Pu'u Poli'ahu, Mauna Kea: a possible analog for the hematite bearing layer located in Gale Crater, Mars. M.E. Adams, University of Hawai'i at Hilo, Hawai'i 96720, meadams@hawaii.edu

Introduction: Hyperspectral data detected by the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) on board Mars Reconnaissance Orbiter (MRO) indicated the presence of a hematite bearing ridge on Mount Sharp situated in the Gale Crater, Mars. [Fraeman]

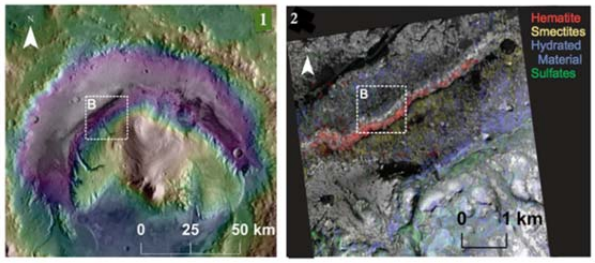

Figure 1 - THEMIS (thermal emission imaging system) daytime infrared image overlain with Mars Orbiter Laser Altimeter elevations showing context of Gale Crater. (Fraeman et al.)

Figure 2 - High Resolution Imaging Science Experiment image DT1EA _009149_1750_009294 _1750_U01 covering Gale Crater and overlain by 5 × 5 median filtered 0.86 μm band depth mineral parameter map (red) indicative of red hematite. Map was created from Compact Reconnaissance Imaging Spectrometer for Mars observation (CRISM) (Fraeman et al.)

The presence of this mineral in high concentrations is indicative of possible aqueous origins. [Fraeman] In 2012, Curiosity Rover landed in Gale Crater on Mars. Curiosity's mission is to determine Mars' habitability and is equipped with an advanced suite of scientific instruments that are capable of conducting analyses on rocks and soil. The hematite bearing ridge on Mount Sharp is thought to be a good candidate of study for Curiosity.

Poli'ahu Cinder Cone: To better understand this type of terrain, the study of analog sites similar in geologic setting is of great importance. One site thought to be a comparable analog is a cinder cone called Pu'u Poli'ahu located on the summit of Mauna Kea, Hawai'i. Poli'ahu is unique among the tephra cones of Mauna Kea because it is thought to have formed in subaqueous conditions approximately 170,000 to 175,000 years ago. [Porter] Consequently located on the inner flanks of Poli'ahu is a rock outcrop that contains hematite.

Figure 3 - Poli'ahu cinder cone, Mauna Kea. Red arrow shows the location of Hematite bearing ridge.

Methods: Samples were collected from the outcrop and characterized using the following instruments: Digital Microscope, Panalytical X-ray diffraction (XRD), and scanning electron microscope (SEM). The initial preparation of the rocks involved documenting each sample by creating powdered samples, thick sections, and photo documentation.

Findings: Results from analysis of the rock samples yielded the presence of hematite.

Figure 4 – depicts up close view of sample HW13MK030B. Bladed hematite present throughout matrix. Image taken by Keyence Digital Microscope at x200.

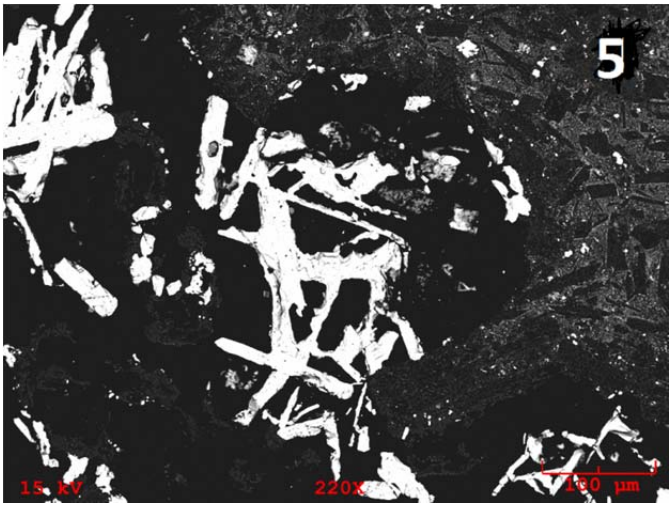

Figure 5 – is a backscatter image showing the mineral hematite (white). JEOL 5910 SEM was used to generate image.

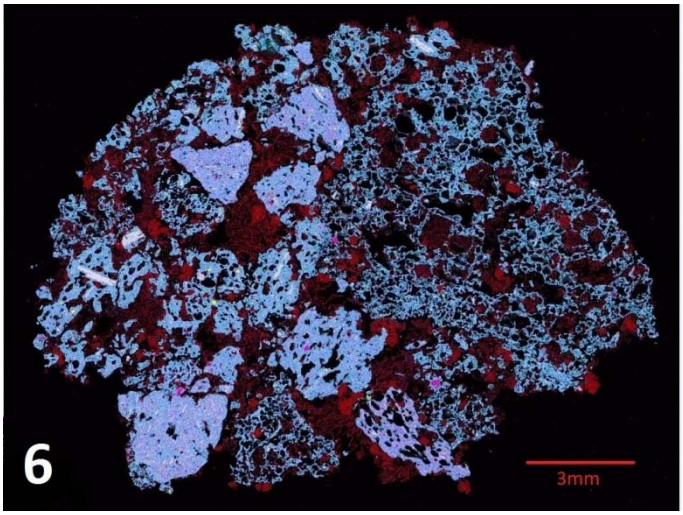

Figure 6 – is an elemental map of sample HW13MK030B. The red portions of the sample indicated Fe rich areas. Map created using JEOL 7600 SEM and ImageJ software.

References:

A hematite-bearing layer in Gale Crater, Mars: Mapping and implications for past aqueous conditions A.A. Fraeman1, R.E. Arvidson1, J.G. Catalano1, J.P. Grotzinger2, R.V. Morris3, S.L. Murchie4, K.M. Stack2, D.C. Humm4, J.A. McGovern4, F.P. Seelos4, K.D. Seelos4, and C.E. Viviano4

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