Geophysical Research Abstracts
Vol. 20, EGU2018-19166, 2018
EGU General Assembly 2018

Subduction and accretion of the Briançonnais continental slice: its effect on the Alpine orogenic wedge

Claudio Rosenberg (1) and Jonas Ruh ()

(1) ISTeP, Sorbonne Université, Paris,France (claudio.rosenberg@upmc.fr), (2) Institute Of Earth Sciences, Jaume Almera, Barcelona, Spain

Alpine subduction and collision is considered to be the result of convergence within a lithospheric system consisting of five distinct plates. In the paleogeographic frame of the Alps, from NW to SE, these plates are respectively, the European continental Plate, the Valais oceanic Plate, the Briançonnais continental Plate, the Liguro-Piemont Plate, and the Adriatic continental Plate. Not all paleogeographic domains inferred to represent the latter plates are continuous along strike in the Alps. In particular, the Briançonnais Domain thins out in the Central Alps and disappears completely in the Eastern Alps. It is generally inferred that this lateral transition corresponds to the Mesozoic, pre-Alpine plate configuration, in which the eastern termination of the Briançonnais Plate corresponded to the future, eastern termination of the Central Alps. In contrast, some debate still exists about the nature of the Valais Domain in the Western Alps, concerning the existence or absence of a Jurassic/Cretaceous oceanic crust. For the present study, a first series of models is presented considering the Valais Domain as oceanic at the onset of Alpine convergence.
2D thermo-mechanical models were performed in order to analyse the effect of the presence of the Briançonnais continental slice on the general architecture and localization of deformation in an Alpine-type orogenic wedge. The experiments were performed by a finite-difference numerical code with a temperature-dependent, non-Newtonian visco-plastic/brittle rheology (I2ELVIS). The geometrical setup implies continental and oceanic crust above an asthenospheric mantle. The initial arrangement (before subduction initiation) is based on the above described paleogeographic frame of the Alps with two continental plates at the lateral ends of the models and two oceanic plates. Additional experiments including a continental sliver dividing the oceanic plate have been conducted to understand the effect of a Brionçonnais-type continental block on the structural evolution of the model.
Irrespective of the rheological and geometrical variations chosen for the initial conditions of the models, we observe that all models that include an intermediate continental domain representing the Briançonnais in the Alps, show that it undergoes partial subduction and exhumation/accretion, but does not accommodate large amounts of shortening during the following collisional phase. In contrast, collisional shortening localizes in a more external zone, further away from the upper plate. Models performed in the absence of an intermediate continental slice show the build-up of a collisional wedge immediately in front of the upper plate boundary. These different structures are similar to what is observed in the Alpine Chain. Indeed, collisional shortening localized in the external zone in the Western Alps, where a large Briançonnais Domain is present, whereas it localized in the more internal part of the orogen in the Central and Eastern Alps, where the Briançonnais Domain is very thin or absent, respectively.