ANALYSIS OF SPIDERS IN INCA CITY, MARS: SPATIAL DISTRIBUTION AND TYPES. J. Hao¹, G.G. Michael¹, S. van Gassel², R. Jaumann⁵.
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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 CO₂ cap. Araneiform terrain (also referred as “Spiders”) is one of these unusual geomorphic features, possibly resulting from CO₂ 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 spiders [5], as well as ‘half’ and ‘elongated’ spiders [5], and 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.


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°N, 295.806°E.

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

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

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