

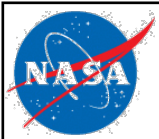
Humans and Robots Together on Mars Panel Discussion

Humans to Mars Summit 2022
Washington DC

Hoppy Price

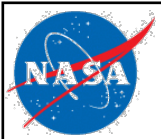
Jet Propulsion Laboratory
California Institute of Technology

May 18, 2022



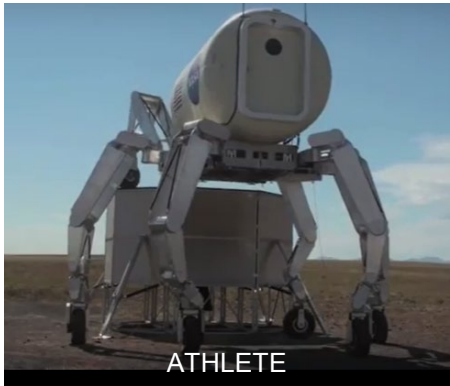
Utility of Robotic Vehicles for Human Exploration

- Human missions to Mars would require robotic interacting with human vehicles and systems to provide a number of functions, including overhead and surface reconnaissance, telecommunications relay, logistics placements and transfers, teleoperated access to extreme terrain and special regions, and surface element mobility, inspection, and maintenance
- Robots would most likely be required for any ISRU operations, including mining and processing of material
- Artemis Lunar surface robotic elements would be important for developing technologies, systems, and operations, and for retiring risks for human/robotic systems
- Robotic vehicles are integral to architecture and programmatic planning for crewed missions to Mars
- The synergy and interaction between human and robotic systems needs to be planned for in an integrated way



Robotic Vehicle Concepts to Support Human Missions

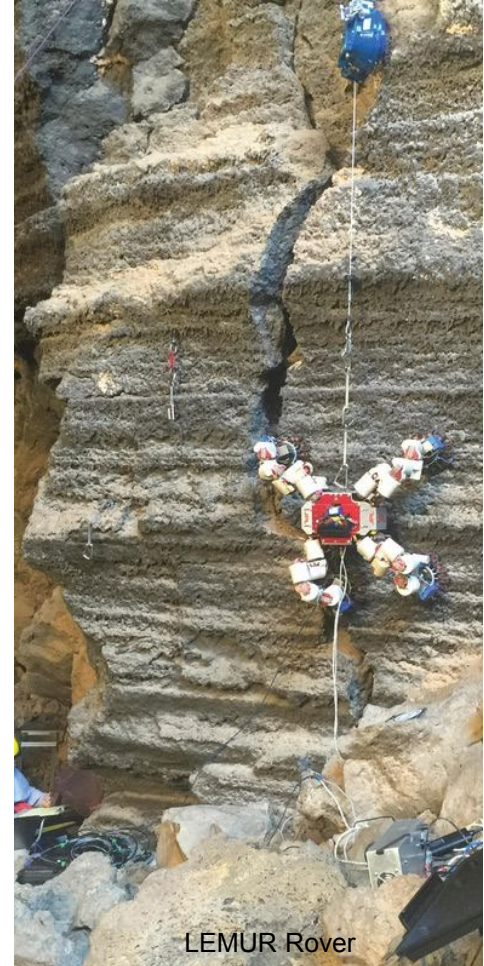
- ATHLETE type vehicles to relocate large elements
- Civil engineering type vehicles for digging and moving regolith, site preparation, and other construction
- Moderate to deep drilling systems
- Fine manipulator rovers to configure crew transfer tunnels, ISRU connections, troubleshooting and contingency deployment of arrays and radiators, perform inspections and repairs
- Telecom relay rovers
- Teleoperated sterilized rovers for special regions
- Extreme terrain exploration rovers (cliffs, caves)
- Helicopters for reconnaissance, telecom relay, other functions



ATHLETE



DuAxel Rover



LEMUR Rover