

Geochemical Signatures of Potassic to Sodic Adang Volcanics, Western Sulawesi: Implications for Their Tectonic Setting and Origin

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| Abstract | <p>The Adang Volcanics represent a series of (ultra) potassic to sodic lavas and tuffaceous rocks of predominantly trachytic composition, which forms the part of a sequence of Late Cenozoic high-K volcanic and associated intrusive rocks occurring extensively throughout Western Sulawesi. The tectonic setting and origin of these high-K rocks have been the subject of considerable debates. The Adang Volcanics have mafic to mafitic-intermediate characteristics (SiO₂: 46 - 56 wt%) and a wide range of high alkaline contents (K₂O: 0.80 - 9.08 %; Na₂O: 0.90 - 7.21 %) with the Total Alkali of 6.67 - 12.60 %. Al₂O₃ values are relatively low (10.63 - 13.21 %) and TiO₂ values relatively high (1.27 - 1.91 %). Zr and REE concentrations are also relatively high (Zr: 1154 - 2340 ppm; Total REE (TREY = TRE): 899.20 - 1256.50 ppm; TRExOy: 1079.76 - 1507.97 ppm), with an average Zr/TRE ratio of similar to 1.39. The major rock forming minerals are leucite/pseudoleucite, diopside/aegirine, and high temperature phlogopite. Geochemical plots (major oxides and trace elements) using various diagrams suggest the Adang Volcanics formed in a postsubduction, within-plate continental extension/initial rift tectonic setting. It is further suggested magma was generated by minor (< 0.1 %) partial melting of depleted MORB mantle material (garnet-lherzolite) with the silicate melt having undergone strong metasomatism. Melt enrichment is reflected in the alkaline nature of the rocks and geochemical signatures such as Nb/Zr > 0.0627 and (Hf/Sm) PM > 1.23. A comparison with the Vulsini ultrapotassic volcanics from the Roman Province in Italy shows both similarities (spidergram pattern indicating affinity with Group III ultrapotassics volcanics) and differences (nature of mantle metasomatism). (C) IJOG - 2016. All right reserved</p> |
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