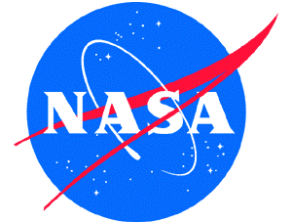


NASA INFORMATION

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Radiation Effects

Early in the evolution of the space program, radiation was recognized as a hazard to humans traveling in space. Outside the Earth's protective atmosphere, the harmful radiation that astronauts are exposed to can lead to cell damage and increase their chances of developing cancer.

Monitoring of crew radiation exposures was initiated during Project Mercury and has continued through the current International Space Station Program. The space radiation environment is significantly different from that found terrestrially.

Space radiation primarily consists of high-energy charged particles, such as protons, alpha and heavy ions, originating from several sources, including galactic cosmic rays, energetic solar particles from solar storms and trapped radiation belts.

Some of these high-energy particles inflict greater biological damage than that resulting from typical terrestrial radiation hazards. The biological risks of continuous exposure to high-energy galactic cosmic rays include cancer, cataracts, and other degenerative diseases related to accelerated aging. Because the radiation types in space are different than those on Earth, the greatest challenge to radiation protection in space is developing accurate methods to estimate these risks. Until the biological risks can accurately be estimated, conservative safety margins will be applied to mission operations.

Scientists at Johnson Space Center are busy developing improved methods to protect astronauts including an early warning SPE system to detect radiation effects in astronauts, the use of new hydrogenous shielding materials, and scheduling of missions and tasks. Researchers are considering the basic biology that will help estimate the individuals at "less risk," and development of biological countermeasures such as anti-oxidants and pharmaceuticals.

Learning how to keep astronauts safe from space radiation may help reduce risks for people who are exposed to different kinds of radiation on Earth.