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Tephra study on the EPICA-DML ice core

M. Kohno (1), S. Kipfstuhl (1), A. Lambrecht (1), Y. Fujii (2) and A. Kronz (3)
(1) AWI, Bremerhaven, (2) NIPR, Tokyo and (3) University of Goettingen

Far-traveled volcanogenic aerosols deposit on polar ice sheets through wet and/or dry processes. Ice cores obtained from an ice sheet, therefore, preserve records of past volcanism. Visible volcanic ash (tephra) layers have been observed in deep ice cores. Chemical composition of the tephras makes it possible to infer their source volcanic regions or, in some cases, source volcanoes. Genetic information of the tephras provides not only records of past volcanism, but also key beds for intercorrelating deep ice cores. The 2564 m deep ice core from Kohnen Station in Dronning Maud Land, East Antarctica (0.00ą, 75.00ą S, 2894 m a.s.l.) contains 18 visible layers colored from light yellow to dark brown and 1 to 25 mm thick. In this study, we infer the source regions of tephra particles obtained from these visible layers based on the abundances of major and some trace (SiO2, TiO2, Al2O3, FeO, MnO, MgO, CaO, Na2O, K2O, P2O5, BaO, S and Cl) elements. A major element analysis was carried out using a wavelength-dispersive electron microprobe analyzer (EPMA; JXA8900, JEOL) at University of Goettingen. The tephra particles of 7 layers (269.60, 808.24, 939.75, 1053.91, 1489.82, 1988.31 and 2374.19 m) among the 18 layers were analyzed. Six tephra layers belong to tholeiitic basaltic andesite to andesite rock series and one to a calc-alkaline andesite rock resries. Amongst them, 5 layers may have counterpart to the Dome Fuji and Vostok ice cores.