



3D numerical modeling on oblique continental collision

Jie Liao and Taras Gerya

ETH, Geophysics, Earth Science, Zurich, Switzerland (jie.liao@erdw.ethz.ch)

Continental collision process at convergent margins has been widely studied by two-dimensional numerical modeling, focused on investigating the influence of the extrinsic and intrinsic parameters. The extrinsic parameters are mainly (1) subduction history, (2) convergence rate, and (3) lateral heterogeneities between continental plates. The intrinsic parameters refer largely to the rheological properties of rock, such as the crustal rheology (especially the lower crust which largely influences the overall dynamics of subduction-collision systems) and lithospheric thermal structure (especially the Moho temperature which plays an important role controlling stable versus unstable collision dynamics). However, the big limitation of the 2D models is the impossibility of investigating the influence of lateral variation along strike (i.e. along the third dimension) on continental collision. 3D models are required.

In this study, we use 3D thermal-mechanical coupled numerical models to investigate continental collision, with particular attention paid on oblique collision. Our forward model directly develops from convergence of two continental plates, without involving oceanic subduction. The inheritance of subduction on collision is simply considered by imposing vertically inclined weak belt, which promotes asymmetric collision. The following two group of parameters are systematically tested: (1) lateral variation along strike (i.e. along the third dimension, such as oblique collision, thermal structure variation), and (2) strength contrast of crust between the two convergent continental plates.