

High-P/high-T metamorphism of the Higo metamorphic rocks, central Kyushu, Japan

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This study describes the High-P/high-T metamorphism estimated from garnet-clinopyroxene granulites intercalating with pelitic gneisses in the Higo metamorphic rocks, central Kyushu, Japan. Three metamorphic stages is determined in the granulite by using mineral assemblage and reaction textures; M1 stages is determined by garnet porphyroblast + coarse-grained clinopyroxene, M2 stage by coronitic clinopyroxene + plagioclase within garnet and symplectite of clinopyroxene + plagioclase surrounding garnet and M3 stage by amphibole + plagioclase. Pressure and temperature conditions for M1 and M2 stages are estimated by using TWQ (Berman, 1991), which calculated P-T conditions from univariant net-transfer reactions defined by $\text{Grt} + \text{Cpx} + \text{Pl} + \text{Qtz}$ assemblage in M1 and M2 stages: $2\text{Grs} + \text{Alm} + 3\text{Qtz} = 3\text{Hd} + 3\text{An}$ and $2\text{Grs} + \text{Prp} + 3\text{Qtz} = 3\text{Di} + 3\text{An}$. The P-T conditions for M1 and M2 stages were 11.3 kbar, 843 C and 5.5-11.9 kbar, 715-954 C, respectively. The results show a clockwise P-T path comprising of a prograde isobaric heating and a steep decompression cooling. The P-T path and the extremely high temperature estimated in the granulite infer a tectonic setting of continental plate margin where a magmatic arc was subducted and later exhumation due to an erosional denudation occurred. An anatexis could occur in the Higo metamorphic rocks if they are saturated with H₂O after or during the exhumation. The anatexis could cause the low-P/high-T metamorphism due to the melt migration during or after the exhumation.