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Deformation characteristics of migmatites and leucogranites from the Pangong Metamorphic Complex, Karakoram Himalaya, India

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Migmatites and leucogranites, the products of partial melting, are ideally suited to investigate the effects of melt-presence and migration on the rheological and geochemical characteristics of crustal rocks. The 10km wide and NW-SE trending Pangong Metamorphic Complex (PMC) consists of numerous migmatites and leucogranites and is bounded by the steep shear zones. We investigated the deformation features of two amphibolites (LD29, 36B), three amphibole-bearing migmatites (LD30, 43A, and 43B), and two quartzo-feldspathic leucogranites (LD33A and 40) from the PMC. Mineralogically, most amphibole grains in the amphibolites are magnesio-hornblende. The ^{T}Al content of the amphiboles from LD36B is more diverse (0.32-1.34 apfu) compared to those (^{T}Al = 1.06-1.48) in LD29, collected from the core of the PMC. The Na occupancies at the B-sites in the amphiboles of LD29 are >0.2 apfu, whereas for those in LD36B are <0.2 apfu. The amphibole grains in the amphibolites exhibit strong shape and crystallographic preferred orientations. The <001> and <100> axes being mainly distributed parallel to the XZ and YZ planes, respectively. The <010> CPOs are relatively weaker. The quartz CPOs are weaker in the sample collected from the core of the PMC. They become stronger away from the core and towards the shear zones. The plagioclase grains exhibit moderate to strong CPOs overall, with those in the amphibolite samples showing stronger CPOs than the ones present in the leucogranites. <010>(001) slip is prominent in the biotite grains of LD30 and LD40. The strong CPOs, subgrain boundaries, and crystallographic control on the distributions of the low-angle misorientation axes indicate that the amphibole, plagioclase, and quartz grains have deformed via dislocation creep mechanisms in the absence of pervasive grain boundary melt. The bulk rock P-wave and fast S-wave anisotropies of the amphibolites range from 11.2-12.2 and 7.6-13.4 km s^{-1}, respectively. The P-wave velocities are the slowest and fastest parallel to the <100> and <001> axes of the constituent amphibole grains. The bulk rock fast S-wave polarization direction is sub-normal to the foliation in LD36B but moderately oblique in LD29 and LD43B.