"Towards an Earth-Moon Economy Developing Off-Planet Resources"

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

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In FOCUS: 🗐 Where we're at & where

The International Robotic Exploration of Mars has been in full swing now for several years. Every successive launch window, 25+ months apart, sees a number of new orbiters and/or lander/rovers sent out by NASA and ESA. The Japanese and Russians plan to get in/back in the fun.

While the twin rovers, *Spirit & Opportunity* are still hanging in there, sending back many thousands of fascinating pictures, their science is very, very local. The European *Mars Express*, and its bevy of instruments, however, have been revolutionizing how we see Mars. Mars was once wet, a *looong* time ago, and still retains some water ice

reserves. Some of these are quite **Our Annual Mars Theme Issue** near the surface, shielded from subli-

mation by a thin layer of dust. Other reserves have been detected at some depth.

What has not been detected is the widespread presence of underground aquifers such as we find on Earth.

The implications of this are that we will have to be quite choosy where we decide to set down, so that accessing subsurface water-ice is not an improbable challenge. The mars Express instrument readings also seem to rule out present day sources of geothermal power. This is disappointing but hardly a surprise. The great Martian volcanoes

Send (3) Habs to (1) Site on Mars, not to (3) Sites!

[L] The plan of Mars Direct would send successive manned missions to separate sites: good for exploration, bad for establishment of a viable outpost. Experience at the Mars Analog Stations shows convincingly that all the facilities needed for viability over many months cannot be crammed into one Hab structure. [R] A) Residence, B) Laboratories, C) machine shop/fabrication, D) Greenhouse.. See pp. 3-5 we need to go in Mars Exploration

seem to have been quiet now for billions of years. Get used to it: geothermal power won't be among our energy options.

A fleet of Mars Prospectors

There is much more to learn about Mars before we can rationally plan a manned landing mission, especially to a location where we intend to dig in for an indefinite stay:

Orbiter Probe to detect Subsurface Voids: Conditions for the formation of Karst limestone caves do not seem to have ever existed on Mars. However, we would be stupefied if the vast Tharsis Uplift and great Martian

shield volcanoes were not laced with lavatubes that could provide voluminous

shelter for settlements, industrial

parks, and warehousing.

- Lander driller(s) to determine thermal flow subsurface temperature gradient(s)
- Chemical Prospector Orbiter to look for all the elements needed to support an industrial civilization: Fe,Al,Ma,Ti,Na,K,P,Lb,Cu,Pl,Th, etc.
- ☑ Data Mining Challenge for Earth based team: define the drainage basins from existing MOLA data; highlight future rivers and lakes in a terraformed Mars, as well as logical transportation corridors. [⇒ p. 2, col. 2]!



MMM #193 – March 2006 – page 1

Moon Miners' Manifesto

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• Moon Miners' Manifesto CLASSICS: Beginning with 'July 2004, we have begun an effort to re-edit, reformat, re-illustrate and republish the timeless articles of MMM's first ten years, with the intention of publishing two issues, each covering one year, in PDF format only, for free downloading, each January and July.

• **MMM's VISION:** "expanding the human economy through offplanet resources"; the early era of heavy reliance on Lunar materials; earliest use of Mars system and asteroidal resources; and the establishment of the permanent settlements necessary to support such an economy.

• **MMM's MISSION:** to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.

• **MMM retains its editorial independence.** MMM serves several groups each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test. Any presumption that participating organizations can be labeled by indirect mutual association is unwarranted.

• For the current space news and near-term developments, read *Ad Astra*, the magazine of the **National Space Society**, in which we recommend and encourage membership.

• The Lunar Reclamation Society is an independently incorporated non-profit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. LRS serves as NSS' Milwaukee chapter

=> www.lunar-reclamation.org

• **The National Space Society** is a grassroots pro-space membership organization, with 10,000 members and 40 chapters, dedicated to the creation of a spacefaring civilization.

The National Space Society, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 <= NEW HQ FAX: (202) 463-8497; nss@nss.org => www.nss.org

• MMM's desktop publication has received computer hardware and software support from the Space Frontier Foundation, 16 First Ave., Nyack NY 10960; 800-78-SPACE - SFF seeks to open the space frontier to human settlement as rapidly as possible. openfrontier@delphi.com => www.space-frontier.org

• **The Moon Society** is "dedicated to overcoming the business, financial, and technological challenges necessary to establish a permanent, self-sustaining human presence on the Moon." — See contact information on page 9.

• **NSS chapters** and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.

• **Publication Deadline:** Final draft is prepared ASAP after the 20th of each month. Articles needing to be keyed in or edited are due on the **15th**, Sooner is better! - No compensation is paid.

 $\sqrt{\text{EMAIL}}$ to KokhMMM@aol.com (*preferred*) $\sqrt{\text{Mac compatible CD / typed hard copy}}$ to:

Moon Miners' Manifesto, c/o Peter Kokh, 1630 N. 32nd Street, Milwaukee WI 53208-2040 \Rightarrow IN FOCUS Editorial continued from p. 1.

- Phobos-Deimos Prospector Mission to analyze the chemical makeup of the surface regolith and any exposed bedrock on Phobos and Deimos. This is absolutely necessary if we are to determine the roles these two moonlets can play in bolstering the now weak Economic Case for Mars (realistic Export products that can competitively earn income for the settlements.)
- Establish an Artificial Intelligence-run forward teleoperations base on Phobos and/or Deimos to allow teleexploration of Global Mars in near real-time, without the ridiculous 6-40 minute time delays experienced in teleoperation of Spirit & Opportunity from Earth.

Evidently, we have quite a lot to do to prepare for an aggressive manned Mars Mission program. And it seems clear that with missions currently decided by Planetary Scientists who may be disinterested in a Manned Mars Program, that we will not get the type of orbiter and landing probes we need without aggressive agitation, going over the heads of the "specialists," if need be. Privately funded Mars Missions under the Planetary Society, may be our big hope.

The Planetary Society is at the top, when it comes to designing probes, or instruments to be added to them, that excite the public attention: e.g. the Mars Sundial, and the Mars Microphone. But NASA's abandoned "*Kittyhawk*" project to fly a drone plane over Valles Marineris should be revived as well. There is obviously room for organized activist input! In the strange absence of Mars Society initiative here, the Planetary Society may be our best hope.

The upshot is that while NASA/ESA are generally moving in the right direction, corrective inputs are much needed.

One can ask who is trying to do the same for the Moon. True activists launched the effort that Alan Binder would bring to conclusion: a probe that would find indications of water ice particles concentrated at the poles. That was the "and behind door #1*" (of the common perception that the Moon is no more than a rubble pile.) A similar effort that we might call "and behind door #2", an effort to get launched a probe that could detect any subsurface voids such as lavatubes that would serve as safe harbor from the scouring cosmic weather has failed. Perhaps such an instrument first flown over Mars could be reflown over the Moon. * MMM # 133, Nov. 1999, In Focus Editorial, pp 1-3.- **PK**

Please Pardon the Tardiness of this Issue

The clone we had tasked to put this issue together while we were in Utah 2/23 - 3/13 broke down on the job.

You guessed it, the manufacture of the unit had the sufficient "fine print" visible only in blacklight to weasel out of the warranty. Another learning experience! Sigh.

From the Arctic & Desert Analog Stations to a Real 1st Human Outpost on Mars

Changing Mars Mission Plans to fit the many lessons learned on Devon Island and in Utah

by Peter Kokh, MDRS Veteran, Crews 34 & 45 **The Mars Direct Mission Plan Revolution**

Mars Direct, the Mars Mission Architectural revolution introduced by Dr. Robert Zubrin more some fifteen years ago, showed how we could mount exploratory missions to Mars with far less throw weight, total tonnage to be paid for dearly with fuel, than NASA's then conventional mission architecture forecast as necessary. By the simple device of making the fuel for the return on Mars itself, instead of carrying it along, as well as all the fuel needed to get that return fuel to Mars, the cost of human missions to Mars was cut to a tenth. Now exploring Mars became something we could budget for, something in 1960's dollars, not much more than another Apollo Program.

But another Apollo Program, a heroic Flags & Footprints Epic to be followed by yet another half century of nothing, is not exactly what we need. By the plan, if the first unmanned crew return ship lands successfully and produces fuel successfully, then, at the next launch window 25 plus months later, a manned Habitat would be landed at the same site, along with a second unmanned crew return ship with fuel making capacity to a site reachable by the first party if necessary. Then another manned Hab would be sent to that second site, etc. Over a period of 8 years, three manned Habitats would be established on Mars, each to be abandoned when its crew went home.

First things first! Settling in before Exploration!

While this plan introduces measures to guarantee a safe return of each crew, and to gradually extend the reach of manned exploration across the globe, it clearly puts exploration ahead of establishment of even one viable outpost. In fact, none of the three manned Habitats would be viable for more than weeks, in our opinion. They are each too small to house all that is needed to sustain a crew for up to two years in good physical *and mental* health. I say that having spent two 2-week tours of duty at the Mars Desert Research Station in Utah.

Before I make that particular case, let me advocate clearly and forcefully that *exploration should follow, not precede establishment of a permanent outpost*. We know far more about North and South America and Australia through exploration by their own settlers, than we could ever have learned from a series of expeditions leaving from and returning to Europe. Why? Logistics, logistics, logistics.!

