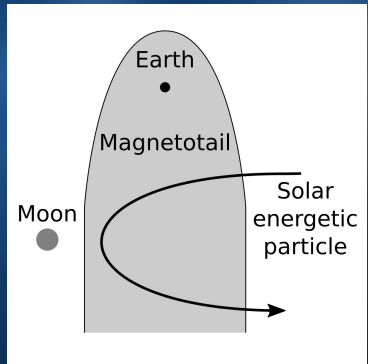


Dielectric Breakdown “Sparking” on the Moon



Cartoon of tiny sparks that may occur on the Moon's cold nightside during large solar energetic particle events.



*Cartoon of Earth's magnetotail deflecting a solar energetic particle from the Moon.
(not to scale)*

The standard view of space weathering on the Moon is that the solar wind and micrometeoroid impacts alter the optical properties of lunar soil. A third process (top figure)—dielectric breakdown driven by solar energetic particles (SEPs)—has also been suggested to contribute to space weathering, although until recently it has been difficult to determine the relative roles of these various processes.

- Luckily, Earth's magnetotail affects only charged particles and not micrometeoroids, so it can help scientist distinguish the effects of these three processes.
- A recent study shows that the magnetotail can deflect SEPs that are traveling across the tail, reducing the flux of SEPs, and causing dielectric breakdown weathering at certain longitudes on the Moon (bottom figure).
- These predictions of magnetotail shielding of SEPs relative to the Moon will be further tested using the Cosmic Ray Telescope for the Effects of Radiation (CRaTER) instrument onboard the Lunar Reconnaissance Orbiter (LRO) to measure energetic particle fluxes as a function of direction when the Moon is near, or just inside, Earth's magnetotail.