

*Mars'
Magnetism
TPW?*

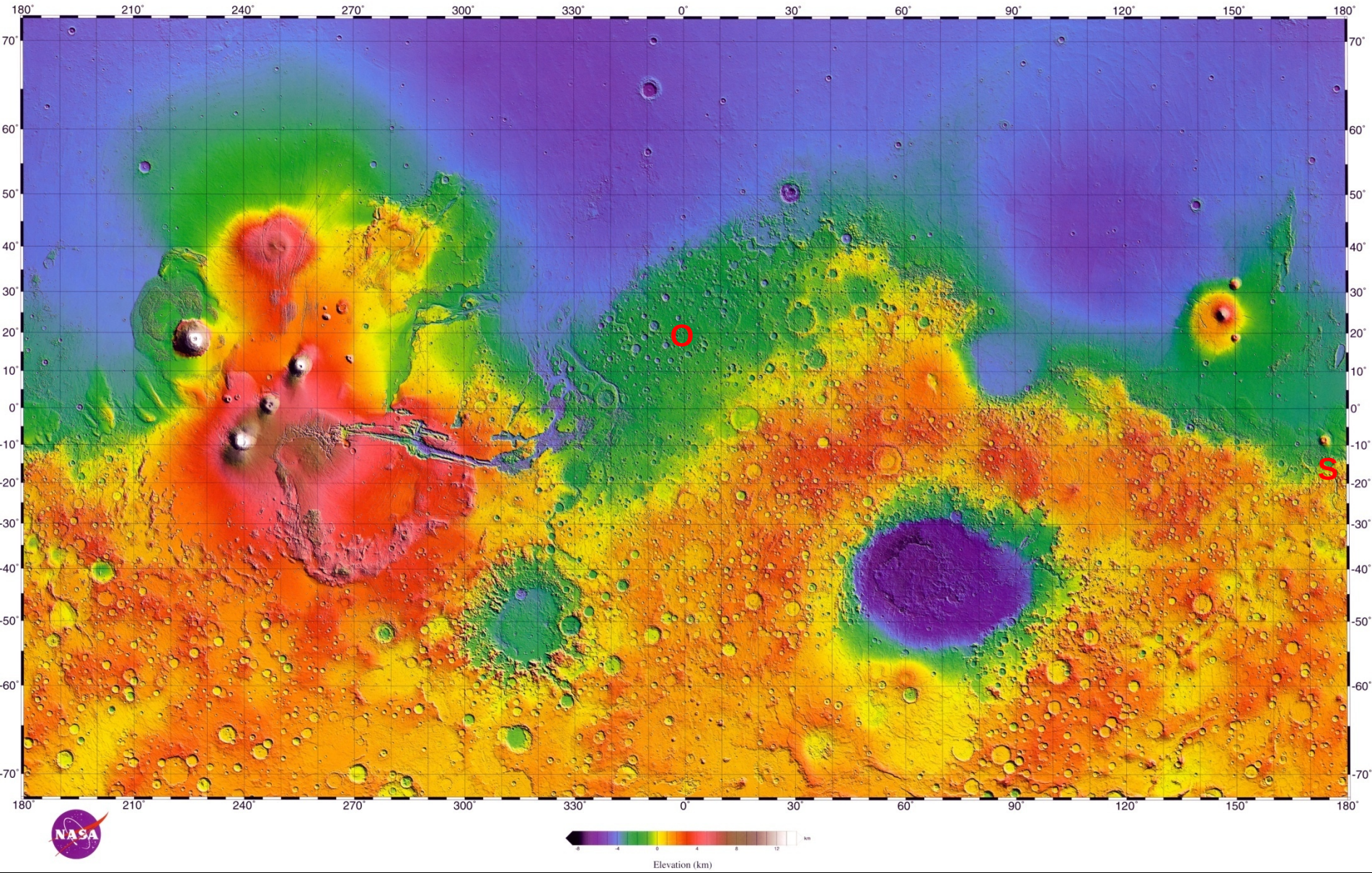
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Mars Global Surveyor Liftoff

