44th Lunar and Planetary Science Conference (2013)

Systematic Use of Constant-Scale Natural Boundary Mapping for Interpreting Formation Processes of Celestial Objects

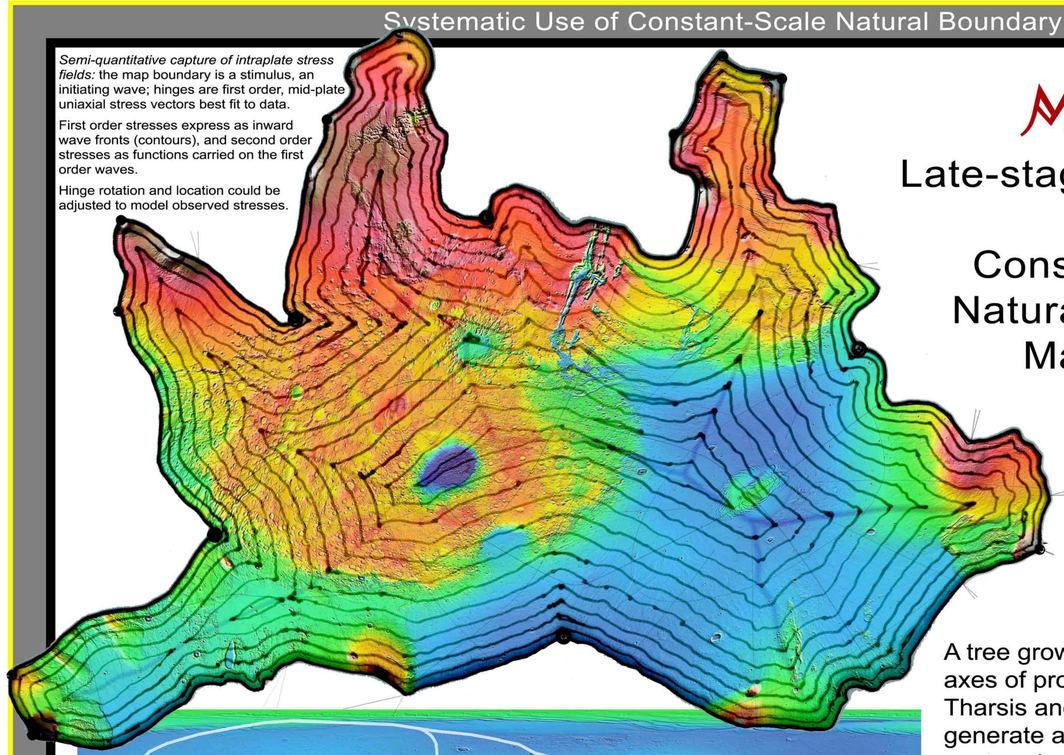
MARS

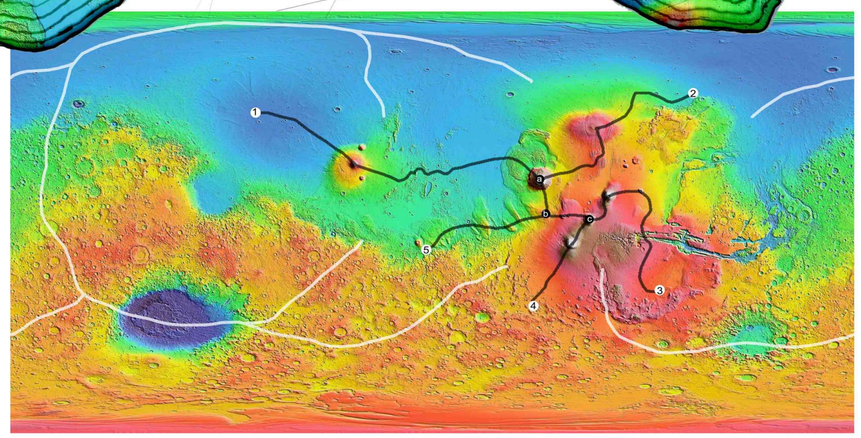
Late-stage Magmatism as Constant-Scale Natural Boundary Map Edge

