

Presentation to the President's Commission on Moon, Mars and Beyond



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Sources of Risk



- Reduced-gravity environment
- Environment inside vehicle/habitat
- Environment outside vehicle/habitat
- Psychological and psychosocial stress



Major Risks for Long Duration, Long Distance Journeys



- Psychological and psychosocial challenges
- Cosmic and solar radiation



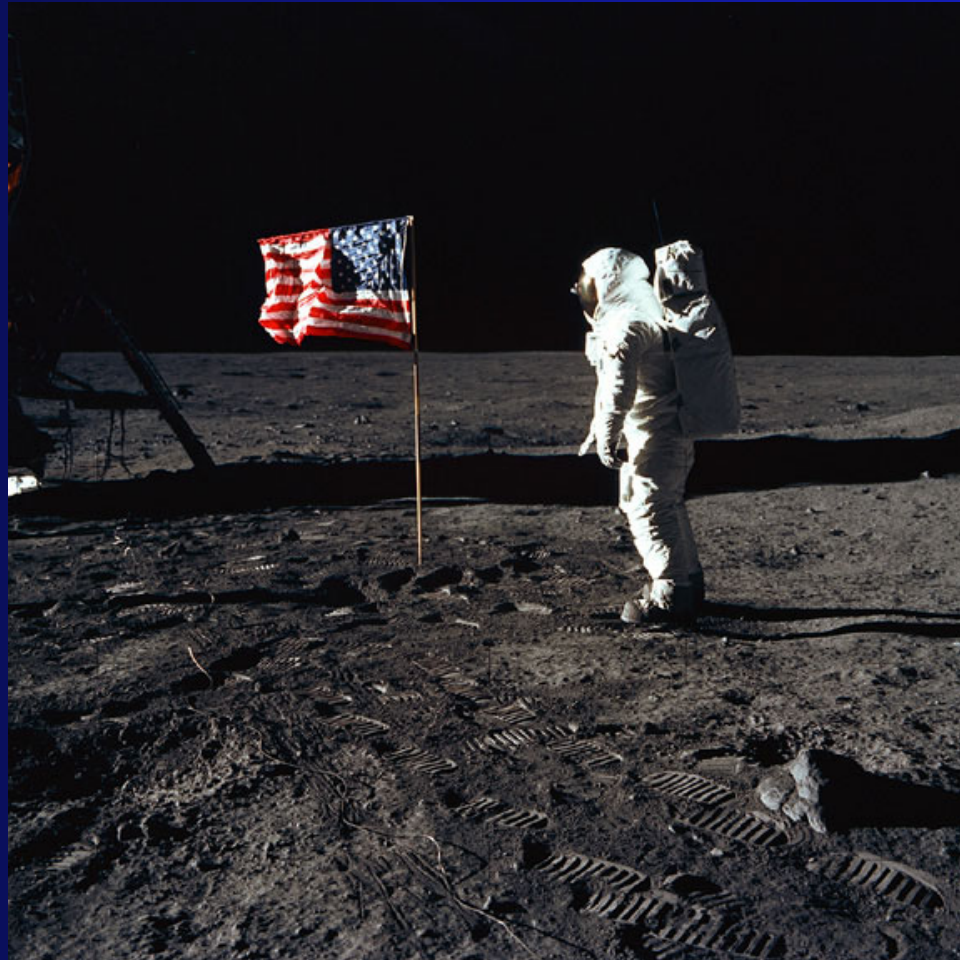
Other Significant Risks



- Loss of bone mineral
- Cardiovascular changes
- Muscle and strength loss
- Neurological changes
- Immune deficiency
- Inadequate nutrition
- Extensive extra vehicular activity (EVA)



Requirement for Advanced Life Support



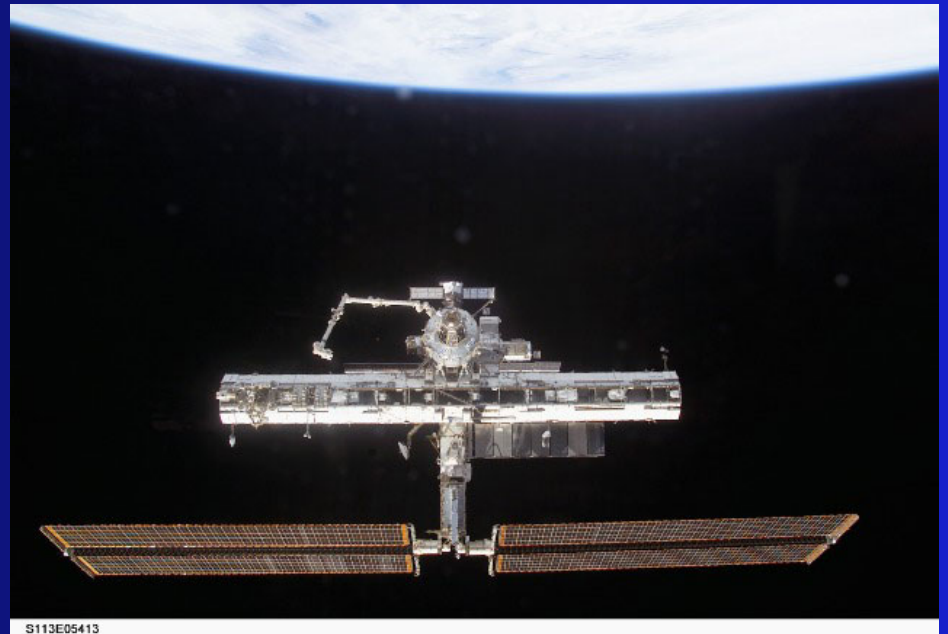
Types of Countermeasures



Platforms for Research and Testing



- International Space Station
- Moon
- Analogs on Earth



Conclusion



- Participants
- Commitment
- Payoff

