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

Moon Miners' Manifesto

& The Moon Society Journal

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In FOCUS The Dawn of the "Lunar Decade" 2007-2016

Lunar Beijing Declaration. July 27, 2006, ILEWG 8
[International Lunar Exploration Working Group]
http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=38863

The news from the ILEWG 8 Conference in Beijing, July 27th, was encouraging. In a declaration issued this day and signed by all the attendees, a Lunar Decade is declared. Indeed, "within the next two years, four independent space craft (SELENE, Changé 1, Chandrayaan 1 and NASA's Lunar Reconnaissance Orbiter) will orbit the Moon " These four missions will kickoff what promises to be an unprecedented period of robotic lunar exploration.

The Conferees are to be congratulated for their realization that these happy concurrencies provide an unprecedented opportunity for international cooperation and coordination on several fronts. *Internationally coordinated analyses to facilitate the validation of data sets produced by different instruments,* enhancing the usefulness of information acquired by multiple spacecraft

Concentrating on a small number of specific targets would facilitate the cross-calibration of different instruments. If all the orbiters monitor solar flux data, cross correlation of this data will improve calibration of all the instruments dependent on knowledge of solar fluxes. This is an opportunity to *coordinate development and utilization of a common, improved Lunar Coordinates Reference Frame.*

All missions should *archive final mission data products in a PDS-compatible form, to implement international standards for access*

Common standards for S-band spacecraft commnication, with potential for common tracking operations and backup support to other missions, if necessary. A *coordinated campaign to provide data cross-check and validation for modern-era missions that have overlap in coverage, with data and experience from Past missions*

The conferees seem to have realized that *the final impact of orbiters on the Moon's surface is not the end of the mission but the final mission experiment. "*Information about the five impact events and subsequent impacts of probes should be coordinated with other ... missions."

Standardized telecommunications, navigation, and VLBI [Very Long Baseline Interferometer] support for future orbiter, lander and rover missions. We are given *"the opportunity to embark some payload technologies for navigation and guidance on orbiters and landers as part of a Global Lunar Navigation & Positioning System."*

Future orbiters could be placed on frozen stable orbits where they can participate in a *joint infrastructure for data relay, aid to navigation and lunar internet, in addition to landed surface beacons.*

The series of landers planned by agencies in the period 2010-2015 (the second half of the Lunar Decade - "the subsequent phase of Lunar Global [⇒ p. 2, col. 2]

Teleoperation: How far can we push it?

Contestants racing teleoperated rovers over a set course, with practice, could conceivably anticipate turns and other routine maneouvers so as to reduce notably the 2.4-2.8 second lag between command and evidence of execution. But as we try to teleoperate more complex equipment to perform more complex routines, teleoperators on Earth will have to be more cautious, yet will routinely work 125-400 times faster than those who teleoperate Mars Rovers. More on the challenge, pp. 7-8

Moon Miners' Manifesto

Moon Miners' Manifesto / Moon Society Journal is published every month except in January and July.

• **Moon Miners' Manifesto CLASSICS:** Beginning in July 2004, we began an effort to re-edit, reformat, re-illustrate and republish the timeless articles of MMM's first fifteen years, in PDF format only, for free downloading from either of two locations:

www.lunar-reclamation.org/mmm_classics/
www.moonsociety.org/publications/mmm_classics/

• **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; early use of Mars system and asteroidal resources; and establishment of permanent settlements supporting this economy.

• **MMM's MISSION:** to encourage "spin-up" entrepre-neurial 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 50 chapters, dedicated to the creation of a spacefaring civilization.

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• **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 to the establishment of a permanent, self-sustaining human presence on the Moon." — Contact information p. 9.

• **NSS chapter**s 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.***

• **Submissions**

√ EMAIL to KokhMMM@aol.com (***preferred***)
√ Mac compatible CD / typed hard copy to:
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⇒ IN FOCUS Editorial continued from p. 1.

Robotic Village") will provide an unique opportunity to set up *"a geophysical network on the Moon"* for which the conferrees "recommend the creation of a*n international scientific working group for definition of a common standard for future Moon network instruments"*

What's in it for us

We see this declaration, and the recommendations for international coordination of efforts in a joint assault on the many remaining mysteries of the Moon, as something momentous. We seriously doubt that such a methodical and well thought out collaboration between the spacefaring nations involved would have risen by itself. If any ILEWG conference justified the existence of ILEWG, this one certainly did. We urge NASA, the Chinese Space Agency, the Indian Space Research Association, and Japan's space agency to take all of these recommendations to heart, establish closer ties between all the respective Moon mission teams, and make every effort to coordinate their efforts on the scientific levels addressed by ILEWG.

Both The Lunar Reclamation Society and The Moon Society wholeheartedly embrace and endorse the declaration of the Lunar Decade and the recommendations of the Beijing conference attendees.

While we remain focused on the establishment of a permanent human presence on the Moon involved in the development of lunar resources, not just to provide their own needs but to help tackle our home planet's stubborn interwoven energy and environmental problems,

we see this declaration and the Lunar Decade as a positive sign that much of the desired "robotic footwork" will be accomplished in a timely fashion, maximizing the productivity of these already budgeted missions. Beyond these missions, will be "ground-truth" probes to the lunar polar coldtraps suspected of harboring water ice and establishment of astronomical facilities on the Moon

To the extent that this level of international space mission collaboration and coordination is achieved, it will create a powerful precedent that bodes well for the future of mankind as a solar system wide species.

The individual missions involved are each within the capabilities of the respective national space agencies. But looming ahead are manned exploration and outpost establishment efforts that will truly require this kind of dedicated mutual collaboration and teamwork. It is not the USA that will create a "permanent" outpost on the Moon or launch a manned expedition to Mars. It will have to be an international effort, and that is as it should be, leaving turf battles behind us on our divided planet. **PK**

A new look for this issue of MMM

We had been planning to introduce a new look to MMM with issue #201, the upcoming 20th Anniversary issue. But for other reasons, we decided not to wait. This change is motivated not by a desire for a new look, nor by a desire to switch fonts. Instead we decided to make life *a lot easier* by relying on only one principal font rather than two. We had been using **Gadget** for headings and *Comic Sans* for text. Now we use Lucida Grande, **bold** and plain, to avoid constantly, and tediously, switching fonts.

The Outpost Trap

Technologies Needed to Break Free

by Peter Kokh

Despite the best of current announced intentions, it is politically and economically predictable that NASA's lunar outpost (even if is "internationalized" by taking on "partners" in a contract) will be stripped of any and all features seen as "frills" or "extras." Consider how the planned 7-man International Space Station was summarily slashed without partner consultation in the stroke of a presidential pen to a 3-person one: 2.5 persons needed for regular maintenance and a half-person is available for scientific research. It can and will happen again, *unless ...*

It becomes our cause, the accepted challenge of those of us who owe it to our own dreams, to do everything in our power to get the outpost built, outfitted, and supplied on a more rigorous and stasis-resistant path. The/a lunar outpost must be designed with expansion in mind, with a suite of easy expansion points, expressing an architectural language that is expansion-friendly. No all-in-one "tuna can stack", please!

To this end, we must reexamine *every aspect and angle* of setting up a lunar outpost.

I. Transportation System Architectures:

Designing cannibalizable items for strategic reuse in Earth-Moon Transportation Systems.

NOTE 1: The author is *not* a rocket scientist, engineer, or architect. The examples given below may not all be feasible, but we hope that those that are not, will suggest other possibilities that are worth exploring.

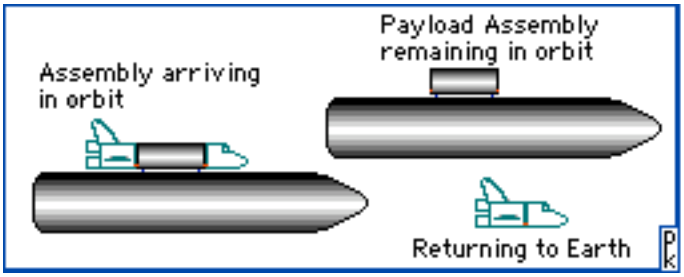
NOTE 2: We do *not* expect NASA to embrace any revolutionary space transportation system architectural turnabout. But it is something that commercial space transportation providers might do well to study.

NOTE 3: Those in the business may be quick to insist that these ideas are all impractical. So be it. They are not part of the solution. We are looking not for those who say "it can't be done," but for those who say "we'll find a way to do it anyway!" If it were not for the "Young Turks" in various fields, we would all still be swinging from the trees. We must find the hidden, unsuspected pathways!

Way back in MMM #4, April 1987, we pointed out that Marshall McLuhan's dictum that "the media is the message," might be transposed to "the rocket is the payload." Of course, you can only push this so far. But this daring architectural philosophy offers the best way to escape the imagined, unnecessarily self-imposed tyranny of the mass fraction rule. "Of the total weight, 91 percent should be propellants; 3 percent should be tanks, engines, fins, etc.; and 6 percent can be the payload." - http://www.allstar.fiu.edu/AERO/rocket5.htm - we are not talking about exotic fuels or better rocket engines, but ways to include the 3% "tanks, engines, fins, etc." into the payload.

In the case of the Shuttle, the mass of the vehicle is much greater than the mass of the payload, so we do not come close to the ideal. At the time (the April 1987 article), I offered this simple example. In the shuttle space transportation system, the payload that gets to stay in orbit is a needlessly small portion of launch vehicle mass.

Adopting philosophy "the rocket is the payload" we could, if we so dared, deliver much more to orbit.



In the suggested alternative, the orbiter has a fore and aft section: Crew Cabin and Engine pod with much smaller wing/tail assembly. There is no payload bay. A much larger payload, with a lightweight faring if needed, takes its place. The External Tank is also placed in orbit as part of the payload. A stubby shuttle is all that returns to Earth. Savings include not just the payload bay section but the much lighter smaller wings and tail. The article referred above to is reprinted in MMM Classic #1, p 10, a freely accessible pdf file at:

www.moonsociety.org/publications/mmm_classics/

Again, don't waste time writing MMM with all the reasons this couldn't be done. Instead, consider yourself challenged to figure out how we could do this anyway.

