The effect of resurfacing events on dynamic topography of the surface

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Resurfacing events play an important role in the evolution of Venus. Crater statistics have shown that the whole surface has the same age of about 500 million years. This implies a global subduction event and a subsequent reformation of the surface at that time.
We applied a self-consistent finite-volume model of mantle convection heated from below in a 3D Cartesian box. All walls are mechanically stress-free and the sidewalls are thermally insulating. The dynamic topography of the surface can be calculated by a formulation, which depends on the dynamic pressure and the deviatoric normal stress. Our model is formulated in primitive variables, which means that all variables are directly available. In particular the dynamic pressure can be directly used. By additionally including a temperature- and stress-dependent rheology we observe a behaviour showing global mobilisation events and subduction of the surface.
These resurfacing events can be divided into three phases: the stagnant lid phase, subduction phase and resurfacing phase. They all differ in their flow structure and topography. We will overview the characteristics of the topography and will present how it changes in all three phases. In the resurfacing phase our simulations show that it is definitely possible that a plume is rising beneath a local depression of the surface. When the plume starts to penetrate the upper boundary the depression changes into an uplift.