Mars Landing Site Selection: An Exercise in Reading Geologic Maps and Other Geologic Data Sets

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Students Will Be Able To:

1) Read and interpret geologic maps;
2) Integrate different spatial data sets wtihout using GIS;
3) Compromise!

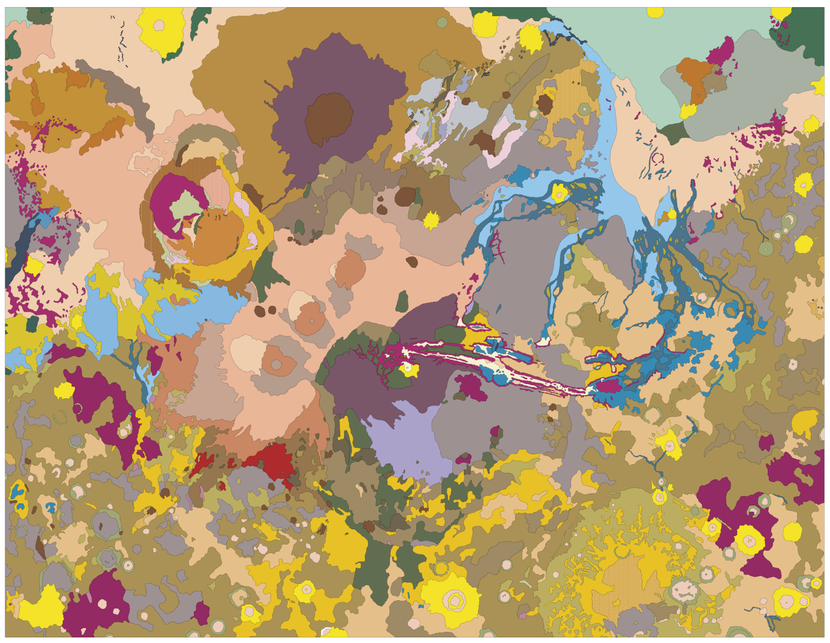
Objectives:

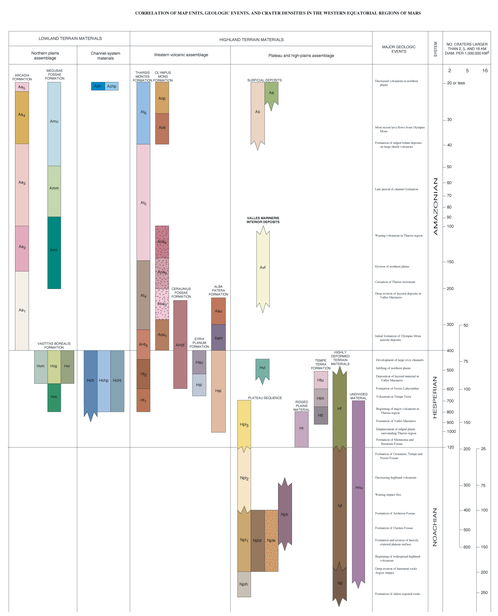
1) Select the next landing site on Mars;
2) Obey safety & engineering constraints;
3) Maximize science!

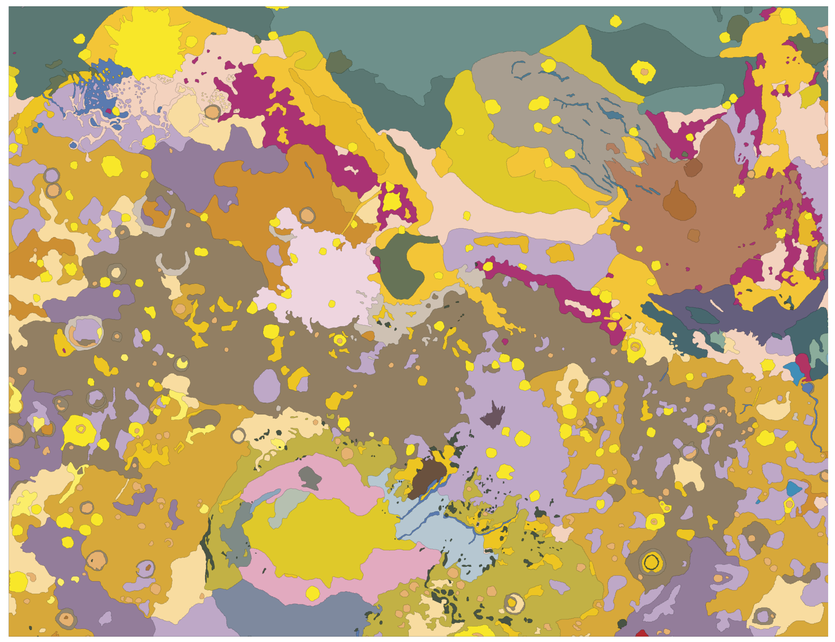
Assessment

1) Compare with selected landing sites;
2) Compare with "top ten" landing sites;
3) Self-assessment;
4) Self-assessment at Team level.

