planktonic foraminiferal assemblages and their variations at centimeter scale, and
2) to provide a high resolution bio-chemostratigraphic correlation across the Paleocene/Eocene boundary.

Quantitative analyses well document the similarity in composition of the planktonic foraminiferal assemblages between the two sites. In general, *Morozovella* dominates the assemblages and its maximum relative abundance is coincident with the carbon isotope excursion. Subbotinids show an opposite trend and are absent in the interval of maximum abundance of *Morozovella*. A decrease in abundance of about 10% in average is observed within the *Acarinina* group from the base to the top of the studied sections. The excursion taxa (*A. sibaiyaensis, M. allisonensis*, and *A. africana*) first appear at the CIE and

rich their maxima abundance (10%) at the beginning of the morozovellids decline. SHE diversity indices, used to evaluate changes in planktonic foraminiferal species composition through the studied interval, show similar trend at both sites. Species diversity varies between 21 to 34 species in the deeper Site 1210, and from 15 to 29 in the shallower Site 1209, with the minimum diversity values occurring in the carbonate-rich ooze below the CIE, and preceding the FO of *A. sibaiyaensis*. This diversity minimum is followed by a general increase in the number of species, reflecting the progressive appearance of igorinids and globanomalinids, and of the excursion taxa. Equitability is relatively high at both sites with average values of 0.5-0.6 that reflects minor changes in composition, as most of the species are present in the same proportion. The maximum diameter of largest specimens of surface-dwelling (*Morozovella velascoensis*, *M. pasionensis*, *M. subbotina*, *M. occlusa* and *Acarinina soldadoensis*), and deep-dwelling planktonic foraminifera (*Subbotina velascoensis*, and *S. triangularis*) were measured in each sample. Results show that during the warming event the test size *Morozovella* has a maximum, and *A. soldadoensis* shows no significant change in size throughout the studied interval. Within the morozovellids several specimens of *M. velascoensis* show diameter close to 800µm in the interval containing the CIE.

Lithology, planktonic foraminiferal distribution and abundances, planktonic and benthic foraminifera tests size, calcareous plankton and benthic events, and the negative carbon isotope excursion allow precise correlation of data between sites.