SEDIMENTARY EVOLUTION OF THE HYDROATES CHAOS, MARS C. Mosangini and G. G. Ori, Laboratorio di Scienze Planetarie, Dipartimento di Scienze, Universita' d'Annunzio, Viale Pindaro 42, 40127 Pescara, Italy. mosangin@sci.unich.it

The Hydroates Chaos is a rather peculiar example of such a type of features. It is located between the Chrysie Planita and the eastern tip of the Valles Marineris. This area is extremely rich of chaotic terrains, which are the source for the largest set of outflow channels on Mars. The Hydroates Chaos (HC) is the origin of two outflow channels from its northern rim, but another channel flows into the Chaos from the south. Thus, the HC acted as a real "lake" receiving water from southern chaotic areas and pouring water to the north in the Chrysie Planitia. This peculiarity has generated a complex geological history that is fossilised in several features. In general term, the HC consists of chaotic terrains made up of knobs and mesas. The fractures bounding the mesas follow some regional tectonic lines, and provide e ceratin order in the geometry of the choatic area. The deepest part is to the south where the marginal scarp is as high as 2000 m. It became shallower to the north, and, particularly to the north-west. The deepest part correspond to the area where the southern channel flows into the HC. The northern channels, actually, rest in a higher position, because they occur in the northern margin that show marginal scarps ranging from 1600 to 1800 m. In the deepest part the morphology of the floor (basically formed by knobs and mesas) is smoothed and the relives show gentle slopes and angles. This area is directly linked with the point of inflow of the southern channels, suggesting that the smoothed morphology is the product of the sedimentation of the detritus brought of the delta. This fact is supported also by the red filtered images that show a sort of fan of sediment in correspondence with the mouth of the inflow channel. Moreover, in this area the topographic relief, characteristic of the chaos is absent and only low-relief (about < 100 m) mounds are present. The water poured into the HC formed a standing body as it is suggested by the extensive presence of terraces. These terraces occur in the central part of the Chaos and surrounding the area with the sediment draping. Commonly, three order of terraces are present. However, single terraces are, also, widespread. The terraces surround the mesas and knobs and, at places they group several of these features together to form a sort of platform, resembling the stepped massif described by [1]. The topography of these terraces has been studied with a photoclinometric software in order to reconstruct reliable relative altimetric profiles from Viking images [2]. The terraces rest from 300 to 500 m above the HC floor and are 200 to 2000 m wide. They can be interpreted as wave-cut platform because they have been probably formed by the erosional action of the waves or of the ice (if the topmost part of the water column has been frozen). The terraces and the sediment draping suggest that the HC has been filled one or more times by water supplied by the southern channel. Due to the lack of deformation on these features and sediments, the Chaos was already formed in its present shape. According to the elevation of the features produced by the standing water, the lake depth was probably 400 - 500 m. This level of water allows the northern channels (particularly the eastern one) to be became active discharging the lake water and keeping the lake level at that elevation. The connection between the southern and the northern channels has been indirect, having the lake water as a buffer. This is suggested, also, by the lack of erosional and current features in the Hydroates Chaos. If the floods of the southern channels passed directly to the northern one, we can expect a large number of tear-shaped island, fluvial bars, etc. Summing up, we can reconstruct the Hydroates Chaos history: (i) The Chaos formed and originated two outflow channels, (ii) the HC was asymmetric with a deepest part to the south, (iii) an outflow channel flew into the HC from the south and formed a delta-like feature in the deepest part, (iv) the water formed a lake, (v) the lake water started do flow out from the northern channels when the water level reached the critical depth. W do not know how many times this happened. The three order of terraces can be linked to, at least, three events of filling, or can represent several stages of water depth in a single event. The HC history, however, suggests that the outflow channels has been active several times and that the flows in the channels can be of several origins and types.

REFERENCES: [1] Parker T. J. Et al., *JGR*, 98, 11061 479 [2] Goldspiel J. M. Et al., *Icarus*, 105, 479.

THE HYDROATES CHAOS: C. Mosangini and G. G. Ori.