November 7,
1996



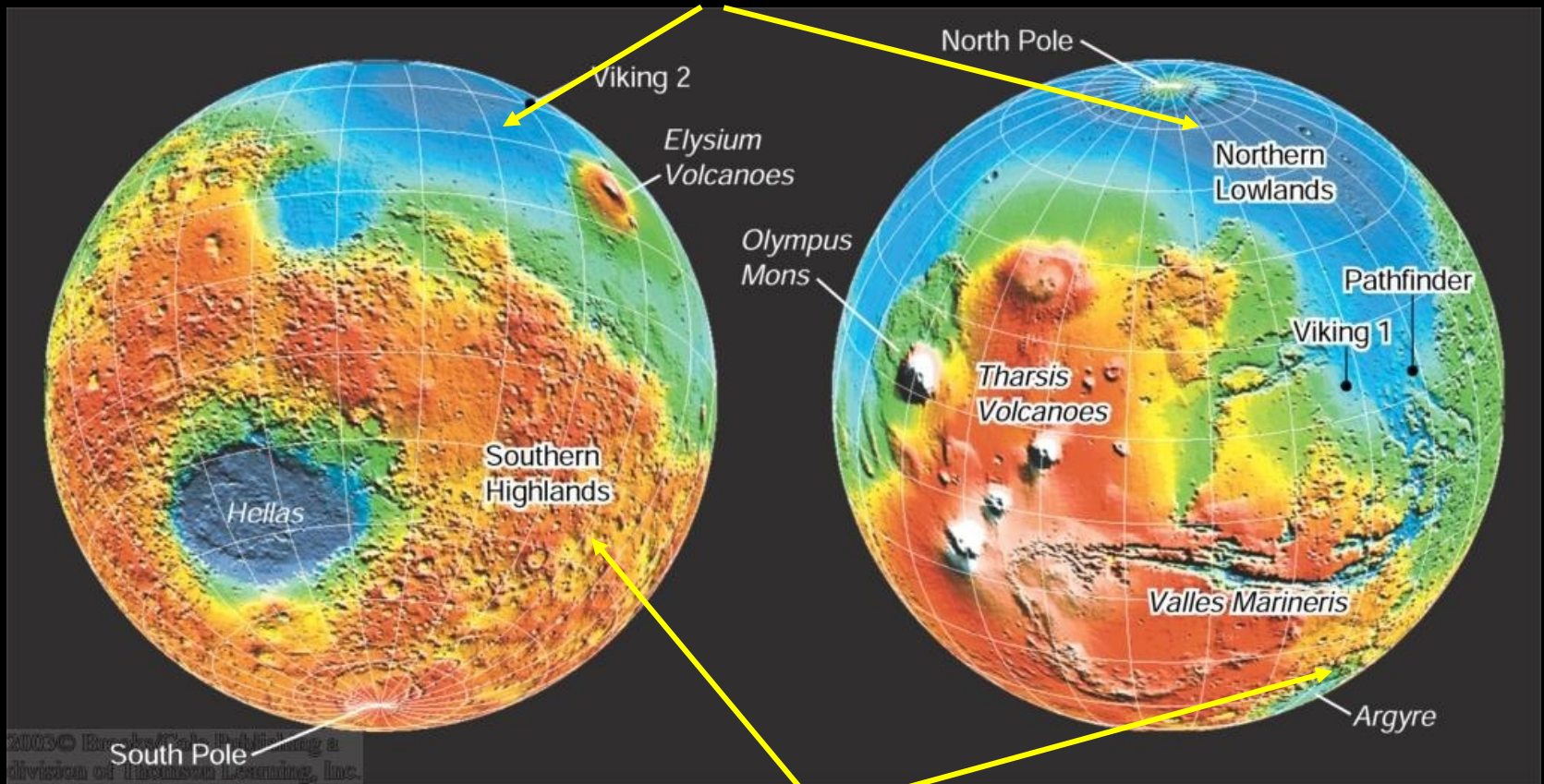
The Topography of Mars



The Geology of Mars

Northern Lowlands: Free of craters; probably re-surfaced a few billion years ago.

Possibly once filled with water.



