Mars for Earthlings

LESSON 19: Extremophiles

Homework 2

Extremophiles_MFE

The Color of Temperature

Objective: Identify why an environment is considered "extreme" and draw inferences about life based upon the attributes/characteristics of these environments.

Extremophiles in Hot Water

Watch the following YouTube video created by GNC Science and answer the following questions: http://www.youtube.com/watch?v=VU-A6Sx7k-U

1. Why is this environment extreme? List characteristics of the environment that would classify this environment as extreme.

2. Given the list of characteristics you provided in #1, name the types of extremophiles that could exist there [refer to the list of extremophiles provided by your instructor].

3. The colors of the hot spring have meaning. What do the colors represent? Which colors represent warmer water and, conversely, cooler water?

Yellowstone: An Earth case study

The photograph (Figure 1), taken in Yellowstone National Park, is a hot spring with outflow channels (hydrothermal environment, similar to above).

4. Determine how many colors you observe and assign a hypothetical temperature range to each color.

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5. Using your temperature ranges, outline the area of each temperature range (at least three but no more than six) to create a temperature map of the photograph provided (this will look similar to a contour map). You may use trace paper over the image to represent the changes you see in color.

Figure 1: A hot spring in Yellowstone National Park (Image Credit: nps.gov Source: http://earthobservatory.nasa.gov/Features/Zircon/zircon3.php)

Draw your map below (be sure to annotate your outlines):

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Holden Crater, Mars

Holden Crater, a potential landing site for MSL Curiosity, is thought to have hydrothermal deposits similar to the Earth environments above. Below in Figure 2 is an example of the terrain provided by HiRISE.

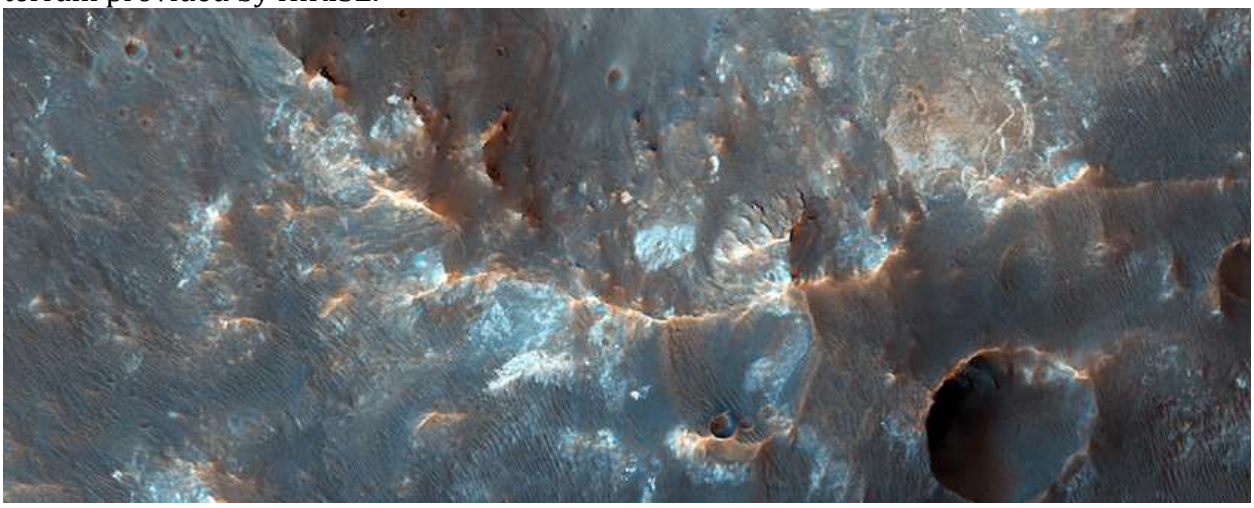

Figure 1: The Western Wall of Holden Crater, HiRISE Image ESP_021946_1535; (Image Credit: NASA/JPL/Univ of Arizona)

1. What do you think the colors represent in the HiRISE image?

2. Using JMARS, capture one CRISM image that would infer a hydrothermal environment and paste below. Hints: (1) Review navigation in JMARS if necessary and investigate the crater walls/rims. (2) Think about what mineral assemblages would suggest a hydrothermal environment.