Mars for Earthlings

LESSON 17: Vast Deserts

In-Class Activity 1

Sand Box Dunes

Purpose: Understand the processes that form sand dunes on Mars and Earth.

Resources:

1. HiRISE Dune Image Source: http://hirise.lpl.arizona.edu/ESP_012202_1390
2. THEMIS Dune Image Source: http://themis.asu.edu/node/5758
3. Mars Global MOLA map: http://mola.gsfc.nasa.gov/images/mercat_med.jpg

Desert Pavement:

1. If you were to travel into a valley and see the rocks shown in Figure 1:
    a. What processes are at work in the valley?

    b. What grain sizes are left?

    c. What happened to the rest of the grains?

Figure 1: Death Valley ventifacts; *Photo by Marjorie Chan*

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Sand Box

1. Watch the sandbox demonstration and answer the following (http://serc.carleton.edu/details/files/44290.html):

    a. How does the surface change?

    b. Which side of the dunes are the steepest? Why?

    c. What happens when the angle becomes too steep? What do we call that angle?

    d. What is the steep side of the dune called?

    e. How does the slip face change through time?

Mars Image Analysis

2. View the following Mars Images

    HiRISE: ESP_012202_1390 Dunes in the Western Nereidum Montes (38.6S, 44W)

    THEMIS: V43323004 Terra Sirenum (39.7S, 150W)

    a. Answer the following:

        i. What is the prevailing wind direction in each image?

        ii. Are the dunes multi-directional? If so, how can you tell?

        iii. Is there more than one dune shape/morphology (barchans, transverse, longitudinal, parabolic etc.)? If so, what are they?

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Sediment Source Determination

Referring to the Mars Images, answer the following:

1. What is the sediment supply like (abundant, sparse)? Explain your answer.

2. According to your knowledge of the geography of Mars and its regions, what might be the source of the sediment (refer to the MOLA map your Instructor has posted)?

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