This is only one suggestion of how we can "cheat" the mass-fraction "rule." The shuttle system will not figure in the establishment of a lunar outpost. So it is not these details, but the spirit behind them that we are trying to get across. *Attitude, attitude, attitude!*

Terracing the way back to the Moon

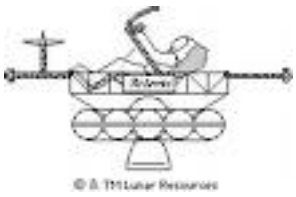
It seems unlikely that the Lunar frontier will be opened with vehicles that depart Earth's surface, make the entire trip out to the Moon, and land on the Moon's surface directly. So what we have to examine is all the various parts:

1. Earth surface to LEO (low Earth orbit) transports
2. LEO to Earth Moon L1 or Low Lunar Orbit ferries
3. Lunar orbit to lunar surface landers

At each phase, if the vehicle addresses the design challenges, material and/or useful assemblies and subassemblies can be deposited at the next. Whether it be all in one ride, or by a succession of waves, more payload gets delivered to the Moon's surface, and/or more robust way stations are constructed in LEO and LLO (low Lunar orbit) or at the L1 Lagrange point. *No opportunity is missed. See* "The Earth-Moon L1 Gateway" MMM #159, October 2002. You can download this issue freely at:

http://www.lunar-reclamation.org/mmm_samples/

We would be remiss if we did not point out that one of the most brilliant components of the **Artemis Project™** Reference Mission architecture involved just such a mass-fraction cheating device: reduction ot the portion of the landing craft that "returns" to the open-vacuum "space motorcycle." I think it can be shown that most objections to this design as vulnerable to micrometeorite impact are baseless. Micrometeorites strike the Moon, and spacesuited astronauts!, on the surface, with velocities much higher than the velocity such a craft would need to reach lunar rendezvous orbit. It was the incorporation of this feature that allowed the Artemis Project™ ferry to deliver the relatively massive triple unit SpaceHab-based outpost core to the surface.



Whether the Artemis Project™ Reference Mission will fly as designed is not our topic and irrelevant. The point is that it demonstrates, at least in this instance, the kind of breakthrough paradigm-scuttling innovation that alone will get us to the Moon "to stay."

Stowaway Imports: smuggling more to the Moon

Another article we wrote that suggests ways to "smuggle" more useful material and items to the Moon is "Stowaway Imports" in MMM #65, May 1993. This article is republished in MMM Classics #7, freely downloaded at www.lunar-reclamation.org/mmm_classics/ - or at www.moonsociety.org/publications/mmm_classics/

The idea here, is that it is inevitable that there will be structural, outfitting, or packaging items aboard craft landing on the Moon that are not needed for the return to the vehicle's base, be it in LLO, LEO, or Earth itself. The cost of getting these items to the Moon is prepaid as part of the cost of getting the payload consist to the Moon, whether or not they remain on the Moon or not. So if we leave them there, these items are a bonus.

Packaging containers, stuffing, dividers, etc. can be made of items not yet possible to duplicate on the Moon: some Moon-exotic element such as copper, or an alloy, some reformable plastic, biodegradable materials useful as fertilizers, nutritional supplements, *whatever.* Everything not absolutely needed for the ride back is game for scavenging. On crewed vehicles this can consist of everything from tableware to bedding, to appliances and even cabin partitions.

Some items can be thoughtfully predesigned for second use on the Moon as is. Others will be melted down or reformed for the useful material they contain. It's all free, or at least less cost than replacing them for the next outbound trip to the Moon. Only the "squeal" need return!

Designing moonbound craft to be cannibalized in this fashion will require resourcefulness, and exploration of a lot of options, some more promising and less difficult than others. Stowaway imports are a way to supplement what personnel on the Moon will be able to produce or fabricate for themselves, thus leading to swifter development of a more diversified lunar startup economy.

Cargo craft landing on the Moon might be designed for one way use only. Fuel tanks will be prize imports, landing engines may be reusable for surface hoppers. The idea is to build these craft cheaply and in numbers, much in the mold of WW II "Liberty Ships." If some crash or go astray, the loss will not be critical.

In our Lunar Hostel's paper (ISDC 1991 San Antonio, TX - www.lunar-reclamation.org/papers/) we introduced the "frog" and the "toad" - Moon ferry under-slung crew cabins that could be winched down to the surface, lower its wheeled chassis, and taxi to the outpost: amphibious space/surface craft. The "frog" would return. The "toad" would be designed to spend the rest of its service life on the Moon as a surface transport "coach."

Modular Transportation

One of the more outstandingly successful innovations of modern transportation is the pod. Cargo in uniformly sized and shaped pods is transported on trucks, flatbed railway cars, and ocean going cargo ships.

The space transportation industry, especially the commercial sector, would do well to develop standardized pods, not waiting upon NASA clues which may never come, simply because the need does not arise in the very limited NASA lunar outpost mission plan. There may be more than one pod design, however, depending on the nature of the cargo. Liquids and aggregate materials (a load of wheat, for the sake of an example) may require container constraints, for shipment through the vacuum of space, that large assemblies do not.

The pod agreed upon would have significant repercussion for modular systems shipped to the Moon: modular power plants, modular water recycling systems; modular regolith processing systems; modular food processing systems; modular hospital cores; the list of possibilities is endless. No one size is ideal for all applications. However, we suggest that the current modular factory system serve as a model and size guideline, as it has proved remarkable successful. See MMM #174 April, 2004 "Modular Container Factories for the Moon" You can download this issue freely at:

http://www.lunar-reclamation.org/mmm_samples/

Such a pod could also deliver inflatable modules to the Moon, which could then be outfitted on location, with cannibalized components and/or items manufactured by startup lunar industries. The result would be quicker build-out of the original outpost structure.

Transportation Systems Architecture Upshot

If we intend to expand the outpost into a real industrial settlement on an "inflationary fast-track" - the only way it can be done economically - the Earth-Moon transportation system must be so-designed from the gitgo, *down to the last seemingly insignificant detail.* A missed opportunity could spell the difference between success and failure. Our purpose in giving the examples above is less to fix attention to our examples than to get across the spirit. Spacecraft architecture, systems architecture, industrial design for reusability as is or with minimum processing effort, choice of materials, etc. And all vehicles at every stage should be designed this way.

Again, these lessons will be lost on NASA as its objectives are strictly limited: to deploy a moonbase in order to prepare for manned exploration of Mars. "." But commercial providers are likely to look for more extensive use of their products, for other more open-ended markets. It is with them that all hope lies. Those that adopt the above philosophy as a cornerstone of their business plans are more likely to survive and thrive long after NASA's government-limited goals are met.

II. An Expansion-friendly Modular Outpost Architectural Language, and Construction/Assembly Systems Design

Back Reading:
MMM #5 May '87 "Lunar Architecture", MMMC #1
MMM #75 May '94 "Lunar-Appropriate Modular Architecture" MMMC #8
MMM #101, Dec. 96 "Expanding the Outpost", MMMC #11

This is one area in which the **Russian**s and **NASA** with its various **contractors**, have already done considerable research and have acquired invaluable inflight/inuse experience in the **Mir** and **International Space Station** programs. Happily too, a commercial contractor, **Bigelow Aerospace** is now making groundbreaking contributions with inflatable module technology, borrowing heavily on NASA's Congress-aborted TransHab project. The prototype one quarter scale inflatable **Genesis I** is now in orbit and rewardingly performing well.

Modular architecture developed for the microgravity of Earth orbit will certainly have applications in the return to the Moon effort. It will apply directly to any way station developed at the L! Gateway point or in lunar orbit. But applications to the design of lunar surface outposts will need some rethinking for four reasons:

1. We are now talking about a 2-dimensional environment stratified by gravity, not the any-which-way dimensions of orbital space. The 1/6 Earth normal gravity environment mandates an established up-down orientation, no "swimming" through the air to get from one point to the other. This is minor.
2. Egress and ingress portals need to be designed to minimize intrusion of insidious moondust. It would be ideal if spacesuits were rethought with this challenge in mind, but NASA has already signaled its intention not to explore that route for money reasons. One more sorry instance of a "stitch in time, saves nine." NASA operations on the Moon will be far more expensive to maintain than the relatively trivial expense of wholesale spacesuit redesign even at multimillion dollar expense. Commercial contractors may be the Knights in Shining Armor here as the NASA approach would be indefensible in any business plan.
3. Outside the safety of the Van Allen belts, radiation protection is required for more than short stays. The lunar surface station must be designed to sit under a shielded canopy, or to be directly covered with a regolith blanket. An added benefit will be thermal equilibrium.

While NASA, its contractors, and the Russians have a head start, it should never be assumed that they have explored all the options. Modular architecture is very much structured like a language: it has nouns (the various habitat and activity modules), conjunctions and prepositions (the various connector nodes), and verbs (the power system, the Candarm and other associated assembly and arrangement tools). The idea in constructing a "lunar-appropriate modular architectural language" is to come up with the most versatile, yet economic in number, set of modular components to support the most diverse and varied layouts and plans. The idea here is to maximize the options for expansion, without prejudging what needs will be accommodated first in the buildout.

We think that this concept is important enough to put to a design competition. NASA, contractors, the Russians can all advise on interface constraints and other design features that must be incorporated. Then let the would be Frank Lloyd Wrights of the lunar frontier have at it. We predict some novel suggestions that NASA and commercial contractors may want to adopt.

We have suggested in Part I of this article, that modules should fit (yet-to-be-)standardized Earth-Moon shipping pods. The cheapest way of providing maximum elbow room, in the era before modules can be manufactured on the Moon out of lunar building materials, will be inflatable modules. Easy to deploy "outfitting systems" for these inflatable units are another area worth exploring through the device of an international design competition. The inflatable manufacturer can set the constraints which will include interior dimensions, purchase points, and ingress opening sizes. Then let the contestants exercise their varied inspirations.

Onsite manufacturability of needed components would be a design goal: maximum use of low-performance cast basalt, glass composite, and crude alloy items should be the preferred contest category. This way, expansion develops hand in hand with early startup industries, and becomes a strong incentive for their earliest development, saving substantial sums over importation from Earth.