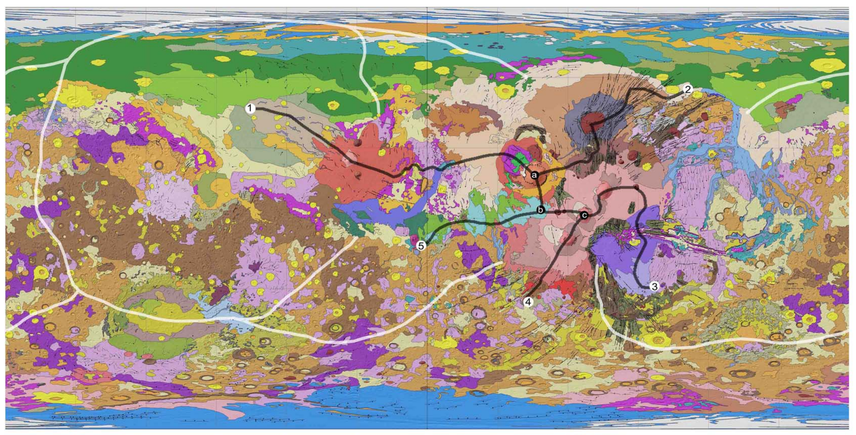
Semi-quantitative capture of intraplate stress fields: the map boundary is a stimulus, an initiating wave; hinges are first order, mid-plate uniaxial stress vectors best fit to data.

First order stresses express as inward wave fronts (contours), and second order stresses as functions carried on the first order waves.

Hinge rotation and location could be adjusted to model observed stresses.







A tree grown through medial axes of provinces remote to Tharsis and Elysium would generate a global map centered on volcanism, with antipodal districts as critical context.

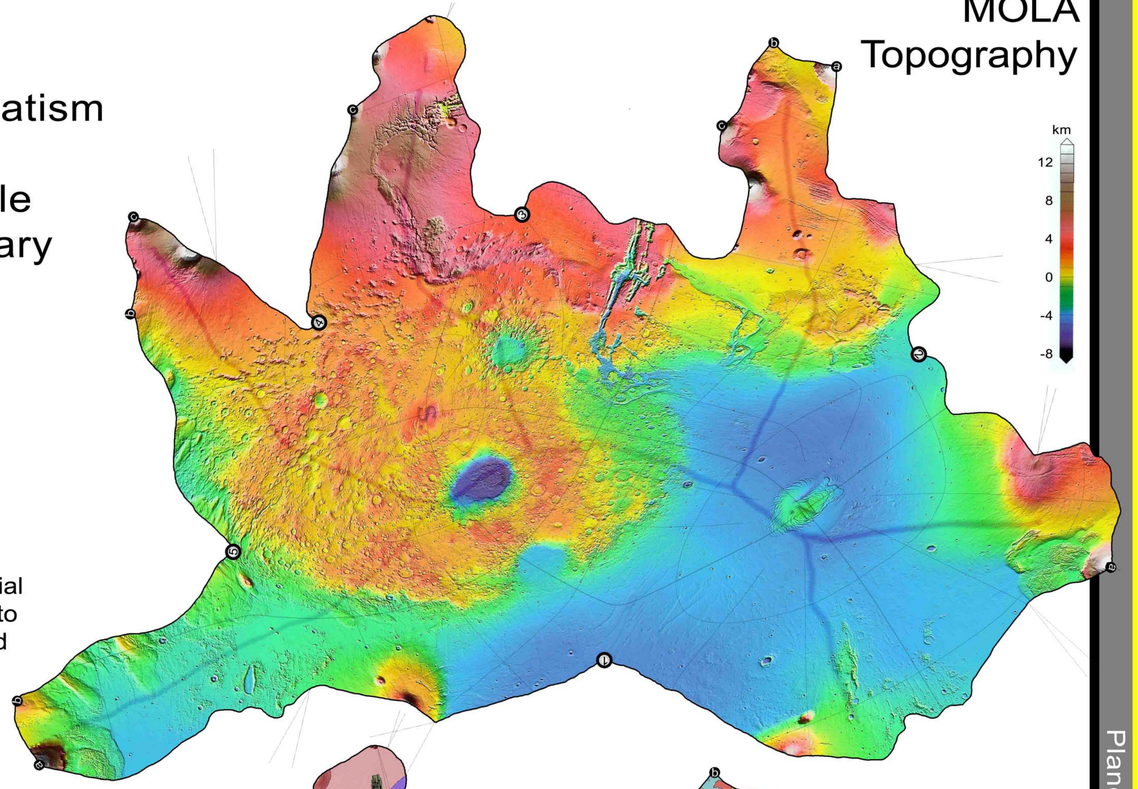
The complementary tree, finely branched but regionally limited, drawn within the terrane of magmatism, also makes an intriguing map, seen at right.

