

Earth's Magnetic Field - A Hazard For Lunar Astronauts?

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For four days every month the Moon passes through the magnetic field of the Earth and parts of the lunar surface are charged with static electricity. Next week Dr Mike Hapgood of the Rutherford Appleton Laboratory will present a model at the Royal Astronomical Society National Astronomy Meeting in Preston, which suggests that this charging may increase after the year 2012 and become an important issue for future lunar explorers.

Once in every orbit around the Earth the Moon moves through the magnetic tail - the region on the nightside of the Earth where the

magnetic field is drawn out into a million or more kilometre long tail pointing away from the Sun. In the middle of the tail there is a region full of energetic electrons and other charged particles (the plasmasheet).

When the Moon passes through the plasmasheet these electrons can collect on parts of the lunar surface and charge them with static electricity. Observations from NASA's Lunar Prospector spacecraft during 1998 confirm the existence of this charging.

Dr Hapgood's model suggests that the exposure of the Moon to plasmasheet charging varies markedly over an 18-year cycle linked to changes in the Moon's orbit. This exposure was low at the time of the Apollo landings in the early 1970s and is low again today - but it was high in the 1990s and will rise again after 2012. The United States, Russia, India, Japan and China have all announced plans to send astronauts back to the Moon around the year 2020 – at the time when lunar surface charging is predicted to be high.

Lunar surface charging may be an important issue for future lunar exploration because it increases the risk of electric discharges, which can interfere with and damage sensitive electronics. It may also affect the behaviour of lunar dust, which is a recognised hazard for lunar astronauts as it can easily enter spacesuits, living quarters and equipment.

Dr Hapgood comments, “Electrical charging is one of the less well-known natural hazards of spaceflight. It's important to understand it how this affects the Moon so spacecraft designers can use scientific knowledge to protect future explorers.”

Source: Royal Astronomical Society

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