

A GLOBAL SURVEY OF THE FLUVIAL ISLANDS OF MARS. H. I. Hargitai¹, V. C. Gulick², N. Glines²
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Introduction: Streamlined islands on Mars are located on the floors of outflow channels, valley networks, fresh shallow valleys, volcanic and tectonic channels. The goal of this study is to determine the morphological types of islands, to investigate the relationship between channel types and island morphologies, and to use islands to help determine the formative conditions of the channel they are situated in. Streamlined islands are also produced in lava channels [9].

Methods: We are surveying Mars globally, at CTX and HiRISE resolution, in and adjacent to the channels in the Hynek Valley Network Database [1], and “channels” and “outflow channels” in the Geologic Map of Mars [2].

Island types: On Earth, islands are commonly classified as bars or islands [3]. Bars are usually defined as typically submerged, unvegetated positive relief forms, whereas islands are usually emerged and vegetated. The problem with this classification is that it only contains information of the relation between water level and island/bar surface, but not about their origin.

There is neither water nor vegetation on Mars. Without knowing the original water level, it is very difficult to distinguish between a braided channel (one channel with convex-up islands or bars) and an anastomosing system (a belt of channels flowing around concave-up alluvial or bedrock remnant islands) [4].

Bars and islands may be defined genetically, by their origin. In this classification, bars are depositional forms, while islands are erosional [5]. There may be mixed forms: pendant bars [6] are composite forms of an erosional bedrock island core and lee side deposits. A complex island type is produced when a narrow, interior channel is incised into the alluvium or a channel fill, dividing it into isolated islands. These are erosional islands produced in depositional materials.

In addition to bars and islands, fluvial dunes and catastrophic flood-produced giant current ripples [10] are also depositional forms, smaller than bars and occurring in groups. Bars may also occur in close groups, separated by cross-bar channels.

The shape of an island is usually streamlined, forming a half-lemniscate (teardrop) shaped form with the blunter ends point upstream and long tails point downstream [7]. Islands may also have two pointed ends or no pointed end. Bedrock islands may be irregular or polygonal [8]. Although topographic data usually is

sufficient to determine the paleoflow direction, island shapes can confirm if the present slopes were similar at the time of channel formation.

Compared to channel/valley wall, relatively low-height islands are alluvial islands or bars, while islands as high as the channel wall that display similar texture than the material over the banks are erosional remnants of the bedrock.

Conclusion: Islands are tools for investigating paleochannel origins and flow conditions on Mars.

References: [1] Hynek et al. 2010 [2] Tanaka et al. 2014. [3] Osterkamp 1998 [4] Makaske 2001 [5] Hargitai et al. 2016, submitted [6] Baker 1979 [7] Baker and Milton 1974 [8] Meshkova 2012 [9] Komatsu et al. 1993 [10] Baker and Milton 1974

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