Exploration is best done from up close, by people living off the land, because it is their land. We must not let the curiosity itches of planetary scientists be scratched at the expense of settlement. In the long run, settlers will find out vastly more about Mars than "foreign" explorers bent on leaving the land they are exploring.

The Mars Analog Habitats tell the tale.

The Mars Hab testbeds at the Flashline Mars Arctic Research Station on Devon Island and at the Mars Desert research Station in south central Utah, are classical cases of design according to the principal "function follows form." Yes, I know that's backwards. That's precisely the point. Instead of defining the facilities and functions we need in a self-sufficient crew habitat, and then finding a modular architecture to house those functions, we have settled on a fixed volume structure, determined not by the needs of usage but by the needs of transportation to the site. Then we have sought to cram all the needed facilities and functions into that fixed volume.

And guess what? They don't fit.

That's not apparent to many crew members because they are there for a 2 or 4 week tour of duty. But Mars crews, on the real (not analog) Mars will make that Hab home for two years or more. If FMARS and MDRS veterans are honest, they will realize that neither Hab can produce its own food, produce its own energy, or keep itself in good repair without all too frequent outside inputs, help, rescue, and resupply - recourses that could not apply on Mars itself.

There is no real allowance for crew recreation - on two week tours, you can simply go without. There is no real attempt to rely solely on original rations and food grown on site in a greenhouse. There is no capability at either location for making parts needed for repair. Again, the Classic Double Tuna-can Hab does not have the space to provide these functions, yet we would send crews in such a cages to Mars. And rather than add additional structures to this complex of one, we would send new Habs elsewhere on Mars.

An Alternative Plan

I think we should send to Mars three or more Habs, each differently configured, *to the same site*, along with other ancillary structures, including inflatable ones.

If we do not establish a viable outpost on the first shot, we may never, ever get another chance.

Exploration will take care of itself. Other things come first.

For starters, we need:

- ☑ A food-growing greenhouse large enough to feed a double crew, should the firsts crew not be able to return home when their relief arrives. A diversity of crops, and several species each would be needed to protect from collapse from blight or disease. A greenhouse operation can never be too big. Witness Biosphere II.
- ☑ A greenhouse-based life-support system with air and water recycling with some chemical/biochemical assist, as needed, to be slowly phased out on Mars.
- ☑ A complete machine shop and fabrication facility. Mars is not the Moon. It can have no umbilical cord to Earth

for repair, resupply, or rescue. A Mars outpost must make do on a Yolk Sac of parts and supplies sufficient to last for several years and with the capacity to selfmanufacture unforeseen needs.

- A complete pocket-hospital. It is one thing to take a chance with crews on the Moon where return to Earth is relatively simple. The longer the stay, the more certain real medical emergencies, both trauma accidents and other emergencies will arise. A first aid locker won't do.
- ☑ An exercise facility, diversified recreation facilities, support for hobbies, arts & crafts
- A lab where experiments can be made with locally produced building materials aimed at selfmanufacturing as many of the physical needs of the outpost as possible, including expansion of the outpost.
- Establishment of a Remote Way Station, a few miles away, where EVA exploration crews could overnight, and to which crew members could retreat for brief periods of quiet rest and privacy in relief of tensions.

Teleoperations Vantage Points on Phobos/Deimos

Nothing leads to failure more surely than impatience. Impatience to explore is an example. Once we have a growing crew at a growing outpost, we will have personnel who can be tasked with the teleoperated exploration of Mars by a whole fleet of mini-rovers and drone aircraft, operated in near-realtime via relays on Deimos and Phobos where the transmission delay is only a fraction of that for the Earth-Moon loop. Manned expeditions could then be sent to the most interesting spots, rather than waste their time on less interesting areas.

Crew expansion leads to economic diversification

Once an outpost, the outpost, is clearly viable and at least partially self-sustaining, crew members could be given the opportunity to renew or reup their commitment. Compatible couples could choose to do so, forming the first families on Mars. We have to shut our ears to those who say we can't allow births until we know for sure that humans can survive long term on Mars. Why? Because the only way to know that is to see how the second native born generation turns out, and that means taking the plunge without delay. The is no believable ivory tower way to find that out. If humans had always been so "timid," (let's call a spade a spade) we would still be in the rain forests or plains of Africa or in the caves of Europe. It is human to take the plunge, as an exercise of faith in the capacity of the human genetic architecture.

One outpost, repeatedly revisited by supply ships, can grow methodically. As it grows, a more diverse slate of occupations can be supported. Made on Mars consumer goods will be first produced by workers with day jobs in their free time, as cottage industry startups. More and more personnel will be freed from outpost support duties to partake on further exploratory expeditions. Once the needs of outpost expansion can be met with home grown industries, we will have the start of a new civilization on Mars, one making real steps towards an independently viable future. And that, after all, is our Holy Grail.

Bidirectional lessons: MDRS to Mars and Mars to MDRS

Consequences flow forward and backward. We can see from what has happened at FMARS and MDRS that the Hab plan will not work for Mars as the plan now stands. The flip side of the coin is that it is not working even now in the Arctic or in Utah. Yes, we simulate exploration procedures, geology and prospecting procedures, exobiology procedures. But we don't simulate the isolation without hope of relief for two plus years.

It would be both valid and honest to say that the Mars Society has had to chose its battles. Some battles are more easily won. The engagement in others seems beyond our grasp as a small nonprofit society. But we ought to advance steadily in that direction, especially since those battles must be won before we dare set out for Mars.

Picking a site on Mars - a prime candidate

If we are to settle on just one landing site, we need to pick that site with care. As of now, we have but a foggy start to an **Economic Geography of Mars**, tracing where all the resources are, the logistical advantages, the logical transportation corridors, a priority list for 2nd, 3rd, and following outposts needed for a trading economy on Mars itself. We can expect this hazy map to become a bit clearer by the time the first crew leaves for Mars.

In the meantime, this suggestion. Pavonis Mons is one of Mars four largest shield volcanoes. Almost as tall, but not guite as large in area as Olympus Mons, it more than makes up for any shortfall by its location, smack on the equator. Its summit caldera rim would be the best spot in the inner solar system to anchor a space elevator (we have to figure out how to avoid Phobos which crosses that path) and its gentle west slope, the ideal place in the inner system for a mountain launch track. The eventual establishment of either would greatly lessen the cost of exports to the Earth-Moon system. More, as a shield volcano much like Mauna Loa/Mauna Kea on the island of Hawaii, it is almost certainly laced with intact lavatubes. In "The Argument from Medicine Lake" (MMM # 74 March 1994, p. 3, republished in MMM Classics #8, pp 12-13) Bryce Walden conservatively estimates that Pavonis offers 333 km^2 = 128 mi² of usable sheltered floor space, the size of a major American central city in the one million population range.

But the outpost doesn't have to be on/in Pavonis Mons itself. It could be to the west, between the outer mountain ramparts and the crater Ulysses - call it "Ulysses Junction."

Or it could be east, between Pavonis Mons and the Head of Valles Marineris. While undoubtedly, other sites

will have some merit, a location along the equator to either side of Pavonis Mons will certainly be in the running and hard to out-merit. Again, exploration goals and geological and scientific curiosities should score *no* points. They are irrelevant to the overarching need to establish an outpost beachhead of humanity on Mars "securely."

De-marginalizing the Mars Analog Stations

Back to the Mars Society's analog research stations - FMARS is already pre-marginalized by the extreme climate on Devon Island as well as the order of magnitude greater cost of logistics: transportation and supplies.

MDRS has been marginalized unnecessarily, we believe, in the absence of a decision to shield it. Shielding, which will clearly be needed on Mars to attract those unwilling to sign waivers that accept the chances of cancer and risk of reproductive sterilization, is one of those things we have silently put on the list of things not to simulate.

The tall profile of the Hab (again, putting form before function instead of vice versa) makes shielding difficult. A Horizontal ranch-style complex would be much easier to shield. While the landlord, the U.S. Bureau of Land Management, BLM, would not take kindly to wholesale earthmoving, shielding could be simulated in easily removable fashion by bags of mulch, for example.

The thermal equilibrium to be gained would result in a significantly longer field season, now limited by summer heat, and thus make possible a true greenhouse, not the very limited graywater recycling GreenHab system we have. Yes, there are other summer heat related issues: cooling the EVA suits for example. But these too are surmountable.

The existing facility could grow, adding a horizontal crew quarters module, reoutfitting the present Hab structure for a more complete lab (whole second floor deck now given to crew berths, ward room, galley, computer stations) and a much expanded engineering, machine shop, fabrication space on the first floor deck. But where we put what is another question. The priority is to expand, create more usable space.

What about FMARS?

The "first-born" has a special place in the affections of Mars Society members. Devon Island offers a different kind of Mars Analog Terrain. The fact remains that any facility not used full-time is too expensive per manhour of use to maintain.

It would be a hard choice to take it down, ship it to some other location where it could enjoy full(er)-time use and reassemble and reoutfit it. There are cost-benefit issues that come into play but which can only be correctly assessed if we take the long view. Have we done about all we can do on Devon Island? If so, the time has come to take a fresh new look at this asset and how it can best serve the dreams of the Society. side to the Desert Hab and then rethinking how each is outfitted, is one option it will do no harm to brainstorm. The result? A more complete outpost capable of simulating more of the facilities and activities a real outpost must have.

