LOCKHEED MARTIN

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LEO Satellite Operations

With LEO becoming more congested and collisions more likely, improved accuracy of trajectory forecasting is necessary:

- With current capabilities, error ellipses for satellite orbits grow quickly with forward propagation, resulting in:
  - Tracking & monitoring challenges
  - Excessive conjunction warnings

- With increasing traffic in LEO, the challenge will only increase, becoming a large burden for all operators, and possibly beyond the capabilities of small operators

- Increased traffic holds the opportunity for additional measurements, and corresponding improvements in thermosphere modeling and forecasting

GEO & Space Domain Awareness

Greater spatial fidelity forecasting and nowcasting of the near-Earth environment is needed for improved SDA:

- Improved local environment nowcasts would assist with anomaly resolution
  - Significant interpretation and interpolation is left to the end user
  - Challenging for large operators, beyond the ability of smaller operators

- Improved local environment nowcasts would support SDA & attribution

- Improved accuracy and lead time of SWx forecasting and nowcasting is needed throughout

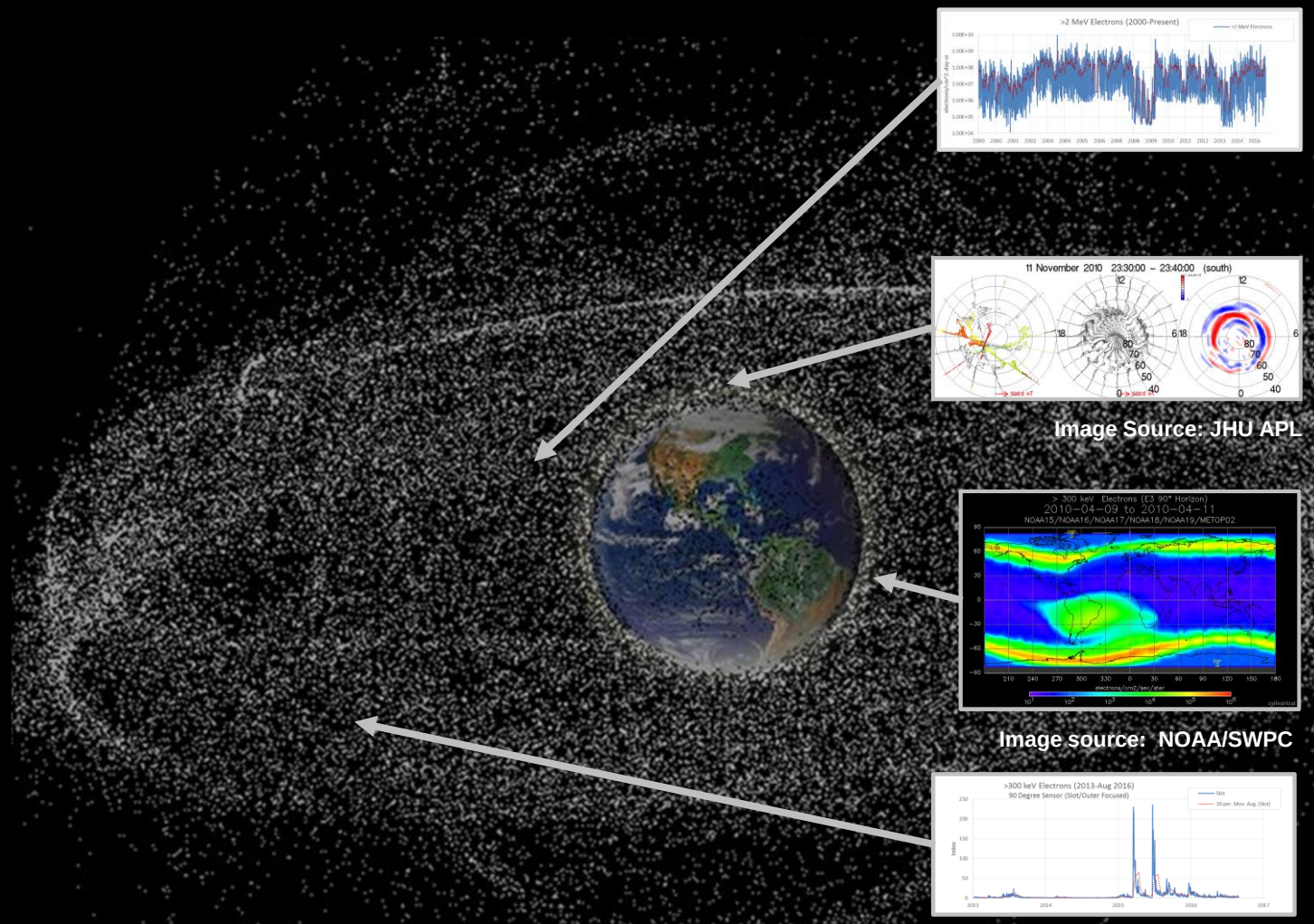
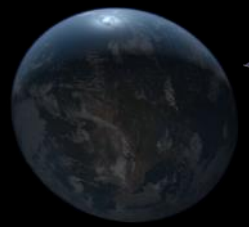


