

Granite Magmatism and Metallogenesis in Malanjhand Region of Kotri Rift Zone, Central India-A Geochemical Appraisal

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The Paleoproterozoic Malanjhand granitoid pluton hosting the giant Cu+Mo+Au deposit in Central India is located in the northernmost peripheral part of the Bastar craton at the critical intersection of the ENE-WSW trending Central Indian Suture/Shear and the N-S aligned Kotri - Dongargarh Rift zone. The pluton constitutes an integral part of the Kotri rift basin and represents the last episode of felsic to acid magmatism related to rift tectonics of Kotri's extensional environment.

Integrated observations of this study unequivocally confirm that the pluton is composed principally of two granitoid-phases which are geochemically distinctive, yet inter-related - an older, grayish, mafic-facies (Pipardhar-type) which is hosting the mineralized quartz vein/lode and is intrusive into the former. Detailed geochemistry and metallogenic specialization of the identified granitoid-type has been worked out.

The overall observations of the study contradict the contention of the advocates of porphyry view that both the grey and pink varieties of granitoid are similar and do not represent separate intrusions. The generation of pink felsic-facies granites by potash metasomatism or wall rock alteration, both of which are irregular and non-pervasive on the deposit scale, as advocated by them, is ruled out.

Broadly common I-type and peraluminous characters, calc-alkaline affinity, available geochemical data and late-to post collisional tectonic setting of both the granitoid types, reveal their comagmatic nature and derivation primarily from a mixed magma produced by anatexis at mantle depths as a result of upper mantle - deep lithospheric interaction. The pulsative nature of release effect of the ore-forming fluids from the fractionated granitic melts of this magma possibly accounts for the observed diversity of paragenetic assemblages of ores in the deposits. The overall observations support the "volcanic affiliation" of ore-forming fluids, the ore depositional process being an integral part of the evolutionary cycle of Kotri belt's rift related activity. The geothermobarometric studies indicate medium temperature of formation of the younger pink granites in the range of 200-250 degree centigrade at approximately 2.75-Kb pressure.

The sources and generation of parent magma, granitic melts and ore-forming fluids and metallogenesis, applicability of porphyry model etc. have been discussed.

Keywords : Malanjhand pluton, Kotri rift, Granite magmatism, Geochemical identities, Metallogenesis.