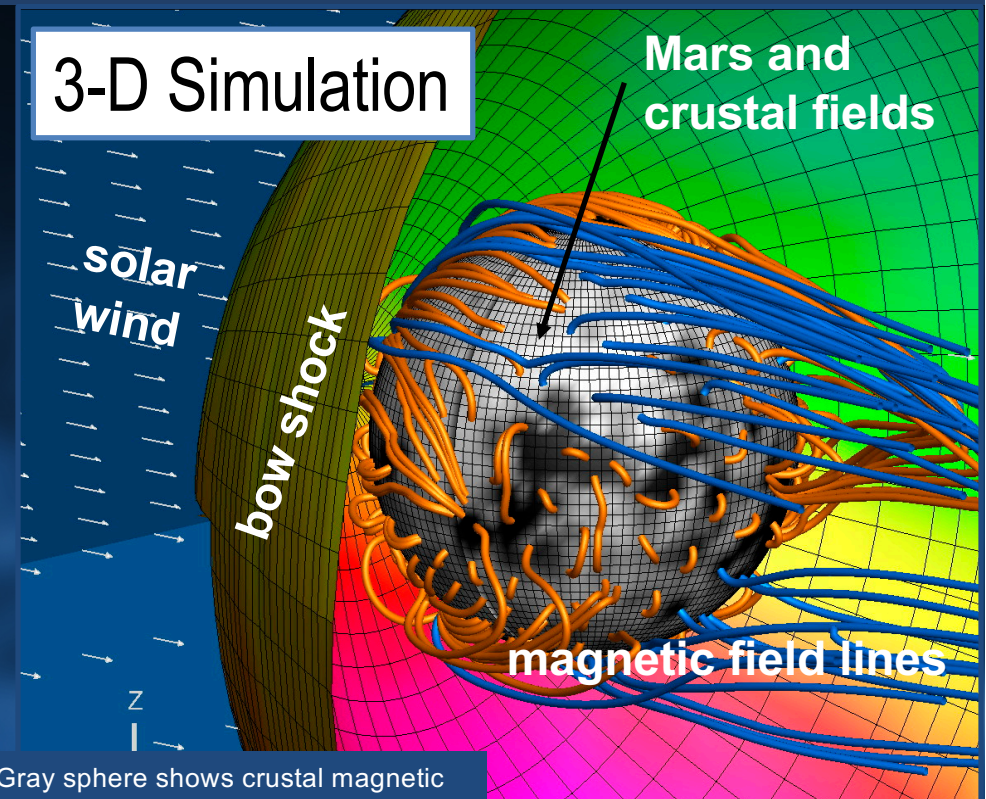


# Crustal Magnetic Anomalies on Mars Control the Solar-Wind Bow Shock

**The non-uniform crustal magnetic fields on Mars affect the shape and location of the bow shock created by the solar wind.**

- Mars has localized crustal magnetic fields instead of a strong global dipole magnetic field like Earth. Contradictory past reports regarding whether the bow shock created by the solar wind is sensitive to the shape of the 'obstacle' presented by Mars' magnetic field were addressed by a new state-of-the-art numerical simulation compared with MAVEN observations.
- Model results and observations agreed well and demonstrate that the magnetic field shape over a broad region collectively affects the most distant plasma boundary of the Mars-solar wind interaction.

*Fang, X., et al. (2017), JGR-Space Physics*



Top: Gray sphere shows crustal magnetic field strength. Magnetic field lines are colored as open (blue) allowing ions and electrons to escape, or closed (orange lines) connecting at both ends to the ionosphere. Bow shock is colored by the degree of asymmetry: Red indicates where the boundary is larger than average, green is smaller, and yellow is close to average.

Right: Observations and modeled distances under similar conditions, show good agreement.

