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Metamorphic fluid release and transport in a subduction orogen: Interrelations with the thermal and seismic evolution

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Fluids released by prograde metamorphic reactions and their transport may significantly alter the thermal structure of a subduction margin, its rheological behaviour and especially the position of its seismogenic zone. However, the rate of fluid production and the distribution of fluids in the plate interface zone are only vaguely known and have only scarcely been considered in numerical simulations so far. Therefore we will present additional results on the role of fluids and their impact on the thermal structure of subduction zones. The complex interrelation between fluid pressure and deformation processes, such as the cycle of frictional sliding of the two plates, will be elucidated. We combine the results of numerical models, thermodynamic concepts, and petrophysical experiments to quantify the important role of fluids in a subduction zone environment and better constrain: a) the thermal structure, where we will show the influence of advective heat transfer b) the frictional sliding of the two plates and c) the interrelation of fluids and deformation processes. The outcome of these numerical simulations and petrophysical experiments is applied to the South Chilean subduction zone, for which ample geophysical and geological data are available in the framework of the TIPTEQ project.