

EGU21-11502

<https://doi.org/10.5194/egusphere-egu21-11502>

EGU General Assembly 2021

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## Dynamics of upper and lower mantle subduction and its effects on the amplitude and pattern of mantle convection.

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Long-lived, Mesozoic-Cenozoic subduction zones such as the Pacific slab under the Americas and the Tethyan slab under Eurasia consumed thousands of kms of lithosphere of which remnants are detected in today's mantle by seismic tomography. Major differences, however, in subduction zone evolution occurred between these systems which include strong variations in subduction rate, slab morphological evolution, and trench motion, which all appear mostly to be accommodated in the upper 1000 km of the mantle (van der Meer et al. 2018). Furthermore, sinking rates of slabs below this zone tend to be similar for different subduction systems and an order of magnitude smaller than their plate/subduction velocities. Working from the premise that the mantle rheology that accommodated these subduction systems is basically similar, although still poorly constrained, we test the hypothesis that the contrasting evolution of these subduction systems is primarily tied in with the global plate tectonic forcing of subduction.

It is generally accepted that plate motion is primarily driven by slab pull with contributions from ridge push, rather than the drag of the underlying mantle. If correct, numerical subduction models should be able to obtain upper as well as lower mantle subduction velocities and sinking rates similar to those reconstructed from geological records. We are at the start of this investigation and will present the numerical model setup, modeling strategy, and preliminary results of a 2-D subduction modelling experiment. We implement a 2D-cylindrical model setup for solving the conservation of momentum, mass and energy with the open-source geodynamics code ASPECT (Kronbichler et al. 2012) using a nonlinear visco-plastic rheology and including the major phase changes. Our focus is on the possible role of the absolute motion of the subducting and overriding plates in concert with slab pull variation reconstructed from plate tectonic evolution models, while in both subduction cases the same (partly nonlinear) mantle rheological processes are required to accommodate slab morphology change and slab sinking. Kinematic modelling constraints are derived from global plate tectonic evolution models, while the tomographically inferred present-day stage provides the end-stage geometry of slabs.

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