

Tephrochronology and evolution of volcanic activities in Japanese islands during late Cenozoic

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The Japanese islands are located along an active plate margin, and are home to many active volcanoes along an island arc. Large, explosive volcanic eruptions have yielded numerous volcanic ash layers (tephras) over geological time. Because tephra are deposited in both onland and seafloor areas, they represent a unique and important link between the geological records of the two settings. There are several source volcanoes to provide tephra to the Japan Sea floor. These are, for example, Kikai, Aira and Aso volcanoes in Kyushu, Sanbe and Daisen volcanoes in Chugoku, Asama volcano in north Kanto, Towada volcano in Tohoku, Toya volcano in Hokkaido, Ulleung volcano on Ulleung Island in the western Japan Sea, and Baegdusan volcano on Korean Peninsula. Most of the previous marine tephra studies in the Japan Sea have been concentrated for the late Quaternary in age. Because of shallow CCD and shallow gateways of the Japan Sea, oxygen isotope stratigraphy is not a perfect tool for age determination, especially in the deep-sea basins. Under the condition, wide-spread tephra works as a key bed connecting among marine cores, and give us a good time-marker. Quaternary Japan Sea sediments are characterized by alternating light- and dark-colored layers. The late Quaternary dark layers were deposited basin-wide in relation to enhanced summer monsoon during the interstadials of the Dansgaard-Oeschger cycles. Recent study on marine tephra among several marine cores in the central Japan Sea suggested the synchronicity of the dark layer deposition. This is clear evidence on significance of marine tephra study for inter-core correlation. Furthermore, tephra may connect the events in marine environments and those in terrestrial and lacustrine environments. Thus, tephra in the Japan Sea sediments are important for the paleoceanographic and paleoclimatic study in and around the Japan Sea. Information on longer time-scale occurrence of tephra layers and their source volcanoes will give us spatio-temporal variation of volcanic activities and their relations to the regional tectonic movements around the Japan Sea, because the continuous and muddy Japan Sea has been a good recorder of tephra layers after its opening.

Keywords: tephra, Japan Sea, stratigraphy