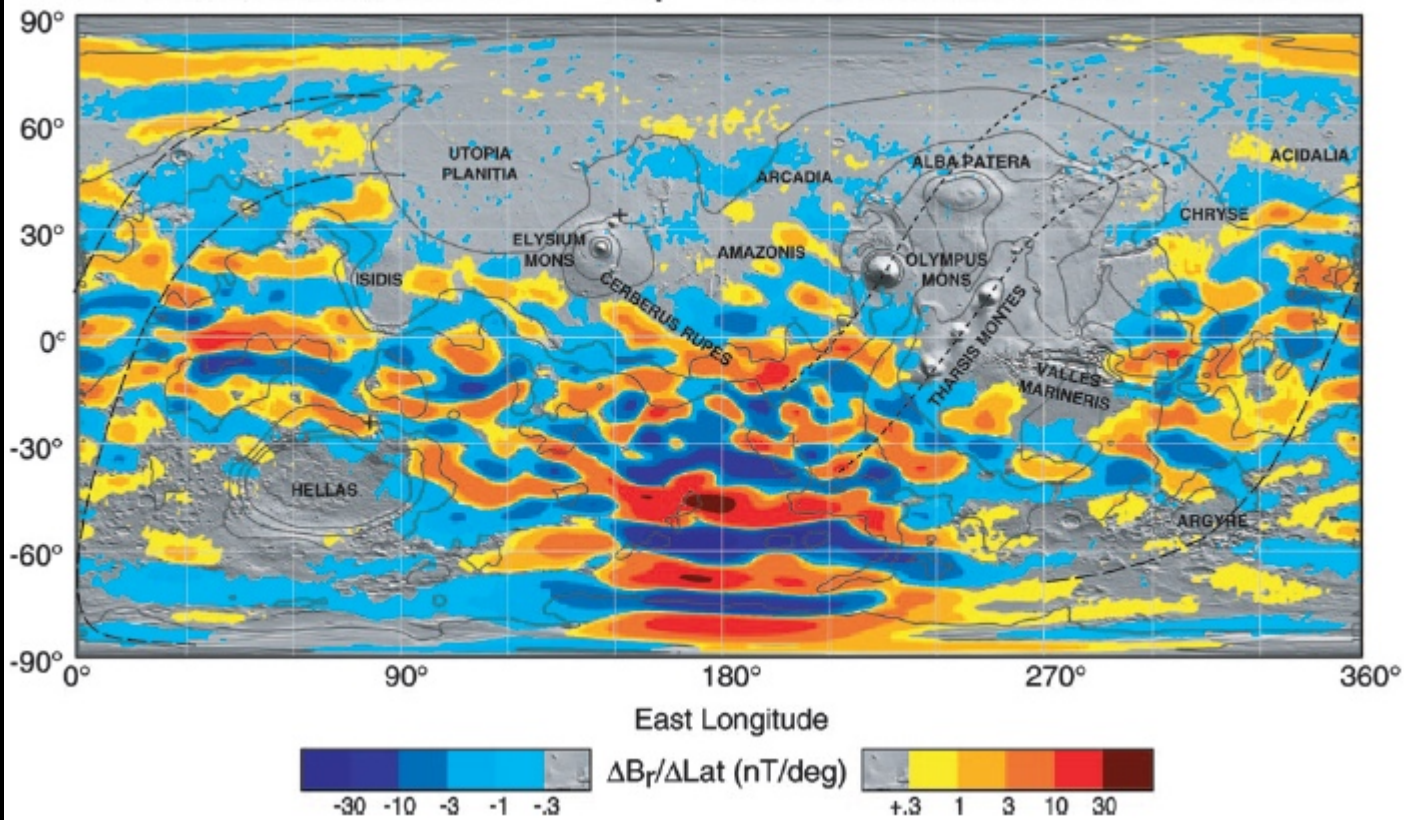
Southern Highlands: Heavily cratered; probably 2 – 3 billion years old.

