

Ber. Inst. Erdwiss. K.-F.-Univ. Graz	ISSN 1608-8166	Band 20/1	Graz 2014
PANGEO AUSTRIA 2014		Graz, 14. September 2014 – 19. September 2014	

## **P-T constraints from Hamadan metapelitic rocks, northwestern Sanandaj-Sirjan zone, Iran**

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The Hamadan area belongs to the northwestern Sanandaj-Sirjan zone (SSZ), a polymetamorphic belt of the Zagros orogen, Iran. The large Alvand pluton intruded into the metamorphic basement during the Jurassic. Therefore, two stages of metamorphism can be expected: (1) regional metamorphism superposed by (2) contact metamorphism. Prograde P–T evolution of the metamorphic units was examined by phase diagram sections, THERIAK-DOMINO ver. 03.01.12, using mineral and texture relationships. The results are then compared with predictions from classical thermobarometry based on experiments. The following assemblages are seen in an irregular succession of isogrades toward the contact (all assemblages contain muscovite + biotite + plagioclase + quartz ± Fe-rich garnet): (1) cordierite + K-feldspar at higher temperature close to the contact, (2) cordierite + andalusite + K-feldspar, locally with andalusite-only assemblages, (3) staurolite-only assemblages, (4) staurolite + andalusite assemblages, (5) andalusite-only assemblages, (6) sillimanite + andalusite assemblages, and (6) sillimanite assemblages at the farthest part from the contact.

Higher-grade metamorphic events are progressively recorded in two distinct mineral assemblages in the model system MnNCKFMASHT. (1) Low to medium pressure at high temperature represented by the Crd ± And ± Kfs ± Grt ± Ms + Bt + Pl + Qtz stability field, that are often in hornfelsic rocks surrounding the pluton but is also found in distant parts. Peak condition estimated by conventional thermobarometry reached ~680 °C and ~ 3-5 kbar. (2) Medium to high grade metamorphism is recorded in schistose rocks containing the assemblage St + Grt + Ms + Bt + Pl + Qtz ± Sil. This assemblage is restricted to the western portion, distant to the pluton. Metamorphic conditions reached ~ 7 kbar and ~ 650 °C. We interpret the medium to high grade schistose rocks as pre-contact metamorphic basement which shows some thermal influence by contact metamorphism. Since a clear prograde gradient with distance to the pluton is not observed we postulate that the pluton either extends at shallow levels below the basement or is disturbed by shearing or smaller plutons are hidden below the surface. However, more field evidence is needed to prove this hypothesis. Previously, the irregular metamorphic pattern of the region was interpreted due to intense deformation related to thrusting that occurred after regional metamorphism.