

Petrology of the Late Cretaceous volcanism in the eastern Blacksea Region, NE-Turkey: Petrographical and geochemical constraints

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Petrogenesis and geodynamic setting of the late Cretaceous volcanic rock series in the Eastern Blacksea region, NE Turkey, play a critical role in determining the nature of the continental crust and mantle dynamics during late Mesozoic subduction processes. The late Cretaceous time in the region is characterized by two bimodal (mafic and felsic) volcanic activity that occurred in the Cenomanian-Santonian (100-85 Ma) and Santonian-Late Campanian (85-75 Ma) periods. The mafic rocks in the two volcanic periods generally include basalt, basaltic andesite and minor andesite whereas their felsic members mainly consists of dacite and rhyolite. The basaltic and andesitic rocks exhibit subaphyric to porphyritic textures with phenocrysts of calcic plagioclase and augite in a hyalopilitic matrix of plag+cpx±amph. The dacitic and rhyolitic samples commonly show a porphyritic texture with predominant Na-rich plagioclase, K-feldspar, quartz and lesser biotite phenocrysts.

The studied volcanics have almost completely a transitional to tholeiitic character and show typical arc geochemical signatures. N-MORB-normalised multi-element patterns show that all rock samples are enriched in LILEs (e.g. Rb, Ba, Th) but depleted in Nb and Ti. The chondrite-normalized REE patterns are nearly concave shapes with low to high enrichment in LREEs from mafic to felsic members and do not exhibit any significant negative Eu anomaly for the mafic samples while those of the felsic rocks clearly display negative Eu anomalies.

All geochemical results reflect a genetic relationship between the mafic (metasomatized mantle-derived) and felsic volcanic rocks through fractional crystallization processes with minor crustal contamination.

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