

Discovery of Australasian microtektites in the hemipelagic sediments of the Japan Sea: It's significance and implications

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Tektite is a glass material formed from terrestrial debris ejected during a meteorite impact. (Sub)millimeter-scale tektites are called microtektites. Tektites occur in four strewn fields and Australasian strewn field is the youngest (ca. 0.8 Ma) and the largest (>10% of the Earth surface) of them. Previous studies revealed asymmetric distribution of the Australasian microtektites with the most distant distribution toward the southeast from southeast Asia to Antarctica. Although the exact location of the impact has not yet been identified, recent studies suggest the location as in southern Laos. Because location and magnitude of the impact can be estimated based on distribution of microtektites, to precisely define the distribution of microtektites is important.

During IODP Expedition 346, Tada et al. (2015) found possible microtektites at site U1422 in the northern part of the Japan Sea from the horizon immediately below the Matsuyama-Brunhes boundary. Here we report the occurrence of microtektites from this horizon at site U1422 and the equivalent horizon at U1426. Microtektites are mostly spherical with some teardrop and dumbbell forms of ca. 100 μm in diameter, transparent and pale olive green in color. Major element composition of microtektite agree well with that of Australasian microtektites reported in previous literatures. The Quaternary hemipelagic sediments of the Japan Sea are characterized with millennial-scale alternations of dark and light layers that can be traced throughout the deeper part of the sea, and the microtektite horizons at the two sites shows parallel relationship with dark layers immediately above and below it, suggesting they are synchronous, supporting primary ejecta origin.

Discovery of Australasian microtektite at site U1422 extends northeastward distribution of Australasian microtektite by ca. 2500 km, almost double the extent in northeastward direction. Microtektite flux to site U1426 is >500 particles/ cm^2 , which is much larger than expected. It is possible that previous studies overlooked microtektites of less than 125 μm because they used >125 μm fraction to look for microtektites. The result of this study suggests that distribution of Australasian microtektites could be much larger than previously suggested. It is possible that Australasian microtektite horizon can be distributed widely in northwest Pacific.

Keywords: Australasian tektite, microtektite, IODP Expedition 346, the Japan Sea, site U1422, site U1426