MARS CRUSTAL MAGNETISM

ΔB_r

MARS GLOBAL SURVEYOR

MAG/ER



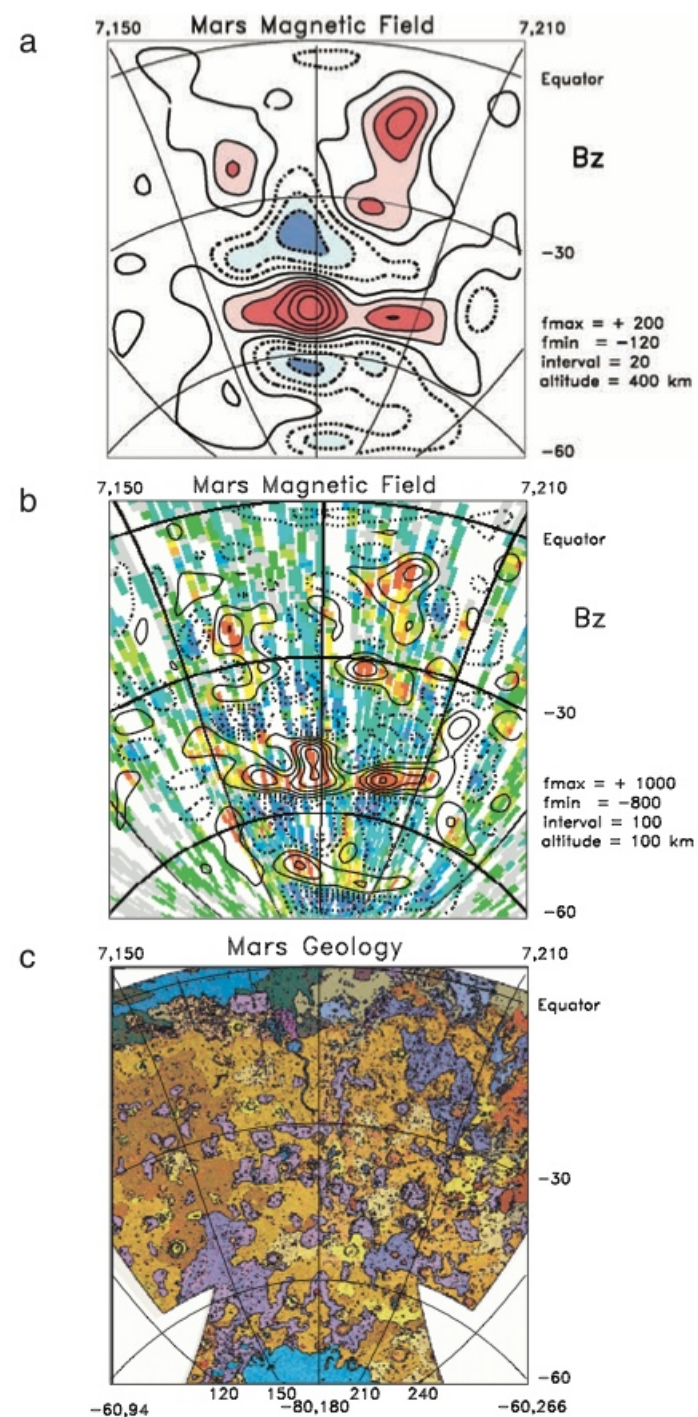
Magnetization of Mars

Figure:

(a) The vertical component of the magnetic field B_z as measured at 400 km.

(b) The vertical component of the magnetic field B_z extrapolated downward from 400 to 100 km using a Fourier transform. The result agrees very well with aerobraking data obtained at 100 km (shown in color) and fills in data gaps. Aerobraking data: **red**, strongly positive; **blue**, strongly negative.

(c) Geology of Mars' highland terrain.



