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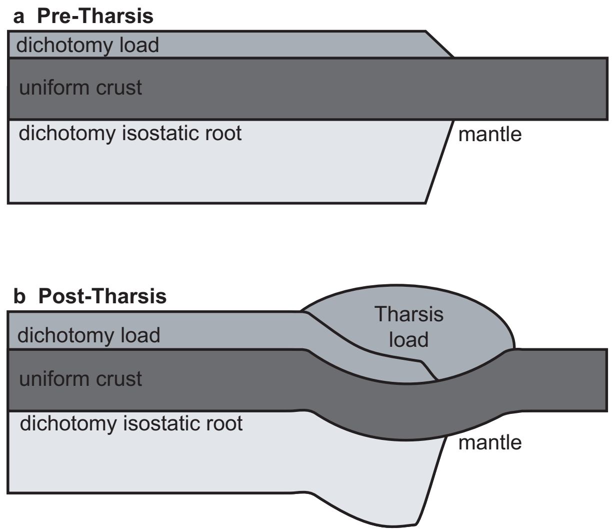
The Borealis basin and the martian crustal dichotomy

Jeffrey C. Andrews-Hanna[1], Maria T. Zuber[1], and W. Bruce Banerdt[2]

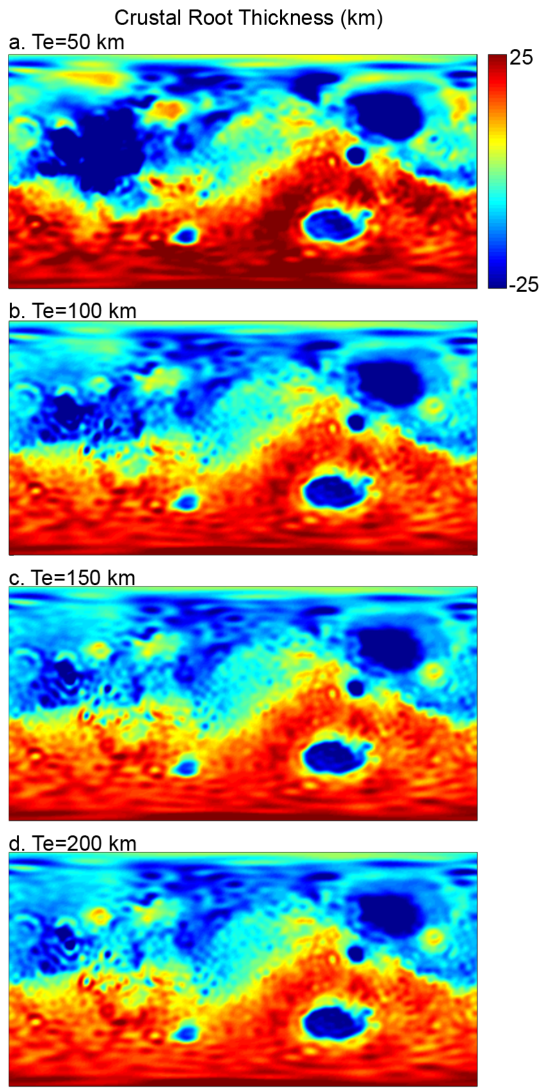
[1]*Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139*