Another idea would be to relocate FMARS to the Orlando or Las Vegas areas as a tourist center. Both MDRS and Euro-Mars have indeed been on display, but in each case, that was prior to interior outfitting. The upshot is that the visitor did not get a good idea of what it would be like to live and work in such an outpost. Missed Opportunity!

In an FMARS tourist facility, visitors could see how and where crews live and work, both by walking through a near-identidal layout and through live web-cams to all of the activity areas of MDRS. Such a facility could pay for itself and the whole analog station program by visitor donations.

Then with FMARS retired to visitor duty, MDRS could be logically expanded first by inflatables, outfitted with local materials, then by modules produced and outfitted from (simulated) local (Martian) materials. This would provide a much better model of the way we will need to do things on Mars if we don't want the Mars Program to end as the Apollo one did, as a futile "moment of glory" dead end. We are here to make "History," not an "Historical Moment!" Summary

The present goal of the Mars Analog Research Station Program is to establish a series of minimal stations at a multiplicity of sites that are each analogs of Mars in different ways. Many things cannot now be modeled or simulated because of the Procrustean limitations of the form/shape/size of the Hab design based on transportation constraints. It would seem better to go beyond the simulation of exploration procedures and the testing of equipment. We need to phase in simulation of transition from initial bare bones outpost into a viable permanent beachhead.

Establishment of a more capacious foothold with endurance capacity is much more important than butterfly sampling of many locations. Exploration, and much, much more of it, will be best guaranteed by establishment of a viable beachhead as the primary goal of a Manned Mars Mission program.

Currently, the separate Mars Foundation works on its own to find pathways to settlement. The Mars Society needs to collaborate with the Foundation to vastly improve its analog program., which is currently aimed only at the exploration of Mars, not settlement.

If we want to simulate what we will need to have on Mars, we must grow MDRS as we would the first outpost on Mars.

It's all so simple, really. **PK/MMM**>

[We realize that this article will prove to be quite controversial, "apple cart upsetting." But it often happens in any movement that a time comes when we must stand back and ask, "are we still on the track? Or did we get off it somehow? If so, how do we get back on the path to our dreams?"]

Relocation of the Arctic Hab to a new home side by

MMM #193 - March 2006 - page 5

New Words for our Vocabulary from the Martian Frontier Slang, Figures of Speech, Names

by Peter Kokh

Frontiers have always expanded our Languages

There are those who loathe the introduction of new words into the language. But its enormous capacity to adopt new words and make them its own is a major reason why English is the most *widespread* language on Earth. Indeed, Dictionary publishers accept this as a matter of fact.

All past frontiers have contributed a wealth of new words, phrases, and names to their languages. America, the American West, Canada, Australia, New Zealand, South America and other newer adopted homelands have all contributed and continue to do so. Stretching old words to convey new meanings can only go so far.

As we move out into frontiers beyond Earth's familiar shores, we should accept and encourage coinage of new words and expressions, not fight futily against them. For it will be no different as we establish ourselves on the Lunar and Martian and asteroidal frontiers ahead.

New Words and Expressions from the Mars Frontier

There will be new types of structures, new occupations, new sports, new hobbies. There will be new kinds of dangers, and new strategies to meet them. New strange environments will contribute many new terms. New time reckoning systems and new holidays and festivals will bring new terms and phrases. Seasons only crudely analogous to any on Earth and new weather phenomena as well as ways the settlers find to deal with them will give birth to new words and figures of speech.

New human places will generate new place names as imaginative, colorful and varied as have the new terrestrial frontiers previously settled. It could hardly be otherwise.

We have already chosen new class names for types of geological features special to Mars. See the next page. As we explore Mars, we will had to the list of words that denote topographical landscape features unique to Mars.

Habitats and Transportation

Mars will see the birth of new types of architecture and new types of construction. Martian homesteads will have new features, new types of rooms, new types of furniture and furnishings. The new Martians will develop new kinds of sports and sporting activities, new kinds of hobbies and new kinds of art media and craft.

The same goes true for new, evolving types of transportation designed for the Martian environment. New types of wheeled vehicles private and public, of trains, even of aircraft will evolve to make the Mars civilization as mobile as our own. And just having to deal with new kinds of obstacles, emergencies, and vulnerabilities will generate new expressions and figures of speech.

Elements of a Unique Martian Culture

Any frontier gives birth to its own unique holidays and festivals, events that promote group solidarity and cohesiveness. These will be special items on a new Martian calendar. On that score, many have attempted to invent and publish Mars calendars, hoping to have the honor of creating the one adopted by the pioneers. The pioneers, and not us, not the Mars Society, will pick their calendar and their timekeeping system. All we can do is supply models for them to consider.

Mars has its own unique rhythms: a slightly longer day, a nearly doubly long year, and very uneven season lengths. Sol, meaning Sun, now designates the 39 minute longer Martian day. I must say that this choice is reprehensible and I harshly censure those who picked this term. Sol means the period form one noon to the next, and as such applies to ANY (yes, I am shouting) noon to noon period on ANY planet or satellite, not just Mars, and no one had the right to reserve it to Mars alone. Sorry, pet peeve big time.

The same goes to economic and political systems. The Mars Society Civilization & Culture Task Force, at least for the period in which I tried to moderate it, attracted many utopians slow to realize that when all was said and done, it would be the pioneers themselves who will choose and have the sole right to choose any and all systems by which they want to live. Mars will be their planet, not ours. It's our lot to prepare, no more.

The arid desert rock and soil tone pallet of mars will also generate new words. This palette is very narrow and introduces serious color deprivation. The eye wants to see more, and for many colonists, the priority will be to surround themselves with the Mars Missing Colors: blues and greens especially, but also yellows, reds, purples, and even blacks and whites. They will introduce missing colors into their home decor, into inside window box planters so that they can look at the barren exteriorscapes through the reassuring filter of green foliage and floral colors. For fast safe identification of suited personnel and vehicles out on the surface suits, signs, and vehicles will hardly come in colors that blend into the background. Unlike the case on Earth, Mars camouflage will have no greens anytime soon!

Marsspeak, whether it is an off shoot of English, of some other terrestrial language, or a new construct will have terms to distinguish newcomers from those born on Mars as well as those who have lived on Mars for some time. There will also be words and expressions to describe the isolation that comes from launch windows two plus years apart and from message transmission lags of 6-40-some minutes.

That the new Martians must live off a Yolk Sac of supplies and parts, and not at the end of an umbilical cord (as is the case for Lunar settlers) will give rise to figures of speech as well.

Whatever language or languages we bring to Mars will evolve with the frontier. Pull a Rip van Winkle and awake

a hundred years from now to a made-on-Mars movie, and you will be hard put to understand. Life moves on, and language moves on with it.



Words, Expressions, and Names from the Mars Society's Analog Research Station Program

The experiences of volunteers at the Mars Society Analog research Stations will also contribute words and phrases that have some real chance of surviving on the actual frontier of Mars. There may be place names such as *New Boulder, New Resolute, New Hanksville,* to mention some of the more obvious choices.

There will also be names and phrases that will ring a bell only with FMARS and/or MDRS veterans. "Mommy, why is the road from the spaceport to the settlement called New Cow Dung Road?" "Daddy, why is the first paved highway on Mars designated Highway 24?" "Daddy, why is that flat mountain top named Factory Butte? There's no factory up there, is there?" And so on. At least we veterans would be pleased to know that some of our experiences may be immortalized in MarsSpeak one day. After all, our hard work is aimed and dedicated to making it possible for the real drama to unfold in the not too distant future.

</MDRS>

From MMM #133 March 2000, p.1

Mars will Forge those who Pioneer it

Alien beauty, endless monochrome horizons, thin breathless air, trans-Siberian cold, a tad longer day, doubly long year, irregular seasons, remote from Earth. Mars! Here is a world that will take its pioneers and reshape them to the core. In the end Mars will tolerate only "its own kind of people." And Mars will make them "the best."

More Relevant Readings from MMM #s Past MMM # 41 December 1990, p 6. To Inject a Unique Flavor into Martian Settlement Culture, add the Romantic Touch of Old BARSOOM

MMM # 73 March 1994, p 5. Canal Names of Yore

MMM #133, March 2000, p 3. Seeds & Wellsprings of Martian Culture, P. Kokh: A One-Sided Mars Palette; p 4. Cont.: Mars Time: A Tad Longer Day; p 5. Cont: A Doubly Long Year; Diverse Seasons Lengths; p 7. Cont.: Outdoor Mars: Thin Atmosphere, Cold Climate; p 8. Cont.: No Open Water; No Biosphere

| Red | Muddy | Green | Blue |
|------|-------|-------|------|
| Mars | Mars | Mars | Mars |

Oops! We forgot a Color!

"So you want to terraform Mars? Wake me up when you're all done!"

Don Foutz

by Peter Kokh

We can begin to breed Mars-hardy plants even now, here on Earth, in conditions where the needs of the most cold-hardy and arid-hardy Earth plants meet present Mars conditions "halfway," so to speak. See our previous article on "Redhousing," MMM #93 MAR '96, p.5. [MMM Classics #10]

But we won't be very successful in introducing them to the unprotected surface soils of Mars until a) the atmospheric pressure has been increased by an order of magnitude or so (to 7-10% Earth-normal) and b) until we are have bodies of liquid water (seas) which evaporate, produce rain, and drain back into the same or other seas.