Magnetization of Mars

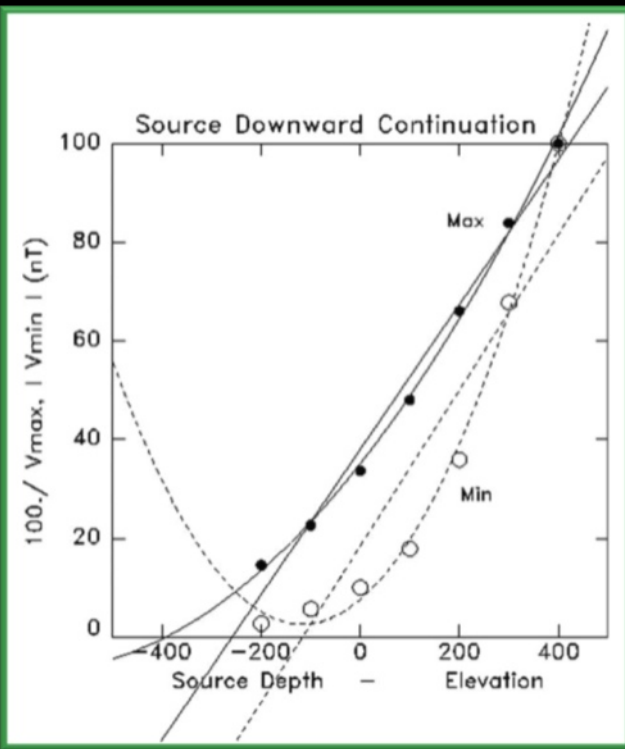


Figure: Reciprocals of maximums and minimums of sources in model shown as a function of altitude and depth of extrapolation. Linear and parabolic fits are made for maximums of the positives (solid circles) and for minimums of the negatives (open circles).

Jurdy and Stefanick (2009)

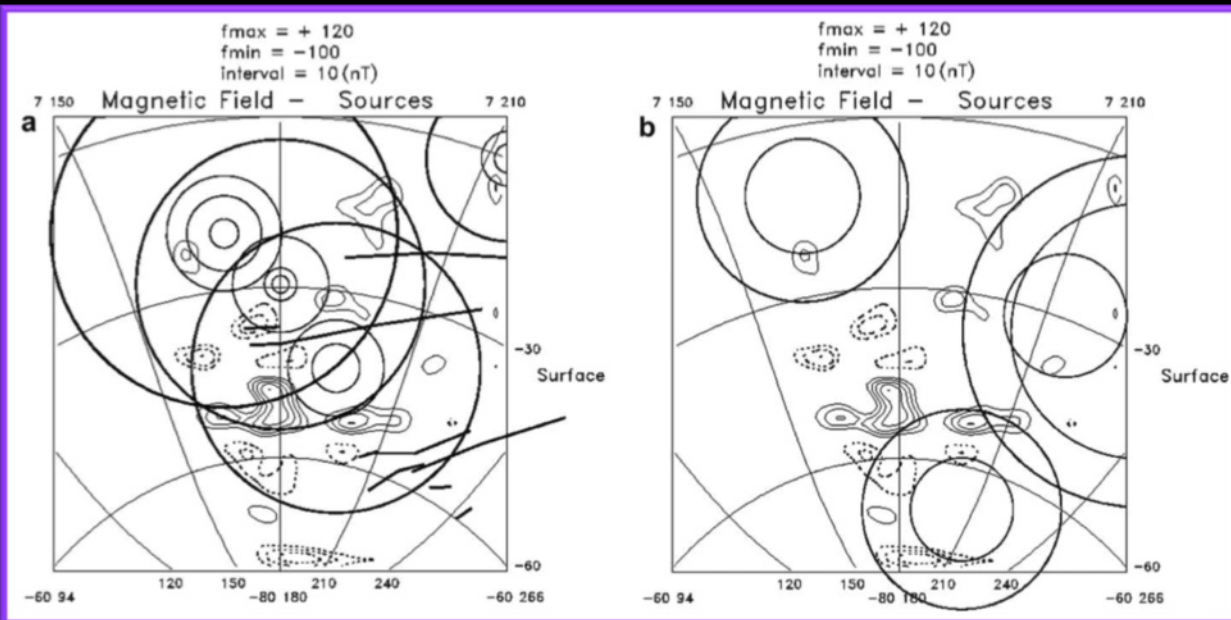
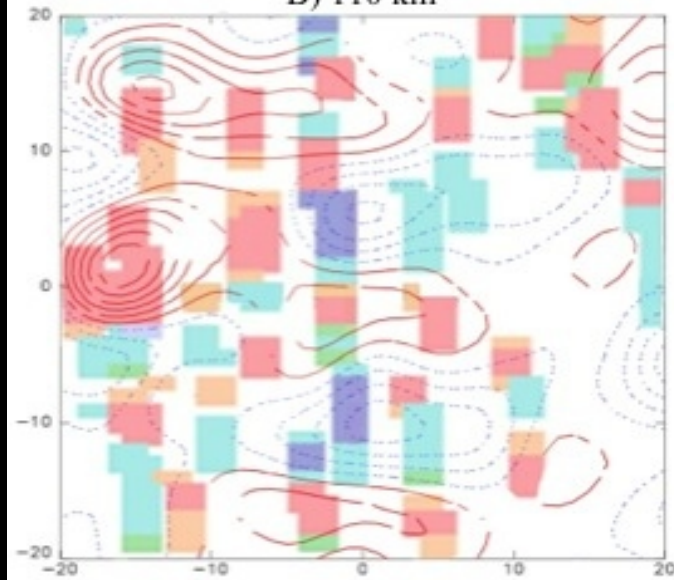


