Geophysical Research Abstracts
Vol. 15, EGU2013-12898, 2013
EGU General Assembly 2013

Spatial patterns in the evolution of Cenozoic dynamic topography and its influence on the Antarctic continent

Lester Anderson (1), Fausto Ferraccioli (1), Graeme Eagles (2), Bernhard Steinberger (3), and Jeroen Ritsema (4)

(1) British Antarctic Survey, Geological Sciences, Cambridge, United Kingdom , (2) Royal Holloway, University of London, United Kingdom, (3) GFZ German Research Institute for Geosciences, Potsdam, Germany, (4) University of Michigan, Ann Arbor, MI, United States

Our knowledge of dynamic topography in Antarctica remains in an infancy stage compared to other continents. We assess the space-time variability in dynamic topography in Antarctica by analysing grids of global dynamic topography in the Cenozoic (and late Cretaceous) based on the tomographic model S40RTS. Our model reveals that the Gamburtsev Province and Dronning Maud Land, two of the major nucleation sites for the East Antarctic Ice Sheet (EAIS) were ∼500 m higher 60 Ma ago. The increased elevation may have facilitated ephemeral ice cap development in the early Cenozoic. Between ca 25 and 50 Ma the northern Wilkes Subglacial Basin was ca 200 m higher than today and a major increase in regional elevation (>600 m) occurred over the last 20-15 Ma over the northern and southern Victoria Land in the Transantarctic Mountains (TAM). The most prominent signal is observed over the Ross Sea Rift (RSR) where predicted Neogene dynamic topography exceeds 1,000 m. The flow of warm mantle from the West Antarctic Rift System (WARS)may have driven these dynamic topography effects over the TAM and RSR. However, we found that these effects are comparatively less significant over the Marie Byrd Land Dome and the interior of the WARS. If these contrasting dynamic topography effects are included, then the predicted elevations of the Ross Sea Embayment ca 20 Ma ago are more similar to the interior of the WARS, with significant implications for the early development of the West Antarctic Ice Sheet.