# Subduction Dynamics
# Preliminary investigations of the ‘valve’


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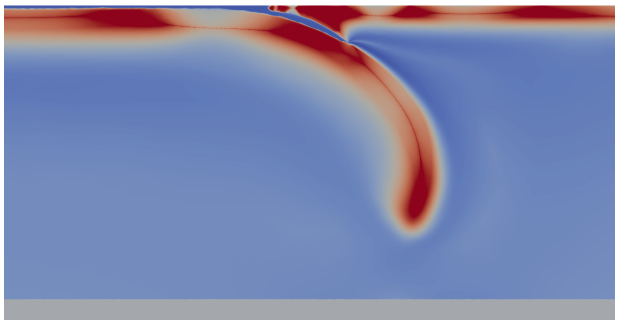
What is the flux of material between the upper and lower mantle? Seismology suggests that material fluxes between these two regions today, but also that some subducting slabs stagnate at this boundary, i.e. the boundary can also be a hindrance. If we are to understand the significance of this ‘valve’ over Earth history then we need to develop a fundamental understanding to allow us to extrapolate back in time.

I will present numerical modelling that starts us on this path. The models incorporate thermal subducting slabs together with an over-riding plate, this is in contrast to many models to date that have focused on compositional slabs. The models also incorporate complex rheology (diffusion, dislocation, Peierls-type creep, and yielding), a true free-surface, and a large domain. The method uses an adaptive grid, which allows resolution as fine as 400m, even though the domain is 10,000km by 2,900km.

I will present results from a series of numerical experiments where we vary the buoyancy of the down-going plate and the resistance of the over-riding plate. We discover 4 different modes of behaviour and have mapped out a regime diagram. These modes capture present day subduction behaviour. We have also investigated the influence of varying lower mantle viscosity on these modes. The implications of these results and comparison with observations will be discussed.



*Zoomed in viscosity structure of strong slab*