



## Biting dust in Mars

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In the absence of thunderstorms, how do Martian dust particles get electrically charged? New research has uncovered how solar radiation coupled with galactic cosmic rays (GCR) charge aerosols — the tiny particles suspended in air in the lower atmosphere of Mars<sup>1</sup>. The insights from this research will help in planning future space missions to Mars.

Solar radiation easily penetrates and reaches the Martian surface as there is no ozone layer enveloping the planet. A rain of energetic cosmic rays and solar photons knock out electrons from dust particles generating ions. These ions and electrons attach themselves to aerosols charging them.

The study focused on the charging of aerosol particles between 0 to 70 km altitudes. It was found that solar photons having energy between 4 eV and 6 eV (electron volt) played a vital role in charging the aerosol particles.

The research found that GCR are the only source of ionization at night. During daytime, solar photons join cosmic rays to remove electrons from aerosols. At night, only positive and negative ions are found. More than 60% of ions get attached to aerosols that are close to the surface. Most of the ion aerosol attachment occurs at altitudes less than 30 km. More than 95% electrons bind to aerosols close to the surface.

The findings of the research are significant as theory. Laboratory experiments and field measurements on earth suggest that the electrically charged Martian dust storms are potential hazards to landers.

### • References

1. Michael, M. *et al.* Dust charging and electrical conductivity in the day and nighttime atmosphere of Mars. *J. Geophys. Res.* 113, E07010 (2008) | [Article](#) |