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Increase in cosmic rays may affect spaceflights

Cosmic rays from outside the solar system, which can harm astronauts, spacecraft computers and electronic systems, are increasing and are now at a "space age" high, according to NASA researchers.

Cosmic rays are very-high-energy particles that originate in explosions of massive stars elsewhere in the Milky Way galaxy. They travel at nearly the speed of light and strike the Earth from all directions.

People on Earth are not in danger from the rays since the planet is surrounded by a protective shield created by its atmosphere and magnetic field. Earth is also protected by activity on the sun, which creates a hard-to-penetrate bubble — called the heliosphere — of wind and magnetic field around the solar system. However, there has been a lull in solar activity since around 2007, and research shows that when solar activity goes down, that natural shielding is weakened and more cosmic rays reach Earth.

"Right now we are in a very extended solar minimum, with the lowest level of solar activity in about 100 years," according to California Institute of Technology's Richard Mewaldt, one of the scientists analyzing data received from NASA's Advanced Composition Explorer spacecraft. (The spacecraft is in solar orbit about a million miles from Earth.) In an e-mail, Mewaldt said that cosmic ray intensity in 2009 is about 20 percent higher than solar-minimum periods of recent decades, and if this trend continues, "NASA may want to reconsider how much shielding is required if astronauts return to the moon."

Mewaldt added that scientists have been able to monitor cosmic rays' effect on Earth going back about 1,000 years by examining polar ice cores. When the rays hit Earth's atmosphere, they produce the radioactive beryllium-10 isotope, which is preserved in year-by-year layers of polar ice when it settles out of the atmosphere and is covered by snow. Those ice cores show that "in about 1700 the cosmic rays intensity was more than twice as high as it was during most of the space era. So we may be returning to the levels of past centuries."

— *Margaret Shapiro*