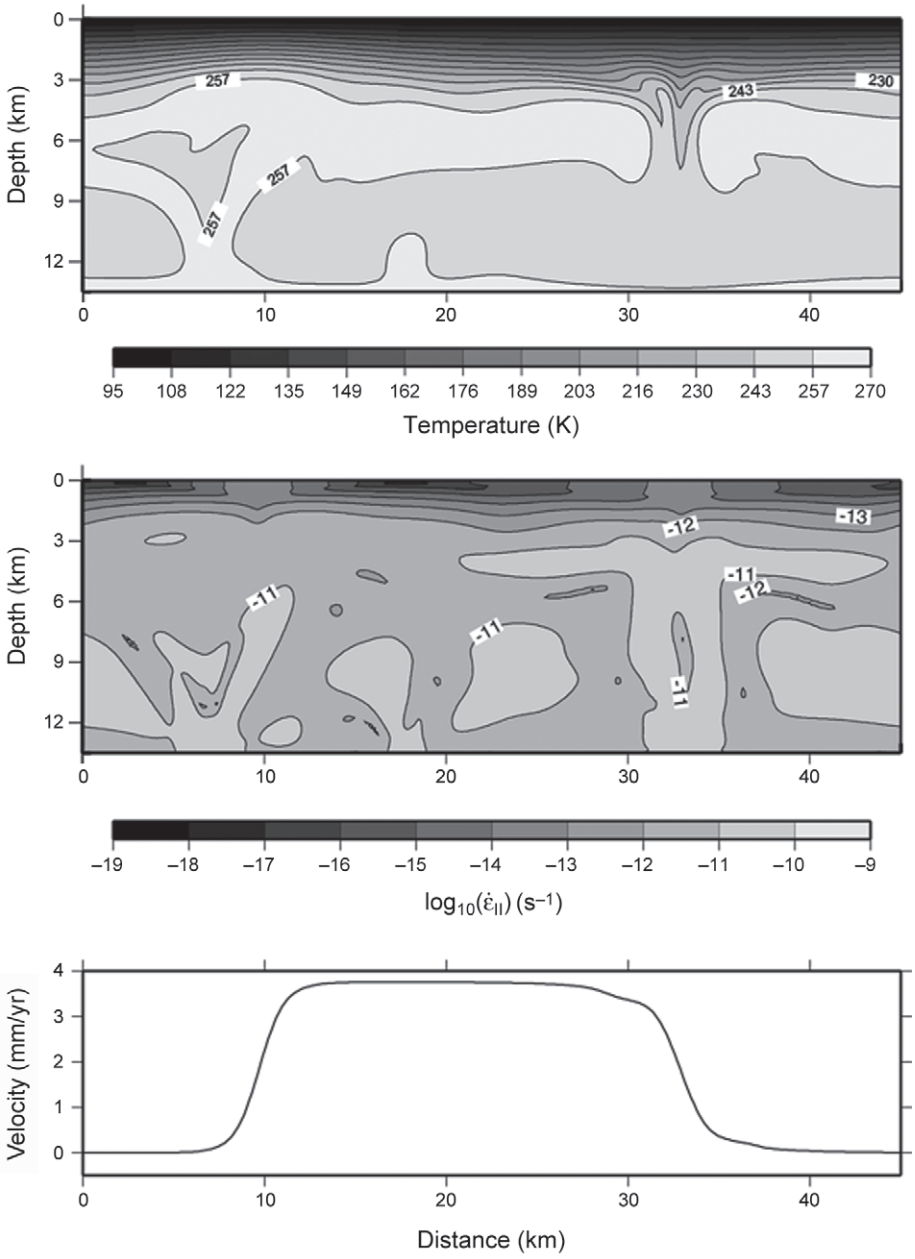

Fig. 5. Simulation of pure thermal convection including plasticity from *Showman and Han* (2005) with a yield stress of 0.03 MPa. Temperature divided by melting temperature (top), second invariant of strain rate (middle), and surface velocity (bottom). Domain is 45 km wide and 15 km deep. Plastic deformation occurs in the upper lid, leading to significant surface deformation. This may be relevant to chaos formation on Europa.

vening matrix. Yet the existence of chaos rafts suggests that, in many cases, surface materials remained near the surface even as they were disrupted. Thus, modes of deformation involving complete foundering of the upper lid (e.g., Fig. 6) appear not to have occurred on Europa. On the other hand, the so-called "pliable lid" regime of *Showman and Han* (2005) (Fig. 5) seems to capture key aspects of the observed behavior. In these simulations, the near-surface strain rates exceed 10^{-14} s^{-1} in localized regions, implying that order-unity strains would occur on timescales of several million years. This is sufficient to disaggregate the surface. The absence of foundering in these simulations suggests that chaos rafts would remain at the surface, as observed. Interestingly, these high-strain regions were localized, occurring in zones only ~5 km wide. This is an encouraging result, although the simulations must be extended to three dimensions to determine whether the disrupted regions would have quasicircular rather than linear (band-like) mor-