

THE BIMODAL MAGMATISM OF THE CONTINENTAL FLOOD BASALTS FROM FRANZ JOSEF LAND, ARCTIC RUSSIA

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Continental flood basalt (CFB) provinces are large areas covered by huge quantities of basaltic lava flows. Although Franz Josef Land (FJL) lavas cover a relative small area (~ 70.000 km²), they are typical CFBs. They are divisible into tholeiitic basalts and basaltic andesites with the tholeiitic basalts always overlying the basaltic andesites. Most of the major element (among them also TiO₂) vs. MgO show compositional trends indicating a bimodal distribution. The FJL CFBs have relatively low LILE/HFSE ratios. With few exceptions, they have significantly lower Ba/Nb ratios (2.5-15) than other CFB provinces. Both lavas have relatively constant Th/Ta ratios similar to the primitive mantle ratio (~2.3), supporting the suggestion that crust contamination was absent and that fractionation was an important process within both lava series. Positive ϵ_{Nd} and the relatively unradiogenic Sr are within ranges of plume-related oceanic basalts. The variations in CaO/Al₂O₃, Zr/Y and La/Sm are not compatible with simple fractionation of both lava series from a common parent magma. Our calculations show that a parental picritic magma were formed: a) for the basaltic andesites by low-degree melting (4%) of a plume at high pressure (gr-Iherzolite field) and b) for the tholeiitic basalts by higher-degree melting (30%) of the same plume at lower pressure (sp-Iherzolite).