

Results of the Concepts and Approaches for Mars Exploration Workshop

Biocompatibility Session

Presented to the Mars Architecture Synthesis
Retreat
August 2000

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Biocompatibility Session Perspective

Biocompatibility links space science and human exploration through a common interest in learning how the surface environment has influenced the past and present distribution of water and life and the implications of the environment for sustaining life (including humans) on Mars.

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Topics

- Biological growth (4 abstracts)
- Environment (13 abstracts)
 - Dust
 - Water
 - Oxidants
 - Boundary layer physics and chemistry
 - Radiation
- Resources (6 abstracts)
 - Atmosphere
 - Subsurface
- Habitation, etc. (3 abstracts)

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Primary Recommendations

- Both Space Science and HEDS have an interest in a better understanding of the near-surface environment of Mars, including the subsurface and the atmospheric boundary layer. Attention should be given to the coupling between the two, particularly in the case of water. A wide variety of capable instruments is available for flight.
- ISRU technologies have implications for both robotic and human missions and should be developed in a fashion that integrates the interests of both types of missions.
- The effects of electrical charging near the Martian surface may have been underestimated. Active experiments to establish the degree to which this may be a problem are recommended.

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Additional Points

- A common set of environmental measurements (T, P, wind velocity, humidity, electric fields, etc) using simple, lightweight sensors, should be made from every landed spacecraft
- Ground based studies using simulation capabilities should focus on the potential for the Martian soil/environment to support life processes
- A complete understanding of the radiation environment will require measurements made between the Earth and Mars and at multiple surface locations, made at different times in the solar cycle. Spending must be balanced with ground-based research on the biological effect of this radiation.
- A focused “follow the water” approach should include detailed subsurface exploration, beginning with an advanced orbital radar sounder, followed by a network of geophysical surface instruments and local deep drilling; for human exploration, additional consideration should be given to nearer-term sources of accessible water