

Exploring HP-LT records through time using inclusions of rutile grains

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High Pressure-Low Temperature (HP-LT; eclogite and blueschists) rocks are the evidence of modern subduction zones. However, the study of blueschist and eclogite facies rocks through time is a difficult task, as they are commonly retrogressed during exhumation, obscuring their early petrological and chemical history. For this reason, the presence of blueschists prior to 850 Ma is hotly debated. Many questions remain about this lack of blueschist and eclogite evidence in the rock records. In this contribution, we test if this apparent absence could be related to later metamorphic events.

In recent years, several studies have suggested the presence of HP-LT rocks in Precambrian terrains invoking cold subduction zones at this time (>2.2 Ga; e.g. Ning et al., 2022; François et al. 2018). Other studies have used the absence of blueschists as evidence for the absence of modern plate tectonics prior to 850 Ma (Maruyama and Liou, 1998). In this study, we propose to use a petrological tool based on the study of rutile grains, their chemistry and mineral inclusions. Hart et al (2016) showed that HP-rutile forming along a cold geothermal gradient are able to incorporate mineral inclusions reflecting peak metamorphism in equilibrated samples. In order to evaluate the impact of retrogression on rutile stability and survey the HP-LT inclusions persistence, we test this petrological tool to partially retrogressed samples. In particular two amphibolitised eclogites: an eclogite from the Léon domain of Variscan age (Brittany) and an eclogite from the Democratic Republic of the Congo of Paleoproterozoic age (ca 2.1 Ga; François et al. 2018). We present initial results on the preservation of mineral inclusions in rutile and discuss the use and limitations of such a petrological tool for ancient terrains.

References

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