

How does a sustainable lunar exploration program benefit lunar science and solar system exploration?

Summarized by Jeff Taylor

Sustainable exploration: benefits
to science

Reminder: Science is not the driver for exploration

It is, however, a beneficiary of any lunar exploration and especially of sustained exploration.

Sustainable exploration: benefits
to science

Robotics is Central to Human Exploration

- Astronaut time will be limited
 - 17% (?) of their time will be available for exploring surface, doing all types of science, basic and applied
 - Some science, esp. field studies, require lots of time
- Implications:
 - Permanent habitation necessary to maximize human-enabled science
 - Robotics can greatly enhance human exploration

Sustainable exploration: benefits
to science

Robotics is Central to Human Exploration

- Robotics can be early and continued
- Exact implementation and goals for robotic exploration not agreed upon, but the concept of robotics as an integral part of lunar exploration seems to be universally accepted
- Particularly useful for:
 - Reconnaissance
 - Repetitive tasks (e.g., surveys)
 - Revisits to human field sites (e.g., systematic sampling and site documentation)

Sustainable exploration: benefits
to science

Site Diversity vs Single Outpost

- Trade off between number of sites and duration of human visits
- Permanent settlement leads to exploration of a great diversity of sites over time through evolving transportation system

Sustainable exploration: benefits
to science

Science is more than lunar science

- Physics, particularly when making use of the lunar environment (1/6 g, vacuum)
 - Fundamental understanding of processes such as surface chemistry and physics
 - Significant synergism between ISRU and physics of materials, such as how to handle regolith
- Biology is essential for learning how humans can live and work on another world