Was the Jurassic–Cretaceous boundary a critical event for marine life in the pelagic Panthalassa?

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It is an urgent task for Earth scientists to determine the appropriate Global Boundary Stratotype Section and Point (GSSP) for the Jurassic–Cretaceous boundary (JKB) as it is the only GSSP in Phanerozoic not to be anchored yet. The JKB is defined as the base of the Berriasian Stage. In 2016, it was formaly decided by the Berriasian Working Group in the International Subcommission on Cretaceous Stratigraphy to use the base of the *Calpionella alpina* Subzone as the primary marker. This definition can only be satisfactorily applied to shallow marine deposits within the Western Tethys, North Atlantic and central-south America. Unfortunately, the primary marker taxon cannot be found in the Pacific and circum-Pacific regions. We are still looking for an alternative marker suitable for the JKB in the Pacific.

Radiolarians are good candidates for defining the JKB because they are widespread and can be found in both shallow and deep sedimentary facies worldwide. Pelagic sequences across the JKB have been reported in ODP/International Ocean Drilling Program (IODP) sites in the western Pacific and land sections in Japan, the Philippines, southern Tibet, Oman and other locations. The evolutionary first appearance datums (FADs) within firmly recognized lineages are extremely valuable for difining radiolarian zones.

Although the JKB is a boundary between geological periods, no significant turnover of pelagic biota has been reported from the Panthalassa. This is principally because the age of the JKB has not been constrained in the pelagic Panthalassa. Therefore, some key questions have not been tested, such as: 1) Was the JKB a critical event for marine biota in the pelagic Panthalassa? 2) Was the JKB significant in the evolution of marine life through the Phanerozoic? It is highly possible that the radiolarian JKB could be obtained by drilling the tuffaceous rocks near the Jurassic–Cretaceous volcanoes at a site around the outer slope of the Mariana Trench. The new cores at this site will provide critical information for constraining the U–Pb ages of the JKB from zircon grains in the tuff, and provide new insights into the biological evolution among pelagic biota in the Panthalassa across the JKB.

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