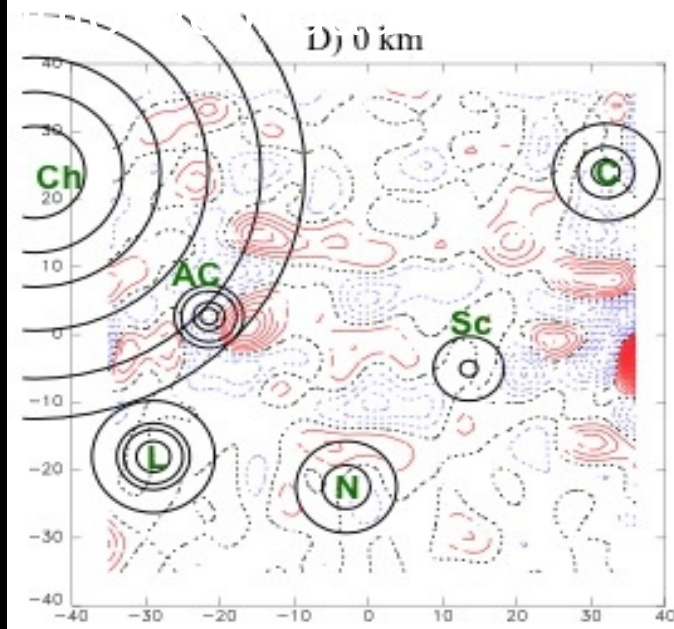
Figure: (a) Sources for magnetic field vertical component at Mars' surface. (b) Craters based on MOLA topography.

Jurdy and Stefanick (2009)