And guess what happens when you rain on exposed plant free soil? You get mud, lots of mud, too much mud, enough mud to make all surface operations very difficult and *discouraging*. Anyone who has served at the Mars Desert Research Station knows that all too well.

Now that poses quite a challenge to devotees of Kim Stanley Robinson's epic Mars Science Fiction Trilogy "Red Mars, Green Mars, Blue Mars." It challenges those also who have become attached to the Mars Society Tricolor.

The challenge? Either invent and develop processes to "fix" the soils of Mars before the first rains fall, or change the tricolor to a 4-color flag. No middle ground.

Now it may be possible to fix the soil, and an ideal location for experiments on a small scale is the Mars Desert Research Station outside of Hanksville, Utah. Small plots a few yards/meters square could be treated without significantly violating the terms of our lease with the U.S. Bureau of Land Management [BLM].

What would you use as a fixative? It had better be something we can easily reproduce on Mars, perhaps something eventually biodegradable from the ingredients in Mars' own atmosphere; something cheap enough to produce on an enormous scale. That means not only that the involved elements must be easy enough to produce with low energy inputs, but that the process of producing the fixative from them must be inexpensive on a vast scale.

We offer no suggestions, just make the challenge. Find a solution or change the flag! There are benefits here and now for a solution. We could treat the area immediately surrounding the MDRS Hab and contiguous structures. That will greatly reduce the tracking of mud into the Hab and the consequent chore of cleaning it up, over and over again.

We'll even name the fixative after you! </MDRS>

MMM #193 - March 2006 - page 7 [[]]

The Classification of Martian Features

http://www.astrodigital.org/mars/features.html

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Features on Mars are grouped by their aerological (geological) category or type. These groupings are based on the general physical appearance of the feature in question. However, just because two or more features look alike does not mean that they originated and evolved via the same geologic/aerologic processes. For example, is a large hole in the ground the result of a large impact or volcanic activity or the result of sapping? For a number of features, these questions will remain unanswered until we obtain much more detailed information about the features in question.

The following table lists each feature type along with a brief description of what that type category represents.

Albedo Feature -- These are features we observe because of variations in the amount of sunlight reflected by the martian surface. A surface that reflected all the light hitting it would have an albedo of 1.0 while a surface that absorbed all light hitting it would have an albedo of 0.0. Therefore the dark features on Mars have a lower albedo than the bright features.

Catena -- A linear string of craters, perhaps produced by a train of impactors, much like Shoemaker-Levy 9 did to Jupiter. Alternatively, the chain of crater-like features could be volcanic in origin and represent the collapse of subsurface lava tubes.

Cavus -- A crater-like, irregularly shaped depression or hollow. These are not thought to be of impact origin.

Chaos -- An area of jumbled or hummocky terrain that is thought to have been created as a result of ground-water sapping.

Chasma -- A large canyon or a depression/trough with steep sides.

Collis -- A smallish hill or knob. A group is referred to as colles, the plural form of collis.

Crater -- A circular depression created by an impacting body. Craters can be subdivided as being (from small to large) simple, complex, central peak basin, peak ring basin, and multi-ring basin. Mars is unique in that is has craters with ejecta deposits that have a unique "flowing" appearance. It is believed that the presence of groundwater or ice is responsible for these features.

Dorsum -- An elongated prominence, ie. a longer than wide area of high ground. The Earth analogue would be a ridge. This term was originally used by the Romans to indicate a mountain ridge.

Fluctus -- Only one example of this type of feature is found on Mars - Galaxias Fluctus. The term was originally used to describe a feature on Io that looks like a flow. The latin meaning is a wave or billow. Here it is used to describe a flow-like feature.

Fossa -- One or more linear depressions most likely the result of faulting. These depressions are long and narrow and resemble a ditch or trench. The Earth analogue is most likely a graben. On Mars, fossa often occur in groups. A group of fossa are referred to as fossae, the plural of fossa.

Labes -- Used to describe those features that appear to be the result of a landslide. The latin meaning for labes is a "falling in" or "sinking in."

Labyrinthus -- An area of intersecting linear depressions/canyons/valleys. The classic example is Noctis Labyrinthus.

Mensa -- An elevated area with a flat top and steep sides (think of a cake). An Earth analog would be the mesas of the US southwest.

Mons -- A large isolated mountain, as opposed to Montes (a chain of mountains). On Mars, most are of volcanic origin.

Patera -- A complex crater, or an irregularly shaped one, with low relief that has scalloped edges and radiating channel-like features. Most are thought to be volcanic in origin.

Planita -- A plain whose area is at a lower altitude than the surrounding regions.

Planum -- A reasonably smooth, flat, relatively uncratered area of ground that is higher than the surrounding region and that is bordered by steep sides. The Earth ana-logue would be a plateau.

Rupes -- A cliff or scarp that is straight/linear rather than sinuous.

Scopulus -- A cliff or scarp that is irregular or lobate in appearance.

Sulcus -- A feature that has the appearance of a furrow, ditch, or wrinkle; often occur in groups.

Terra -- An extended areal region or land mass. It is used in reference to the older, cratered highlands.

Tholus An isolated, dome-shaped small mountain or hill. These are thought to be of volcanic origin. The plural form is tholi.

Unda -- An area of dunes that are very wave-like in appear-ance. The plural form is undae.

Vallis -- Vallis is a sinuous valley most of which are probably of fluvial origin.

Vastitas -- A very large lowland plain. The only feature in the Solar System to which this description has been attached is Vastitas Borealis.

MMM #193 – March 2006– page 8

The Moon Society



http://www.moonsociety.org

Please make NEWS submissions to KokhMMM@aol.com

The Moon Society was formed in July, 2000 as a broadbased membership organization with local chapters, to spearhead a drive for further exploration and utilization of the Moon in cooperation with other like-focused organizations and groups.

Artemis Society International was formed in August 1994 as a forum for supporters and participants in the Artemis Project[™] quest to establish a commercial Moon base as a first step to a permanent, self-supporting lunar community. ASI does not engage in any form of commercial business directly, but seeks to build a Project support business team. Registered trademarks of the Artemis Project[™] belong to The Lunar Resources Company®

PROJECTS: www.moonsociety.org/projects/ The Artemis Project[™] - Project LETO[™] - Rent-MDRS

Moon Society DUES include Moon Miners'Manifesto

- Electronic (pdf) MMM \$35 Students/Seniors: \$20
- Hardcopy MMM: U.S. & Canada \$35 Elsewhere: \$60

Join/Renew Online - www.moonsociety.org/register/

Mail Box Destinations:

- Checks, money orders, membership questions
 Moon Society <u>Membership Services</u>:
 PO Box 940825, Plano, TX 75094-0825, USA :
- Projects, chapters, volunteers, information, etc.
 Moon Society Program Services
 PO Box 080395, Milwaukee, WI 53208, USA

OUR LOGO above, shows the Moon in its natural beauty, empty and deceptively barren, waiting for human settlers to shelter and to mother as an adopted new human home world. We have work to do!

Successful 1st MDRS Mission Concluded AMSO – Artemis Moonbase Sim One *We did it Good* ! –Commander's Report

from Peter Kokh

I write this four days after a safe trip home - time to relax, unwind, catchup on household duties, and above all, time to let the various impressions settle into place. We had started this exercise with an ambitious and packed plan. We simply did not have time to do it all. The day could have been a few hours longer, there could have been another day or two in each week. But that's a better situation than one of having planned to little and ending up sitting around with nothing left to do.

Yes, we did good! We had planned a number of things to set a lunar atmosphere or ambiance, from lunar frontier tableware to green tint sunglasses that neutralized the prevailing Mars tones outdoors to special night time excursions. Some of these worked, others did not. We got to do only one nighttime sortie, a pedestrian outing within sight of the Hab (for safety) in our new Sim Lite suits outfitted with miners' helmet LED headlamps. That was the one time I really felt transported to the future somewhere on the Moon - the highlight experience for me personally.

But it was not about experiencing being on the Moon. It was all about projects that contributed to our understanding of what needs to happen at future outposts, whether on the Moon or Mars. Our Early Space Frontier Diet was an overall success.

We wanted to simulate working out on the surface,



exposed to vacuum, but protected by a shielded canopy from the cosmic elements. That is the kind of environment we foresee utilities and supplies needed to be accessed everyday will be placed.

Our Sim Lite suits of Tyvek overalls with built in hood and full face shields did the job in simulating the lighter pressure suits that could be worn in such situations instead of the more cumbersome and tiring radiation hardened suits.

We also wanted to simulate going to & fro between the Hab and the GreenHab in a pressurized tunnel, dressed in every day inside wear. This led to our proposal to build a simulated tunnel out of PVC and snow fence fabric. The Mars Society's MDRS Engineering Team liked the idea so well that they wanted us to build a structure that would last well beyond our two week period. That led to the present sturdy design of what we have christened "The Robert A. Heinlein Memorial Tunnel." It will be a semi-permanent addition tot he MDRS complex for which our crew will be credited for a long time to come. The downside of that is that the tunnel took more time to complete than we had hoped to spare for it, leaving less time for other projects.

