

MEPAG 38, Proposed White Paper: Survey for Resources to Build a Permanent Mars Settlement

1. Title: **Survey for Resources to Build a Permanent Mars Settlement**

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4. Description:

This is help bridge a gulf between those experienced with current Mars science missions, and those hoping to send people permanently to Mars.

Different information is needed from a geological survey of Mars, if the survey is for scientific geologic information, or if it will be used to choose a location for constructing a permanent Mars settlement, and design equipment needed for construction.

There is significant interest outside the scientific community for early, permanent settlements on Mars.

This assumes we will construct structures on Mars from local materials.

We need enough information in advance to choose a site with a wide range of usable raw materials.

They should be easy to excavate, refine into construction materials.

And, we should know the properties of the regolith to design the equipment well in advance.

The choice of possible building materials will greatly affect the architectural designs.

Examples of construction material choices may include: cast basalt, basalt fiber, polymers, various concretes, sintered bricks, as well as nutrients available for plant food growth.

For planning, we need data such as: impurities of local ice, melting point of local basalt, regolith and dust, strength of resulting cast basalt, strength of resulting spun basalt or fiber glass, perchlorates and other dangerous chemicals or minerals. Other properties of the regolith are needed to design excavation equipment, and separation of regolith into aggregates, sand, rocks and dust.

The proposed white paper should identify:

Possible construction materials needed.

Likely technologies to refine raw materials into building materials; and

Information needed in advance about local regolith to design construction equipment.

How to identify good settlement sites from orbit.

5: Status: Proposed.

6: Involvement / Collaboration

Additional co-authors and specialty experts are welcome, such as in geology material science, remote sensing, etc.