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Numerical model for subduction zone dynamics

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I present a numerical model for subduction zone dynamics. This model is composed of upper and lower continental crust, upper and lower oceanic crust, mantle lithosphere and asthenosphere, seawater and air. The model includes various processes such as the subduction and deformation of oceanic plate, the deformation of mantle wedge and continental crust, the metamorphic processes in the subducting oceanic crust (eclogitization and dehydration) and the mantle wedge (serpentinization), the reduction of effective frictional coefficient due to increase in fluid pressure, melting of peridotites, permeable flow of melt and aqueous fluids, and temperature-dependent solid flow of mantle peridotites with water- and melt-induced weakening. The final goal of this modeling is to understand (1) the coupling depth and strength of the plate interfaces, (2) the mechanism for exhumation of metamorphic rocks, (3) the processes and conditions for the accretion and tectonic erosion, and (4) the deformation and stress distribution in the arc crust.

Keywords: subduction zones, numerical model, strength of plate interfaces, exhumation of metamorphic rocks, crustal deformation and stress, accretion and tectonic erosion