Expanding on this theme, even equipment in hard-hull modules arriving fully outfitted from Earth might be limited to subassemblies of components not yet manufacturable on the Moon. A very simple example would be cabinets, tables, floor tiles, even chairs without horizontal tops or seats. These could be made of cast basalt, saving some weight in shipment. Many more possibilities of this compound sourcing paradigm are worth exploring: wall surfacing systems, simple utensils, appliance chasses, etc. See MMM #18, Sep. '88, "Processing with Industrial "M.U.S./c.l.e." reprinted in MMM C #2.

We mentioned the need for shielding. The development of simple canopy framework systems that can be locally manufactured, then covered with regolith, would be invaluable. Such canopies could protect stored fuel and other warehoused items that need to be accessed regularly, so that personnel could do these routine chores in less cumbersome pressure suits as opposed to hardened spacesuits. Such canopies could also serve as flare shelters out in the field at construction sites or at periodic points along a highway. An easily assembled (teleoperated?) space frame system with a covering that would hold a couple of meters (~yards) of regolith should be another design contest goal.

Modular Power Generation, Storage, and Heat Rejection Systems

This is a suggestion that NASA may well not bother considering. The initial outpost power generation and storage systems and heat rejection systems should be designed with modular expansion in mind. NASA will not be reflecting on the needs of expansion because its government mandate does not extend to expansion, unless space advocates force a change, even if "just to leave the door open for commercial developers who may follow." We think such activism is worth the effort.

Introducing Load-based Modular Biospherics

In our opinion, NASA's performance in developing life support systems has been hit and miss. Chances to incorporate a higher level of recycling on the Space Station were passed up in the name of up front economies, even though such systems will be absolutely vital on the Moon and Mars. To its credit, the agency does have the BioPlex project in full swing in Houston. But we worry that the outcome will be a centralized system that will work for the designed size of the lunar outpost, and not support further expansion.

The centralized approach to biospherics has a famous precedent: Biosphere II. We think centralized approaches are not the way to go. Instead, we should develop load-based decentralized systems. In this approach, wherever there is a toilet - in a residence, a workspace, a school, a shopping area, a recreation space, etc. there should be a system to pretreat the effluent so that the residual load on a modular centralized treatment facility is minimized. The Wolverton system is what we have in mind.

If all outpost modules with toilets have built-in pretreatment systems, then, as the physical modular complex grows by additions, the "modular biosphere" will expand with it. Expansion will not race ahead of the capacity of the contained biosphere to refresh itself.

Another essential element of modular biospherics is having plants everywhere. A phone-booth sized salad station will not do. Useful plants can be grown throughout the lunar outpost: they can provide additional salad ingredients and meal enhancers: peppers, herbs, spices, even mushrooms. Even decorative foliage and flowering plants help keep the air fresh as well as provide a friendly just-like-home atmosphere. Plants in front of any window or viewing portal would filter the stark and sterile barrenness outside.

Plants must not be an afterthought. We cannot long survive, let alone thrive as a species that hosts houseplants. We *are* a species *hosted by* the lush vegetation of our homeworld. We should never forget this. We cannot go with the attitude of "let's build some cities, and a token farm here and there." Rather we must go to build a new vegetation-based but modular biosphere which will then host our settlements.

City dwellers all too easily discount the farm. We have houseplants as botanical pets. That paradigm won't work. Designing all habitation and activity modules to house plants as an integral feature will help allow the biosphere to grow in a modular way along with the physical plant. It will be a more enjoyable place to live as well.

NASA is unlikely to pay these suggestions a glancing thought. We hope that commercial contractors, whose long range plans are not limited by governmental myopia are more farsighted. Modular biospherics should be part of their business plans for any industrial settlements or tourist complexes on the Moon.

Teleoperation of construction & assembly tasks

So far we have been talking about architectural considerations that would prime any startup lunar outpost for expansion, no matter how restricted its mandated goals. But expansion, as well as original deployment, requires construction and assembly. To the extend that individuals in spacesuits are involved in this work, it will be dangerous and risky. Human manpower hours on the Moon will be expensive to support. Loss or incapacitation of just one person in an outpost construction accident would be a major and expensive one.

In order to maximize crew usefulness and productivity as well as health and safety as many tasks as possible should be designed for remote operation by persons safely inside the outpost or construction shack, or by teleoperation by less expensively supported people back on Earth. The latter option may be more technologically demanding but it is far more preferable. Every construction operation tele-controlled from Earth frees personnel on the Moon for things that only personnel on site can accomplish. The result is progress is surer, safer, and yet quicker. The outpost is up and running in less time, with everyone healthy and ready for real duties.

In the following article, page 7 below, we take up this fascinating topic of pushing the limits of teleoperation, surely a prime area for engineering competitions.

III. Locate for local, regional, and global expansion options

The writer's position on moonbase siting is well known. We have no problem with being all alone in seeing a lunar south polar outpost as a dead end. But we hope that commercial contractors will be more farsighted. The problem is that we need to plan not just one outpost, but an outpost that can be a center from which an industrious human presence will spread across the lunar globe.

In their very well brainstormed proposal outlined in "**The Moon: Resources, Future Development and Colonization**", David Schrunck, Burton Sharpe, Bonnie Cooper, and Madhu Thangavelu present a comprehensive plan for establishing such an outpost at the south pole and for spreading out from that center across the globe via an electrified lunar railroad. We certainly support the latter idea and have written independently on the feasibility of electric lunar railroads.

But we fear that south pole advocates have discounted the dangers of operating in a polar environment, in mountainous terrain, where the sun is always at or just below the horizon *or* immediately above it casting constantly shifting "blackhole-black" long shadows. We also suspect that the difficulty of deploying a solar power tower system in mountainous terrain is not addressed. That the nearest highland/mare "coast" where resources of both terrain types needed for industrialization are accessible is 1,300 miles dopant is another overlooked disadvantage. That sunlight is available 86% of the time does not erase these drawbacks.

Water-ice may exist at the poles. But hydrogen is everywhere on the Moon in the regolith, ready to harvest. As much as we need water, we will use far greater tonnages of other materials. Do we bring Mohammed to the Mountain or the Mountain to Mohammed?

There is, it seems, an unstoppable bandwagon for the South Pole. Commercial contractors interested in developing lunar resources and/or tourist facilities, are likely to take a second look. Our hope lies with them.

A NASA-International lunar polar outpost may survive, minimally manned to tend astronomical observatories in the area. If we mine polar ice preserves it makes more sense to do that in the north polar areas. If the observatories go unsupported, one day, lunar tourists may visit the historic ruins at the South Pole.

IV & ff. Next Month

In next month's installment of "**The Outpost Trap: Technologies Needed to Break Free"** we will talk about ISRU, In Situ (onsite) Resource Utilization, processing the most common elements in the regolith and producing building materials. We cannot thrive on oxygen alone! Any effort to do so will end in outpost termination.

We will also explore the ways to get lunar industrialization off on the optimum path to a logical diversification that will build upon itself and reach import-export expense-income breakeven as quickly as possible.

Lastly, we will explore the demands of the most critical of all moonbase systems, without which all the rest, no matter how well designed, will collapse, or at the very least totally preclude civilian expansion of the kind most of us want to see: "the human system". This is the system currently being viewed with the most rusty-hinge horse blinders, and not just by NASA.

Meanwhile, a parting thought

While no one has ever established an outworld outpost before, we humans have certainly had plenty of experience in establishing new frontiers. There is a substantial reservoir of experience here throughout human history and in many human cultures, on which to draw.

Establishing an outpost, whether or not new and complex equipment is needed, is much more than a matter of nuts and bolts, of engineering and rocket science. To rely solely on the insights of experts in those professions will only gain us an expensive collection of hardware on the Moon. It will not gain us the open-ended establishment of a civilian, resource-using presence bent on making itself as much "at home" on the Moon as we have always done, over and over, everywhere that we have pioneered new frontiers on our home world.

In a sense, this will be a second Cradle Breakout. We are, you see, already an *intra*-planetfaring species. We have already settled new "worlds" in our "Continental System" beyond home continent Africa. The next step is only a continuation. But we must rely most of all on our instinctive cultural wisdom based on millennia of experience by endless waves of pioneers who have gone before. The upshot is that NASA and other agencies must fit in *our plan, rather than we in theirs.*

Much of the expertise needed will have to be developed or at least rethought. Here we need to rely not solely on those "tasked" with working on the project. After all, it is our project, not theirs, and no government has the right to exclusively appoint any set of specialists to the task. This frontier like all others, will be pioneered by rebels, by those unhappy with the status quo, by Young Turks who dare to look at old problems in a fresh light, by people who are willing to dust off the countless pages of abandoned research, looking for promising turns in the many "paths not taken."

And we need the entrepreneurs who will develop these new technologies *now, for profitable terrestrial applications,* but ultimately to put them "on the shelf" *just in time* where lunar pioneers can find them when needed.

As a Society tasking ourselves with doing what we can to make it happen, we need to seek out "adventurous expertise", well researched but yet open minded persons who will make the breakthroughs, large and small, that will help realize the dream. **<MMM>**

Teleoperation: getting the most productivity from our personnel on the Moon

by Peter Kokh

Tel•e•o•per•a•tion: the remote control of the operation of untended equipment; radio-control;

Actually, "teleoperation" is a relatively new word coined by space development writers. Even though we have been using it for two decades or more, it has escaped notice by those who are supposed to keep dictionaries abreast of the times.

The basic idea is do what we can, remotely, on the Moon, when human on site labor would be expensive, or dangerous, or best reserved for things which cannot yet be easily remotely performed. What makes teleoperation practical on the Moon, but discouragingly tedious on Mars, is the speed of light that governs remote control by radio. At that speed, there is a bit less than a 3 second delay between a teleoperators "joy stick" movement and the observation of the command being performed. Numerous experiments, many of them by enthusiasts, have shown that this small time delay is manageable. On the other hand, anyone attempting to teleoperate a rover or some other kind of equipment on Mars would have to endure a minimum delay 125 times longer, 6 minutes, and a maximum of around 40 minutes. Ho hum! Zzzzz!

Equipment on Mars, a whole fleet of it, in fact, could indeed be easily teleoperated from Phobos or Deimos, but the Mars Society resists the idea of setting up forward outposts on either Mars moonlet, as a "detour." That's their problem. Impatience always bites one in the but, one reason the opening of Mars must be more broadly based. But we digress.