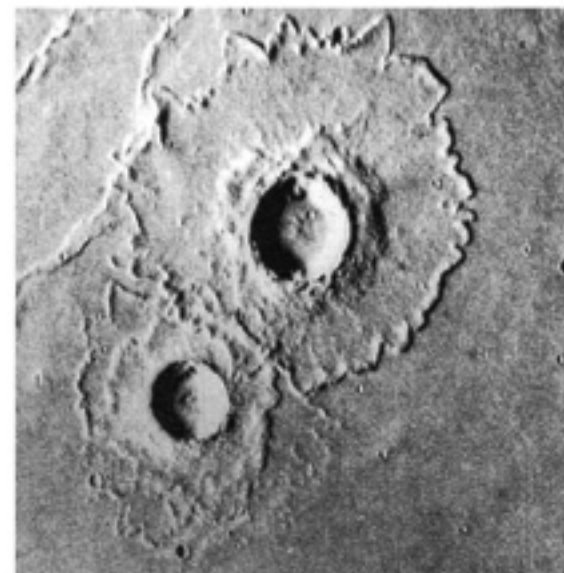
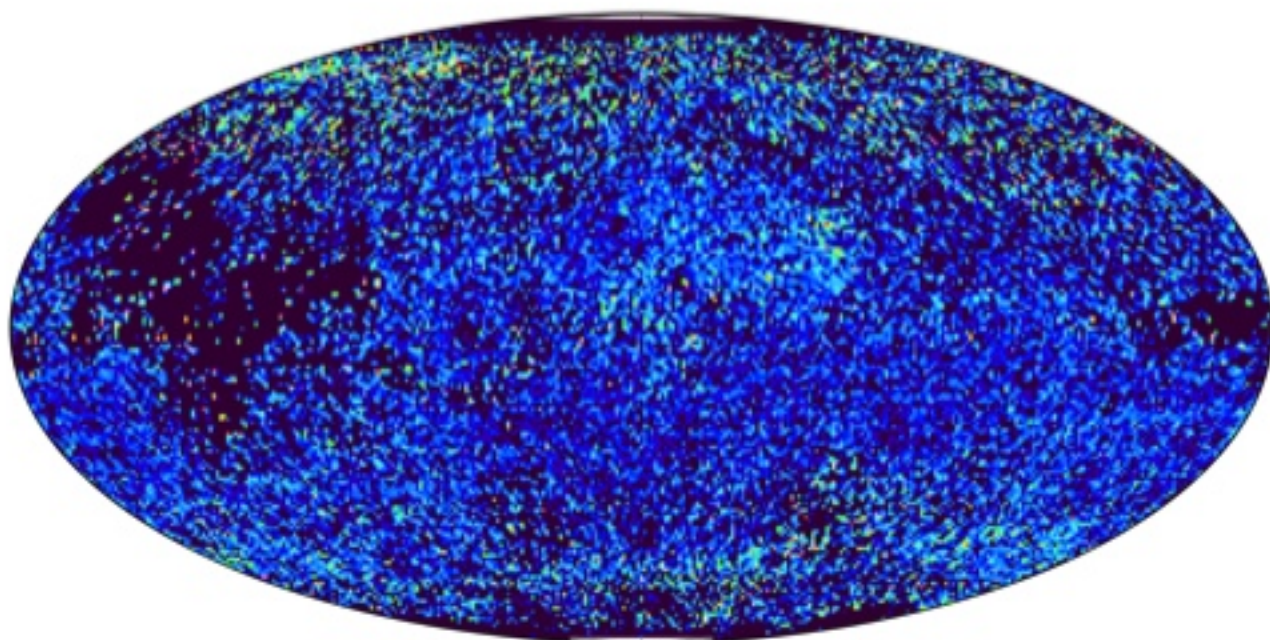
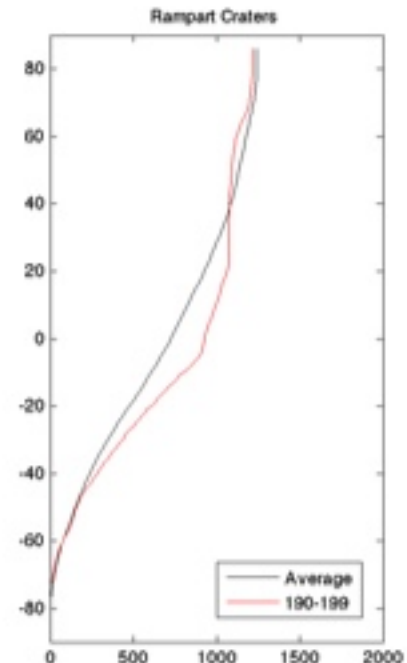
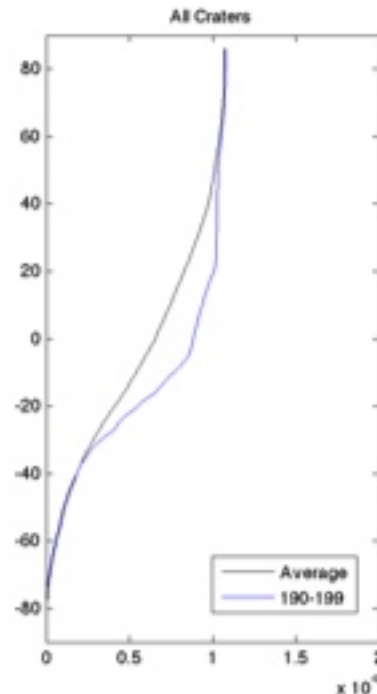
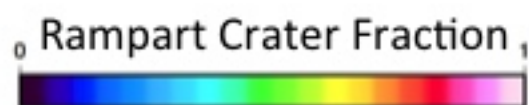
B) 110 km

