



The effect of water to mantle rheology and convection

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Water has a significant influence to mantle rheology and therefore also to the convection of the mantle and the plate tectonics. The viscosity of the mantle can be decreased by up to two orders of magnitude when water is present. Another effect of the water is the change in the solidus of the mantle and therefore the melting regime. These two effects of water in the mantle have a significant influence on mantle convection and plate tectonics. The influx of water to the mantle is driven by plate tectonics as wet oceanic lithosphere is subducted into the mantle, then water is brought back to the lithosphere and the surface by MOR-, arc- and hotspot volcanism. Studies show that the amount of water in the mantle is about three times bigger than the water in the oceans. To model this water cycle multiple additions to our simulation code StagYY are necessary. A water diffusion to complement the water transport due to advection, and water dependent viscosity law are implemented. This additions to StagYY will be followed by implementations of a pressure-temperature law for maximum water content, additional transport mechanisms for water, water dependent solidus functions and the implementation of recent values for plate velocities and water capacities in subducting slabs. This will allow us to research the influence of water to the mantle convection and rheology over the past 200Ma.