Yearly changes in dust devil tracks within Malea Planum, Mars

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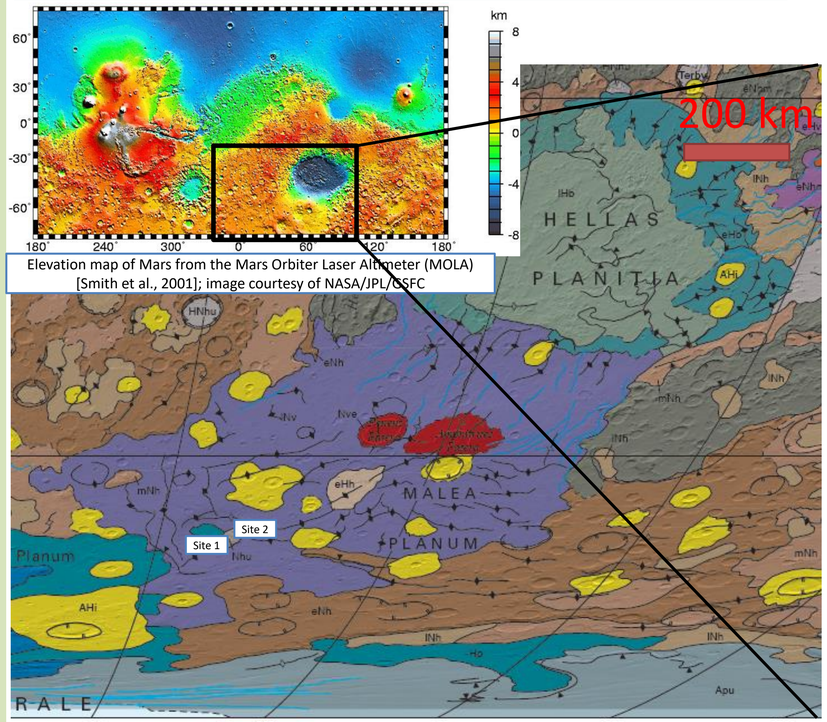
Goal and Objectives

Goal:
Constrain current aeolian activity on Mars through dust-devil track (DDT) behavior

Objectives:
- Characterize the year-to-year behavior of DDTs within Malea Planum, Mars
- Create detailed maps of DDTs found on repeat Context Camera (CTX) *[Malin et al., 2007]* images collected in different Martian years (MY) to determine:

1) dominant trends of DDTs over time;
2) how the areal density of DDT changes over time;
3) the role of local topography in the formation of DDTs.

Malea Planum, Mars



Elevation map of Mars from the Mars Orbiter Laser Altimeter (MOLA) [Smith et al., 2001]; image courtesy of NASA/JPL/GSFC

Malea Planum, as mapped by Tanaka et al. (2014).
Malea Planum is the purple unit southwest of Hellas Planitia.

Methods

- Used Java Mission-Planning and Analysis for Remote Sensing (JMARS) *[Christensen et al., 2009]* to identify repeat CTX images
- Enhanced image contrast and applied edge filter using 7 x 7 pixel kernel
- Mapped DDT using ArcGIS and QGIS
- Calculated DDT trends using start and end points
- Used Rose.Net (http://mypage.iu.edu/~tthomps/programs/html/tntrose.htm) to generate rose diagrams

Future work

- Map DDTs at 4 more sites within Malea Planum
- Constrain how much time is required for DDT to disappear

Preliminary Conclusions

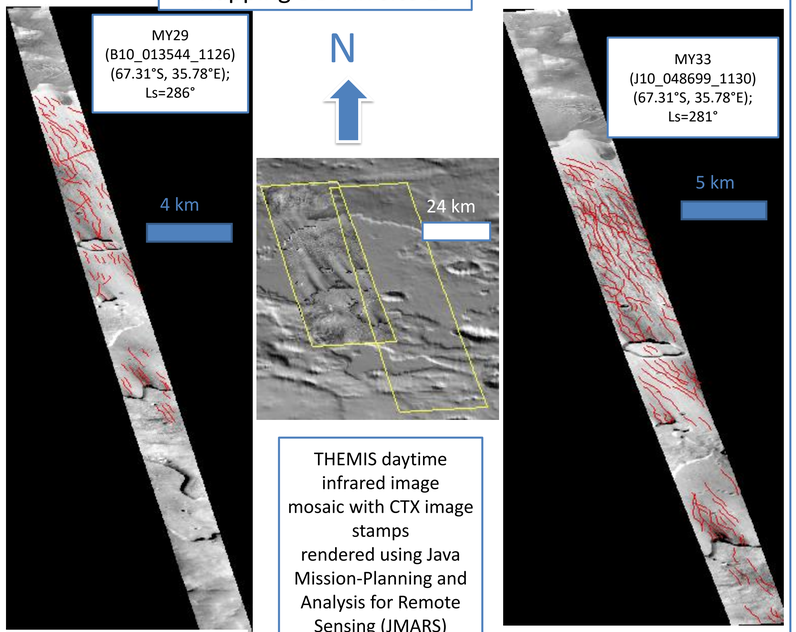
- DDT trends vary slightly from year to year
- DDTs generally trend to the NW

DDT trends in sites 1 and 2

	Martian Year 29		Martian Year 33	
	Site1	Site 2	Site 1	Site 2
Number Of DDT	82	72	139	50
Mean Trend	326.69°	315.50°	320.97°	306.02°
Standard Deviation of Trend	±22.23°	±45.70°	±18.27°	±29.29°

Results 1

Mapping DDT in site 1

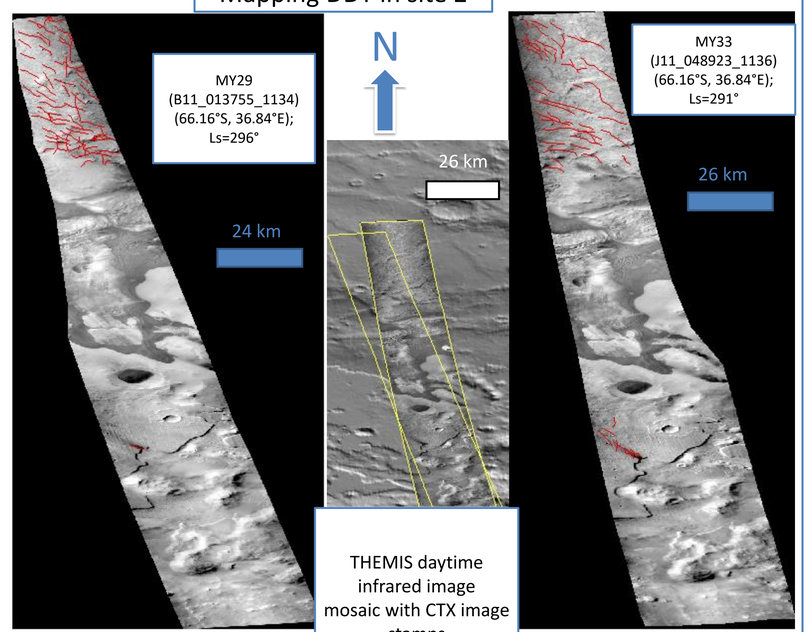


THEMIS daytime infrared image mosaic with CTX image stamps rendered using Java Mission-Planning and Analysis for Remote Sensing (JMARS) *[Christensen et al., 2009]*

CTX images courtesy of NASA/JPL/MSSS

Results 2

Mapping DDT in site 2



THEMIS daytime infrared image mosaic with CTX image stamps rendered using JMARS *[Christensen et al., 2009]*

CTX images courtesy of NASA/JPL/MSSS

References

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