Proposals on the table for teleoperations on the Moon

Over fifteen years ago, it was suggested that mini-rovers on the Moon could be "raced" against one another over a prescribed course, the race watched on television, with the contestants paying for the privilege. The idea was to raise money.

More to the point, it has been suggested that equipment placed on the Moon could be tele-controlled to *grade and prepare a site* for a lunar outpost and once that was in place, the same or additional teleoperated equipment could *cover it with regolith shielding*, in advance of the arrival of the first moonbase crew. These would be time-consuming tasks for human crews. By tele-performing these operations, the crew would arrive at a Moonbase all set to go.

Beyond Site and Outpost Preparation

There will be "too much to do" for the small initial crew right from the outset. Nor will this change when the outpost begins to grow, not even when the first true

settlers arrive. It is a truism of all frontiers, that there is always too much to do, that *needs being done,* than people to do it all. Sending people who are each multi-talented will certainly help. But that will not change the fact that there are only so many hours a day, and that there are limits beyond which driving individuals to put out ever more and more will backfire.

More to the point, there is a question of priorities. Somethings are too sensitive and/or too complex to be performed remotely. Hair-trigger responses are needed. On the other hand, there are tasks that are reasonably dangerous to perform, with a high risk of injury, or even death. These considerations give us a basis on which to decide when it is better to teleoperate, and when it is best to have an on site individual perform a task.

Add to that the financial considerations. Each man-hour of work, regardless of the pay-scale, performed on the Moon, costs much more than that person's pay. You have to factor in what it cost to send that person to the Moon, maintain him/her there in good health, and to eventually (at least in the early phases of our open-ended presence on the Moon) return the person back to Earth.

It makes even more sense then, to find a way to teleoperate all risky and dangerous jobs, all routine and tedious jobs, and anything else we can do to relieve base personnel of any work we can so that they can get on with doing what only they can do. That way, the outpost, whether it is manned by four or forty or four hundred, can advance more quickly, will get more accomplished, thanks to its ghost army of teleoperators back on Earth.

Yes, we'd all like to see the lunar population to swell quickly to the hundreds, the thousands, maybe someday the hundreds of thousands. Doesn't taking jobs away from real people on location counter that goal? To the contrary, it advances it, because at each stage this pocket of mankind will be more productive, allowing it to grow faster, not just in industrial diversification and export output, but also in numbers. And the extra productivity earned by teleoperations, will make the settlement bottom line more attractive, less a target for budget cutters on Earth. When they arrive, their habitat space will be ready, thanks largely to teleoperated tasks.

What all can we teleoperate?

- □ Site preparation, grading, road building, excavation, shielding emplacement, repeatable construction and assembly tasks, deploying radio/microwave repeaters, deployment of solar power stations, initial prospecting surveys. (much more, especially in a given time, than Spirit or Opportunity can do), setting charges in road building, gas scavenging, preliminary routine prospecting surveys, lavatube exploration, etc. – *i.e., many tasks that need to be done out on the surface, minimizing EVA hours by personnel in space suits.*
- □ Tending agriculture installations, routine watering, weeding harvesting, fertilizing, etc.
- □ Many factory operations, especially dangerous ones
- □ Desk work, paper pushing, document processing tasks

The priority should be (a) to take care of as many out vac tasks as possible which would be exhausting and cumbersome for people working in space suits, and not without real risk. (ab) exploration of subsurface voids – lavatubes. (b) inside operations which carry some danger. (c) routine, repetitive, and boring tasks to the extent that they cannot be automated. (d) utility and air/water treatment routine tasks, (e) routine inspection jobs, (f) some bureaucratic paper work, minimizing the amount of desk work that has to be done on location. (g) when the time comes, the bulk of routine teaching assignments. Again, one must keep in mind, that teleoperations are to prepare for humans to settle in and live comfortable fulfilling lives.

What we can do now

If we succeed in putting together an aggressive Lunar Analog Research Station program, one thing we don't have to do is prove the value of human-robot teams in field exploration. We have already made that point in the Apollo program years. So practicing lunar geology is not a high priority, nor is field exobiology. The M.A.R.S. analog stations have done great work in this area. Again, we've already made that point almost forty years ago.

On the other hand, the Mars people have no need to demonstrate teleoperations skills, as Mars much greater distance, from 125 to 400 times further from Earth than the Moon, makes teleoperation impractical – unless they want to come to their senses and realize how much faster the Martian globe could be explored with fleets of minirover probes teleoperated from just above, from shielded stations on Phobos and/or Deimos.

Teleoperation with a 3 second time delay has been demonstrated many times, but mainly in the "driving" of rovers. More complex tasks such as site preparation and shielding emplacement via teleoperation have not been demonstrated. These are challenges suitable for college level engineering teams, and the demonstrations could be done at an analog station. What we'd need for terrain, at least in the area where we would be teleoperating is a *physical analog* of lunar moondust or regolith. The elemental and chemical composition would be irrelevant. The mix of particle sizes and the behavior of the mix in handling would be essential. It would be in NASA's interest to fund creation of such a site, whether a sandy gravel mix native to the area was further transformed to meet the experiment constraints, or whether the faux regolith was prepared elsewhere and trucked in.

Once site preparation and shielding emplacement techniques were demonstrated, we could ramp up the challenges to include road construction and many other chores we'd prefer not to have done by humans in cumbersome spacesuits, exposed to cosmic radiation.(ab) teleoperated exploration of a nearby lavatube would be possible in some of the sites under consideration (Bend, OR; El Mapais National Monument south of Grants, NM, Craters of the Moon National Park in Idaho). But we could run such tests at one or more of those locations whether we had deployed an analog research station nearby or not. We could also try to develop teleoperable greenhouse systems, water recycling systems, ACC; even though we don't need to demonstrate human geology field work, we could demonstrate teleoperation of prospecting probes.

The possibilities are many, and will grow with the complexity of our outpost, and its continued growth.

Teleoperators on Earth

These people, whether unpaid volunteers, or paid assistants, should earn status as "lunar pioneers." For even if they never personally set foot on the Moon, the fruit of their work will be in evidence throughout the area where human settlements spread. **<MMM>**

The Moon Society

J O U R N A L

http://www.moonsociety.org

http://www.moonsociety.org/blog/

Please make NEWS submissions to KokhMMM@aol.com

The Moon Society was formed in July, 2000 as a broad-based membership organization with local chapters, to spearhead a drive for further exploration and utiliza-tion 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/

Artemis Project™ - Project LETO™ - Rent-MDRS

Moon Society DUES with ***Moon Miners' Manifesto***

- **Electronic MMM** (pdf) **$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 Membership Services:
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: 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!

Moon Society Election Results

Certified Ballot Count September 6, 2006

September 7, 2006 - At last night's Leadership Council meeting, the ballots for this year's election were counted.

Moon Society Officers

Two officer positions were both uncontested, though, as always, the opportunity to write in the name of another candidate was provided.

President: Peter Kokh, Milwaukee WI, was reelected as Moon Society President.

Treasurer: Ben Smith, Baltimore MD, was elected as Moon Society Treasurer.

Vice-President Randall Severy and Treasurer Dana Carson, both elected last year, will be up for reelection next year, in 2007.

Moon Society Board of Directors

The Board had voted previously, to downsize from seven members to the original size of five. With three board members choosing to retire because of increasing duties in their day jobs (Charles Radley, Bill Clawson, Mike Delaney) that, combined with downsizing, created two openings for this election.

Gregory R. Bennett, Moon Society founder and President Emeritus, was reelected.

Peter J. Schubert, was elected to the second slot, in an extremely close vote.

We thank the retiring Board members for their service, and those not elected, for their offer to serve. Unelected persons remain most welcome to participate in the Moon Society's Leadership Council. That they cared enough to run for office is an indication that they have valuable input to contribute to our discussions of Moon Society affairs, even if they cannot vote, when a vote is needed.

The Job is not done

There is widespread dissatisfaction in the Leader-ship Council with the particular method of preferential vote counting that has been employed. The bylaws them-selves do not specify the method to be used. This must be corrected.

Because of unavoidable individual circumstances in each case, we did not have a Board Quorum at this meeting. Every effort will be made to insure that we do have a quorum for the upcoming meeting on September 20th. To be addressed is one Board position which has effectively been vacated by a member who chose not to renew his membership. We need to declare this position open and appoint a third person to the Board. As Presi-dent, I will recommend that the Board appoint the person who came in third in the balloting, by just a hair. The Board is not obliged to follow this advice.

We also need to tackle the relevant ambiguities of the election process as spelled out in the Society bylaws.

An invitation

Our Society is governed by unpaid volunteers. To survive as a functional organization, we depend on some fraction of our membership taking a serious interest in the direction of the Society. Any member can go to: www.moonsociety.org/mymoon/ and choose to join the Leadership Council. If you are regularly free the 1st & 3rd Wednesday evenings monthly, please consider doing so.

"Whitelist" these email addresses to allow email from the Society to get past your ISP's spam filters!

From Peter Kokh

One possible reason that some members fail to renew their membership is that they never get email updates on Society Progress, let alone renewal reminders. There are two reasons why this may happen:

1. The member changes his/her email address and fails to notify the society.
2. The member's Internet Service Provider employs spam filters that may intercept Society email: if you are an att.com DSL subscriber, you will be one of these. All society email to att.com addresses bounces.

Changing your email address:

If you change your email address, do not notify us, and have chosen to receive the electronic version of MMM, you will not get notices when a new issue is available for downloading. If you fail to check pdf file availability on your own, you will stop hearing from the Society and inevitably lose interest.

First, go to www.moonsociety.org/mymoon/

This is your own personal Moon Society webpage. You need to establish a username and password for access and will be prompted to do so if you have not done so already. On this page, you will find your personal data, and you can click the edit option to make needed changes in email address, postal address, phone # etc.

If you get the newsletter electronically only, when you next renew, you can select the hardcopy option at no extra cost, and *still* download the pdf file. This would ensure that MMM still comes your way in one form or another. Of course, we need you to notify us of any contact information changes, or make the edits yourself.

