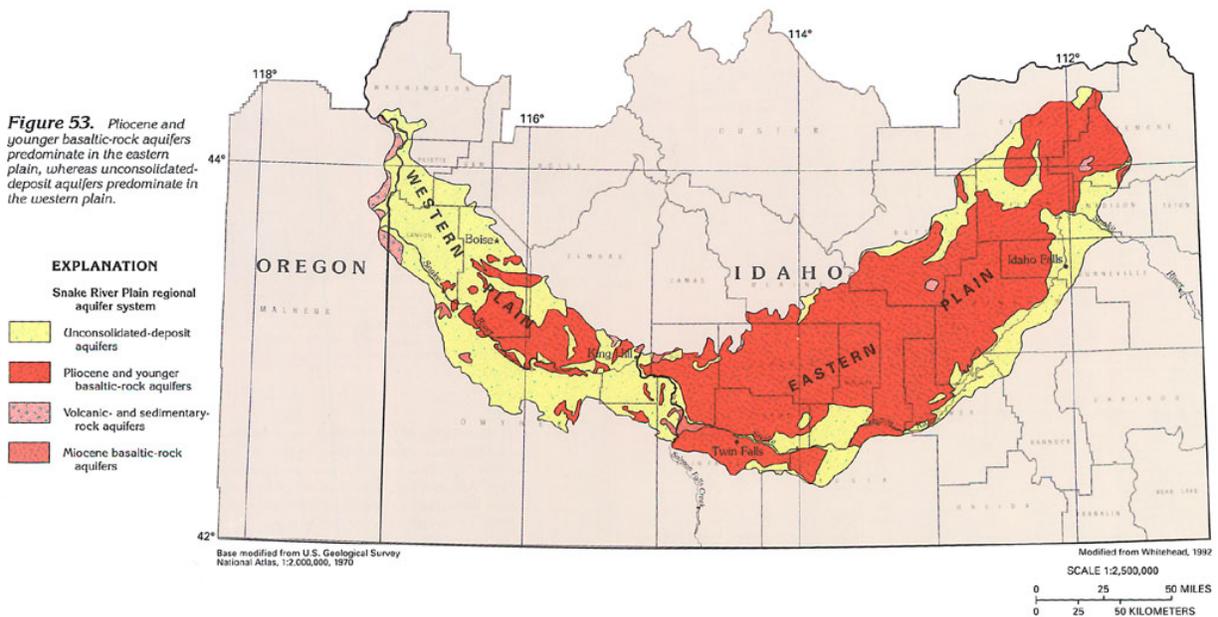




OUTBOUND #10 NOVEMBER 10, 2018

Where Basalt is found in the continental United States



Snake River, southern Idaho, & Craters of the Moon Nat. Mon.

The Columbia River Basalt Group Stretches from Oregon to Idaho

Courtesy of Oregon L5 Society members Bryce Walden and Cheryl York, I had the privilege of **walking and crawling through a pair of lava tubes outside Bend, Oregon, in 1992**. There was one mini-tunnel connecting the two, and I was slim enough (still am) to make it from one to the other.

Meanwhile, a long awaited opportunity to visit **Craters of the Moon National Monument** in South Central Idaho, remains on my travels wish list (via airports in Boise, Idaho or Salt Lake City, Utah.)



Of course, **the Hawaiian Islands are 100% basaltic.**

Probably in some inverse ratio to gravity, lunar lava tubes are expected to be considerably larger in width (about a hundred yards/meters or so) as well as in average depth below the surface. In many areas, where the tube is too close to the surface, the tube “roof” has caved in, creating an open “rille” valley.

We expect that lavatubes, intact, or collapsed, will be of intermediate size on Mars. The higher the gravity, the smaller the tube. These tubes form in episodes of basaltic flooding.

Lavatube rubble is sheer basalt. Funny, how this most primitive of materials has become the most valuable as we have come to realize **the construction value of basalts: cast, carved, and above all, basalt fiber.**

Basalt and nearby water-ice partially filled craters in the Mare Frigoris area on the Moon will become the basis of industrial civilization on the Moon. **We have not yet found such a basalt/water pair location on Mars. Finding or not finding it could spell the success or failure of settlements on the red planet.**

NASA “IS” looking for subsurface water flows on Mars, but this search seems to be of less importance than the search to find signs of life on Mars, although such signs will only be found where water still does flow underground.

