
Rheology of hydrated plagioclase at lower crustal conditions

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Résumé

Assessing the rheology of plagioclase feldspar, one of the main rock-forming minerals of the crust, is of particular importance for understanding the mechanics of convergence zones. Indeed, pressure and strain rate increase in these zones are associated with metamorphic reactions and fluid fluxes, that can dramatically affect the rheology of the rocks. In this prospect, we present the results of axial shortening experiments performed on "as-is" and water-added plagioclase aggregates in a Griggs-type apparatus equipped with an acoustic emission monitoring system. Samples were deformed in the plagioclase stability field, but experiments have also been performed at 1.5 GPa in order to study the rheological impact of the widespread and nevertheless often overlooked breakdown reaction: Ca-rich plagioclase + water = zoisite + kyanite + quartz + Na-rich plagioclase. Combined analysis of mechanical data and microstructural observations highlight the importance of water content on the rheology of plagioclase, reacting or not. Cataclasis, creep and transformational plasticity have been identified as the main mechanical behaviors of plagioclase aggregates depending on their hydration extent and reaction rate.

Mots-Clés: plagioclase, lower, crustal rheology, mineral reactions, deformation experiments, effect of water, cataclastic flow, transformational plasticity

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