Bypassing Spam Filters

You can make sure that society email ends up in your In Box, simply by putting the various Society email addresses in your address book. Then your mail program will recognize our mail as mail you want to read. Here are some of the addresses in question:

- mail from the Society President
  - kokhmmm@aol.com
  - president@moonsociety.org
- mail from the Secretary
  - elections@moonsociety.org
  - secretary@moonsociety.org
- mail from Memberhsip Processing
  - membership@moonsociety.org
- optional Discussion List
  - discuss@moonsociety.org
- Team Participation reminders
  - teamdir@moonsociety.org – *notice that the next issue of MMM is ready for downloading* at www.moonsociety.org/members/mmm/
  - teamdir@asi.org

Please take just a few minutes to add these addresses to your email Address Book. **<MSJ>**

Moon Society Blog Reactivated

Check Our Blog

Our blog,launched in the weeks leading up to our 1st moonbase exercise in the Utah desert at the Mars Desert Research Station has seen little activity since – a few posts, perhaps two over 5 months.

Sorry about that. We were too busy doing other things. *Not that we didn't have plenty to blog about!*

But now we have developed a plan to keep the blog posts flowing, simply by integrating the Blog into the things we do already:

- ***in producing MMM***
- ***in working on the website***
- ***in working on other projects***
- ***in Moon Society reports and announcements***
- ***etc.***

So check it out! We've created a little "thumbnail" logo image to precede the blog link in our front page Main Menu area. We began blogging in earnest again on Sunday, August 13th, hoping to make at least two posts weekly if not more.

The goal of the Blog is twofold.

1. To keep members updated on what's going on in the society often long before it gets to you in Moon Miners' Manifesto or in other ways.
2. To catch the interest of a whole new audience.

We hope to have guest bloggers on occasion, and any member can apply for a loggin to post constructive and brainstorming material.

Your input is welcome!

Our Welcome Packet, a "work-in-progress"

from Peter Kokh

Some new members are lost at first, not sure what's going on. MMM is not aimed at the special needs of new members. In addition, many website visitors have a difficult time trying to decide if "this outfit is worth joining" or not. To meet these needs, we launched our new Moon Society "Welcome Packet" project last April. We put up a special Welcome Packet link near the bottom of the Main Menu on the left hand of our front-page. This links to a page on which there are links to existing documents that could prove helpful.

The first of these is the "**Who We Are & What We Do"** essay available as a web page, but also as a downloadable PDF file in both flyer format and brochure format. Several preexisting flyers were linked also.

Our latest edition, as both a web page and downloadable flyer pdf file, is **"Exploring the Moon Society Website."** Some long time members have asked why we do not have this or that anywhere on our website, when in fact *we do!* – So this tour of the website and its connected files seemed in order. For many of you, it may seem a little basic. But I am willing to bet that most of you will find something you didn't know was there all the time! Our website, in fact, is steadily growing.

Coming: **"Many Ways to be an Active Member"** and **"Improving your Familiarity with the Moon."** We welcome your suggestions for additional items!

After our 1st Moonbase Exercise in Utah what/where/how do we "follow suite?"

from Peter Kokh, Commander MDRS Crew #45
"Artemis Moonbase I"

We had a great crew, and for the most part, we achieved our major goals, that is, all except two.

1. We got only a fraction of the publicity we had hoped, for our mission, and for the society and its goals.
2. Despite some significant donations from groups and individuals to whom we are most grateful, we did not reach our funding goal and had to dig into the Moon Society pocket to pay the shortfall. That reality works to discourage us from a sequel done under the same circumstances, with $7,000 rent due the Mars Society for a two week "crew rotation slot" at the Mars Desert Research Station - M.D.R.S., or simply, MDRS.

But no one should think that our two weeks in the Utah sun were a futile effort leading to a dead end.

We no not know how, or when, or in what form, but we remain convinced that moonbase exercises, focused on *"demonstrating the technologies needed to grow an initial human presence on the Moon from outpost into true settlement"* are very much a part of our master plan.

Since the end of the exercise in mid-March, a few of us, especially William Fung-Schwarz, crew Health & Safety Officer, myself, and David. A. Dunlop, the Society's new Director of Project Management, have been discussing a wide range of options (other than a return to MDRS.) They *would seem to be* three.

1. an "analog site" in which the geology and morphology of the terrain is a good match for a true moonscape
2. a high volume "tourist traffic" center such as Las Vegas, Orlando, or now, with *Spaceport America* under construction, the area north of Las Cruces, NM which itself is just north of El Paso, TX.
3. a scattered site approach. For geological work, we'd choose an analog site. But modeling the 29.5 day long dayspan/nightspan cycle would be easier, *anywhere,* in a large volume *where light could be totally controlled:* a large aircraft hanger, a roofed sports arena (during the off season) or even a high-ceiling wide-span warehouse. And to make progress on air/water/waste recycling and/or agriculture, it would make sense to work *where the people are, all the time,* such as a university.

   I see at least three alternative options that dovetail with each of the three above, in turn.
4. (re 1) an *artificial* analog site. We really do not need to demonstrate geological techniques (though we may at some time want to demonstrate teleoperated prospecting equipment.) On the other hand, we do want to demonstrate teleoperated site preparation, regolith shielding emplacement, road construction, and other remotely operated equipment. For this, a chemical analog of regolith is not essential. Any chemical or mineralogical mix would do, *so long as it has been pre-pulverized into the right mix of particle sizes, and behaves like regolith in handling.*
5. (re 2) Despite strong support from several persons for option #2, having become familiar with how the Mars Society Analog Research Station program operates so successfully to keep churning out quality research in many areas, this writer would be *adamantly* opposed to physically combining a research station with a tourist facility, however admittedly valuable and important a tourist visitor center could be. Rather, I suggest two identical stations (two are cheaper to build than twice one) with one being in a remote location far from distracting visitors, and the other at the tourist center. Webcams showing live exterior and interior views of the actual research station would let tourist center visitors see what is going on as they watch.
6. (re 3) A modular analog station on wheels that could one season be parked at a geological analog site, for example to do lavatube-related projects, and the next season at a physical analog site for demonstration of teleoperation equipment and procedures, and the next season at a university for biosphere related projects, and the following season inside a hanger for projects related to the dayspan/nightspan cycle. And in between, this mobile and modular outpost could visit high tourist traffic destinations, major space conferences, theme parks, state fairs, etc.

We noted that the principal obstacle to doing a sequel mission(s) at the Mars Desert station in Utah is money. But in all honesty, *all* the options above would cost *much more* money. For (1) teams would have to visit each proposed general area and hunt for the best specific site in each, secure a lease (public BLM, Bureau of Land Management, lands) or limited access to private land. Next, we'd have to deploy (a) structure(s) not just rent them. (2) ditto, not counting the extra much higher cost of putting up a really good visitor center. (3) some of the options, such as a university biospheric research center, would require many sponsors and sources of funds (4) We'd have to find a site where the native material could be prepared as good physical analog of regolith at modest expense, then deploy (a) station module(s) . (5) combines the expenses of (1) and (2). (6) adds the expenses of providing built-in mobility.

While, at this point in our brainstorming, option (6) or a combination of (5) and (6) would seem to make *the best daydream,* any decision all comes down to one brutal fact. We cannot do anything without securing outside funds and donations. *We desperately need the help of a Fundraising Team!*

Meanwhile, we will keep fine tuning the above, very general suggestions: So look for more, next month, on geological analog locations on our short list; next we will take up the question of a physical analog location; future articles will take up modular outpost/station architecture, permanent or mobile. And despite of many ways in which the Mars Desert Station is a less than desirable place to operate, a 2-week sequel stint there continues to be the most realistic, at least for the 2008 season - it is almost too late to apply for a slot in the 2007 season.

Cheer up! *Since when do obstacles predict failure?* - **PK**

New Video about Working at the Mars Desert Research Station

Report by Peter Kokh

A new video about MDRS Crew #44 (the crew just before our Moon Society crew #45) has been produced for SpaceChannel.TV. It is a documentary about the Canadian crew's "Mars Training Expedition" to Utah.

The documentary, "The Spirit of Exploration," was created by IPX Entertainment, Inc. (IPXN) in Toronto, Ontario. It is now available on its internet television channel / video download service SpaceChannel.TV.

CREW 44 tells the story of eight young scientists and engineers training and conducting research at the Mars Desert Research Station during the winter of 2006, February 12-25th.

Some of the material, notably the demonstration of Mars-appropriate techniques for geological and exo-biological field research are not relevant to a moonbase situation. However, it will give readers a better idea of the place where the Moon Society's Artemis Moonbase Sim 1 crew operated.

I have downloaded the documentary and watched it - a quality production!

www.hobbyspace.com/nucleus/HSblog.php?itemid=2237

A DVD about Artemis Moonbase Sim 1?

In retrospect, it would have been super if our exercise could have been documented in a similar manner. Former Hollywood screenwriter and Moon Society Advisor Chip Proser (producer of Gaia-Selene, www.Gaia-Selene.com) planned on videotaping our mission, with a future documentary in mind, but a last minute business conflict arose to keep in California. (See the Gaia-Selene image link in the right hand menu column of our front page.)

We do have some materials, however. Crew Health & Safety Officer William Fung-Schwarz took short videos with his camera every day, each focusing on something different. They are short, have background music, but need a voiceover as the narration audio quality is poor.

William and fellow crew members Guido Meyer, Steven Winikoff, Hugh S. Gregory, and Ben Huset took hundreds of still shots.

There is a project underway to take all these tidbits, create a unifying script, and put them together into what will be a short DVD that the Society can use for promotion and outreach.

It will take some time to bring this effort to fruition, as all of us involved have other projects on the front burner that require priority attention. However, we have set a deadline for ourselves. We would like to have the Artemis Moonbase Sim I DVD ready for ISDC 2007 next May, and as much before that as feasible.

The first priority is to write the script around the most usable of those elements. As crew commander, I will be involved in this, but other crew members will be assisting. Moon Society Membership Processing staff person, Bobby K. Perry, will produce the actual DVD, something he has experience in doing. **<MSJ>**

Chapters & Outposts

Bay Area Moon Society

http://www.moonsociety.org/chapters/bams/

Contact: Henry Cate <hcate2@offshore.ai>

Meeting the 4th Thursday each month at Henry's home, in **San Jose**, California.

