Geophysical Research Abstracts
Vol. 15, EGU2013-11021, 2013
EGU General Assembly 2013

Tectonisation of basin edges on Mercury

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Lobate scarps on Mercury are generally accepted to be surface expressions of thrust faulting. This is taken as evidence of lithospheric contraction on a global scale, reflecting either global cooling, leading to thermal contraction and internal phase changes; or tidal despinning, leading to collapse of an equatorial bulge; or a combination of both. It has been further suggested that the orientations of lobate scarps could reflect a pattern of mantle convection.

Here we review compressional tectonics localized along the interface between basin-fill and the inner walls of >200 km diameter mercurian impact basins. This occurs as outward-directed thrust faults following the inside of basin rims, and sometimes completely over-thrusting the rim location. Thrusting at the edges of low-latitude basins tends to be most strongly developed at eastern and western rims, suggesting tidal despinning as a driving force. Cross-cutting relationships show examples of thrusting that must considerably post-date the volcanic infilling of the associated basin, suggesting despinning occurring (or continuing) well after the end of the late heavy bombardment, contrary to previous expectations.