MMM #193 - March 2006 - page 9 Exception 2006 - page 9

The Moon Society Journal Free Enterprise on the Moon

Commander's Report Continued.

We did find time to complete the Dust Control Study in which we took a "census" of all the gaps, cracks, holes and other openings through which dust, mud, and unwelcome critters find their way into the Hab. We suggested remedies for each type, and then attempted to outline the many benefits that would flow from tightening up the Hab in this way: thermal equilibrium benefits, lower energy expenditures, improved health, and the ability to better simulate air and water recycling systems. The study was published on the MDRS website and we hope that the Mars Society and MDRS Engineering Team take it to heart. http://www.marssociety.org/MDRS/fs05/0310/dcs.asp

We found time, but not quite enough for a fist class job, to do a Site Management Study as well. Maybe that study will spur some action also. We had wanted to go into greater depth on policies for nature preserves, outdoor warehousing, and planning for Hab Complex expansion. http://www.marssociety.org/MDRS/fs05/0310/sms.asp

William Fung-Schwarz did find time, on his own initiative to complete two Site Management demonstration projects and these also, after some initial miscommunication, made a very favorable impression on our hosts.

Laurel Ladd, who oversaw the special diet project, had also wanted to a *Complex Closed/Semi-Closed Systems* Study but between preoccupation with meal planning and just simply not feeling well for more than a week, did not get around to it. However, we trust that she took mental notes that will allow her to advance her studies all the same.

Similarly, Leslie Wickman, who both arrived late and left early because of prior commitments, did not feel well for much of her stay. However, she did manage to uncover some interesting data about how well, or not so well, the GreenHab system works to recycle graywater from sinks and the shower for reuse in flushing the toilet. She also will be reporting findings to the Mars Society.

In short, we were good guests. To some extent we had little choice given the local geology, to concentrate on projects of relevance to outposts on the Moon and Mars alike. But we also made improvements and suggested others that could make the Mars Desert Research Station a better place for all crews to come. We can be proud of that.

See our official Summary report to the Mars Society at: http://www.marssociety.org/MDRS/fs05/0311/sum.asp

Yes, there were some disappointments. One of the obstacles was the imposed schedule mandating the hours of 7-9 pm for Crew Reports to Mission Control. With the very slow data uplink in bits, not kb, per second and many service interruptions, this period almost always ran overtime by 1-3 hours. Eventually, we found a rebellious work around. Do our reports early, and have the evening to ourselves! Two planned night time EVAs were not done for lack of opportunity: (a) simulating the bright Earth in the lunar nighttime sky;(b) simulating the long ink-black shadows of early sunrise and polar lighting conditions. Next time!

We had hoped for major national and local crew home town publicity. This was much more difficult to arrange than we had expected. We are grateful to crew journalist Guido Meyer for the major publicity he got for us in his homeland Germany.

All in all, the positives outnumber and swamp the negatives and neutrals. We did good. No other way to sum it up. But where do we go from here? That's another question and a difficult one. Their are many options to analyze and compare. We'll report on that in future issues.

Benefits for MDRS from Moon Society Crew #45 Projects √ Reorganization of the "Antarctica" storage area including removing all combustible materials from the area near the utilities: diesel fueled generator; propane tanks feeding Hab range, water heater, furnace. (William Fung-Schwarz)

✓ Trail maintenance of the path up the Observatory Hill with safety in mind, including installation of solar-powered trail markers. (William Fung-Schwarz and Peter Kokh)

J Determinations of the state of the GreenHab graywater recycling system with recommendations to the Mars Society for possible upgrades. (Leslie Wickman)

 \checkmark Construction of a simulated pressurized tunnel between the Hab and GreenHab allowing crew members to walk between them without EVA suits. (Peter Kokh)

 \checkmark Dust Control Study with recommendations for tightening up the Hab and a list of many benefits that would flow from such a project including the enabling of new areas of simulation. (Peter Kokh)

✓ Start of an Online feedback-based Early Space Frontier Cookbook from our Early Space Frontier Diet (Laurel Ladd)

J Major publicity in Germany for both the MDRS program and for the Moon Society mission. (Guido Meyer)

√ Major overhaul of how the daily Engineering Reports are made (Steven Winikoff)

Gifts for MDRS Mars Crews to come from Moon Society Crew Artemis Moonbase Sim 1

 ${\cal J}$ A set of 6 laminated Mars Scene Placemats with the Mars Society logo on the flip side.

 ${\it J}$ A Sand Painting depicting Mars as seen from shifting locations on Phobos

 \emph{J} A 12" Miniature Steel Pan (musical) Drum made in Trinidad

J DVD Sci-Fi film "Stranded" (on Mars. A great story.)

√ Sci-Fi novel "Abyss of Elysium" by Dennis Chamberland

√ The Robert A. Heinlein Memorial Tunnel

✓ Solar-powered trail markers up the Observatory path ✓ MDRS Dust Control Study Findings.

The Moon Society Journal Free Enterprise on the Moon

"Tunnel Project" Gallery



3-D preview of tunnel structure by Mary Cooper A simple 1" PVC frame and see thru green snow fence fabric helps to create the illusion of pressurized protection.



The completed "Heinlein Tunnel" before snow and mud stopped application of the green snow fence fabric on the upper portion. Shown is the start of a "Tee" branch towards the Observatory. The tunnel ends at the Engineering Airlock porch steps. The porch deck will be kept as is for now.

The Moon Society Blogsite: "Artemis Moonbase Under Construction"

The AMS 1 crew launched this blog with the hopes of making individual contributions to it throughout our mission in Utah. Unfortunately, a little detail (there are no more than 24 hours in each day) got in the way. We all are deeply grateful to Tom Greenwalt of Minnesota Space Frontier Society, an NSS chapter that now partners with the Moon Society, for finding material to keep it going in our absence.

Our intention is to keep the blog going to share information and news about Moon Society projects. As the Society's goals include the actual construction of a real permanent resource-using settlement on the Moon, the blog subtitle "Artemis Moonbase under Construction" is apt. If we find ourselves doing something that does not work to advance that goal, then we are off-track.

> The blog site is easy to remember: http://www.moonsociety.org/blog/

Casualties Along the Way

Our own Website: www.moonsociety.org/moonbasesim/

There were two server crashes in the weeks leading up to the mission that affected the Moon Society website. The timing could not have been worse. /moonbasesim/ webmaster William Fung-Schwarz decided that the prudent thing to do was move the site to the Nursing Society website which he also maintains. However, once the mission began, he had no time to complete the job, and much of the original site was unavailable to visitors. We meant well!

We hope in time to recreate the original site complete with in-mission and post-mission additions as a standing record of what we did.

Meanwhile, you are encouraged to visit our records and photos on the following Mars Society pages:

> http://www.marssociety.org/MDRS/fs05/ [go to the Crew #45 Section]

http://chapters.marssociety.org/swhab/Crew45/ [A day by day directory of photos and other media items]

The Moon Today E-paper

This was another of William's great ideas. He actually completed the first edition, and put it online, but at the moment, there is no working link to it. We'll get around to fixing that also. William found no time to compose other editions on the planned every-other-day schedule.

Chalk up these disappointments to the obligatory "Learning Experiences." Indeed, learning was the one overarching most successful part of the mission: as a society, we now have the experience and now how to do it better next time, and sometime perhaps, at our own location!.

MMM #193 – March 2006– page 11

The Moon Society Journal Outpost Frontier Report



You Can Now Get LED Online Free!

Dear Lunar Enterprise Daily Readers and Friends:

With a human return to the Moon now imminent, the Editors at Space Age Publishing Company believe that the Earth's leading lunar news resource should be available to everyone *free of charge*. Our new "Public Edition" will be online March 2006!

From science researchers and commercial entrepreneurs who appreciate concise information leading to global connections to the casual space enthusiast who wants to keep current with lunar activities, the *Lunar Enterprise Daily (LED)* provides a valuable service.

LED's new online format can be accessed through Space Age Publishing Company's homepage at:

<u>www.spaceagepub.com</u>. *LED* still retains the same great lunar and space news, but with increased online features including:

- More graphics
- Links to enlarged graphics
- Individual page format articles

Please contact us at <u>news@spaceagepub.com</u> with any feedback or comments as to how we might improve your reading experience. Also, feel free to keep us informed of commercial, international and other lunar or space efforts you would like to see covered.

> To the Moon, and Stars, with Aloha, The Editors Space Age Publishing Company Hawai'i and California, USA 808-885-3473, 650-324-3705 news@spaceagepub.comwww.spaceagepub.com

[Steve Durst, Palo Alto, CA and Kamuela, HI. is a member of the Moon Society's Board of Advisors, as well as a founding memberof the Society. We are deeply indebted to him for making this publication available on a free online basis!]

04-01-2006 Stellar Spectacular

Prepare for a Real Treat and forget about April Fool's Day! The crescent Moon will occult the bright nearby star cluster Pleiades - and that is no joke!

For more information, go to:

http://www.skynewsmagazine.com/pages/ pleiades_lunar_occultation_april1_2006.html To enhance the naked eye spectacle, a good pair of binoculars should serve quite well. Best at *jow* power.