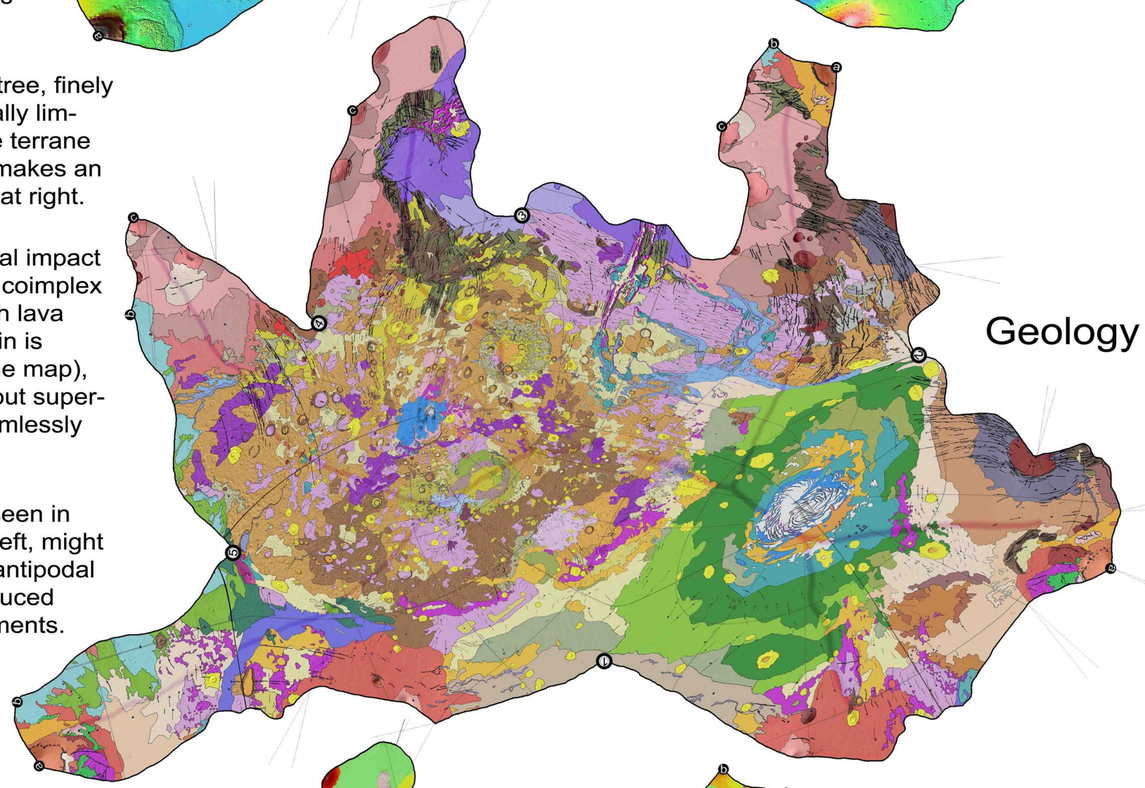
On this map the global impact of this huge volcanic coimplex is clear, because both lava flow and bulging strain is inward (in terms of the map), and suppositions about superplumes could be seamlessly contemplated.

A waterlining study, seen in crude form at upper left, might tease into focus the antipodal effects of Tharsis-induced tilt on Meridiani sediments.

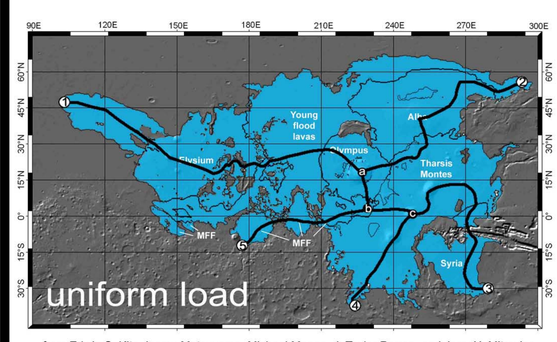
Note that the anti-Tharsis tree intersects both Hellas and Argyre Basins.