Image Source: JHU APL

Image source: NOAA/SWPC

Future Space Exploration



ISS

Orion

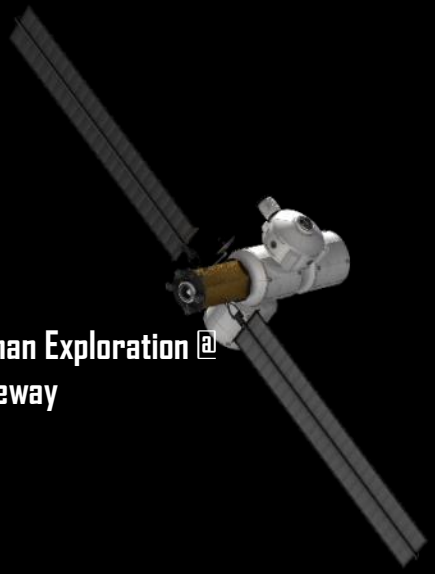
Mars Transit

Deep Space Missions

Science Orbiters

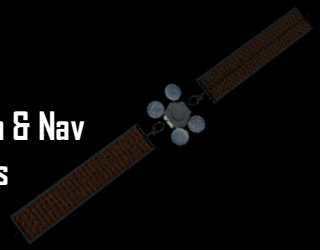
Heliophysics

Astrophysics



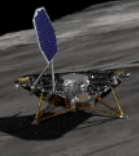
Human Exploration @ Gateway

Mars Surface & Sample Return



Comm & Nav Relays

Human Landers



