Geophysical Research Abstracts
Vol. 15, EGU2013-13782, 2013
EGU General Assembly 2013

Are sinuous ridges in the equatorial Rahway Vallis region of Mars fluvioglacial in origin?

Jason D. Ramsdale (1), Matt R. Balme (1), Susan J. Conway (1), and Colman Gallagher (2)

(1) Dept. Physical Sciences, Open University, Walton Hall, Milton Keynes MK7 6AA , (2) School Of Geography, Planning & Environmental Policy, University College Dublin, Dublin, Ireland

A suite of elongate, branching positive relief landforms has been observed around Rahway Vallis, south-west of Orcus Patera, Mars. They are typically 10 to 150 metres across, and several to tens of kilometres in length. We have observed that these forms occur both individually and as part of complex systems incorporating various cross-cutting, anastomosing and branching patterns. This study forms part of a larger debate as to whether fluvioglacial processes, as opposed to igneous activity, shaped the landscapes in the Elysium Planitia region.

The similarity of some of these positive relief branching forms to inverted channels, or perhaps even relict sub-glacial fluvial systems (eskers) suggests an alternative fluvioglacial hypothesis to formation by volcanic processes. Interestingly, if these are esker-like forms then glacial activity in this region was “wet-based”, so there should be other characteristic landforms visible. To address this idea, we are conducting a new mapping study of sinuous ridges in the region around Rahway Vallis to assess whether they are more consistent in morphology with formation by igneous or fluvioglacial processes.

The survey is being performed using orbital images from the Context Camera (CTX) on the Mars Reconnaissance Orbiter and elevation data from the Mars Orbiter Laser Altimeter (MOLA). Our mapping has shown that many of the ridges form convergent, contributory networks. The ridges are spatially associated with kilometre-wide shallow channels and are found at a nearly constant elevation of -3000m above Mars Datum. Our preliminary interpretation is that these ridges are depositional landforms with multiple sources, and therefore could be sub-glacial (eskers), or inverted fluvial channels. The associated larger channels could be higher order fluvial channels, with the ridges and wide-channels together forming part of a larger drainage network.