PTYS 442/542 – Mars
Homework #2 – Assigned 2/15, due Friday 2/27 (except question 1 – due 2/19)

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1) HiRISE target Selection

This part of the homework has an earlier deadline that the rest – I need you to create a HiRISE suggestion and email me the suggestion number by the end of day on Thursday February 19th.

Use the HiWISH website that I demoed in class (http://www.uahirise.org/hiwish/) to browse Mars and create your HiRISE target suggestion. Give some thought to what you expect to see and include this in the 'Science Rationale' box and put 'Mars Class' in the special notes box. You'll also need to choose a primary science theme based on the descriptions that are on the targeting page. The grade for this question will be based on how well thought out the science rationale is.

A few things to bear in mind:

- The north polar area is in darkness at the moment – no imaging north of ~65N
- Anything further north than roughly 35N will have very low sun angles so there'll be lots of shadows and the images may be noisy. You can still plan an observation here if there's a good reason to do so – such as investigating winter frosts.
- Some areas on the equator are heavily contested and difficult to acquire observations in, such as near Valles Marineris or near the Curiosity landing site. Again, you can still plan an observation here if there's a (very) good reason to do so, but it will be harder to acquire.
- The southern mid-latitudes and polar areas are well illuminated. The closer to the pole you get then the more likely it is that we can acquire your image.
- Don't use any seasonal (solar longitude) restrictions or phase/incidence/emission angle restrictions in the advanced options.
- Don't select 'yes' for stereo or CRISM coordination unless you know you need it.
- Do change the resolution to what you need though.

After you create the suggestion the HiWISH website will tell you the suggestion ID. Please email this to me (shane@lpl.arizona.edu) before the end of Thursday.

2) JMARS investigation

Use the JMARS software that we spent a class discussing to characterize the HiRISE target site that you suggested in question 1. Put the longitude and latitude of the target into JMARS' location box and click on 'View' -> 'Recenter Projection'. Starting adding layers of other data as appropriate. This characterization should be thorough and at least include:

Discussion of context from basemaps such as the THEMIS daytime IR mosaic. Is this site within some larger feature? How would that affect what you expect to see in your upcoming HiRISE observation?

Topographic profiles across the target – is this on a slope, in a depression or on a rise? Include the plots of the profiles and optionally a 3D perspective view.

Thermal inertia values in this location – do you expect dust, sand or exposed bedrock?

What is the overall albedo? Is this high or low compared to average Mars (average is about 0.25)?

What previous imagery is available (especially from the CTX camera) – do you expect anything to have changed between the previous imagery and your upcoming HiRISE observation?

3) As with the last homework we'll examine two images in HiReport except this time we'll take advantage of the full power of the instrument and look at the full-resolution data.

http://hireport.lpl.arizona.edu/hireport/hi

username: MarsClass
password: MarsClass2015

This time, in addition to the general description you did last time, look for images with features you recognize. E.g. we just had a lecture on impact craters, so pick at least one image that has obvious impact craters in it.
You can describe these craters much more elaborately than your first homework using terms we discussed in class. Is the crater simple or complex? Describe the features you can use to tell the difference. Does the crater still have an obvious ejecta blanket? What does that mean for its age? What other geologic landforms does the crater superpose and what landforms are superposed on the crater? Etc…
You might recognize other features if you've had some geology courses before and it's fine to focus on them instead, if not then just stick with discussing craters.

On the HiReport observation page there are several links just above the image thumbnail. Click on the 'HTTP' link to download the full image file in Jpeg 2000 format. This will be a very big file; you should do this somewhere on campus that has a fast internet connection. Jpeg 2000 files are still not widely supported. We provide a free piece of software called HiView that allows you to look at them. You can download and install it from:

http://www.uahirise.org//hiview/

Open HiView and go to 'File' -> 'Open File' and select your downloaded file. There are tutorials on using HiView on the website above and I'll show a quick demo at the start of class on Monday (the basic functionality is pretty straightforward).

When you describe the craters (or other features in your image) some of the description must reference small-scale features. Examine some part of the crater at full resolution and describe what you see – draw some conclusions from this observation about what happened when the crater was created or subsequently modified.

You need only look at the full resolution monochrome (RED) images for this homework. In future homework, we'll expand this to color products and 3D anaglyphs. Keep HiView installed on your computer, you'll need it throughout the semester.