# Feedback of the metamorphic changes on the subducting processes

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Many large-scale dynamic processes, from continental rifting to plate subduction, are intimately linked to metamorphic reactions. This close relation between geodynamic processes and metamorphic reactions is, in spite of appearances, yet poorly understood. For example, during the subduction-collision processes, rocks will be exposed to changing temperature, pressures and stress regimes. Meanwhile less attention has been paid to other important aspects of the metamorphic processes. When reacting rocks expand and contract, density [1] and volume changes will set up in the surrounding material. Modeling several cases of subduction for different types of rocks, we explore implications 1) on the dynamic of the subduction. Hence computing changes of physical properties of rocks as well quantity of released fluids by dynamic modeling of metamorphic reactions, we will show that some subductions are more propitious to exhume (U)HP rocks and thus to obstruct the subduction dynamic the while others are more propitious to produce heavier rocks and self-sustained subduction. In the meantime, we show that this slab dip is mainly controlled by the dynamic of the subducting lithosphere. 2) on the localization of earthquakes into the subducting slab. As shown by several authors, intermediate-depth earthquakes mainly occur where hydrous minerals are predicted to be present, implying a causal link between dehydration reactions and seismicity. We investigate petrophysical changes related to dehydration and their implications for generating an earthquake? We show, as it was already proposed by [2], that volume changes accompanying dehydration reactions contribute significantly to earthquake generation.3) on the dynamic of the mantle wedge. In many subductions, the upper plate thinning seems to be controlled by the dehydration reactions. We test influence of bulk composition of the lithosphere to estimate the back-arc dynamic. Preliminary results suggest that the appearance of amphiboles within the lithosphere favors local convection and formation of back-arc basin.

We conclude that changes associated with metamorphism as an alternative to changes attributed solely to compositional differences.

**References**

[1] Bousquet et al. (1997) *Tectonophysics* **97,** 128-134.

[2] Delany & Helgeson (1978) *AJS* **278,** 638-686.