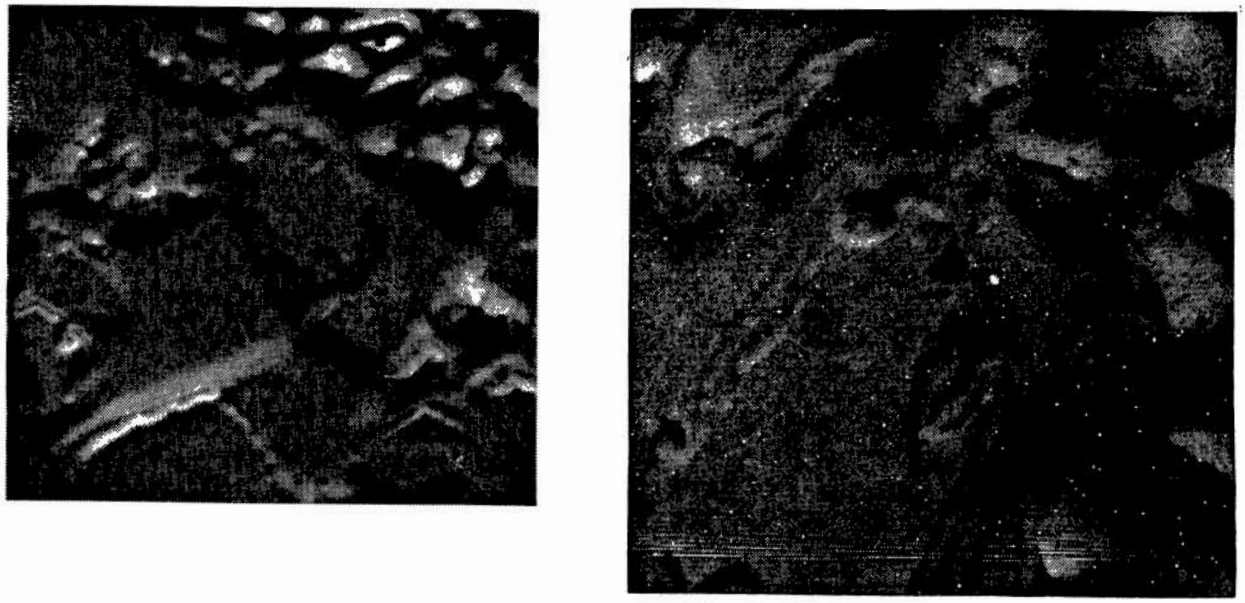

Fig. 1 - Two examples of terraces in the Hydroates Chaos.

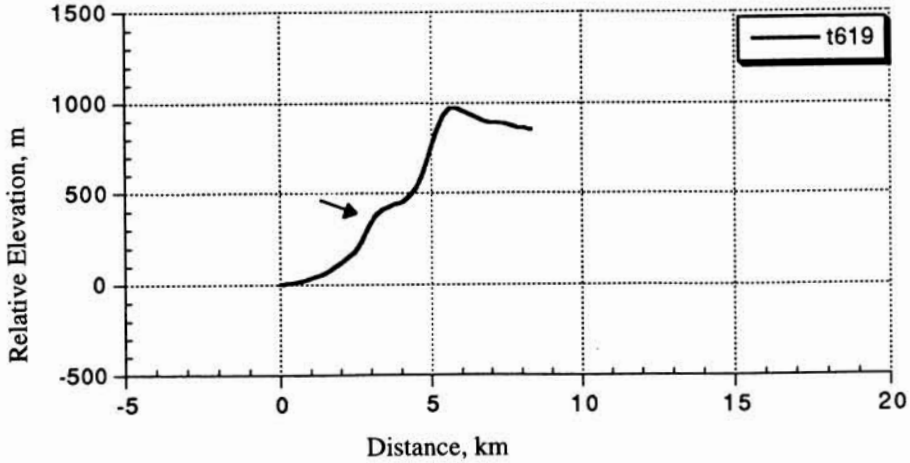

Fig. 2 - Topographic profile (photoclinometry) of a side of a mesa with a prominent terrace (arrowed).