- **August 31st, September 28th, October 26th**

Moon Society St. Louis

http://www.moonsociety.org/chapters/stlouis/

Contact: Keith Wetzel <kawetzel@swbell.net>

MSStL is busy preparing for its 4th annual participation in the metropolitan area's largest and oldest Science Fiction Convention: Archon, now celebrating its 30th anniversary, October 5-8th in Collinsville, IL just across the Mississippi River. MSStL has had a presence at this event for several years now, fielding an information table and providing presentations and panel discussions.

http://www.archonstl.org/30/index.html

Participating at local science fiction conventions has become a time-honored form of space-enthusiast outreach. While more fans are interested only in fantasy and escape, chapters have picked up new members at these events. Plus, it is good plain fun!

"Space" at Science Fiction Conventions

There is a guide on how to approach this kind of opportunity, on the Space Chapter Hub at:

http://nsschapters.org/hub/con.htm

This page tells you how to set up an information table so that it attracts attention: different ways to contribute to the programming; and how to make yourself a welcome part of "the con" family.

Members may be surprised to know that our predecessor membership organization, Artemis Society International, got its start at Worldcon 1994 in Winnipeg, Manitoba, Canada, 12 years ago this Labor Day weekend. ASI and Moon Society founder, Gregory R. Bennett, currently working for NASA, is an avid science fiction fan, with several science fiction works to his credit, and one of the cofounders of Norwescon in 1978, the big Con in the Seattle area, where he was working for Boeing at the time.

To be sure, the majority of fans may not be interested in real space travel: it is too primitive in any comparison tot the interstellar travel and far future magic that captivates them. But here and there are fans that are deeply interested in humanity's first humble steps, and only to happy to find a chance to get involved.

It is a challenge, however, to find a topic that will draw people to your talk or panel with so much else going on. But meanwhile, you get to have fun too.

A significant percentage of current space enthusiasts had their early interests kindled and nourished by science fiction writers: Robert A. Heinlein, Arthur C. Clarke and many more. **<MSJ>**

GREAT BROWSING !

NASA offers a $250,000 prize for a better glove:
http://www.courant.com/technology/hc-space0425.artapr25,0,666931.story?track=rss

Save Skylab (the spare, that is)
http://www.saveskylab.org/

Chandrayaan-1 (India's Lunar Mission)
http://www.youthplanetary.org/chandrayaan.html

Bigelow Aerospace, Future Plans, & Space Industry
http://www.thespacereview.com/article/667/1

Tour of the Bigelow Aerospace factory
http://www.thespacereview.com/gallery/18

Applying the argument that humans are useless in space to the usefulness of humans on Earth
http://www.thespacereview.com/article/664/1

Book Review: Beyond Earth - potpouri of essayshttp://www.thespacereview.com/article/663/1

"Spirit of the Lone Eagle": an audacious program for a manned Mars landing
http://www.thespacereview.com/article/669/1

Ten years since the "discovery of fossil life" on the Mars meteorite
http://www.thespacereview.com/article/678/1

Mars Aboveground - Documentary featuring Zubrin
http://www.thespacereview.com/article/677/1

NASA's Crew Exploration Vehicle under fire
http://www.thespacereview.com/article/676/1

Canada seeks its role in space exploration
http://www.thespacereview.com/article/674/1

Toxic Side of Martian Dust Storms
http://space.com/scienceastronomy/060731_mars_duststorms.html

Walking on the Moon on Earth at Bend, Oregon
http://mywebpages.comcast.net/picspace1/newberry-fieldtrip1.htm

Proposals for new Mars scout craft
http://www.astronomy.com/asy/default.aspx?c=a&id=4437

Update on Ares I Manned/Cargo Launcher
http://blogs.orlandosentinel.com/news_space_thewritestuff/2006/08/new_details_on_.html

Demote Pluto, or demote "planet"?
http://www.thespacereview.com/article/692/1
(see our blog commentary, reprinted at right)

[Of 8 Planets vs. 28 Worlds & Counting

Or on demoting the Gas Giants, reinstating Pluto, adding major moons

Opinion Piece by Peter Kokh

www.moonsociety.org/**blog**/index.php?title=of_8_planets_vs_28_worlds_aamp_counting&more=1&c=1&tb=1&pb=1

Okay, you can see the astronomer's point of view.

But from "a truly human point of view", most of us are interested in places that can be imagined as "worlds, theaters for human life", even if the living conditions are much, much less comfortable than we are used to, even if we are talking about spartan, and possibly very temporary outposts or one time exploratory visits. Even if, we may add, we are talking about proxy human visits through the eyes of robot rovers, robot aircraft, robot balloons, etc., that can transport us to these alien landscapes, as opposed to distant views from orbit. Worlds are places we humans can conceivably experience first hand.

So let's exclude worlds without a hard surface, or world's on which the surface atmospheric pressure exceeds 100 times what we are used to on Earth. That standard excludes Jupiter, Saturn, Uranus, Neptune - and is craftily drafted to allow Venus to make the cut. Aerostats hovering just below the Veneran cloud deck at tolerable atmospheric pressure levels, may provide future tourists a real glimpse of Venus' overheated landscapes.

Our definition includes any world with enough mass to force itself into a spheroidal shape. Even Earth, slightly flattened at the poles, is not a true sphere!

That gives us the following list of worlds, grouped by distance from the Sun:

1	Mercury
2	Venus
3-4	Earth, Luna
5	Mars
6-8	Ceres, Pallas, Vesta
9-12	Io, Europa, Ganymede, Callisto
13-19	Mimas, Enceladys, Tethys, Dione, Rhea,Titan, Iapetus
20-24	Miranda, Ariel, Umbriel, Titania, Oberon
25	Triton
26-27	Pluto, Charon
28 ff.	Xena and other "Plutonians"

"Planet" - a word that can include Jupiter and Mercury in the same category, is a bit contrived. It includes only objects which orbit the sun directly. But what difference does that make? Luna and Europa orbit the Sun just as surely, admittedly while also orbiting Earth and Jupiter respectively. Phenomenologically, there is no difference. Luna and Europa and other major satellites enjoy sunrises and sunsets just as do Earth and Jupiter.

To the public, to the imagination of the would be explorer, traveler, tourist, trader, diplomat, and on and on, Ganymede is a world, Jupiter is not. Titan is a world, Saturn is not, and so on.

So let the astronomers gloat in their victory over the public. Their victory is hollow. The emperor, empress, prince, and princess (the gas giants) have no clothes. Yet they do fill an important role; they create "communal gravity wells" making it possible to *collocate* mulitple moon-worlds in the same solar orbit, very handy for transportation to and fro! Let's Keep the Solar System an "open" frontier! *May the human viewpoint prevail!* <**PK**>

Planetary Society gets in the Mars Analog Business]

Exploring Mars on Earth
The Arctic Mars Analog Svalbard Expedition

High in the Arctic, just below Earth's north polar cap, a collaboration of nearly two dozen biologists, geologists, and engineers are embarking on an expedition to practice and prepare for an expedition to Mars.

The annual expedition is called the Arctic Mars Analogue Svalbard Expedition (AMASE), and this year, The Planetary Society is cosponsoring the effort, enabling the testing of a spacesuit designed for the Moon and Mars.

The 2006 expedition lasts from August 8 to 22, on the island many know as Spitzbergen. Throughout the expedition, we'll be hearing from Jake Maule, a biologist at the Carnegie Institution of Washington who is the lucky one to work in the spacesuit.

Find out more about the expedition and readupdates at:
http://planetary.org/explore/topics/planetary_analogs/

[There is also a NASA led Mars Analog program on Devon Island, distinct from the Mars Society one. Sadly, they do not talk to one another because of personality conflicts.]

Proposals sought for the European Student Moon Orbiter (ESMO)

Sponsored by SSETI [Student Space Exploration & Technology Initiative] Thursday, 01 June 2006

http://www.sseti.net/index.php?option=com_content&task=view&id=120&Itemid=90

Following approval by ESA in March 2006, the ESA Education Projects Division and the SSETI Association ... announce that the official Call For Proposals to European students for participation in the European Student Moon Orbiter (ESMO) Mission Phase A Feasibility Study. The Call solicits proposals from student teams across ESA member states and associated countries for the definition of all spacecraft subsystems, all ground segment elements, and the scientific payload. In addition, individual students not in a student team are encouraged to apply for positions in the System Engineering Team.The proposal submission deadline is 15th August.

More about the ESMO Mission

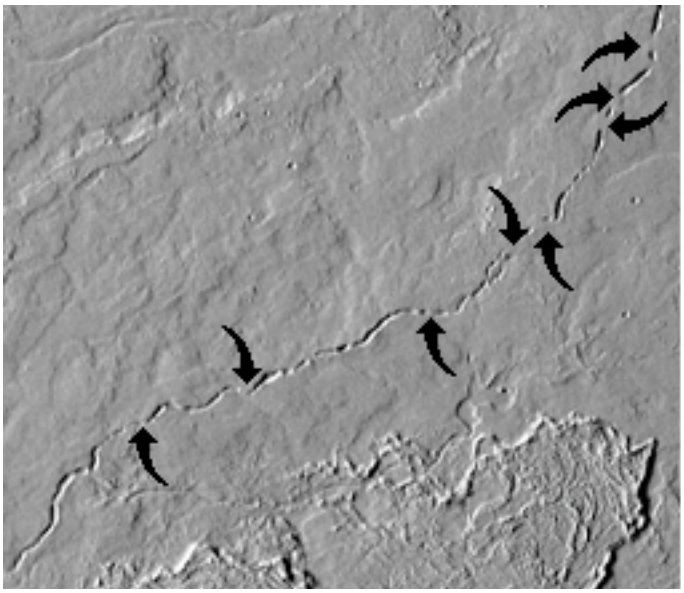
http://www.sseti.net/index.php?option=com_content&task=category&sectionid=19&id=38&Itemid=83

If found to be feasible, ESMO will be the third mission to be designed, built and operated by European students through the SSETI association, and would join many other contemporary missions to the Moon such as ESA's SMART-1, China's Chang'e-1, India's Chandrayaan, JAXA's SELENE and Lunar-A, and NASA's Lunar Reconnaissance Orbiter. Target launch date is 2011, mid-point of the "Lunar Decade." The 200 kg (440 lb) orbiter would have a miniaturized 10 kg (22 lb) minia-turised suite of scientific instruments (by student teams) to perform measurements during the lunar transfer and lunar orbit phases over a few months, according to highly focussed science objectives. The core payload would be a high-resolution narrow angle CCD camera for optical imaging of lunar surface characteristics. Optional items being considered: a LIDAR, an IR hyperspectral imager, a mini sub-surface sounding radar for polar ice detection, and a Cubesat subsatellite for precision gravity field mapping.

