Geophysical Research Abstracts
Vol. 13, EGU2011-4047, 2011
EGU General Assembly 2011

3D numerical models of trench migration for lateral heterogeneous subducting palte

Valentina Magni (1), Jeroen van Hunen (2), Francesca Funiciello (1), and Claudio Faccenna (1)

(1) Università di Roma Tre, Dipartimento di Scienze Geologiche, Roma, Italy (vmagni@uniroma3.it), (2) Durham University, Department of Earth Sciences, Durham, UK

Trenches are dynamically evolving systems. They move with different rates and with different styles. The way trenches move- retreating vs. advancing motion- is directly depending on the dynamics of the system which, in turn, is affected by the the general features characterising the subduction system.
In this study we focus our attention on retreating (i.e. roll-back) style subductions that can be easly found in nature (e.g. Apennines, Andes). The aim is to realize a parametric study to understand how major subduction features have a influence on roll-back and, in turn, on slab geometry, deformation of incoming/overriding plates and trench shape. For this purpose, we developed 3D numerical models of a free subduction system with a temperature-dependent rheology. The numerical calculations are performed using the Citcom code. Our thermal models include a) the slab, b) the overriding plate, c) the upper mantle. After the beginning of the subduction process, the trench and the overriding plate move self-consistently as a function of the dynamics of the system. We perform a systematic parametric study by changing the geometry, such as plate thickness and age, and the rheology of the system, such as system viscosity, strength and density of the plate and lithospheric yield stress. Finally we study the trench migration in a 3D model with a laterally heterogeneous subducting plate.