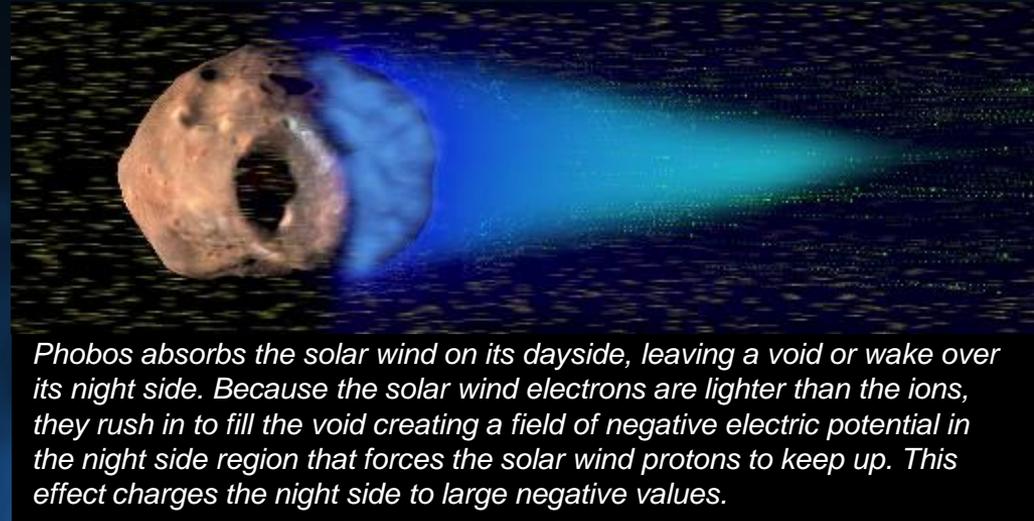


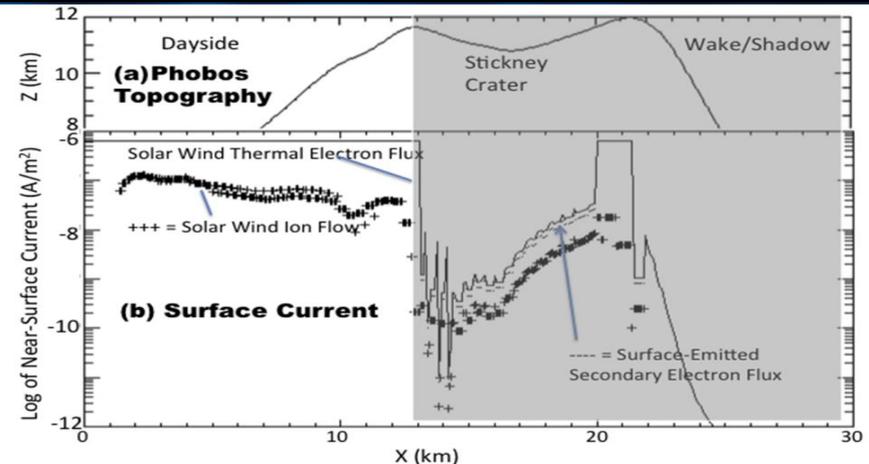
Solar Eruptions Electrify Moons of Mars

- Scientists modeled the flow of the solar wind around Phobos and calculated the buildup of charge on the night side, as well as in obstructed regions in shadow, like Stickney crater.
- Excess charge builds up in these regions during all solar wind conditions, but the charging effect was especially severe in the wake of solar eruptions like coronal mass ejections.
- Powerful solar eruptions could electrically charge areas of the Martian moon Phobos to hundreds of volts of negative potential, presenting a complex electrical environment that could possibly affect sensitive electronics carried by future missions.
- Charges aren't expected to be large enough to injure an astronaut, but spacesuits and equipment should be designed to minimize the hazard.
- This study was a follow-up to earlier studies that revealed the charging effects of solar wind in shadowed craters on the Earth's moon and asteroids

Farrell et al. 2017



Phobos absorbs the solar wind on its dayside, leaving a void or wake over its night side. Because the solar wind electrons are lighter than the ions, they rush in to fill the void creating a field of negative electric potential in the night side region that forces the solar wind protons to keep up. This effect charges the night side to large negative values.



When Stickney crater falls into shadow, the overpassing solar wind is obstructed, leading to a factor of 1000 reduction in solar wind ion and electron flux to the floor of the crater. An astronaut roving in these conditions can not easily dissipate any charge buildup back to the plasma.