



Crater counts reveal young resurfacing in the Eastern Hellas Basin, Mars

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We are investigating the stratigraphy of the eastern rim region of the Hellas impact basin on Mars. As the largest well-preserved impact basin (with a diameter exceeding 2000 km and a depth of more than 8000 m below datum), it has acted as the most important depositional sink in the southern Martian hemisphere since its formation 4 Ga ago. Especially in the northeastern part of the basin, features indicating fluvial activity are widespread, and form a complex pattern of erosional and depositional units, with isolated remnants of an underlying landscape embayed by younger geologic units. The stratigraphic sequence of this region and the surface ages of the different geologic units have not been well constrained in previous work. Using data acquired by HRSC (Mars Express), CTX (Mars Reconnaissance Orbiter) and THEMIS (Mars Odyssey), we identified several small depositional areas associated with small and medium-sized fluvial channels in the vicinity of Dao and Harmakhis Valles. Several of these areas were selected for further investigation, as not all surfaces were suitable for age determination by crater size-frequency statistics. Also included in the study were several shallow basins located on the floor in the eastern part of the Hellas basin. These basins are located in the flow path of water discharged from the channels into the basin. Using crater size frequency statistics based on CTX image data for age determination, we determined a spatially extensive episode of resurfacing in the younger Martian geologic history, spanning from 400 to 600 Ma. Both the deposits associated with the channels on the basin slopes and the shallow basins on the Hellas floor are similarly affected.

The large spatial spread of the crater counting areas indicates that this episode has caused resurfacing in a large region, presumably by sediment deposition. Areas with a different geologic setting did not experience resurfacing in this timespan, showing that not all surfaces were affected by this episode of activity. Other, older resurfacing events were also identified, but their occurrence is not as widespread as that of the younger episode.