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The role of thermal expansion and volume contractions on the slab stress distribution

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The distribution of the stress within the subducted lithosphere, especially at the depth of the transition zone, is still poorly understood and is crucial for the understanding of deep focus earthquakes. Using a 2D Cartesian finite-volume code, based on a modified version of the algorithm introduced by Gerya and Yuen (2003), we present numerical models of subduction with emphasis on the slab stress distribution. Using a non-linear viscous rheology, we solve the thermomechanical problem for a subducting slab with a simplified mineralogical composition and take into account the effects of major phase transitions at 410 km and 660 km. In particular we describe the stress field in relation to the thermal expansion from the warming of the slab and to the volumetric changes induced by phase transitions, which, so far, have only been considered within the framework of strongly simplified subduction models (e.g. Guest et al., 2003).

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