Plastic deformation of plagioclase in a gabbro pluton accreted at a slow-spreading ridge (Hole U1473A, Atlantis Bank, Southwest Indian ridge)

Maël Allard *, Benoît Ildefonse, Émilien Oliot, Fabrice Barou

Géosciences Montpellier, Université de Montpellier, CNRS - France

The crustal architecture of slow-spread ocean crust results from complex interactions between magmatism, tectonics and hydrothermalism. IODP Hole U1473A (789m depth) was drilled at the summit of the Atlantis Bank, a gabbroic massif exhumed at the Southwest Indian Ridge (SWIR), during IODP Expedition 360. In this study, we have used 115 samples to identify and quantify plagioclase plastic deformation processes in these oceanic gabbros from the SWIR.

We describe deformed zones using petrographic observations made along the core. Ductile deformation is widespread and is sometimes strongly localized. It initiated during accretion under magmatic conditions and continued until late brittle conditions. Porphyroclastic microstructures testify for post-magmatic, solid-state, high-temperature (HT) pervasive deformation. Plagioclase represents >50% of rock's volume and is the dominant phase accommodating HT deformation in the gabbro. It shows strong dynamic recrystallization, forming a fine-grained matrix. Strain localization, expressed by mylonitic and ultramylonitic zones, is often overprinted by deformation at decreasing temperatures.

Electron Backscattered Diffraction (EBSD) analyses of plagioclase reveal a weak crystallographic preferred orientations (CPO), first developed during early magmatic flow that has developed a primary fabric with a (010) foliation plane and a [100] lineation axis. This CPO is persistent during subsequent plastic deformation and strain localization, and is observed in almost all samples. A detailed investigation of internal misorientations measured at plagioclase subgrain boundaries indicates the activity of at least 5 slip systems: [100](010), [001](010), [100](001), ½[110](001), and ½[1$\bar{1}$0](001). The calculated CPO strength increases from slightly foliated samples to mylonites before decreasing significantly in ultramylonites, which could be explained by orientation scattering after subgrain rotation and grain boundary processes.

Mots-Clés: Gabbros ; Plagioclase ; Deformation ; EBSD ; Atlantis Bank ; Mid-Ocean Ridge.

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.