



Fig. 6. A time sequence (top to bottom) of a simulation of pure thermal convection including plasticity from *Showman and Han (2005)* with a yield stress of 0.03 MPa. This simulation illustrates necking and overturn of the upper lid, followed by reformation of a cold upper lid by conduction.

phology. However, a difficulty is that the pliable-lid regime occurs over only a narrow range of yield stresses; a yield stress that is slightly too large or small pushes the behavior into stagnant-lid or lithospheric-founding regimes, respectively. Potentially, partial-melting or porosity in the subsurface could cause a density stratification that would

prevent lithospheric founding (*Collins et al., 2000*) and allow the observed behavior to occur over a wider range of yield stresses.

Although thermal and/or compositional convection seems to be a viable mechanism for causing at least some chaotic terrain, explaining the specific observed aspects of