Eureka! Mars Lavatubes

From Bryce Walden <moonbase@comcast.net>
To: <orl5rt@yahoogroups.com> August 19, 2006

Check out this THEMIS "Image of the Day" for 2006 August 18, "Tharsis Lava Flows". There's a long, long interrupted sinuous rille running SW to NE in the top half of the long vertical image. The TIFF file would be best for study, if you can afford the 4 MB download. It's only barely visible in the "thumbnail" image on this page; download choices for the larger image are at the bottom of the page. http://themis.asu.edu/zoom-20060817a



Crop of original TIFF file by MMM Editor
Arrows indicating uncollapsed sections added by Editor.

Editor's Comment: Uncollapsed sections of should-be-continuous rilles are at present our only real evidence that lavatubes exist on the Moon and Mars. The Oregon L5 Society's Tom Billings has been working on a concept dubbed the "Radar Flashbulb" that would illuminate and map intact whole lavatubes that geologists expect to abound in the maria, lava sheet flows on the Moon, Mars, and possibly the dwarf planet Vesta in the asteroid belt. Lavatubes are natural features formed in the process of lava flows spreading out from their point of origin and are commonly found in lava flows on Earth and also in the gentle slopes of shield volcanoes such as Mauna Loa and Mauna Kea on the Big Island of Hawaii and elsewhere.

A workshop to advance the Radar Flashbulb concept was held at ISDC 1998 in Milwaukee. Financing to advance the project further has been the stumbling block. A preview of the project is outlined in the second section of this online paper:

www.lunar-reclamation.org/papers/lavatubes_ccc.htm
"Remote Mapping of Lunar Lavatubes:
Teleo-Spelunking on the Moon"

A more complete explanation was published in MMM # 115, May, 1998, p. 14. "A Radar Flashbulb on the Moon" by Tom Billings. This article has been reprinted in MMM Classics #12, in pdf format, freely downloadable at:

www.moonsociety.org/publications/mmm_classics/
also download the following:

www.lpi.usra.edu/meetings/moon98/pdf/6049.pdf
www.lpi.usra.edu/meetings/robomars/pdf/6062.pdf

NASA Ames Collaborates on
Lunar Race Simulation Learning System

NASA NEWS RELEASE: 06-62AR: 2006 August 22
[abridged by MMM to fit column space]

NASA Ames Research Center, Moffett Field, CA, has signed an agreement to collaborate with VirtueArts, Inc., and VirtuePlay, Inc., Los Angeles, for engineering and real-time simulation training in a variety of applications, including a dynamic learning system that allows users to virtually race lunar buggies on the Moon in 3D.

The Lunar Racing Championship software simulates driving on the Moon. It will be demonstrated to the public at the AIAA Space 2006 Conference & Exposition, Sept. 19-21 at the San Jose McEnery Convention Center, San Jose, CA News media will have an opportunity to drive the lunar buggies during a preview at NASA Ames Thurs., Aug. 31, 11 am - 1 pm PDT. The preview opportunity will be held in the Exploration Center, the large white dome located at the main gate to NASA Ames.

Says Dan Rasky, NASA Ames,"Immersion racing on the Moon is the introduction to being on the Moon."

The Lunar Racing Championship simulation was developed from actual lunar mission footage derived from the 1998 Clementine mission. The software realistically simulates the Moon's gravity, one sixth of that on Earth.

Under the terms of the three-year memorandum of understanding with VirtueArts, Inc., and VirtuePlay, Inc., NASA will collaborate in several areas of mutual interest, including engineering design tools, simulation and modeling tools, multidisciplinary collaborative design tools, data visualization tools, multimedia outreach and education, logistics modeling and studies, mission planning, and human factors simulation studies.

During the simulation, drivers are seated in individual racing pods, complete with force feedback steering wheels and gas and brake pedals. High-fidelity stereo, head-mounted displays with 4-directional head-tracking devices enable drivers to look in any direction and see the racecourse, other racers and the lunar terrain in 3D.

Each lunar buggy has various thrusters to help maintain stability and traction, as well as jumps and bursts of speed. Each race lasts about five minutes and takes place in a variety of locations on the Moon: Hadley Rille, Amundsen Crater, Alpine Valley and Tycho Crater.

"The Lunar Racing Championship demonstration is a truly unique experience that combines the immersion with real low-gravity physics and the accurate terrain of the Moon," said Steve Henderson, Sr. VP Sales VirtueArts.

"The Lunar Racing Championship not only provides immersion racing on a simulated lunar surface in virtual reality, it also creates a dynamic learning experience for the user," said Mary Duda, CEO/ Pres. VirtuePlay, Inc. "Our goal is to transform education by immersing students in fun learning experiences." She envisions that students who participate in the lunar races will be inspired to build their own lunar robots. Following the AIAA conference, the corporation plans to offer an on-line version of the lunar race experience to students and schools throughout the country, and provide lunar buggy tool kits to assist the students to build their lunar racers.

NASA invests in the nation's education programs, building strategic partnerships and links between education providers to increase science & technology literacy. #

Mercury Gemini, Apollo, *and now* 8/23/2006 *NASA has* chosen **Orion**

http://www.space.com/news/cs_060823_orion.html
Words in quotes are from the website above.

"***Orion*** is the name of the vehicle NASA's ***Constellation Program*** is developing to carry a new generation of astronauts back to the Moon and later to Mars. Orion will succeed the space shuttle as the space agency's ***primary craft for crewed exploration***."

Orion (the hunter) is the name of the brightest constellation in the sky, dominating winter nights in the northern hemisphere, summer nights in the southern. It's brightest stars include Rigel, Betelgeuse, and Bellatrix. Three stars make up Orion's belt and are prominent in the logo. The Orion Nebula is the most famous in the sky.

"Orion's first flight with astronauts on-board is planned for no later than 2014 to the International Space Station. Its first flight to the Moon is planned for no later than 2020. Orion will transport cargo and up to six crew members to and from ISS. It can carry a crew of four for lunar missions. Later, it will support crew transfers for Mars missions, according to NASA's plans."

"Orion borrows its shape from Apollo capsules of the past, but will take advantage of modern technology. NASA engineers have said that its conical shape is the safest and most reliable for reentering the Earth's atmosphere, particularly at the speeds required for a direct return form the Moon."

"Current plans call for Orion to be 16.5 feet (5 meters) in diameter and have a mass of about 25 tons. Inside, it will have more than twice the volume of an Apollo command module. The spacecraft is designed to return humans to the Moon to stay for long periods as a testing ground for the longer journey to Mars."

Two teams are competing for the contract to build Orion: Lockheed Martin and undisclosed partners, and Northrop Grumman - Boeing.

The Apollo 16 Moon lander was also named Orion. Orion is also the name of a well known design concept for a nuclear interstellar space craft. What other names were considered for the new crew capsule were not disclosed. The choice was not the result of any public input or contest. Individual capsules may be given names by crews. Just as were the Apollo Command Modules #9ff: Gumdrop, Charlie Brown, Columbia, Yankee Clipper, Odyssey, Kitty Hawk, Endeavor, and Casper. </**MMM**>

Lunar Reclamation Society, Inc.

P.O. Box 2102
Milwaukee
WI 53201

www.lunar-reclamation.org

Ad Astra per Ardua Nostra
To the Stars through our own hard work!

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LRS News

• **SpaceShipOne**: A full size mockup of the now famous craft built by Burt Rutan's company, and winner of the X-Prize, is now on display at the EAA museum in Oshkosh. Anyone interested in a field trip (80 miles each way)?

• **Opportunity to contribute prize to NSS' 2008 Space Settlements Calendar art contest declined:** We would not have been able to select the amount we would contribute nor have any say as to which artist gets the prize, nor have any rights to use of the art. The Moon Society may be participating but on more favorable terms.

• **Dupres Delivery Services:** Charlotte & Gene will bring to the September meeting, copies of Maxim magazine (August) with an article on our moonbase mission in Utah, given them by Ben Huset at North Wood Star Fest.

LRS Upcoming Events – September, October

Saturday, September 10th, 1-4 pm

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

Reports on Summer events, Updates on space and space mission news, conferences etc. A look at the calendar ahead. Planning our 20th Anniversary Party to be held at the December 9th Meeting slot.

Saturday, October 15th, 1-4 pm

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

Reports on Summer events, Updates on space and space mission news, conferences etc. A look at the calendar ahead.

MMM 7 NSS Chapters Strong

NSS Chapter Events

Space Chapters HUB Website:
[http://nsschapters.org/hub/]

Oregon L5 Society

P.O. Box 86, Oregon City, OR 97045
voice mail / (503) 655-6189 -- FAX (503)-251-9901
[http://www.OregonL5.org/]

Allen G. Taylor <allen.taylor@ieee.org>
Bryce Walden <moonbase@comcast.net>
(LBRT – Oregon Moonbase) moonbase@comcast.net

Meetings 3rd Sat. each month at 2 p.m.
Bourne Plaza, 1441 SE 122nd, Portland, downstairs
Sept. 16th – Oct. 21st – Nov. 18th

Chicago Space Frontier L5

610 West 47th Place, Chicago, IL 60609

INFORMATION: Larry Ahearn: 773/373-0349

Minnesota Space Frontier Society

c/o Dave Buth 433 South 7th St. #1808
Minneapolis, MN 55415

Tom Greenwalt (w) 763-784-6244 (h) 763-442-6015
David Buth (w) (612) 333-1872, (h) (763) 536-1237
Email: tomg@mnsfs.org

[www.mnsfs.org/]
MN SFS News & Pictures

Convergence Pix
http://freemars.org/mnfan/Convergence/2006/

MN State Fair 1998 Space Display
http://freemars.org/ben/mnsf98.htm

North Woods Star Fest 2006 pix (Ben spoke on the two MDRS crews, 42 & 45, that he served on earlier this year. Fall Creek, WI August 18-20, 2006)
http://freemars.org/mnfan/CVAS/2006-NWSF/

WISCONSIN

Sheboygan Space Society

728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376 (h) <willf@tcei.com>
SSS Sec. Harald Schenk <hschenk@charter.net>
>>> **DUES:** "SSS" c/o B. P. Knier
22608 County Line Rd, Elkhart Lake WI 53020

[http://www.tcei.com/sss/]

We meet the 3rd Thursday of the month 7-9pm

Sep.21: UW-Sheboygan, **Sheboygan**, In front of Rm 6101
Oct.20:Stoelting House, 309 Indian Hill, **Kiel**
Nov.16: UW-Sheboygan, **Sheboygan**, In front of Rm 6101
At UW-S we meet in the Science Building in the Physics Lab, One University Drive.

