

## 3-D convection with stress history dependent rheology

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We study the numerical simulations of thermal convection with the temperature, pressure, and stress history dependent viscosity in 3-D Cartesian box. The goals of this study are to clear that if the 'plate-like' regime that is found in the 2-D simulation by Ogawa (2001) is confirmed or not, and the dynamic interaction between upper thermal boundary layer (lid) and active hot plume. The aspect ratios of the 3-D box are 3:3:1. The Raleigh number which is defined by the viscosity of upper boundary is  $10^{*2}$  to  $10^{*4}$ . The viscosity contrast of the lid is the order of  $10^{*4}$  to  $10^{*7}$ . We set the healing time scale of mantle materials from damaging to be around  $10^{*6}$  years. The initial conditions of our runs are the statistically equilibrium solutions.