[A publication of the Milwaukee Lunar Reclamation Society, a chapter of the National Space Society & the Moon Society]

OUTBOUND #21 SEPTEMBER 2019

Overnight changes in Mars' atmosphere could solve a Methane Mystery

The Curiosity Mars rover, shown in a self-portrait taken in May, detected a much higher concentration of methane gas on the ground than an overhead orbiter did. Now there may be an explanation.

Since 2003, several spacecraft have detected varying amounts of methane on Mars. NASA's Curiosity rover, which landed in Gale crater in 2012, has found that ampounts of the gas rise and fall in a seasonal cycle.

Methane should last no more than about 300 years in the Martian atmosphere before sunlight breaks it down. "To see a seasonal cycle tells you that **something is actively producing or destroying methane in the present time**."

Microbes produce methane on Earth, so **finding the gas on the Red Planet has been seen as a possible sign of life — although not a definitive one.** Methane "can be produced by abiotic processes,. But even if it's not directly related to biology, it can enhance habitability for other kinds of microbes. So it's an important thing to be seeking.

"Curiosity took all its methane measurements at night, *when the rover is standing still and charging its batteries. Night could also mark a time when gases mix differently in the Martian atmosphere than they do in the daytime."*

For more, read the whole article at:
https://www.sciencenews.org/article/overnight-changes-in-mars-atmosphere-could-solve-a-methane-mystery?

==========

The Moon Society asked me to comment on various aspects of NASA's Apollo Moon missions (my comments are in bold face)

Q: What are your thoughts on this anniversary of Apollo 11 landing?
√ It is a crime for Congress to have killed 3 additional Apollo missions to more interesting parts of the Moon.
√ NASA might have cut its budget by getting equipment for extended missions donated by companies involved at no cost, but for the publicity.

Q: What did the Apollo program get right?
√ Separating the lander into two sections, the bottom part remaining on the Moon.

Q: What did the Apollo program almost get right?
√The design of the Apollo lander

Q: What did it get terribly wrong?
√ Not providing pop up awnings to keep the lander in the shade. Not designing the cabin so that crew members could sleep stretched out instead of curled up.

Q: What are the biggest lessons of Apollo for upcoming efforts?
√ **Plan extended stays if all is going well after the advertised stay, providing more knowledge about the Moon.**

Q: What could have been done for a better followup to Apollo?
√ **The lander could have wheels to move to more interesting places once it had safely landed. (if there were more interesting places nearby. Taking pictures of the lander and a crew member from nearby high ground.**

Q: What could have been a better buildup for Apollo 11 that could have better motivated the general public at the time?
√ **It would have been a mistake to broadcast all the things that "might go wrong."**
√ **We could have given a look at the possibilities of a permanent outpost on the Moon, but given Congress' indifference, that might have backfired. NASA did give Congress and the people a preview of future missions in the planning stages.**

Could we have convinced NASA to choose one of each 3 person Apollo crew to be someone picked blind from a pile of interested healthy and talented volunteers to go through the training exercises?

Q: Same question, but for the general public of today -- how can we motivate them on a lunar return?
√ Describe more visually interesting locations, such as a collapsed entry into a lava tube or a hole in a lava tube ceiling created by an asteroid hit right on target, with equipment to take astronauts down into it to look around.
Q: What projects and/or policies should the Moon Society be pursuing?
√ How might we avoid more such stupendous failures in the future?Congress and NASA are both to blame.

==========

Three Apollo Missions to more interesting parts of the Moon were cancelled by a bored Congress

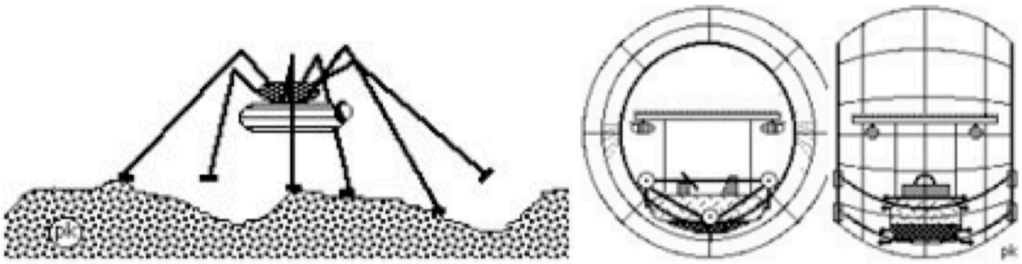
√ Apollo 15 (J1) Hadley–Apennine, July 197

√ Apollo 16 (J2) Descartes Highlands, April 1972.

√ Apollo 17 (J3) Taurus–Littrow valley, December 1972.

On the wild side. 2 possible helpful vehicles

(both proposals by Peter Kokh)



Left: A Spider like “Gray Hound” that could take explorers and/or tourists on a wild ride over rugged highlands terrain, with an extensive view in all directions, given the height of the cabin.

Right: An “**atlas mobile**” bike, with a motor, but able to be peddled by the person inside and easy to keep upright, almost impossible to tip over. Could be pedaled over rugged terrain, and, over smooth terrain, at considerable speed. Races, anyone?

B**oth such vehicles could be built here on Earth and used on tours of our various national park and national monuments.** The atlas mobile might be handy to crews at the various (Mars Society) space analog stations on Devon Island in Canada’s far north, and at its Mars Desert Research Station in SE Utah, and at our suggested station in one of the Antarctic Dry Valleys.

Doing so, would lead to various improvements, making them even more advantageous on the both Moon and Mars. #