

Physical conditions for transition from dislocation to dissolution-precipitation creep in natural quartzite

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Physical conditions for transition from dislocation to dissolution-precipitation creep in quartzite with decreasing grain size was investigated using the respective constitutive equations. Since the grain boundaries are partially closed under high pressure at depth, the coefficient for grain-boundary diffusion was calculated, assuming that the mechanism switch occurred at the temperature conditions of ca. 300 oC at natural strain rates. The results show that the mechanism switch occurs for the grain size ranging 10-100 microns at the likely strain rate conditions in nature. Therefore, when rocks become fine-grained either by metamorphic reaction or by dynamic recrystallization, it is probable that dissolution-precipitation creep dominates and strain becomes localized in the rocks.