[2]*Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109*

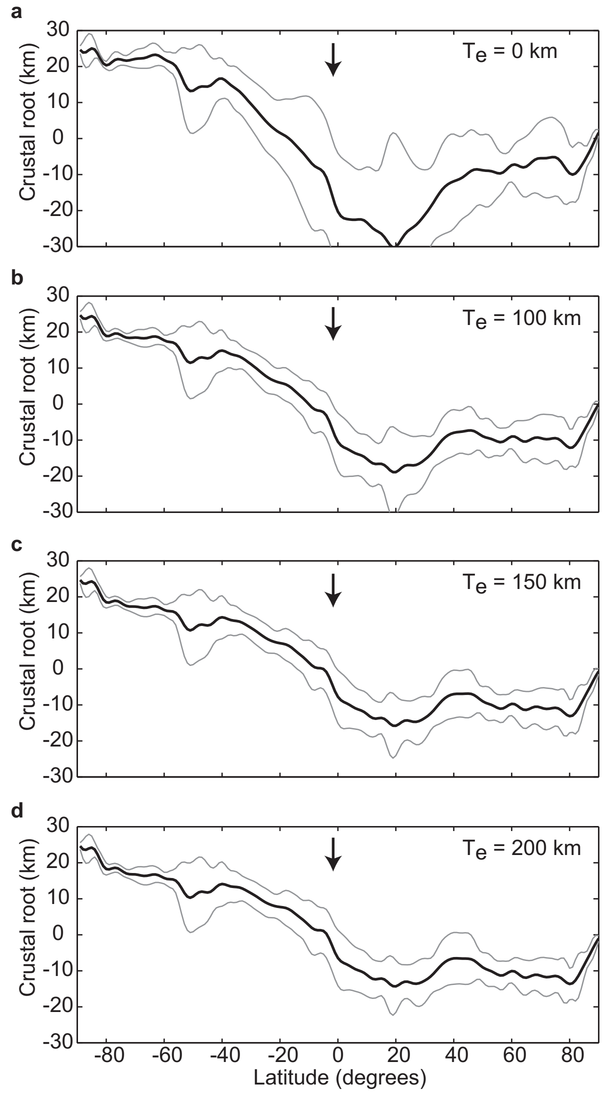
Supplementary Figures



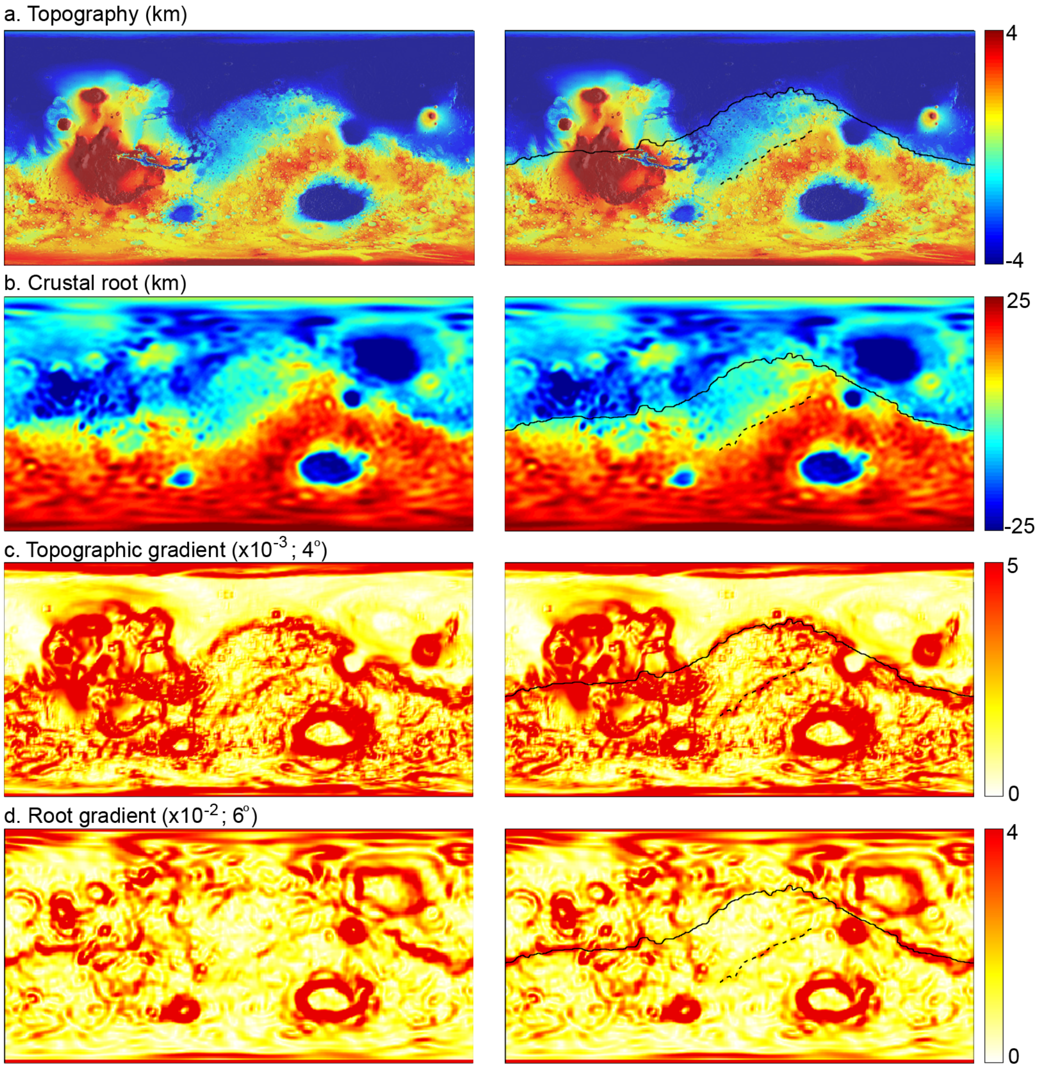
Supplementary Figure 1. Schematic representation of the crustal structure before (a) and after (b) Tharsis loading. The isostatic dichotomy is dominated by the crustal root, while Tharsis is predominantly a top load that results in a downward displacement of the crust and lithosphere. The model divides the crust into loads and isostatic roots, thereby allowing us to isolate the sub-Tharsis dichotomy boundary. The lithosphere is not explicitly labeled, but may include part or all of the crust, as well as portions of the upper mantle. The crust and lithosphere deform together during Tharsis loading.



