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# Mapping the northern plains of Mars: origins, evolution and response to climate change

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An ISSI (International Space Science Institute) international team has been convened to study the Northern Plain of Mars. The northern plains are extensive, geologically young, low-lying areas that contrast in age and relief to Mars' older, heavily cratered, southern highlands. Mars' northern plains are characterised by a wealth of landforms and landscapes that have been inferred to be related to the presence of ice or ice-rich material near, beneath, or at the surface. Such landforms include 'scalloped' pits and depressions, polygonally-patterned grounds, and viscous flow features similar in form to terrestrial glacial or ice-sheet landforms. Furthermore, new (within the last few years) impact craters have exposed ice in the northern plains, and spectral data from orbiting instruments have revealed the presence of tens of percent by weight of water within the upper most $\sim$50 cm of the martian surface at high latitudes.

The northern plains comprise three linked zones: Acidalia Planitia, Utopia Planitia and Arcadia Planitia. Each region consists of a shallow basin, with the three areas are separated by low topographic divides. Our aim is to study the ice-related geomorphology of each region in order to understand the origins, evolution and response to climate change of ice on Mars. In particular, by comparing and contrasting the three separate basins we hope to determine if the processes that created the ice-related terrains are regional (perhaps basin limited) or global in scope, and whether the differing geology of each basin has an effect on the ice-related features observed there.

The ISSI team is using planetary geomorphological mapping to meet this aim. Three long strips, each about 250 km wide and spanning the $\sim$30N to $\sim$80N latitude range have been defined and sub-teams are each mapping a single area. The group contains experts in mapping, GIS and crater counting (details in the size-frequency distribution of impact craters on a planetary surface can reveal information about when terrains were emplaced, modified, eroded or exhumed). The first meeting of this group was held in December 2013. Here, we give an overview of the science aims of the project, describe the main difference between the three strips and report on mapping work done so far.