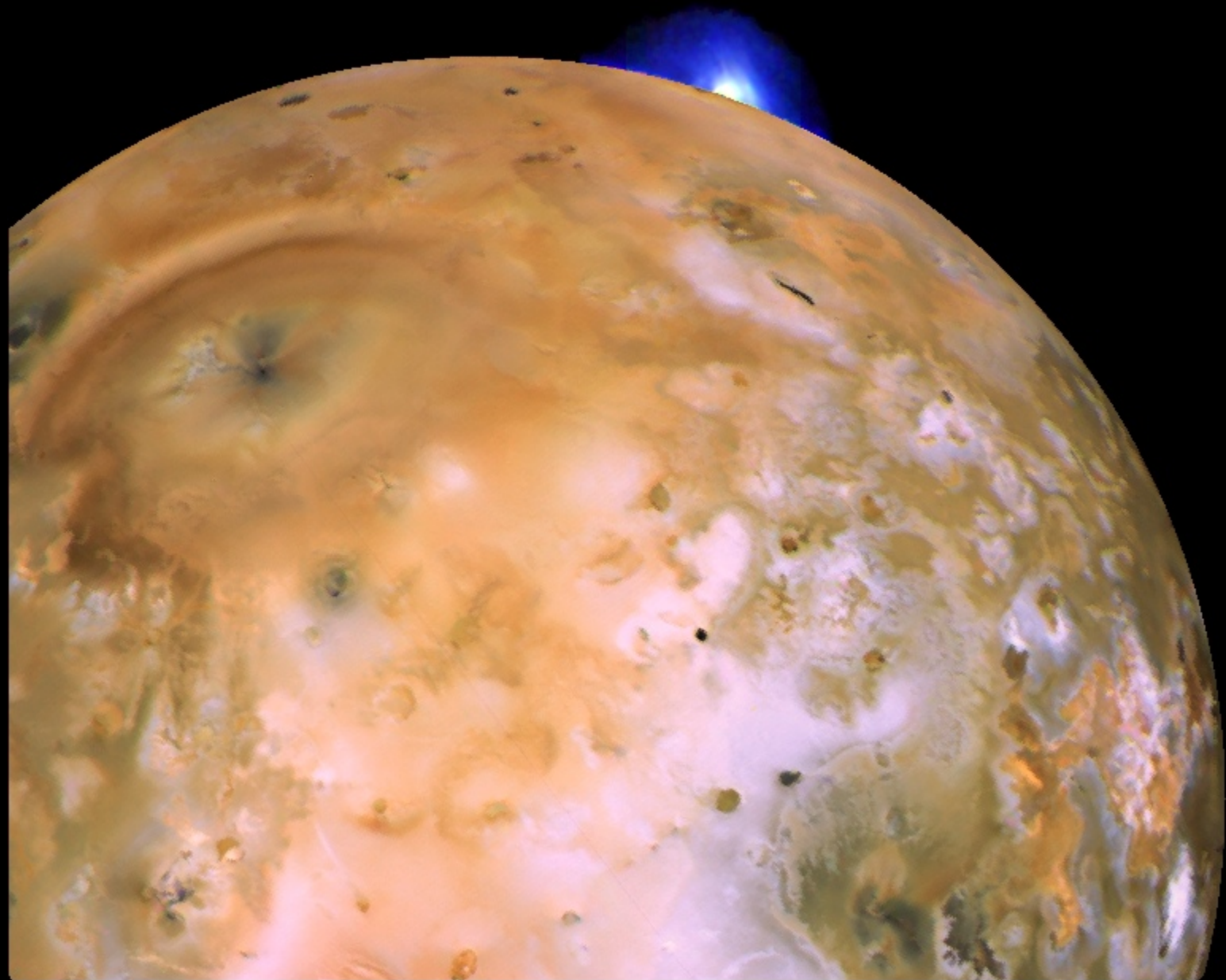


D) 0 km



Martian Rampart Craters





Conclusions

Mars had a magnetic field early in its history.

Martian crust either very strongly magnetized or extending to great depth. Perhaps both.

TPW may have occurred on Mars.

Io, the most volcanically active body, promising candidate

A photograph showing a sunset on Mars. The sky is a gradient of light blue and white, with a small, bright sun visible on the horizon. The foreground is dark and silhouetted, showing the rugged terrain of the Martian surface.

Sunset on Mars (Spirit)