Geophysical Research Abstracts
Vol. 14, EGU2012-14296, 2012
EGU General Assembly 2012

Terrain accretion along the subduction interface: numerical modeling

K Vogt and T Gerya

Swiss Federal Institute of Technology, Department of earth Science, Switzerland

The oceanic floor contains allochthonous terranes (extinct ridges and arcs, continental fragments and volcanic piles) that move with the oceanic crust and may collide with continental margins to form collisional orogens that are believed to have contributed to the growth of the continental crust.
The dynamics of terrane accretion and its implcation in relation to crustal growth were analyzed using a thermomechanical-pertological numerical model of an oceanic-continental subduction zone. The model is based on the i2vis code, that solves the govering equations of mass, momentum and energy for a viscous-plastic rheology.
Our results indicate that allochthonous terranes may subduct or accrete depending on their rheological strength and the negative buoyancy of the downgoing slab, which is imposed by its thermal structure.
Subduction of cold and dense oceanic lithosphere coupled with the collsion of rheologically strong terranes results in deep subdution. Crustal material may be subducted back into the mantle or be incorporated into active arcs that form above the overriding plate. Terranes with a weak crustal structure that are embedded in young oceanic lithosphere are less prone to subdution and may be accreted in form of collisional orogens and accreted terranes. Weak crustal material is scrapped off the downgoing plate and added to the continental margin, which leads to rapid growth of the continental crust and may result in plate failure associated with slab break off. In cases where slab break off occurs a new subduction zone is formed behnind the accreted terrane.