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PETROLOGY AND GEOCHEMISTRY OF ACID VOLCANICS IN CUMBUM FORMATION, OF NALLAMALAI FOLD BELT, RAJAMPET AREA, ANDHRA PRADESH, INDIA

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The Nallamalai Fold Belt (NFB), forming upper units of Proterozoic Cuddapah Super Group occupies the eastern part of the Cuddapah basin consisting of rocks belonging to the Nallamalai Group. This group is intensely deformed and comprises a sequence of quartzites (Bairenkonda / Nagari Formation) overlain by argillaceous sediments with bands of dolomite and quartzite (Pullampet/ Cumbum Formation). On the western part, NFB is thrust over Kurnool Group along Rudravaram thrust line and in the eastern part NFB is thrust over by Nellore Schist belt (NSB) along Velikonda Thrust Front. Nallamalai sub-basin is further divided from south to north into four different sub-basin viz. Pullampet/Rajampeta, Zangamrajupalle, Markapur and Agnigundla. Present study area is situated in the southern most part of Nallamalai Fold Belt (in Pullampet sub basin).

Intrusive Igneous activity within NFB includes Alkali syenite of Racherla, Giddalur and lamproite dykes in Chelima and Zangamrajupalle. So far no acid volcanic rocks are reported from NFB.

Acid volcanics are found to exposed in close association with khaki shale of Cumbum Formation. Three bands of acid volcanics are observed, trending NE-SW. The rock is extremely fine grained strongly schistose and off white/black in colour, contains vesicles, which are filled up by off white coloured kaolinite. At places, the rock is highly weathered and has become powdery in nature.

Microscopic study reveals that rock is extremely fine grained and contains quartz with some K-feldspar and illite. These quartz grains show a preferred orientation defining schistosity. Needle shaped chlorites are developed and oriented parallel to the schistosity plane. Seven samples of acid volcanics have been analysed for major oxide and minor trace element and five samples for REE. The SiO₂ values of these acid volcanics ranging from 69.43%-88%. White coloured acid volcanics are highly siliceous in nature (86%-88%), shows felsitic texture under microscope, indicating rapid under cooling [1]. Plots of the samples in TAS diagram reveals that two samples fall in the rhyolitic field and rest of the samples fall in silexite field. Hypersthene normative [3] shows that major minerals are quartz, k-feldspar, corundum and hypersthene in decreasing order.

Plots of REE of five samples in rock vs chondrite normalised diagram show negative Eu anomaly suggesting absence of plagioclase feldspar and a strongly enriched in LREE pattern, suggesting low degree of partial melting with negative slope in HREE, which suggest fractionation of garnet. Plot of acid volcanic samples in NMORB normative multielement diagram shows that they are strongly enriched in LILE, indicating contribution of water in generating magma. Prominent troughs are noticed in Nb, Sr, Zr and Ti and peaks in U, K, Pb, Nd and Sm. Plot of these acid volcanics in tectonic discrimination diagram [2] shows that most of the samples fall in volcanic Arc Granite (VAG) field. Enrichment of LREE, LILE and peaks in U, Pb indicates contribution of water in generating magma may be released from subducting slab. Troughs in Nb, Ti and Zr are characteristics of subduction zone magmatism. Plots of acid volcanic samples in tectonic discrimination diagram [2] show that most of the samples fall in volcanic Arc Granite

(VAG) field. Plots of these samples in probability based tectonic diagram using major and trace element [4] show that the samples have a tendency to fall near the boundary between collisional and continental rift+ocean island basalt field.

References:

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