

# Role of the mantle dynamics on water distribution in the Earth's mantle

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The effects of the dynamics on water distribution in the Earth's mantle have been investigated in a 2D cartesian box. The model takes in account water partitioning between mantle transition zone and upper and lower mantle (i.e between resp. Olivine-Spinel and Spinel-PostSpinel). The momentum equation is expanded in harmonic series along horizontal direction and solved by finite difference along the vertical direction. Water and Temperature fields are solved using finite differences and ADI scheme. We have also modelled water extraction at the ridge and reinjection at the trench.

First results suggest that the importance of storage in the transition zone is driven by the diffusivity of the water. For characteristic temperature of the transition zone (1400 °C), intra-cristalin diffusivity ( $D_{H_2O}$ ) is about  $10^{-8}$  m<sup>2</sup>/s. However, the diffusion along the grain boundaries, could be two orders of magnitude higher (i.e  $10^{-6}$  m<sup>2</sup>/s). This extremal values correspond to opposite situations. When diffusivity is high, a reservoir can set in the transition zone. Otherwise, the water concentration of the mantle remains homogen, mixed by the dynamics.