Bay Area Moon Society

http://www.moonsociety.org/chapters/bams/ From: Bill Clawson <billclawson@yahoo.com>

We continue to meet regularly, 7 pm on the 4th Thursday evening every month at a member's home. We've got the talent and ideas to organize, but getting a critical mass of members together at any one meeting to take up organizing has been an ongoing problem. We all have demanding jobs and busy lives, yet space continues to light our fire!

Moon Society St. Louis

http://www.moonsociety.org/chapters/stlouis/ From: Keith Wetzel <kawetzel@swbell.net>

. For several years now, we have been setting up exhibits and giving presentations at the major St.Louis Metro area science fiction event, **Archcon**. Now we are planning to take on a second local "con" - **ShowMeCon 3**, April 21-23, at the (Lambert International) Airport Hilton. Members Keith Wetzel, Dave Dietzler and David Heck and others will be participating actively.

[Science Fiction events are one place to look for potential new members enthused about space. But given that much of today's "fandom" is more into fantasy than traditional "hard core" science fiction, recruitng at these events is a hit and miss thing - very much of an uphill struggle. But when we catch someone, it's good! - the Editor who has been fishing at many a con over the years.]

Moon Society Mid-Atlantic Outpost

http://www.moonsociety.org/chapters/midatlantic/ Contact: Ben Smith <terranexplorer@yahoo.com>

Calling all Moon Society members and any other persons reading this who live in Maryland, Washington DC, or in NE Virginia. The Mid-Atlantic Outpost, once an active chapter in Artemis Society International, is in need of rejuvenation. Together, we can do great things. Let's organize and get our Chapter Certificate. Please contact my by email at the address above **or by phone:** 410-837-0427

Moon Society Montreal, Quebec, Canada

Currently there are two of us, now both proud veterans of MDRS Crew 45, the Artemis Moonbase Sim 1 mission. We are zeroing in on a third person suspected of deep interest in Space and the Moon.

> **Contacts:** Laurel Ladd <scarlets@videotron.ca> Steven Winikoff <smw@alcor.concordia.ca

MAM #193 - March 2006- page 12 March 2006- page 12

GREAT BROWSING !

Review: Roving Mars in IMAX

http://www.thespacereview.com/article/545/1

Low-cost Aquarius launch & orbital depots http://www.thespacereview.com/article/544/1

James Oberg on Russian Plan to Sell Loopthe-Moon tours for \$100 Million per Ticket http://www.thespacereview.com/article/551/1

Will rocket racing help us get into orbit? http://www.thespacereview.com/article/549/1

Essays on Private Sector Role in Moon Return http://www.thespacereview.com/article/547/1

Lunar platinum and alcohol fuel cells http://www.thespacereview.com/article/555/1

Those Humans who Prefer Robots http://www.thespacereview.com/article/554/1

Speculative Illustration of Extrasolar Planets http://www.thespacereview.com/article/553/1

Centennial Challenges: SpaceTech Olympics http://www.thespacereview.com/article/559/1

Review: Unreal Estate (Lunar Land Claims) http://www.thespacereview.com/article/562/1

Animation of Mars Ice Cap Seasonal Vareiation http://ltpwww.gsfc.nasa.gov/tharsis/snow_paper.html

Mars Odyssey's THEMIS instrument Discoveries http://themis.asu.edu/discoveries

Melting snow carved gullies on Mars http://themis.asu.edu/discoveries-snowmelt

Mars' Aram Chaos was once a lake http://themis.asu.edu/discoveries-aramchaos

Granite-like rocks discovered http://themis.asu.edu/discoveries-granitepeaks

Olivine-rich rocks hint at cold, dry Martian past http://themis.asu.edu/discoveries-olivine

Discovery of Evolved Lavas on Syrtis Major http://themis.asu.edu/discoveries-dacitelava

Mars has complex volcanic processes http://themis.asu.edu/discoveries-volcanicdiversity

Mars: more channels than previously thought http://themis.asu.edu/discoveries-channels

Mars has large expanses with exposed bedrock http://themis.asu.edu/discoveries-winderosion

25th International Space Development Conf. Los Angeles – May 4–7, 2006* Co-hosted by The Planetary Society**

http://isdc.nss.org/2006/

Sheraton Gateway Los Angeles

http://www.sheratonlosangeles.com/ 6101 West Century Blvd, Los Angeles, CA 90045 Phone: 310-642-1111 Fax: 310-645-1414 The hotel is at LAX - free shuttle

*Three weeks before the customary Memorial Day Weekend slot, and the earliest that ISDC has been held since '87 when it was held the last weekend in March in Pittsburgh.

** This is an historic event in NSS-TPS Collaboration. Previously, The Planetary Society had sponsored a half-day seminar at ISDC '89 in Chicago. An effort to cosponsor ISDC jointly with the Mars Society, the event to serve as the Mars Society Annual Convention as well as the ISDC, failed when the two Societies could not agree on dates.

Looking Ahead:

• *Gala Celebration of the dawn of Space Tourism*, on Thursday night, in partnership with the Space Tourism Society. All three space tourists, Dennis Tito, Mark Shuttleworth, and Greg Olsen, will be invited to attend, as well space tourism entrepreneurs.

• *Day-long Space Venture Forum*, in cooperation with the Venture Forum, bringing together top leaders from venture capital, internet business, space entrepreneurs and media to discuss the future of the industry.

• Special screenings of the all-time top space films

Tours:

□ NASA-Caltech Jet Propulsion Laboratory (JPL)

- □ The future Mojave Spaceport
- □ Mount Wilson Observatory

Registration: Online Registration now available! Early Bird Registration ended March 15th. Current Conference registration fees are as follows:

| Preregi | stration | At Door Daily | |
|-------------------------|----------|---------------|------|
| Member/Cosponsor | \$100 | \$125 | \$45 |
| Join both organizations | \$120 | \$145 | \$65 |
| Nonmember | \$125 | \$150 | \$55 |
| Student * (no Senior) | \$ 35 | \$ 50 | \$20 |

Visit the ISDC 2006 website above:

For the latest on programming, tracks, workshops, speakers, meal functions, tours, and hotel registration rates. [None of this information was available at print time.]

Note: Local Volunteers needed. This event is currently not supported by any of the California NSS chapters. The last two ISDCs in California were ISDC 2003 San Jose, and ISDC 1990 Anaheim, and the 1st ISDC, 1982 Los Angeles.

Whenever possible the annual ISDC is hosted by a local NSS Chapter. Exceptions have included 1994 Toronto (The Canadian Space Society) and 2001 Albuquerque (AIAA)

ISDC 2007 is slated for **Dallas** and will be hosted by the NSS North Texas chapter at the Intercontinental Hotel. You can follow their conference planning at:

http://nssnt.org/ISDC2007

MMM #193 - March 2006- page 13

[From the Mars Homestead Project - www.MarsHome.org]

Mars Homestead Project[™] Update

Goals of Project on Earth and on Mars Key IMAGE

Did Your Family Include Pioneers?

Many of us are presently with relatives for the holidays. Think for a moment about any of your past relatives who were pioneers.

- Perhaps pioneering in a new business field.
- Perhaps exploring the New World.
- Perhaps an immigrant family, saving money to send one family member to a new world, to make a new life and seek out the opportunities that the frontier offered them and

later, bringing other family members over to join them.

You can be part of the next pioneering wave. Join the Mars Homestead group, and help us design a low-cost, early, growing settlement on Mars. Together we can open the next frontier for humanity.

Mars Homestead™ Study

This year we completed the Mars Homestead™ reference design study. This innovative plan calls for a dozen people, with robotic assistance, to establish a small settlement on Mars using near term technologies. Their focus would be on the initial mining, refining, manufacturing, agriculture, and habitation systems. They would enlarge the settlement, using local materials for construction.

In the initial study, twenty experts studied technical areas; including: agriculture, architecture, construction materials, electrical distribution, bulk gas production, HVAC, instrumentation and controls, information technology, medicine, psychology, nuclear power, waste recycling, polymer manufacturing, and metals manufacturing systems.

The latest image of the Homestead design is at

www.marshome.org/images2/displayimage.php?pos=-3188

We are continuing design studies during workshops at MIT during January, and later with web-based teams.

Presentations of the Mars Homestead:

Various members of the design team represented the Mars Homestead project at several 2005 conferences:

- Internat'l Conf. on Environmental Systems (ICES) Rome
- International Space Development Conf., Washington DC.
- Mars Society Conference, Boulder, Colorado.
- Meridiani Base Workshop. Canada
- Space Generation Congress 2005, Fukuoka, Japan.
- International Astronautical Congress, Japan
- X-Prize Cup, Las Cruces, New Mexico
- And several local events.

We will continue to refine our concepts and will have a presence at a number of upcoming conferences. Let us know if there is an event we should be present at, and whether you can help in any way.

Joe Palaia wins Diamandis Award

Mars Foundation programming team member Joseph Palaia received the Peter Diamandis leadership award while attending the Space Generation Congress 2005 in Fukuoka, Japan. The award recognizes the Space Generation Congress delegate who makes the most significant contribution to the



online discussion before SGC, and demonstrates the greatest leadership and initiative during

Donations - Deductions Approved by (US) IRS

Another milestone: the US IRS approved the "501(c)(3)" status for the Mars Foundation, just in time for the end of the 2005 tax year. This means that donations to the Mars Foundation are deductible for most US taxpayers, up to the limit allowed by law.

