ANALYSIS OF SPIDERS IN *INCA CITY*, MARS: SPATIAL DISTRIBUTION AND TYPES. J. Hao[1], G.G. Michael[1], S. van Gasselt[2], R. Jaumann[3].
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Introduction: The south polar area exhibits an abundance of different and exotic landform types, most of which are located within season CO_2 cap. Araneiform terrain (also referred as "Spiders") is one of these unusual geomorphic features, possibly resulting from CO_2 sublimation driven seasonal erosion. The High Resolution Imaging Science Experiment (HiRISE) onboard NASA's Mars Reconnaissance Orbiter (MRO) spacecraft has repeatedly imaged Angustus Labyrinthus, informally known as the Inca city (-81 °N, 296 °E), which shows a variety of classic polar features associated with sublimation and deposition including spiders over four Martian years. This has enabled us to make a detailed study of the spiders in this area. We mapped the spiders´ spatial distribution in the Inca City and classified them into four types in view of their morphological and distribution characteristics partly based on previous research [5]. We also provide a discussion of these observations with possible causes. In this sense, our work can help enrich the understanding about the spider formation mechanism, providing insight into surface erosion processes and seasonal changes in the polar areas of Mars.

Method: Inca city is one of the key locations for HiRISE to monitor the sublimation activities (Fig.1) near the south pole. Here we defined a region of interest, the "Inca city research area", its extent and border being determined by the outer border of available HiRISE images rather than a geographic boundary.

HiRISE can return 25cm per pixel surface images with high signal to noise ratio [1,2]. These enable us to identify almost all spiders including their troughs under low light conditions. The High Resolution Stereo Camera (HRSC) onboard Mars Express provides a large and continuous coverage of the Martian surface with intermediate resolution which can be as high as 12.5m per pixel[3,4]. Here we used HRSC nadir pointing images for context purposes.

We systematically scrutinized and mapped all spiders over the extent of the "Inca city research area" from over 100 HiRISE images.

Result and Discussion: We made a detailed mapping of the spider distribution and location in the "Inca city research area" (Fig.1) and found 3549 ±30 spiders. Some are interconnected with troughs and it is not easy to clearly determine whether this is single spider resulting in the uncertainty (Fig.5 and Fig.6).

Based on previous studies on definition and characteristics about spiders [5], we found that there are four types of spider in the " Inca city research area", and we named them as: 'fat' and 'thin' spiders [5], as well as 'half' and 'elongated' spiders (Fig.2, Fig.3, Fig.4, Fig.5).

Future Work: We mapped the distributions of spiders in the Inca city research area and classified key morphometric features as well as more subtle characteristics. Thus we intend to study the spatial growth trend of the spiders' troughs and to understand the implications for the surface properties and processes involved. We will focus on investigating how far and in which way spiders are controlled and affected by environmental parameters.

References: [1]McEwen, A. S., et al. (2007a) *JGR*, 112, E05S02. [2]McEwen, A. S., et al. (2010) *Icarus*, 205, 2-37. [3] Neukum, G., et al. (2004) *ESA SP-1240*, 17–35. [4]Jaumann, R., et al. (2007) *Planet. Space Sci.*, 55 (7–8), 928–952. [5]Hansen, C., et al. (2010) *Icarus*, 205(1), 283–295.

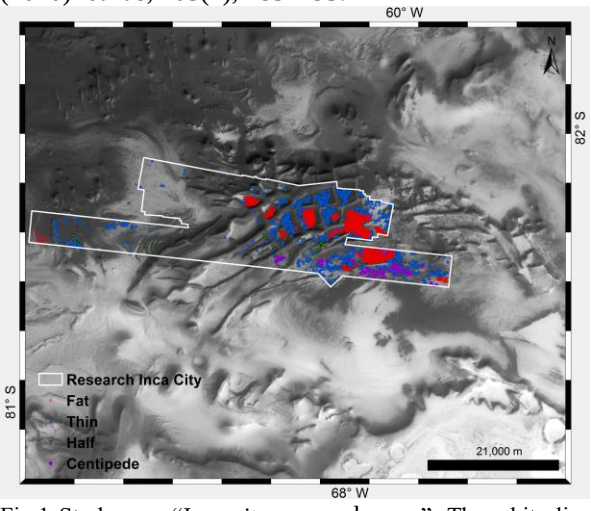

Fig.1 Study area "Inca city research area". The white line indicates the "Inca city research area". High Resolution Stereo Camera (HRSC) image h6980_0000 at 25m/pixel, centered at -81.62N/242.36E; with Ls (Solar Longitude) =283 and MY=29. Four different type of spiders are shown in different shapes and colors.