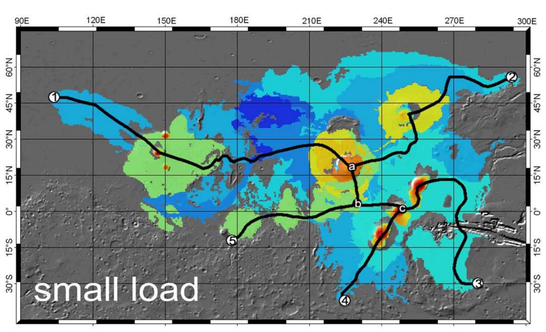
MOLA Topography





Geology

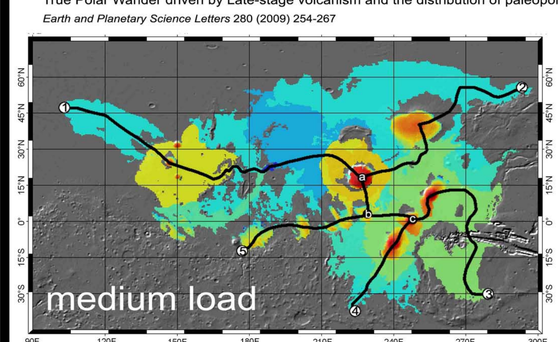


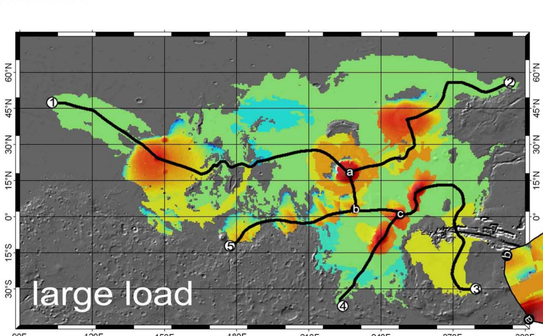


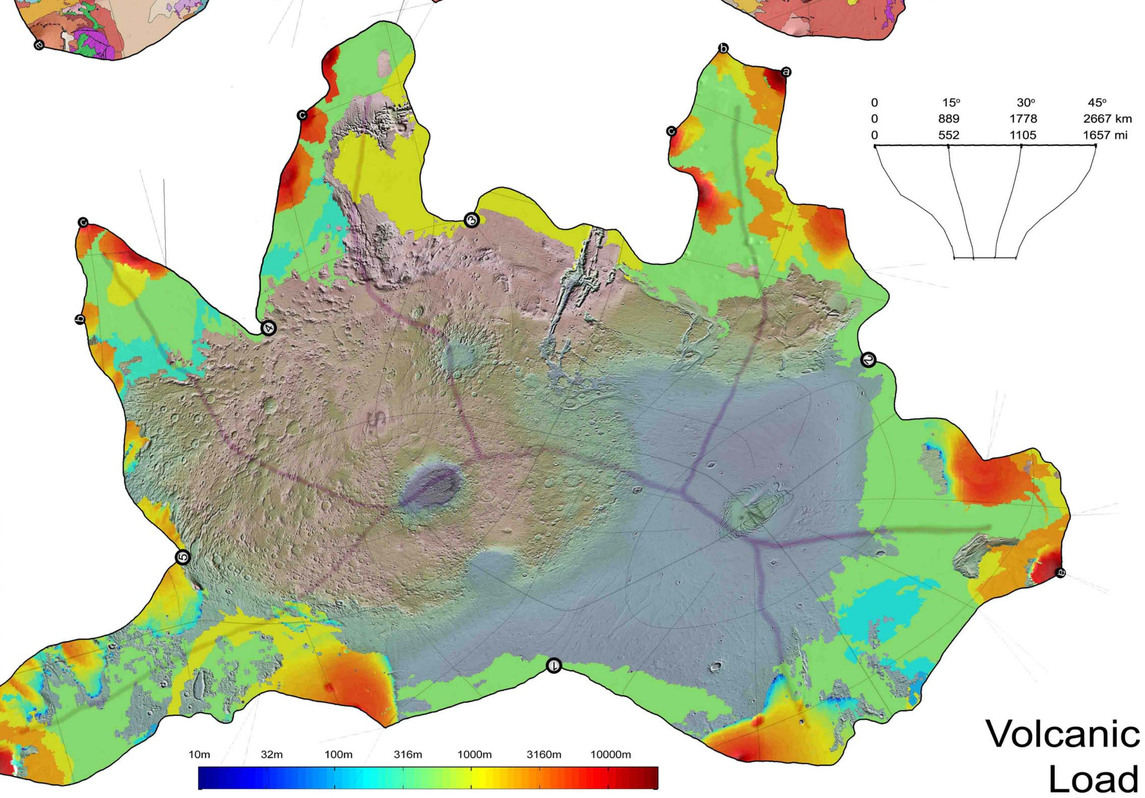
from Edwin S. Kite, Isamu Matsuyama, Michael Manga, J. Taylor Perron, and Jerry X. Mitrovica

True Polar Wander driven by Late-stage volcanism and the distribution of paleopolar deposits on Mars

Earth and Planetary Science Letters 280 (2009) 254-267







Volcanic Load

Planetary Cartography Abstract Number 1245

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