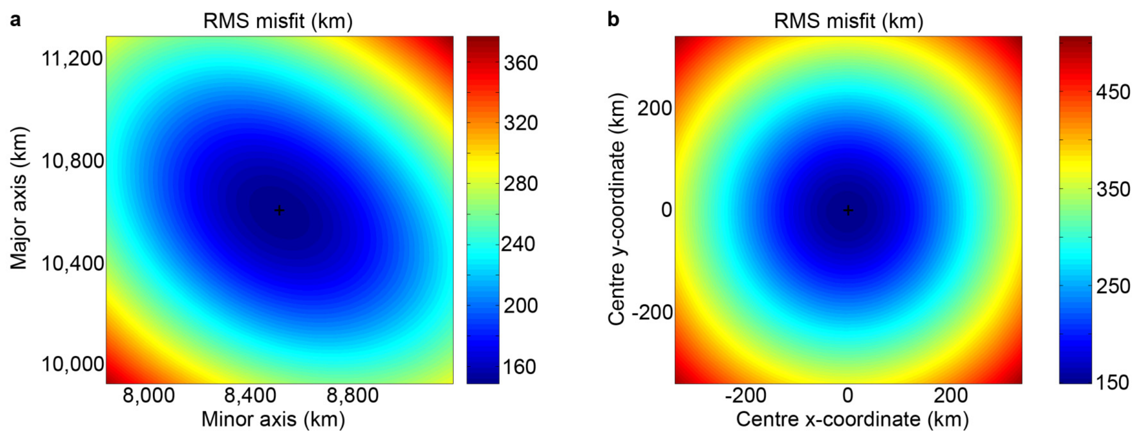
Supplementary Figure 2. Maps of the isostatic crustal root. Models show a range of lithosphere thicknesses (T_e) between 50 and 200 km.



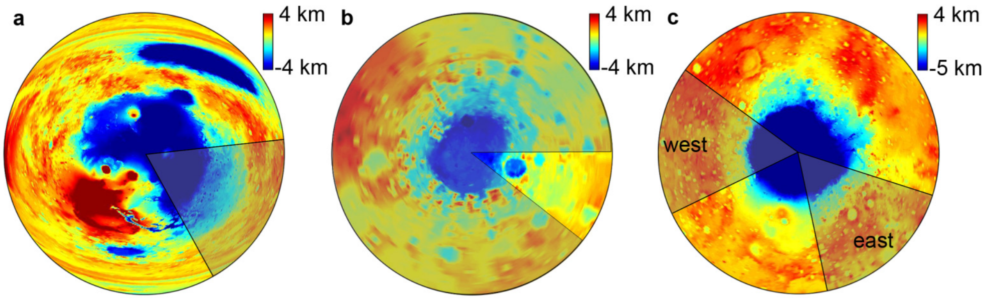
Supplementary Figure 3. Profiles of the isostatic crustal root. Averaged latitudinal profiles (black) and the 1-σ variation (grey), created from profiles spaced in 1˚ increments between 180˚ E and 330˚ E. The maximum slope representing the dichotomy boundary is delineated by the arrow.



Supplementary Figure 4. Cylindrical projection of the topography (a), isostatic crustal root (b), topographic gradient (c), and crustal root gradient (d). The inferred dichotomy boundary is traced on the right (southern edge of Arabia Terra shown with a dashed line). The crustal root here was calculated for a lithosphere thickness of 100 km.



Supplementary Figure 5. RMS misfit between the traced dichotomy boundary and an ellipse, as a function of the ellipse dimensions (a) and centre location (b). These figures represent two-dimensional cross-sections of the five-parameter minimization, including major and minor axes, ellipse centre coordinates, and long axis orientation. The y- and x-coordinates in **b** correspond to east and north relative to the best-fit basin centre. All parameters not being varied in each figure are held at their optimal values. The best-fit ellipse parameters are indicated by the "+" symbol.



Supplementary Figure 6. Basin-centred polar projection views of “Borealis”, Argyre, and Hellas basins. Borealis and Hellas have been scaled so as to circularize the basins to allow azimuthally averaged profiles of the topography to be taken. Profiles in Figure 4 were averaged over the shaded areas to avoid regions of volcanic, fluvial, or impact modification of the basin structure (for Hellas and Argyre), or to isolate the Arabia Terra region (for Borealis).