Small donations are especially appreciated, they give the team members a good feeling and you'd be surprised at the number of small expenses to support volunteers. They can be made on a secure web site linked from:

http://MarsHome.org/about/donations.html

To designate a contribution for a specific project, make a large donation, or to donate materials or supplies, please send us an e-mail to:

"Info at MarsHome.org" or call (781)944-7027.

Volunteer? Want to help open the Space Frontier? You don't need to be a 'Rocket Scientist', to design a house on Mars. The Mars Homestead design can especially use assistance with: web, cad, writing, editing, engineering design, con-struction, and grants. Let us know if you can consistently devote several hours to a specific project. Some of you sent messages to individual team members offering to help, if you were not placed on one of our projects, please resend your contact info on our contact page:

> http://marshome.org/about/contact.html or via e-mail to: Info at MarsHome.org

DVD, Web Presentations Available of Mars Homestead designs - Let us know if you wish to try out 'web-cast' or telecon presentations, or have DVD video presentations the Mars Homestead (tm) designs. Details are being arranged and will depend on your interest.

> http://marshome.org/about/contact.html or via e-mail to: Info at MarsHome.org Mars Homestead Project - www.MarsHome.org To Arríve, Survíve, and Thríve!™

MMM #193 - March 2006- page 14

All-Sky Optical SETI Telescope of Planetary Society Very Close to Completion ... and a plea!

From Louis Friedman, TPS Exec. Dir. 2/28/2006 http://planetary.org/programs/projects/ seti_optical_searches/facts.html

The Planetary Society's incredible All-Sky Optical SETI telescope is very close to going online! And when it does, it's going to, quite literally, revolutionize the Search for Extraterrestrial Intelligence.

The first-ever Optical SETI Dedicated Observatory, funded by The Planetary Society, is due to open in April. This unique and groundbreaking project will be the first optical observatory on Earth dedicated entirely to SETI. Project scientist Paul Horowitz and his Harvard University team have developed an innovative way to scan huge swaths of the sky -- as opposed to pinpointing one small area -- for possible light signals sent by intelligent civilizations elsewhere in the galaxy.

> The telescope is a 1.8 m (72") f 2.5 reflector being built at Oak Ridge, Tennessee http://planetary.org/image/jason_mirror.jpg

This powerful new telescope will not only be the

world's first dedicated Optical SETI observatory: with it The Planetary Society and its Members are actually bringing entirely new technology to the search!

As of now, the telescope itself is finished, as is the building that houses it. Most of the electronics are in and functioning. Much of the software is done, and the team has worked out all the operating protocols and procedures. All that remains is the 150-pound camera, and the associated processors that will be able to crunch more raw data in less time than anyone ever dreamed we could do!

The camera that Paul and his colleagues are building is something that would have been in the realm of science fiction just a few years ago...literally. It contains 32 computer chips -- designed and programmed right on site -with a combined data processing rate of 3.5 terabits/sec:

These chips could process the text of every book in print ... every second!

Our camera isn't going to use CCDs (charge-coupled devices) -- not even the fanciest cutting-edge versions of them -- because they're just not up to the work. Paul's team is using an array of photo-multiplier tubes (about \$52,000 worth, actually)... because they are approximately one million times faster at registering light than CCDs. And the amazing thing is, much of this hardware is being hand-built by Paul's team. They are so excited about the Search for Extraterrestrial Intelligence, and about this approach to SETI in particular, because it represents one of the most thrilling exploratory efforts in human history...exploration that could actually transform humanity's understanding of our place in the galaxy. We started our first optical search a few years ago. Using the old technology, we've now looked at about 5,000 stars...out of approximately 400 billion in the galaxy. Slow going, indeed. And that's the reason for our fantastic new All-Sky Optical SETI program. For anywhere from eight to twelve hours each night -- depending on the season -- it will scan a strip of the sky about 1.6-degrees wide, roughly north-south. To get everything, we'll have to hit each section of the sky about three times during the year.

Unfortunately, as we enter this final stretch, our SETI Fund is absolutely exhausted! "There's no such thing as a free launch." It's true. You can't go to space without resources. And you can't search for extraterrestrial intelligence without them, either.

While our search for signs of life from across the galaxy may be a bargain compared to the cost of boosting space vehicles into orbit, it can't run on thin air. It takes money...and as always, since we won't take government money, that can only come from you.

We'll put your contribution to immediate good use, helping to pay for the camera, computer chips, the photomultipliers, circuit board fabrication, and all the rest. You can contribute to the SETI Fund online at:

https://planetary.org/join/donate/seti06/ <LF/TPS>

Other Planetary Society News

The Mysterious "Pioneer Anomaly" The Final Attempt to Contact Pioneer 10

In early March 2006, for the very last time Earth was in a favorable position to receive Pioneer 10's radio signal. The Deep Space Network attempted to reacquire Pioneer 10's weak signal, with the hope, however faint, that we may yet have another data point to aid in our investigation of the Pioneers' enigmatic behavior. The craft is slowing down at a rate unaccountable by gravity alone.

Pioneer Anomaly Team member Slava Turyshev reports on the outcome of this final attempt to make contact with Pioneer 10 at:

> http://planetary.org/programs/projects/ pioneer_anomaly/update_200603.html

Mars Climate Sounder

The Planetary Society is an education outreach partner on Mars Climate Sounder, and is proud to be a part of this next phase of Mars exploration. MCS will be the first science investigation at Mars that is capable of performing a "4-dimensional" study of the Martian climate.

Find out more.

http://planetary.org/programs/projects/ mars_climate_sounder/

MMM #193 - March 2006 - page 15 Easter a sector a sector

Optical Vortex Telescope Could Look Directly At Extrasolar Planets

A new optical device might allow astronomers to view extrasolar planets directly without the annoying glare of the parent star. It would do this by "nulling" out the light of the parent star by exploiting its wave nature, leaving the reflected light from the nearby planet to be observed in space-based detectors. The device, called an optical vortex coronagraph, is described in the December 15, 2005 issue of Optics Letters.

http://150.135.248.2/~grovers/swartzlander.pdf

http://www.sciencedaily.com/ releases/2005/11/051130232242.htm

[original release;] http://aip.org/pnu/2005/755.html

NASA's Telerobotic Construction Competition

PRESS RELEASE : NASA HQ: Friday, December 2, 2005

NASA's Centennial Challenges program office, in collaboration with the Spaceward Foundation, Mountain View, Calif., announced the new Telerobotic Construction Challenge. The competition awards \$250,000 to teams to develop technologies enabling robots to perform complex tasks with minimal human intervention.

"The Telerobotic Challenge may directly affect how exploration is conducted on the moon," said NASA's Associate Administrator for the Exploration Systems Mission Directorate, Scott Horowitz. "If the Challenge can successfully demonstrate the remote assembly of simple and complex structures, many aspects of exploration in general will be affected for the better."

This Challenge will be conducted in an arena containing scattered structural building blocks. The task is to assemble the structure using multiple robotic agents remotely controlled by humans. The operators may only see and talk to the robots through communications' equipment that simulates Earth-moon time delays and restrictions. The robots must be smart enough to work together with only intermittent human direction to be successful.

"The Telerobotic Construction Challenge is directly linked to NASA's focus on lunar exploration," said Brant Sponberg, NASA's Centennial Challenges program manager. "Spaceward has shown their capability to conduct a successful prize competition, and we look to them to help advance this new technology." More at:

http://www.spaceref.com/news/viewpr.html?pid=18433

Telerobotics Projects that would Hasten the Day we Return to the Moon to Stay

• Site Leveling & Preparation

• Emplacement of Regolith Shielding on Delivered Habitat Complex Modules



www.lunar-reclamation.org

Ad Astra per Ardua Nostra To the Stars through our own hard work! 2005 LRS OFFICERS / Contact Information

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LRS News

• Peter Kokh commands first Moonbase Exercise at Mars Desert Station: The two week long exercise began on Feb. 26th and concluded March 12th. LRS was the first of three principal cosponsors of the exercise, contributing the first 20% of the rental cost.

• Peter scheduled for two talks in Highland Park, Illinois: On Wednesdays April 19 and 26, Peter will be telling audiences at the Highland Park Senior Center about the Moon, and the Mars Desert Research Station.

LRS Upcoming Events - April and May

دﷺ> Saturday, April 8th, 1–4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110 AGENDA: www.lunar-reclamation.org/page4.htm

Bob Bialecki and Jim Schroeter will chair the meeting, as Peter will still be in St. Louis on private business, but also meeting with members of Moon Society St. Louis.

د Saturday, May 13th, 1–4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110 AGENDA: www.lunar-reclamation.org/page4.htm

Peter will give his delayed report on the Moon Society/LRS/NSS mission at the Mars Desert Research Station Feb 26-Mar 11th, with photos. He will discuss the successes and what we might do next, either on a sequel mission in Utah or at another less expensive location.

This is the brainstorming stage of what comes next, and member input is most welcome.



