SEDIMENTARY VOLCANOES IN THE CROMMELIN SOUTH CRATER, MARS. M. Pondrelli[1], A. P. Rossi[2], G. G. Ori[1] and S. van Gasselt[3], [1]IRSPS, Università d'Annunzio, Pescara (Italy), (monica@irsps.unich.it), [2]ISSI, Bern (CH), [3]Freie Universität, Berlin (DE).

Introduction: Mound-shaped morphologies are extremely common on Martian surface and have been ascribed to very different geological processes. The possibility that sedimentary volcanism could have played a role in the formation of some of these features have been also proposed [1, 2, 3, 4, 5, 6,7].

We report here the discovery of possible sedimentary volcanoes located in an unnamed crater located immediately south of the Crommelin crater.

Geological Setting: The stratigraphic succession of the Crommelin South crater (centered: 9W-4N) starts with the Plateau Sequence (Cratered unit) of Noachian age. The Equatorial Layered Deposits (ELD) nonconformably cover this unit. On top of the ELDs, the presence of metric to more than 100 m large mounds has been recognized.

Description: The mounds are located along the outer floor and the inner rim of the crater or are preferentially aligned along fractures. They include simple and coalescing complex mounds, both with and without central orifice (Fig. 1).

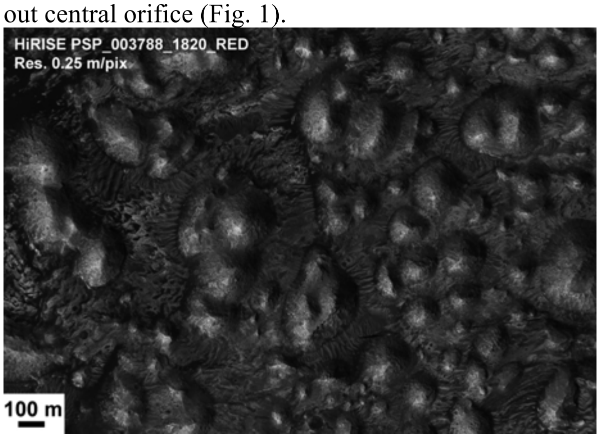

Fig. 1 – Complex and simple mounds.

Their height can be estimated about few tens of meters at most. About 50% of the mounds display a central orifice (Fig. 2) while others not. Orifices have small sizes, with an average area of about 170 m^2. The ratio between orifice, when visible, and mound areas is almost always less than 1%.

Mounds consist of poorly sorted either clast supported or matrix supported breccia. Layering, although faint, is locally emphasized by the presence of finer grained dark levels (Fig. 2).

Both the mounds and the ELDs are characterized by the presence of very similar bright material, fractured in polygons in the ELDs and breccia clasts in the mounds (Fig. 4). We hypothesize that the clasts represent reworked ELD bright layers material.

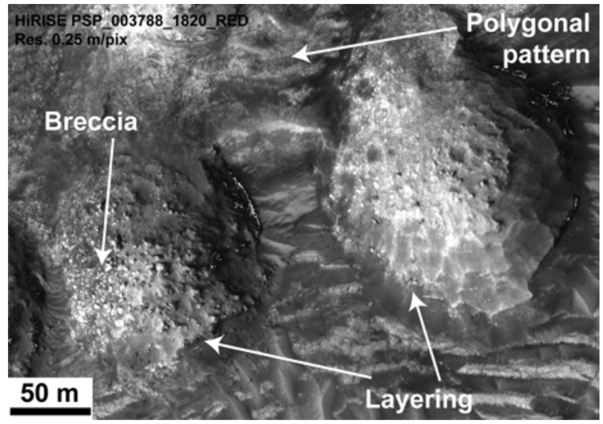

Fig. 2 – Mounds showing layering and breccia deposits.

Origin of the mounds: The fact that the mounds and the ELD consist of different deposits prevent from hypothesizing that the mounds could be remnants of a unit covering the present substrate. The morphology of the central orifices could suggest a formation following cratering but their constant presence on the topmost part of the mounds rule out this interpretation. The mound shape as well as the presence of an orifice could bear some resemblance with pingos, but the layering, the extensive brecciation, the lacking of radial fractures are strongly pointing against a pingo origin. A volcanic origin also appears to be unlikely for the complete lack of unambiguous volcanic landforms and deposits associated, within the basin, such as lava flows or dykes. Moreover, the material forming the breccia seems to consist of reworked ELD light toned layers deposits, and this strongly argue against a volcanic origin.

We propose that the mounds were formed as sedimentary volcanoes because of the general morphology, the distribution along fractures and the texture of the material. They would result from the emplacement of fluid-rich sediments moving upward due to overpressurization. Overpressure could have been related to endogenic processes or to overburden related to younger deposits (spring deposits? [8]).

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