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Geology and Petrogenesis of Bigadic-Sindirgi Volcanites, Western Turkey

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The Bigadic-Sındırgı volcanic field is located in western Anatolia and contains various products of post collisional volcanism . Volcanic rocks of this region are represented by felsic and mafic lavas and associated pyroclastic rocks intercalated with Lower to Middle Miocene lacustrine rocks. Early pyroclastic products were deposited in lacustrine environment and intercalated with sedimentary rocks. Felsic pyroclastic rocks are characterized mainly by pumice-ash and ash-block fall deposits and associated pyroclastic flow units. All these pyroclastic rocks interfinger with rhyolitic lavas. Both intermediate to mafic and felsic lavas are co-eval and were associated with NE-SW trending fault systems that were also bounding Early Miocene local lacustrine depocenters in the region.

We report new major, trace (REE) element concentrations and Sr, Nd, Pb isotope ratios from both felsic and mafic lavas of Bigadic-Sındırgı volcanites. Ranging in composition from basaltic andesite to rhyolite, volcanic rocks of Bigadic-Sındırgı volcanites are represented by predominantly High-K calcalkaline series. They are significantly enriched in light ion lithophile elements (LILE) and light rare earth elements (LREE) but depleted in Zr, Nb and Ta. These mafic and felsic lavas have high 87Sr/86Sr values varying from 0,707327 to 0,709221 and low 143Nd/144Nd values ranging between 0,512337and 0,512553. The trace element patterns and Sr, Nd and Pb isotopic features of the Bigadiç-Sındırgı volcanites suggest that their hybrid magmas were derived from partial melting of the enriched sub continental lithospheric mantle and that they were contaminated by the continental crust. High 207Pb/204Pb (15,67 to 15,79) and low 206Pb/204Pb (18,71 to 18,94) suggest also the involvement of old continental crustal material. Over all evaluation of major, trace element compositions, Sr – Nd - Pb geochemistry and the geology of western Anatolia suggest that the Early Miocene volcanism in Bigadic and Sındırgı region may have been caused by partial delamination of the sub continental lithospheric mantle beneath western Anatolia.