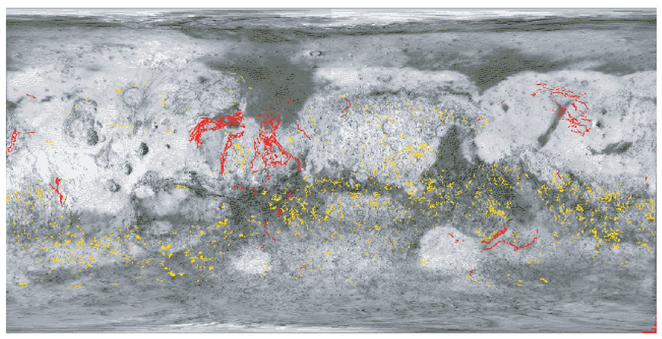
Materials



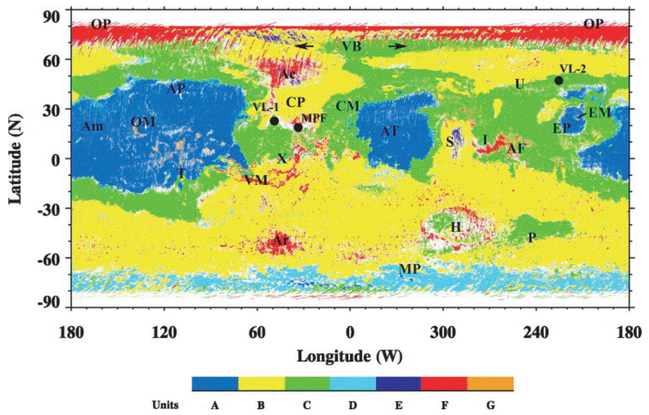




Mars western (left) and eastern (right) 1:15M geologic maps (available on-line)



Mars channels (red) and valleys (yellow) (available on-line)



Unit	Inertia	Albedo	% Surface	Interpretation
A	Low (28–135)	High (0.23–0 .31)	36	Bright unconsolid ated fines
B	High (160–355)	Low (0.10–0.19)	36	Sand, rocks, and bedrock; some duricrust
C	High (110–330)	Med. (0.19–0 .26)	23	Duricrust; som e sand, rocks and bedrock
D	Low (24–170)	Low–med. (0.09–0 .24)	2	Low density mantle *or* dark dust?
E	High (140–386)	Ver y Low (<0.09)	0.3	As B, but littl e or no fines
F	Ver y high (>386)	All	4	Rocks, bedrock, duricrust, and pol ar ice
G	Low–high (40–386)	Ver y high (>0.23)	0.7	As A, thermally thin at higher inertia

Thermal inertia and rock abundance (Putzig et al., 2005)

Procedure:

1) Assign students to be either engineers, geologists or biologists.
2) Engineering constraints:
   units A, B or E;
   within 15° of equator
3) Biology constraints:
   water (past or present), and heat
4) Geology constraints:
   what do you want to know?
5) Teams of only one science type decide top 3 landing sites.
6) Mix up teams (1 engineer, 1 biologist, 1 geologist) to decide top 3 sites
7) Class must agree on 1 final site

Resources

Mars Geologic Maps:
http://webgis.wr.usgs.gov/mars_geology.htm

Mars Channel & Valley Map
http://www.msss.com/http/ps/channels/channel-map.gif

Mars Thermal Inertia & Rock Abundance
Putzig, N.E., M.T. Mellon, K.A. Kretke and R.E. Arvidson (2005) Global thermal inertia and surface properties of Mars from the MGS mapping mission, *Icarus 173(2)*:325-341.

Pathfinder Landing Site Selected
http://tes.asu.edu/PATHFINDER/p_f_landingsite_letter.html

Comments & Suggestions