

Multiple cryptotephra layers from Ulleung Island and Baegdusan volcanoes detected by INAA in the Japan Sea

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The Ulleung and the Baegdusan, which are characterized by alkaline tephtras, are clearly distinguished from many other widespread tephtra layers located in and around the Sea of Japan. Only a few alkaline tephtra horizons (U-Oki, Bm-T, U-Ym) are found in cores collected from this sea. Little is known about the age of Baegdusan tephtra. Machida et al. (1984) reported the occurrence of seven deposition events of pumice layers (U1-U7) on Ulleung Island during the late Quaternary. Many plinian-type eruptions should take place more frequently and, the tephtra layers have weathered on Ulleung Island. The Ta/Sc elemental ratio obtained by the supersensitive method of instrumental neutron activation analysis (INAA) is a useful indicator for detecting alkaline cryptotephtras from continental volcanoes (Lim et al., 2006a). Rhyolitic Kikai-Akahoya (K-Ah, 6300 yr BP) cryptotephtra layers have been also detected from three deep-sea cores (GH86-4-510, GH87-2-KT, and GH88-2-308) by using Cr/Eu and Cs/Sc elemental ratios analyzed by INAA. The presence of these volcanic glasses in samples of trace element ratios is confirmed by EPMA analysis (Lim et al., 2006b).

We analyzed about 2200 samples, taken at 1.2-cm intervals from six piston cores (4-6 m long), collected from the Sea of Japan during research cruises conducted by the National Institute of Advanced Industrial Science and Technology (AIST): GH89-2-26 and GH89-2-28 (Yamato basin); GH86-2-N (Offshore of Saninn district); GH86-2-N and GH99-1259 (Offshore of Oga Peninsula); KR05-09PC1 (Matsumae seamount).

We surveyed the core sediments deposited between the U-Oki tephtra (ca 9.3 kyr BP) and the Aso-4 tephtra (89 14C kyr BP) and found some Ta/Sc peaks at the upper and/or lower parts of the U-Oki layer from the cores taken from the southern Japan sea (Lim et al., 2006a).

From the east part of Japan Sea, four to six unknown alkaline ash fall events have been detected between the Baegdusan-Tomakomai (B-Tm) tephtra (age: 1 ka) and the Aso-4 tephtra (89 14C kyr BP) layers. These tephtras probably contain Ulleung-Yamato (U-Ym) layers. The result of GH89-2-25 and GH99-1259 cores show five Ta/Sc peaks and similar patterns between them. Electron probe microanalysis (EPMA) also reveals that the volcanic glasses separated from the anomalous tephtra layers are comparable with some alkaline tephtras.