Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.13702

Metamorphic evolution of the low baric metapelites of the Champaner Group, Gujarat, Western India: Constraints from textural relationship, geochemistry and phase equilibria.

MS. PARITA GORANIA, M.SC.[1], MANOJ A LIMAYE[1] AND ADITYA U JOSHI[2]

[1]The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat

[2]Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal, Karnataka

Presenting Author: paritagoraniya2811@gmail.com

The Meso-Neoproterozoic Champaner Group located at the northeastern margin of Gujarat is a geologically crucial Pre-Cambrian metamorphic province as it marks a vital curvature in the structure of Greater Indian Proterozoic fold belt (GIPFB). The GIPFB extends from NW India (Aravalli Delhi Fold Belt, ADFB) through central India (the Satpura Mobile Belt, SMB) to eastern India (the Chottanagpur Gneiss Complex, CGC). The supracrustal units of Champaner Group are exposed at the southern edge of the Aravalli Delhi Fold belt in NW India and further appears to display a continuity with the Satpura mobile belt in central India thus forming a curvilinear fold belt at the convergence segment of GIPFB. The metapelitic assemblages of the Champaner Group in the present study reveals polyphase deformation and multiple episodes of metamorphism. The time relations between the phases of deformation (D_1, D_2 and D_3) and metamorphic crystallization indicates polymetamorphic history of the rocks wherein the earliest phase of metamorphism (M_1) is a low-grade regional metamorphism of greenschist facies that initiated with D_1 deformation. The second episode of metamorphism was a regional metamorphism of andalusite-cordierite type designated as (M_2 a) with an essentially syn-D_2 granitic intrusion which was later followed by a fluid induced retrogressive phase of regional metamorphism designated as (M_2b). The last episode of metamorphism (M_3) was a syn-post D_3 contact metamorphism wherein the deformation was very weak with a nearly isotropic stress field. The textural relations, mineral chemistry and paragenetic reactions suggests mineral assemblages like chlorite, muscovite, biotite, andalusite, cordierite, garnet and sillimanite were formed by various continuous and discontinuous reactions within different metamorphic zones. The metamorphic zones delineated on the basis of critical mineral assemblages and paragenetic reactions in the form of different isograds/reaction-isograds are as follows: a) muscovite-biotite zone, (b) biotite-andalusite zone, (c) biotite-andalusite-cordierite zone, (d) andalusite-garnet zone, (e) andalusite-sillimanite zone. The bulk-rock compositional data plotted on various discriminatory plots indicates a Fe-poor to Fe-rich shale protolith deposited in an active continental margin tectonic setting. Various pseudosections built using Perplex_X software in a MnKFMASHTO model system gives insights into the P-T-t-D evolutionary paths of metapelites of the study area.