Two big retarding obstacles are 1) the long time it takes for a probe from Earth to reach Mars, and 2) concentration on finding still living life forms on Mars, instead of looking for places where life is most likely to have formed and survived, where basalt and water meet to offer prime sites for human settlement.

Mars probes are very expensive to construct, and the priority is on minimization of weight. Whereas we can send probes to the Moon at any time, openings for Earth to Mars flights are more than 2 years apart. All the more reason to choose the right instruments and the right landing places.

NASA’s Curiosity rover has been an amazingly capable machine. But it is limited in the area it can rove. While the chosen site is one where many kinds of Mars soil converge, the “find” which is of far more importance than any other, is of water, a substantial flow of water, has not been detected.

Basalt here on Earth

While the resourcefulness of basalt has not been utilized here on Earth where we have so many other resources, notably wood, it would be good to establish a much larger Mars Analog Research Station in one of the basaltic areas of America noted above, in Oregon and Idaho. Here we could make the habitat cylinders out of cast basalt, more conveniently a paired “quonset” structure, with two floors. The end caps would be made of cast basalt also, as will be furniture (bed headboards, tables, desks, cabinets, etc.

Lamp bases and planters and tubs could be made of carved basalt.

Fabrics (curtains, drapes, mattress exteriors could be made of basalt fibers) while basalt fiber mattress and cushion cases could be filled with small basalt balls which would rearrange themselves under a person’s weight;

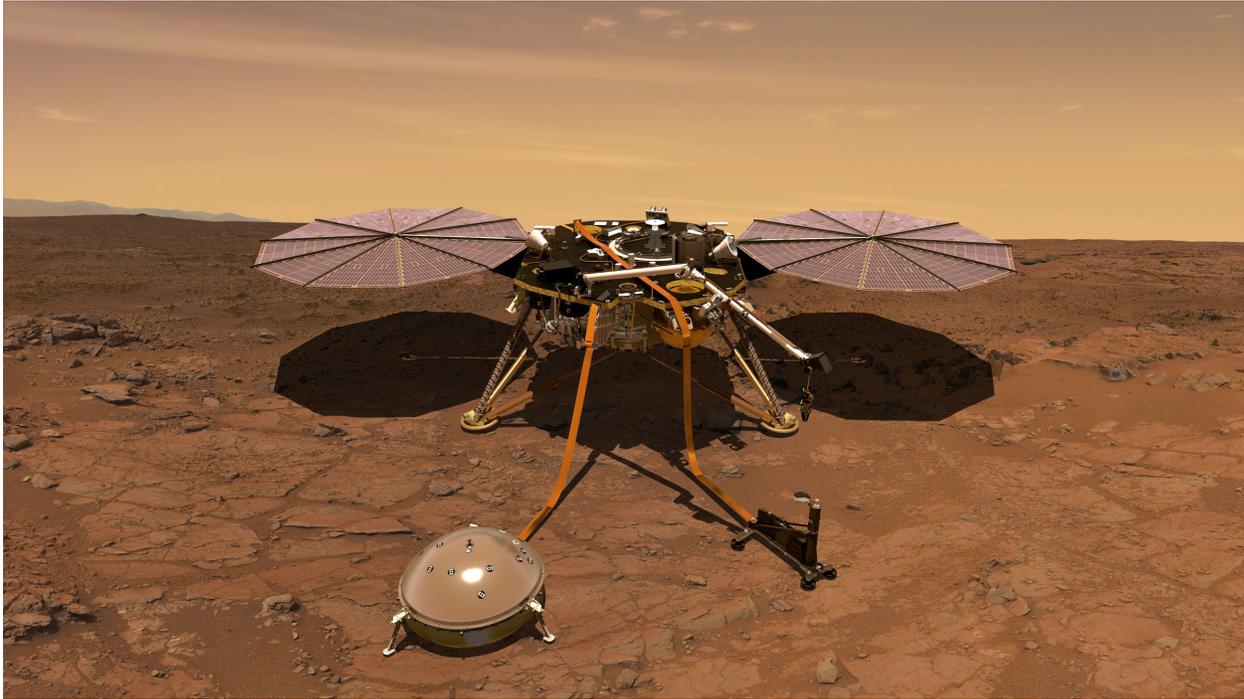
- **Windows could be made of Alon_{tm}** - an Optical Ceramic - an advanced transparent polycrystalline ...
- www.surmet.com/technology/alon-optical-ceramics/index.php

[Surmet has capability to produce precisely finished ALON components and is the only supplier of monolithic windows as big as 18x35-inch and windows with ...]

