



Stress heterogeneities in-situ within deforming synthetic serpentinized peridotites.

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Among the mineral reactions occurring within subduction zones, serpentinisation of peridotites or dehydration of serpentinized peridotites, are expected to have a major influence on the subduction zone dynamics, both on the short term (earthquakes) and on the long term (mantle wedge dynamics). Here we will present experiments using in-situ stress measurements on deforming synthetic serpentinized peridotites, dehydrating or not. These allow measuring stress heterogeneities at the aggregate scale, within the different phases, in real time.

In Ferrand et al, 2017, studying syn-deformational dehydration of serpentine (antigorite) +olivine aggregates under high pressures and temperatures, a brittle like behavior was observed for a specific range of serpentine amount in the samples. These events are interpreted as the result of a stress load transfer to the rigid olivine framework in within the peridotite. This highlights an essential role of stress heterogeneities at the polycrystal scale for the rock scale mechanical behavior.

Here we will further present stress partitioning for non-dehydrating olivine+antigorite aggregates with varied antigorite content. At the polycrystal scale, the experimental stresses can vary by a factor of two between different grain populations or between phases. Above a classic threshold of about 15% vol. antigorite in the rock, a significant mechanical weakening occurs. The results could be relevant to deformation within « high » strain (rate) serpentinized shear zones at depths within subduction zones.