



Subject offered for a contract starting April 2014

Experimental constraints on rheology during metamorphic reactions

Advisor: **CHOPIN Christian, (DR)**, chopin@geologie.ens.fr

Second Advisor/ Supervisor:

SCHUBNEL, Alexandre, (CR), aschubnel@geologie.ens.fr

Host lab/ Team : **ENS- Laboratoire de Géologie de l'ENS- UMR 8538**

In the last twenty years, transformation-induced faulting has been evidenced in several rocks undergoing phase transformations both in the laboratory and in the field. Observations have led to believe that phase transformations must play a major role in the triggering and the propagation of earthquakes in subduction environments. Nevertheless, the way mineral reactions can modify the deformation regime of deep rocks, from ductile to brittle (embrittlement) remains poorly understood, mainly because of the technological challenge it represents. Indeed, being able to deform rocks in a controlled manner at HP-HT conditions, while contemporaneously monitoring the reaction progress, proves to be a challenging interdisciplinary task that lies at the frontier between the High Pressure and the Rock Mechanics communities.

On a practical point of view, systematic set of experiments will be performed in order to characterize the mechanics of a number of phase transitions (Serpentine dehydration and Eclogitization reactions) typical of subduction zones. Experiments will be performed in a newly designed solid medium deformation (Griggs type) apparatus equipped with acoustics, which will be installed at ENS Paris early 2014. Additional experiments will be performed in the multi-anvil deformation apparatus (D-DIA) now fully operational on the GSECARS beam line of the Advanced Photon Source synchrotron in Argonne Illinois, USA.

It is crucial for experimentalists to be forced into thinking at a larger scale. In such a way, this project also involves one field study (Western Gneiss Region, Norway) in order to remember what kind of microstructures we are to reproduce in the laboratory.

Financing: ITN ZIP – MARIE CURIE

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