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Abstract title

INFLUENCE OF SUBDUCTION GEOMETRY AND MANTLE WEDGE HYDRATION IN OCEAN/CONTINENT CONVERGENT SYSTEMS: A NUMERICAL SIMULATION

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Abstract

To analyze the effects of hydration mechanism on continental crust recycling a parametric study using a 2D finite elements thermo-mechanical model is here presented. We implemented oceanic slab dehydration and consequent mantle wedge hydration using a dynamic method; hydration is accomplished by Lawsonite and Serpentine break-down. Topography is treated as a free surface.
Results of a set of numerical simulations investigate the influence of subduction rate, slab dip and mantle rheology changes on thermal regime variations, exhumation rate and amount of recycled crust. At this purpose subduction rates of 1, 3, 5, 7.5 and 10 cm/yr, slab angles of 30°, 45° and 60° and a mantle rheology represented by dry dunite and dry olivine flow laws, have been taken into account during successive numerical experiments.
Model predictions pointed out that a direct relationship between mantle rheology and the amount of recycled crustal material exists: the larger is the viscosity contrast between hydrated and dry mantle the larger is the percentage of recycled material into the mantle wedge. A quite impact on recycling is consequent to slab dip variation.
Metamorphic evolutions of recycled material are influenced by subduction style: Tmax of Pmax, generally accomplished under eclogite-facies conditions, is sensible to slab dip changing and the increasing subduction rate induces a decrease in Tmax of Pmax values.
A direct relationship between subduction rate and exhumation rate results for different slab dips, independent of mantle flow law used.
Thermal regimes predicted by different numerical models are compared with PT paths followed by continental crustal slices involved in ancient and actual subduction zones.

Presentation mode

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Choice of session

1st OPTION H3 - Deformation and petrogenesis of active margins: natural data, numerical models and experiments

2nd OPTION Geo03 - Structural Geology

FINAL SAVE