



## **Crestal graben associated with lobate scarps on Mercury**

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Mercury is host to various tectonic landforms which can be broadly divided into localized, basin-related features on the one hand, and regional or global features on the other. The globally distributed tectonic landforms are dominantly contractional in nature and consist of lobate scarps, wrinkle ridges and high-relief ridges [1]. Until now, extensional features have only been found within the Caloris basin, several smaller impact basins, such as Raditladi, Rachmaninoff & Rembrandt [2], and within volcanic deposits in the northern smooth plains [3,4].

New imagery obtained from the MESSENGER spacecraft, shows localized, along-strike troughs associated with several lobate scarps on Mercury. These troughs occur at or near the crest of the lobate scarps and are interpreted to be graben. While previously discovered graben on Mercury are thought to be related to thermal contraction of localized volcanic fill, these crestal graben are the first extensional tectonic features which have been discovered outside of such settings and have not been reported in literature previously.

Of the 49 lobate scarps investigated in this study, 7 exhibit graben along their crest. The graben are usually only present along small sections of the scarp, but in some cases extend up to 180 km along the scarp crest. The persistent along-strike orientation of the graben with respect to the scarps, combined with several observed cross-cutting relations, suggests that the graben developed coeval with the formation of the lobate scarps.

Numerical mechanical modeling using the Discrete Element Method (DEM) is currently being employed in order to better understand the mechanisms which control the formation of crestal graben associated with lobate scarps on Mercury.

### References:

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