

Lunar Life Sciences Lander Mission: Precursor for Mars

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The Life Sciences Lunar Lander mission will address Goal #6 as outlined in the NASA Astrobiology Roadmap by examining the “potential for survival and biological evolution beyond the planet of origin”. Lunar environmental conditions as well as their effects on terrestrial biological systems will be characterized.

Lunar conditions to be measured include radiation levels, ambient light levels, thermal regime, dust properties, and complex soil chemistry. In addition to characterizing the lunar environment, the biological effects of the relevant parameters will be assessed using a plant growth chamber. Plants are complex terrestrial biological organisms and as such are superb models of biological systems to send to the Moon and Mars in precursor

biological experiments. Plants are highly responsive to gravity and radiation, able to be genetically manipulated, easy to transport and handle as seeds, and there are few regulations for their use, all of which also contribute to their suitability as experimental tools for the advanced research required for the biological exploration of space. The payload of such a plant growth experiment would be a set of plant growth modules, suitable controls, and analytic capability.

Additionally, the growth of a single plant on another planetary surface would be a powerful symbol of the long-term vision of life expanding beyond the Earth, first to the Moon, then to Mars, and then beyond.