Geophysical Research Abstracts
Vol. 12, EGU2010-7439, 2010
EGU General Assembly 2010

How to produce flat slabs: insights from numeric modeling

Vlad Constantin Manea (1), Marta Perez-Gussinye (2), and Marina Manea (1)

(1) Computational Geodynamics Laboratory, Geosciences Center, UNAM, Juriquilla, Mexico (vlad_manea@yahoo.com), (2) Dept. Earth Sciences, Royal Holloway, University of London, UK

Flat slab subduction occurs at $\sim$10% of the active convergent margins and it is assumed that subduction of oceanic aseismic ridges or seamount chains is the main mechanism to produce very low angle subduction slabs. However, recent numeric and analog modeling showed that ridges alone of moderate dimensions subducted perpendicular to the trench are not sufficient to produce flat-slab geometries. Therefore an alternative mechanism able to produce flat-slabs is required. In this paper we present dynamic numeric modeling results of subduction in the vicinity of thick continental lithosphere, as a craton for example. We tailored our modeling setup for the Chilean margins at $\sim$31° and our models are integrated back in time 30 Myr. Modeling results show that a craton thickness of 200 km or more when approaching the trench is capable of blocking the asthenospheric flow in the mantle wedge and increasing considerably the suction force. We were able to produce a flat slab that fits well the flat slab geometry in Chile (based on seismicity) and stress distribution.
We conclude that thick cratons located in the vicinity of subduction zones, are capable to produce very low angle slabs, and probable a combination of buoyant ridge subduction with a neighbor thick craton represent a better mechanism to produce flat slabs.