Alon is crack proof, even bullet proof. These windows might be supplied free as an advertising opportunity.

The analog station could have a multi-faceted workshop where crews would learn how to make this significant variety of basalt products.

Whether we are going to the Moon or Mars, such an Analog Facility would be of enormous help and volunteer Lunar and Martian settlers would do well to spend months here.#



InSight (above) is on its way and should land on this November 26th, 4 days after Thanksgiving Day, 2018.

It has three instruments, all designed to probe Mars' deep Interior, sense "Marsquakes" etc. But no instruments to detect subsurface water were included. (The mistake of the century? It's a good candidate for this category!)

"NASA and DLR (German Aerospace Center) plan to take the planet's temperature for the first time ever, measuring how heat flows out of the planet and drives this inspiring geology. Detecting this escaping heat will be a crucial part of a mission called **InSight** (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport), managed by NASA's Jet Propulsion Laboratory Pasadena, California.

<https://mars.nasa.gov/insight/news/2018/nasas-insight-has-a-thermometer-for-mars>

"InSight will be the first mission to study Mars' deep interior, using its **Heat Flow and Physical Properties Package (HP³)** instrument to measure heat as it is conducted from the interior to the planet's surface. This energy was in part captured when Mars formed more than 4 billion years ago, preserving a record of its creation. That energy is also due to the decay of radioactive elements in the rocky interior.

"The way heat moves through a planet's mantle and crust determines what surface features it will have. Most of the planet's geology is a result of heat. Volcanic eruptions in the ancient past were driven by the flow of this heat, pushing up and constructing the towering mountains Mars is famous for." [Olympus Mons is more than twice the height of our Mt. Everest and vastly more massive.]

Now while there are no instruments to specifically detect water, its presence might show up in the signals transmitted and received. If so, however, it will only indicate water in that particular area. This Insight probe will not be moving anywhere from its landing area. ##

Obstacles that Delay Finding Answers

The root problem is that Mars probes are designed to answer questions of geologists, interested in Mars' past, **not the questions of would be settlers and farmers, interested in the possibilities of Mars' future as a human world.** It takes a long time to design a Mars probe, and with launch windows to Mars about 26 months apart, if time is running out, design compromises are made, and science goals reduced.

A root problem is that stay-at-home Mars scientists and would-be settlers have different priorities. **Pioneers need to know where if anywhere basalt rich soils and underground water ice are near one another on Mars.**

The Mars Society has not been able to redefine and redirect the goals of overly patient stay-at-home Mars scientists. **Perhaps those of us who want to open the Mars Frontier need to find other capable organizations & financial sponsors than NASA. Where Lunar Resources can help**

And we need to find **ways if not to increase the number of launch-to-Mars windows, then to widen these windows.** Faster rockets, using a round-the-Moon slingshot, or an even bolder round-Mercury slingshot may widen launch windows well beyond regular direct Earth to Mars launch opportunities.

So will nuclear rockets which once off Earth, could be refueled with nuclear fuel made from Lunar thorium, which is abundant just below Mare Frigoris, which in turn is just below partially ice-filled craters above the 60° North latitude on the Moon.##

Back to NASA's Current Priorities

<https://mars.nasa.gov/mars2020/mission/timeline/prelaunch/landing-site-selection/#Columbia-Hills>

NASA's interest is not so much in the water itself as in the possible traces of micro-organisms

In other words, NASA is not searching for current sub-surface water reservoirs, though it would be overjoyed to stumble upon them. ##

“A Pioneer's Guide to Living on the Moon”

Available both in paper (750 pages) \$19.95 - Print version: <https://amzn.to/2Eg6g4h>

Kindle Reader format \$9.95: <https://amzn.to/2yw0wx4>

Link to both on same page: <https://www.amazon.com/Peter-Kokh/e/B07F1XXSFB>
