Geophysical Research Abstracts
Vol. 17, EGU2015-6768, 2015
EGU General Assembly 2015

Subduction initiation at oceanic detachment faults: a mechanism to generate extensive ophiolite belts

Marco Maffione (1), Cedric Thieulot (1), Douwe van Hinsbergen (1), Antony Morris (2), oliver Plumper (1), and Wim Spakman (1)

(1) Utrecht University, Earth Sciences, Utrecht, Netherlands (m.maffione@uu.nl), (2) School of Geography, Earth and Environmental Sciences, Plymouth University, Drake Circus, Plymouth PL4 8AA, UK

One of the least understood processes of plate tectonics is the nucleation of new subduction zones and the formation of ophiolites by subsequent upper plate extension. Subduction initiation within ocean basins is thought to occur along weakness zones such as transform faults, fracture zones, and mid-ocean ridges. Detachment faults, which cut across oceanic lithosphere immediately adjacent to slow-spreading mid-ocean ridges may yields ideal rheological conditions for subduction initiation due to their pervasive serpentinization. We numerically test this hypothesis by modeling the inversion of an ocean basin cut by a serpentinized detachment fault adjacent to an active spreading center. The results of our models consistently show that the serpentinized fault effectively localizes deformation, assisting subduction initiation upon compression. Subsequent reactivation of the pre-existing spreading center preserved in the forearc above the nascent subduction zone provides an efficient mechanism for the formation of supra-subduction zone ophiolites. Application of our model of subduction initiation to the $\sim$700 km-long ophiolite belt spanning from Albania to Greece is then discussed.