Geophysical Research Abstracts
Vol. 16, EGU2014-14381, 2014
EGU General Assembly 2014

Fluid Release and the Deformation of Subducting Crust

Benjamin Maunder, Jeroen van Hunen, Valentina Magni, and Pierre Bouilhol
Durham University, Durham, UK

It is known that slab dehydration is crucial in subduction dynamics and for the formation of arc-magmatism. Previous studies of this process have constrained this intake and subsequent release of fluids into the mantle wedge by considering the stability hydrous phases within the slab.
Other, more dynamical effects of this hydration state and partial melting have also been suggested, such as the possibility of “cold plumes”, crustal delamination, and subduction channel return flow. These processes have been inferred to play a role in the generation of continental crust over time through accumulation and melting beneath the overriding plate.
Water content and melt fraction have a strong control on the rheology of the system. Therefore we investigate the effect of these parameters on the dynamics of a subducting slab, with the aim to establish the physical bounds on the delamination process. To do this we use a coupled geodynamical-petrological model that tracks dehydration and melting reactions in order to factor in the rheological effect of metamorphism and magmatism on slab and mantle wedge dynamics. We focus primarily on the strength of the subducting crust and the possibility of delamination. We then extend this investigation by considering whether early earth crust formation could have been the result of such a processes by looking at a hypothetical Archean setting.