Characterizing the Moon's radiation environment

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The radiation environment near the Moon could be damaging to humans and electronics on future missions. To characterize this potentially hazardous environment, the Cosmic Ray Telescope for the Effects of Radiation (CRaTER) on board the Lunar Reconnaissance Orbiter mission, which orbits at 50 kilometers (31 miles) above the Moon's surface, measures the radiation that would be absorbed by either electronic parts or human tissue behind the shielding of a spacecraft.

CRaTER has measured the lunar radiation environment since 2009, during the recent solar minimum. The solar wind is less turbulent during solar minima and thus presents less of a barrier to incoming galactic cosmic rays, so cosmic rays were at a high during that time period. Cosmic rays include various high energy particles, and they create a shower of secondary radiation upon impact with the Moon or a spacecraft's shielding.

Looper et al. ran simulations that model the response of the CRaTER sensor to various energetic particles. The simulations enabled the researchers to extract observations about the radiation environment from observations specific to the sensor. Looking at contributions from galactic cosmic rays, secondary particles, and sensor background, they were able to derive energy spectra for the radiation dose that humans or instruments would absorb in the lunar environment.

More information: Characterizing the Moon's radiation environment, *Space Weather*, doi: 10.1002/swe.20034, 2013.