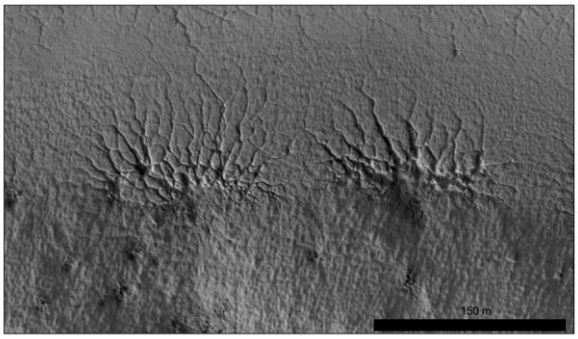

Fig.2. Examples of Half Spiders. HiRISE image PSP_006204_0985 was acquired at Ls=351.487, centered approximately at -81.562 ºN, 295.806 ºE.

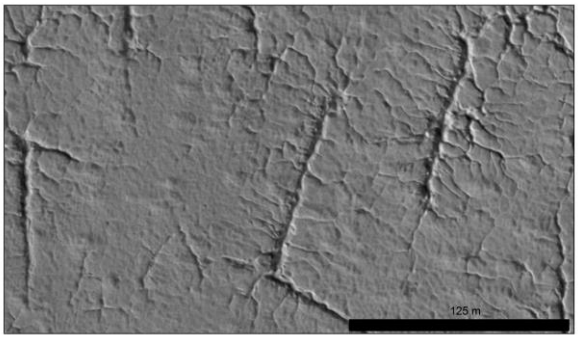

Fig.3. Examples of Elongated Spiders, centered approximately at -81.768 ºN, 296.02 ºE. HiRISE image PSP_006204_0985 was acquired at Ls=351.487.

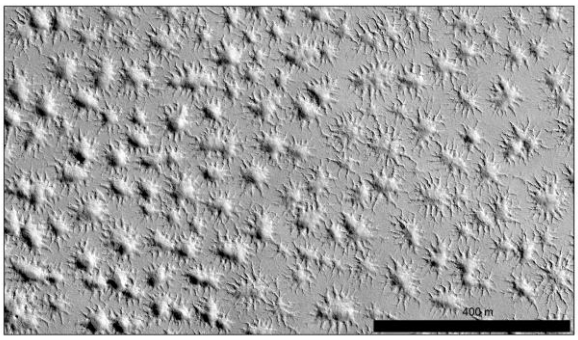

Fig.4. Examples of Fat Spiders, centered approximately at -81.62 ºN, 296.395 ºE. HiRISE image PSP_005993_0985 was acquired at Ls=342.93.

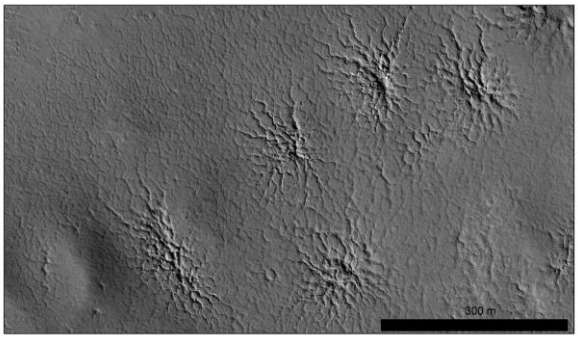

Fig.5. Examples of Thin Spiders, centered approximately at -81.441 ºN, 295.92 ºE. HiRISE image ESP_041029_0985 was acquired at Ls=333.398.