Evaluation of magma mixing from Ghansura Rhyolite Dome of Chotanagpur Granite Gneiss Complex, Eastern India

B. GOGOI[1]*, A. SAIKIA[1] AND M. AHMAD[2]

[1]Department of Geology, University of Delhi, New Delhi 110007, India
(*correspondence: bibhuti.gogoi.baruah@gmail.com)
[2]Geological Survey of India, Patna 800020, India

The Ghansura Rhyolite Dome (GRD) of the Bathani Volcano-Sedimentary Sequence (BVSS) is located on the northern fringe of the Proterozoic Chotanagpur Granite Gneiss Complex (CGGC). This dome has been intruded by basaltic magma leading to magma mixing and mingling scenario and formation of hybrid andesitic rocks. Structural and textural features at outcrop/microscopic scale clearly indicate the occurrence of magma mixing.

Near linear trends on Harker variation diagrams displayed by the rocks of the GRD for most of the major oxides suggest the occurrence of magma mixing. The major oxides linear correlation plots have enabled us to calculate the relative contributions of the end-member magmas in forming the hybrid product [1]. However, the major drawback associated with these traditional mixing tests is that they are solely based on the chemical compositions of the interacting magmas.

This work uses two recently developed experimental mixing models that are based on physical properties of the interacting magmas [2]. A number of physical properties like Temperature (T), Viscosity (η), Glass Transition Temperature (T_g) and Fragility (m) have been calculated for the magmas involved in the mixing process. These properties, in turn, have been used in the mixing models. The models confirm that the andesitic rocks of the GRD are indeed hybrid product formed by the interaction of basaltic and rhyolitic magmas. The relative contribution of the basaltic magma in forming the hybrid andesite has been evaluated to be ~60% through these models. The result is corroborating with that of the traditional mixing tests.

The present work for the first time has geochemically deciphered the occurrence of magma mixing and mingling from CGGC of the eastern Indian shield. This magmatism is related to the suturing of the northern and southern Indian blocks along the Central India Tectonic Zone (CITZ) during Proterozoic .

[1] S. Fourcade and C.J. Alle´gre (1981) *Contrib. Miner. Petrol.* **76** 177–195. [2] D. Giordano *et al* (2008) *Earth Planet. Sci. Lett.* **271** 123-134.