Landers

Power

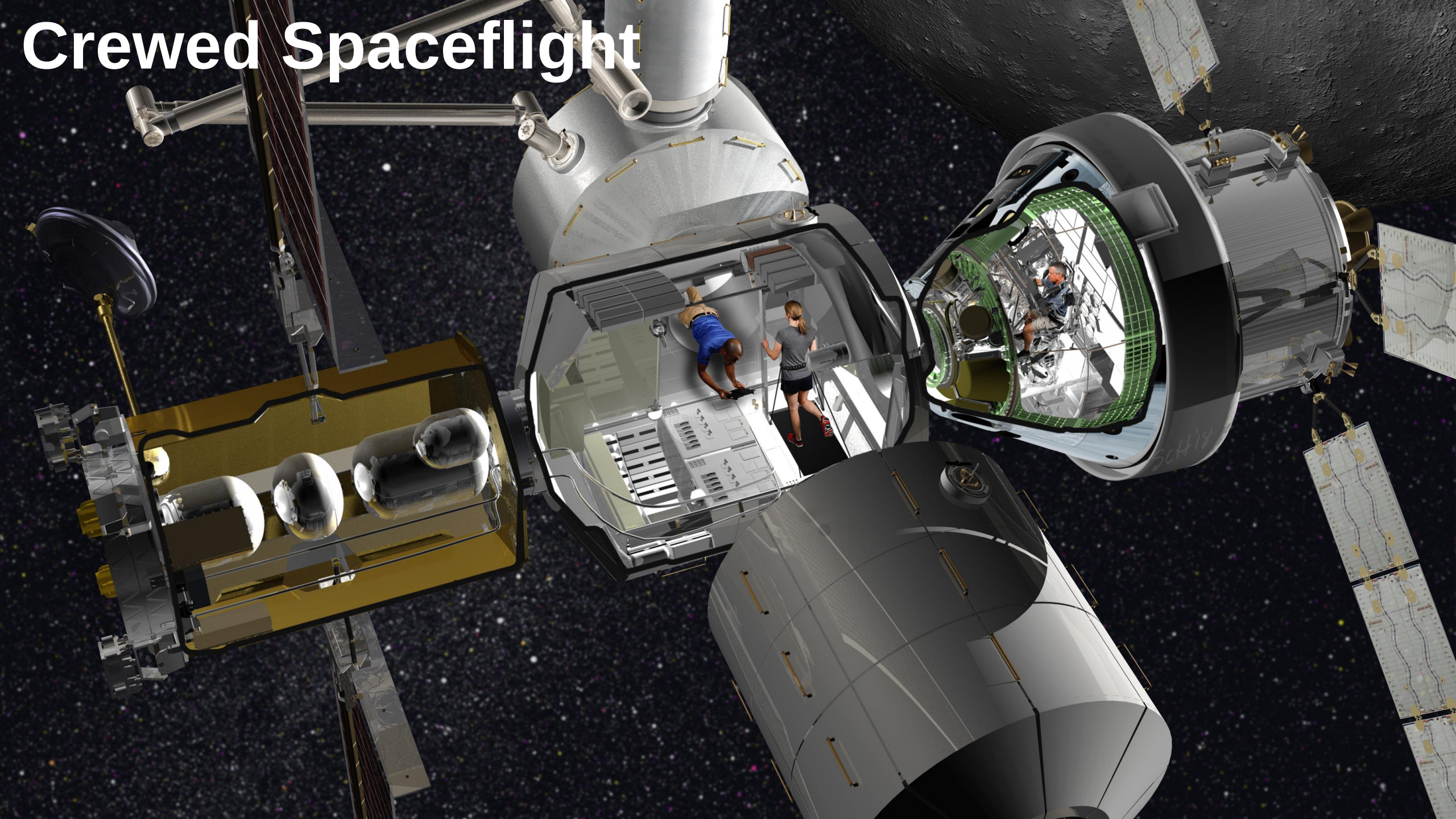
Rovers

Habitats

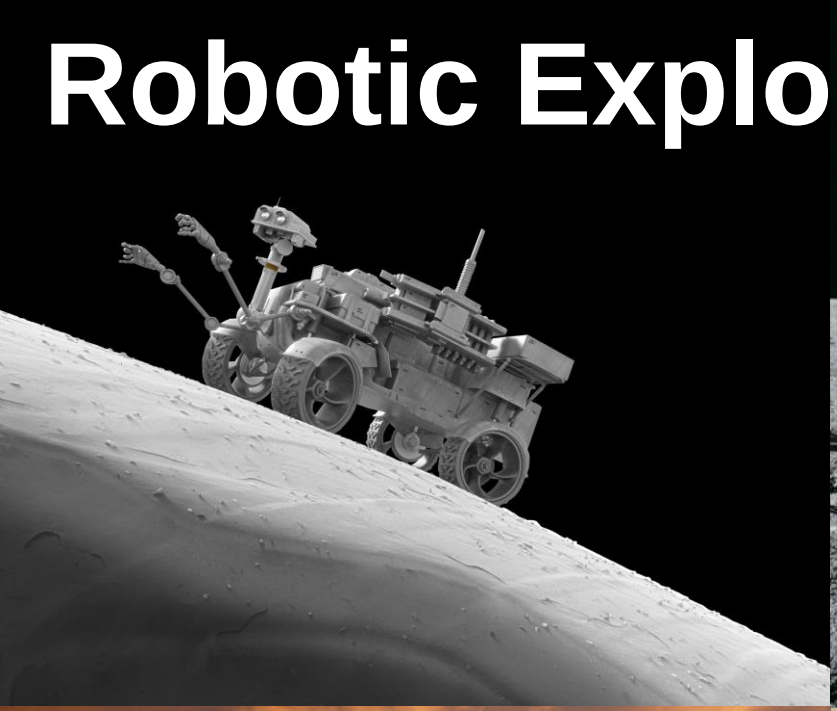
In-Situ Resource Utilization

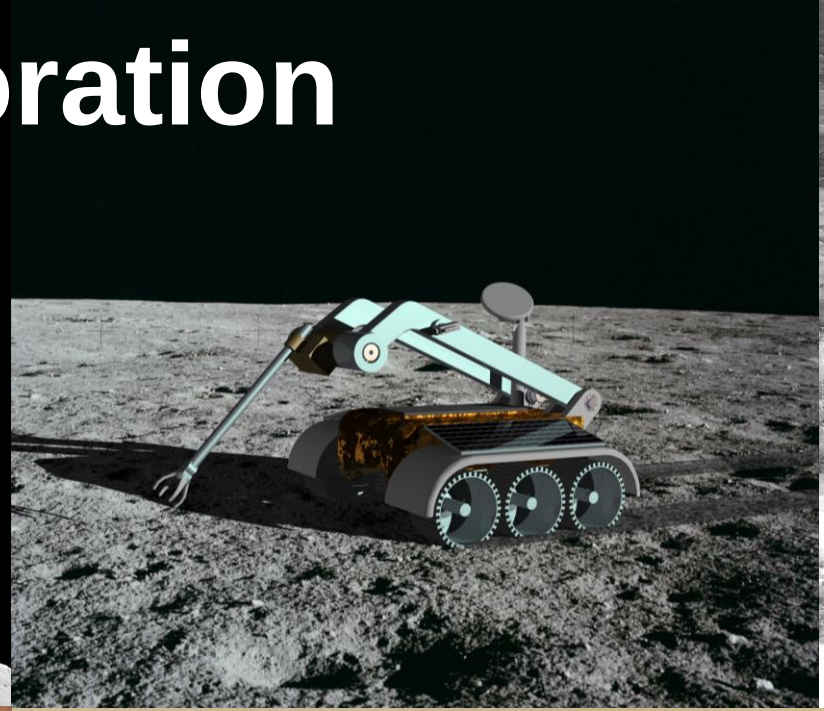