Ben's 3rd tour of duty at MDRS, the 2nd this season: Next Meetings: March 19 [Sun.] April 22 [4th Sat.], May 20

Ben Huset will be returning to Utah for the second week of Crew 45, the Moon Society Mission, aka Artemis Moonbase Sim 1 (Simulation 1). Last year, Ben succeeded in getting Peter Kokh on that season's Refit Crew, Crew #45. This time, Peter is returning the favor, and Ben will fly out the day after this year's MarsCon is history, March 6h, making the trip with Science Goh Hugh Gregory who will also be (re)joining the crew. Ben will serve as crew astronomer this time, his jack-of-all-trades talents much appreciated.

Tom Greenwalt runs blog for Moon Crew at MDRS http://www.moonsociety.org/blog/

In April we will do public outreach at The State

Activities: We will participate in several events in coming

months: in February we will judge at the George Washington

Carver Science Fair with members judging for the James H

Chestek Award that we give for space related science and

technology research at the elementary level of the Fair. Due

to a lack of sufficient judges we will not have a senior level

award this year. On March second we will give the award

noted above at The Academy of Natural Sciences on the

Benjamin Franklin Parkway in center city Philadelphia.

 MMM #193 - March 2006 - page 17
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Museum of New Jerseys "Super Science Weekend" on April 29 & 30. I have requested exhibit ideas from our members and included several suggestions on a handout: innovative rover designs, including the Tumbleweed concept from NASA and any other clever, practical design they might think of. A model of the Mass Driver, a Laser Propulsion System mock up and a Mars Diorama where some other possibilities suggested. We have a diverse group and I'm sure we can extend the range of interesting concepts that the public can build on. And this time we are not up against the I.S.D.C. in our area!

February 18th Meeting Notes: Our group met on the 18th in February with several members unable to attend due to new job commitments, overtime, and family events.

Hank Smith, our Science Fiction Outreach Coordinator, talked on the recent events of the Philadelphia Science Fiction Society. He is involved in the "hard science" subject and presenters selection of the organization and has interests in horror and gaming, especially board gaming. He will be going to ConCussion on Easter weekend. Where, you may ask, would somebody hold a convention with such a name? In the British Isles, specifically in Glasgow Scotland. Hank told us of another future event we can be part of: the 2006 Philcon will be held in November again! It will be held at The Franklin Windham Plaza from the 17th to the 19th. Hank will update us in March. Yeah!

Michelle Baker gave the Treasurers Report: We are solvent. This good news should not deter members from paying annual dues payable in March (\$25/yr or \$6.50/ qrtr)

Dotty and Larry gave reports on the February National Geographic and our website respectively. As previously mentioned by Larry we need to add more material for the Web and Blog postings. Lets see if I can put this report on our site.

Earl brought up some possibilities for the Super Science Weekend: Michele's' favorite "Tumbleweeds Rovers," models of the Mass Driver, Laser Propulsion, and dioramas on Mars Homesteads or other locations. Pictures we have; something to look at in three dimensions could help focus us and the visitors on practical needs for displayed ideas. Although I don,t expect "the real thing" for some of these exhibits, but I think some of our members special interests could inspire them.

Mitch Gordon: brought both Ad Astra and The Futurist the Winter and January/ February Issues respectively. Ad Astra included articles on Saving Earth from Space (which engendered some talk on the merits of shifting energy and other "products " off world).

Even among space oriented people there is disagreement on what would be best in this area, just as there is among environmentalists on choosing Coal or Nuclear Power (a talk for another time). Our choices of Solar or Nuclear for a number of jobs can also be refined. There where also articles on Luna Palooza , (Returning to the Moon), the Webb Space Telescope and much more. In the Futurist there was an article on a new aircraft design to improve fuel efficiency by eliminating windows in the Tomorrow in Brief section. The design is a joint MIT/ Cambridge University effort. Perhaps it could lead to "glass cockpits" on high flight excursion vehicles. Mitch is in the magazine in Designing for Democracy as a contributor to this feature.

There is another area of Mitch's' outreach that may bear fruit in the near future: he has been in contact with both Drexel and University of Pennsylvania to introduce students at those schools to concepts like *Mars Homestead* and other ideas that we are familiar with. These would be through the schools departments of engineering. He also brought up an opportunity that may, or may not, work for us as part of a "Table Talk" series at a liberal bar restaurant in our city. This would be at The White Dog Cafe at 34th and Sansom Streets in the University City area of Philadelphia. Think "Save the Earth by Developing Space" as a possibly acceptable topic there.

And finally, for February, Janice brought up an article from *Science* on the existence of glaciers on Mars in the past. This was the January 20th issue and had a good amount of detail and speculation on what this could portend for the search for life on Mars. If the glaciers, which are not located at the Poles are buried by sand they could exist for millions of years as locations for life to survive. We could also use the resource, as found by our spacecraft. "Formation of Glaciers on Mars by Atmospheric Precipitation at High Obliquity." Okay, Janice!

January 21st meeting notes: We did have an extensive January meeting with Gary Fisher bringing up a lot of activities he is involved in and events for us to attend and be part of. First and foremost is the August 2006 Mars Society Convention which will be in Washington DC. It will be a bit expensive (>\$200) at the door but is in Washington D.C and could be a "day trip" for many of us. He has joined the AIAA and brought material from their publication and other sources: the AIAA pieces (January issue) included one on the CEV, obsolete already, experiments on real moon dust (melts quickly under microwave beam) and the chemically vicious properties of martian dust. He brought an article on a glacier in the Hellas Basin and its melt patterns as imaged by the european orbiter. From The New Scientist he also had an Earthbound device that may go into space eventually: a "pocket nuclear reactor" being studied for use in large building complexes. The output would be in the 200 kw. range. And much more from Gary.

Earl had recommended several books for January and has added another; for the prospects of interstellar flight: Adrian Barry's' "The Giant Leap" which has a lot of material presented well on the techniques that may go into practical reasons for doing this. He also has some cautionary comments on things like "not leaving your engine at home." The second book is closer to home. John S. Lewis' "Mining the Sky" which mixes vignettes of "future history" with the current ideas of going into space and utilizing the resources we can get there. Note that we have found much that is useful, someone has to go and stake working claims to it. I have found it a somewhat heavier read than the Barry book. It is from the mid 90s but, what I have read of it, is generally still applicable.

It does have the "Cycler" space craft but no Mass Drivers The last is somewhat light hearted, in a way, as it uses Star Trek as a major reference and is written by a Tribble! Okay, he is actually quite bright (Princeton doesn't "dumb down" I believe) but his last name must have gotten Alan C. Tribble a lot of kidding at some point. He addresses the fundamentals of space technology, and what would actually be needed in terms of energy etc., to do some of the things shown and written about in the popular TV shows. No math, readable at the Junior High level and above. www.alantribble.com.

On March 2, PASA will award the James H. Chestek Award for the George Washington Carver Science Fair at the elementary level. This year's winner is Bansi Bhatt, Grade 6. Baldi School Earth Science Project #139 Title: "Magnetic field: Does it effect plant growth?" The award presentation will be held at The Academy of Natural Sciences (19th & the Parkway) at 1:00 PM.

SOLAR SYSTEM AMBASSADORS

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[http://www.oasis-nss.org/]

oasis@oasis-nss.org Odyssey Newsletter Online http://www.oasis-nss.org/articles.html

 Regular Meeting 3 pm 3rd Sat. each month Microcosm, 401 Coral Circle, El Segundo.
 March 18th - April 15th - May 20th

Information: OASIS Hotline, 310/364-2290; website.

Upcoming Events

- Sat. March 18th, 3:00pm OASIS Monthly Business Meeting at the home of Bob Gounley and Paula Delfosse, 1738 La Paz Rd, Altadena. Plans to be discussed include the upcoming ISDC in Los Angeles, the April presentation on the CEV program, and the World Science Fiction Convention coming to Anaheim in the fall.
- Sat. April 15th, 3:00 pm –OASIS Monthly Business Meeting at the home of Craig and Karin Ward, 1914 Condon Avenue, Redondo Beach.

Looking Ahead

• Thu.-Sun. May 4-7, 2006 -- The International Space Development Conference (ISDC), the annual meeting of the National Space Society, Sheraton Gateway Hotel, Los Angeles. The theme for the conference is Exploring Together. More information on the web at:

http://isdc.nss.org/2006/

or contact us by email: oasis@oasis-nss.org

OASIS is coordinating voluteers for the conference.

Scheduled tours of JPL and new Mohave Spaceport Site. This is the 1st ISDC in LA area since !990 (Anaheim)

For more info in this issue of MMM, turn to page 13.

Vision without action is just a dream Action without vision is just activity Vision and Action together can change the world.

MAM #193 - March 2006 - page 19 March 2006 - page 19

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🔁 INDEX to #193, Mar 2006 🝋

- p 1. In Focus: Where we're at and where we need to go, in Mars Exploration, Editorial, P. Kokh
- p 3 From Mars Analog Stations to a Real Mars Base, Kokh
- p 6. New Words from Mars for our Vocabulary
- p.7. Oops! We forgot a Color (in the Mars Society Flag)
- p 8. Classification of Martian Features, J. Plaxco
- p 9. Moon Society Journal; AMS 1 Commander's Report
- p 12. LED Daily Online & Free; Chapters & Outposts Report
- p 13. Browsing Links; ISDC 2006 Conf. Ad
- p 14. Mars Foundation Report
- p 15. Planetary Society News; p 16. LRS News
- p 17. MMM NSS Chapters News

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