HUMAN EXPLORATION

NASA's Journey to Mars

EARTH RELIANT

MISSION: 6 TO 12 MONTHS
RETURN TO EARTH: HOURS

Mastering fundamentals aboard the International Space Station

U.S. companies provide access to low-Earth orbit

PROVING GROUND

MISSION: 1 TO 12 MONTHS
RETURN TO EARTH: DAYS

Expanding capabilities by visiting an asteroid redirected to a lunar distant retrograde orbit

The next step: traveling beyond low-Earth orbit with the Space Launch System rocket and Orion spacecraft

MARS READY

MISSION: 2 TO 3 YEARS
RETURN TO EARTH: MONTHS

Developing planetary independence by exploring Mars, its moons and other deep space destinations

www.nasa.gov

The Human Research Program

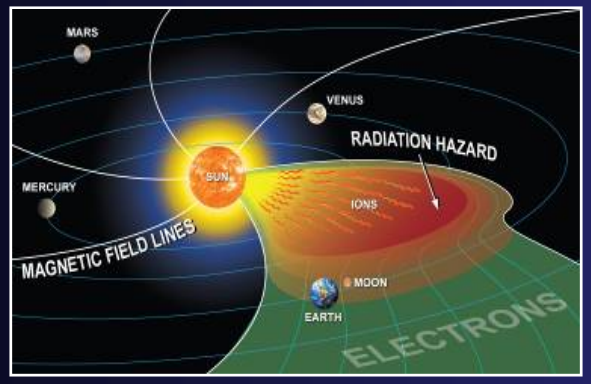
The Human Research Program (HRP) investigates and mitigates the highest risks to human health and performance, providing essential countermeasures and technologies for human space exploration. Risks include physiological effects from radiation, hypogravity, and terrestrial environments, as well as unique challenges in medical support, human factors, and behavioral health support.

http://humanresearchroadmap.nasa.gov/

NASA Space Radiation Program Research Priorities

Space Radiation Program Element

- *Risk of Radiation Carcinogenesis from Space Radiation Exposure*
- *Risk of Acute or Late Central Nervous System Effects from Space Radiation – inflight cognitive or behavioral changes that impact mission success and late neurological disorders*
- *Risk of Cardiovascular Disease and other Degenerative Tissue Risks from Space Radiation*
- *Acute Radiation Risks from Solar Particle Event Exposure – prodromal risks, immune system dysfunction and skin injury that jeopardize crew health and mission success*



Research Opportunities

Space Radiation Program Element

Human Exploration Research Opportunities (HERO)
Solicitation: NNJ13ZSA002N
http://nspires.nasaprs.com/external/

- **Appendix A:** NASA Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions
- **Appendix B:** The National Space Biomedical Research Institute (NSBRI) Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions
- **Appendix C:** NASA Human Research Program Omnibus Opportunity
- **Appendix D:** Differential Effects on Homozygous Twin Astronauts Associated with Differences in Exposure to Spaceflight Factors
- **Appendix E:** Ground-Based Studies in Space Radiobiology
- **Appendix F:** International Life Sciences Research Announcement (ILSRA)
- **Appendix G:** NASA Specialized Centers of Research (NSCORs) for Ground-Based Studies in Cancer Risks and Cognitive and Behavioral Central Nervous System Risks from Space Radiation
- **Appendix H:** Behavioral Health and Performance

2015 NASA Space Radiation Summer School:
http://spaceradiation.usra.edu/nsrss/

Information on Space Radiation Health Risks:
three.usra.edu