Some Images Courtesy of NASA

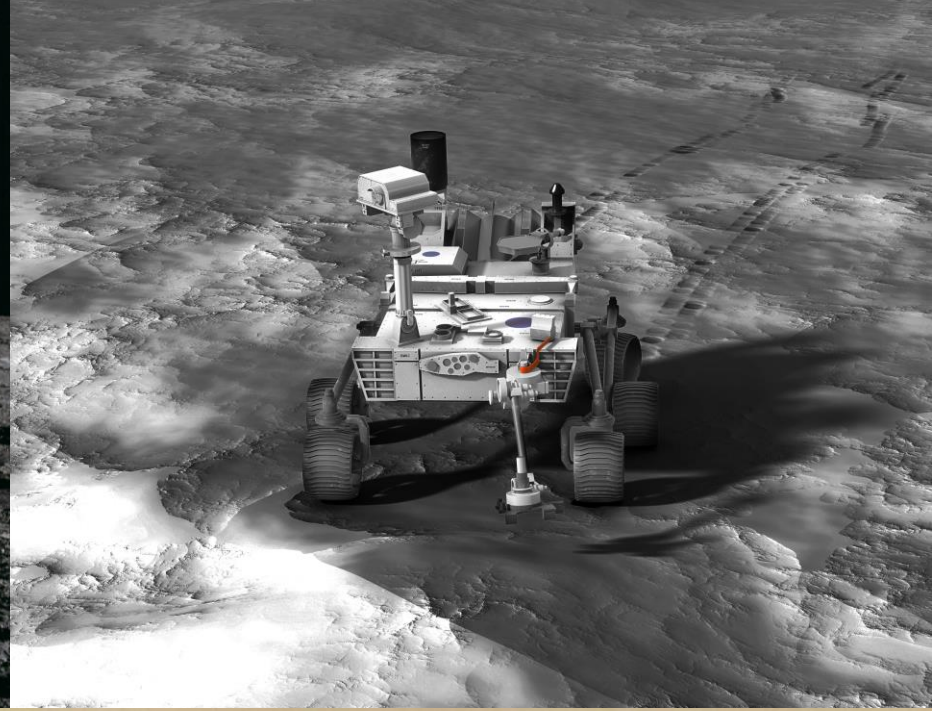
Crewed Spaceflight

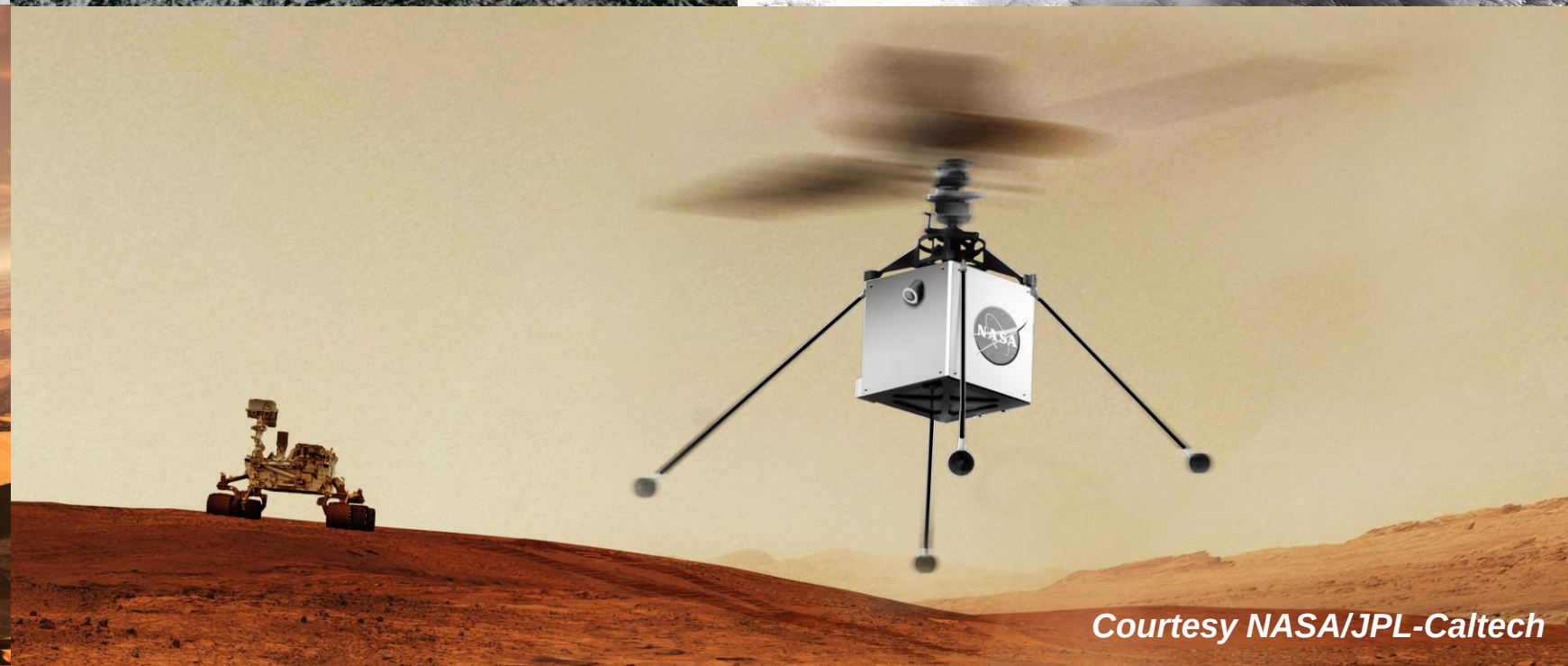


Robotic Exploration









Courtesy NASA/JPL-Caltech

Questions?