PENNSYLVANIA

Philadelphia Area Space Alliance

PO Box 1715, Philadelphia, PA 19105

c/o Earl Bennett, EarlBennett@erols.com
215/633-0878 (H), 610/640-2345(W)

[http://pasa01.tripod.com/]

[http://www.phillypasa.blogspot.com/]

PASA regular business luncheon/formal meeting from **1-3 pm**, the **3rd Saturday of every month** at the **Liberty One food court** on the second level, **16th and S. Market.** Go toward the windows on the 17th street side and go *left*. Look for table sign. Parking at Liberty One on 17th St. Call Earl or Mitch 215-625-0670 to verify all meetings.

Next Meetings: Sept. 16, Oct. 20, Nov. 18

Our next meeting will be at our Liberty One location on September 16. We may combine our October meeting with an activity (see Mitch's suggestions, below in the August. 19 Meeting Notes, page 18, col. 2).

July 20th Meeting Notes: Our meeting was after the Moon Landing. We had a guest, Ken, who lived in the Boston area and had attended meetings of space groups at MIT. He is looking for activities to be part of. He initially found us from our website.

Larry and Janice started our web and blog discussion on how to develop an ongoing dialog on the blog site. This is something Janice wants to try and Larry is talking to her about it. He also bought statistics on site use. He will post our Super Science pictures soon.

Dotty brought material on The Newark Museum which is the largest museum in NJ They have a large number of activities and cater to both adults and children. Space exhibits and activities are featured. She also brought up a review of the IMAX film **Roving Mars** at The Franklin Institute.

Hank Smith will be at WorldCon in Anaheim CA in late August. Hank also was in Washington early in August for The Mars Society Convention. Talking about the Con and the Society event caused a general discussion on going to places and where not to stay! Since a number of us where going to Washington we chatted for a while. Hank found a place in Gaithersburg MD. and ""commuted in to the L' Enfant Plaza site of The Mars Society event.

Mitch brought word on several subjects including our shore restaurant - Our meeting was to be held in Atlantic City at Cosimo's Restaurant on August 19. He also found that the LEM. is still in place, where we will be in the Fall, at The Franklin Institute. Mitch is working on us being part of the U.N. Space Week at the Institute, most likely in early October. With all this going on he is planning an article, to be published in a university newspaper, on space related study courses. We're still hoping this will happen.Two more items: Mitch is working on having a forum for Gary Fisher to speak on the Mars Homestead Project at a public venue, and, in the next few years, Mitch says we may have a new meeting place being developed in University City! Go Mitch!

Speaking of Gary Fisher: he attended the meeting and brought news on several Mars related fronts: the Mars Terrain we had built ten years ago is no more. We'll come up with something else as this was a popular activity for children. The good news is that Gary will be speaking at The Mars Society's Ninth Annual Convention specifically on Habitat orientation. It was an interesting talk on the trade-offs of the different orientations. There is more than" tuna cans" in our future!.

He brought out the plan, now being implemented, for a four month stay on Devon Island, at the Flashline Mars Station. This will be a seven person crew in the May to September 2007 time frame Funding was raised at the Convention. As we talked on various topics Gary pointed out that Bigelow Aero-space had a successful launch of a test habitat module in mid July. This unit deployed and inflated as planned.

Back on the ground: another topic that came up, in relation to a "real" simulation of Us On Mars is the possible installation of wind-mills for power at the simulation sites. As readers may know; the majority of power used on site, in most instances, is produced by fuel burning engine-generator sets. There is a host of problems with them, as described by Gary in the last few years, and alternatives, including windmills, are being looked into. I was asked a question about this at one of our public presentations and said I thought, not usable, at that time. However: for the simulations it might be more robust than the current method and might even work, for applications on Mars! He also proposed that we work on A Space Law event that to be on the 40th anniversary (2009) of the Moon Landing at our Constitution Center. Food for thought from Gary.

Earl Bennett described the work on the Delft-C3 Student Nanosatellite (article title) in the May/ June issue of ***The Amsat Journal***. A group of university students, at The Delft University of Technology, are building an ambitious orbiter that includes advanced solar cells for power (Gallium Arsinide) and another group of thin film cells that are one of the experiments. The object is to see if this new, lightweight design can handle space conditions. They could double the available power to weight ratio of the solar array at low costs. There are also elements that use wireless networking components on board and much other techno fun stuff. O.K. so I'm a bit geeky. Techsavy is part of the "how" of space operations so all of us will benefit from this kind of project.

An additional note on the amateur satellite groups: one of the presentations at the Mars Society event was on a balloon based explorer being developed for deployment (I love that phrase) by the German branch of the amateur satellite group. This one could be picked up with a good radio (scanner) and moderate antenna. There is also an amateur built relay going in the next three years! And much more of course.

I also brought in "Distant Wanderers" on the detection of extra- solar planets and past, current and future activities in this field. One of the areas considered was the false starts of earlier investigators, included work at a local university at the Sproul Observatory, and how some results that where thought to be in error from a source actually where proven right by later observations. Excellent reading. And much more.

Janice brought several reports: one from Science which was a book review about Galileo: "Galileo's' Instrument of Credit". The telescope had more uses than looking into the sky; ship arrivals were very important and seeing them at great distances gave financial advantage, just as accurate weather prediction can now. The author is Mario Biagioli. From the July 7 issue. She also brought an archival article from the June 2006 issue of ***Bioscience Magazine*** on Desertification.

And: Gary, Hank, Michelle and I attended the Mars Society Convention during August in Washington. Although many of the presentations where limited to 1/2 hour (!) slots there was still overlap due to the great quantity of interesting topics presented. The Moon, Mars, or Both was discussed as well as whether NASA or the various private sector groups would get us off world. Much energizing the base talk, with people willing to help go soon, with tempering of the enthusiasm by the lead time we are facing: 20 to 30 years to the actuality of Mars; with the Moon by 2015 (by ?).

The final presentation we attended was by Bruce Mackenzie on what needs to be done for background work to prepare for the homesteading on Mars. See www.marshomes.org, or info@marshome.org, for how members can help (email: BMackenzie@alum.mit.edu)

Submitted by Earl Bennett.

August 19 Meeting Notes: We held our August meeting at the edge of country on the east coast in Atlantic City at Cosmiri's Restauran. The restaurant we met at allowed us to look out on the boardwalk, a low barrier dune, and the ocean. There is actually a strip of beach and a tourist club there too but it was in front of the dune. The casinos' where quite visible. Since we met at the shore Mitch Gordon pioneered our path.

Michelle gave our treasurers report: we are solvent, but we need members to renew. Contacts will be made soon. She also noted that we have to pay for Moon Miners and will handle this. More on possible members later. Michelle traveled to The Mars Society Ninth Annual Convention and thought it was great. She enjoyed a number of the talks: from Dr Scott Horowitz, NASA, Dr. Matt Mountain, Dir. Space Telescope Science Institute, Dr. Chris McKay, and many more. Since she is intellectually drawn to space exploration, her interests where not just on the "can we go" and " how can this be done" but also on the spiritual and societal aspects of the human expansion into the universe. "Truth, Virtue and the Opening of a New World," by Rev. James Heiser spoke to this aspect as did some of the comments of Matt and Dr. Mckay. And then there is Gary...

Gary was our main speaker at this meeting with the Mars Society Ninth Annual Convention as the main topic of this meeting. He was a presenter with "Cylindrical Mars Habitats- Should They be Vertical or Horizontal?". He reprised some of the talk, pointing out the vertical (on end) had several advantages which included more usable space(more headroom especially) with a ~9 by ~14 foot "tuna can" format, being optimum for a number of reasons beyond the interior human space needs. There is also construction site considerations that make this format desirable. He also discussed other projects and his own work on the Mars Greenhouse Project and the possible use of wind driven generators that was being examined. I brought this up at the meeting for two reasons: I find the concept of environmentally derived power desirable, and we had driven into Atlantic City past a number of windmills supplying several mega watts! In our discussion the wind conditions at the Mars Desert Research Station where described as not easily usable and I must concede that, in general, capturing this "free energy" is not that easy here, much less on Mars. Gary may also be a speaker this fall at venues our next correspondent is working on.

Mitch Gordon reported on his efforts to set up speaking locations that Gary and other members could inform the public about the group and areas of space activity that they could become a part of. He talked on several interesting topics and a new business in our area: the Nastar Center (nastar center.com) which will provide "aerospace training" in the Philadelphia area. There representative, Alex Halerton, will come to our September meeting to tell us more about this new operation. Mitch asked an obvious question " Why here?". There are other, well established, space oriented operations in the Delaware Valley region: We have some small companies as well as Boeing and Lockheed Martin. More in the September report. Mitch is working on a presentation at The White Dog Cafe and wants us to come up with a talk that might be suitable for this "very liberal" audience. Tying in environmental protection and future lifestyle choices might help. The ability to argue, both with passion and factual knowledge, will be needed. On another topic: we began talking of going to see" Roving Mars", which could be a group trip soon, and the topic sparked Gary to remind us of a Mars Society competition for the development of robotic helpers to aid in the evolution of the tools that will be used on Mars. The "Finals" of this exercise will be held at The Mars Desert

Research Station! Since we have had an active Mars Society presence in our area for as long as the group has existed there may be a team from our area. When this will happen has not been announced (as of August 25).. On the subject of events: Mitch is going to contact The Franklin Institute for U.N. Space Week and we will report this events time and our place as Mitch gets them. Social note: Mitche's friend Hal came to our meeting as a guest.

I reported on his impressions at the Mars Society Conference with the Mars Balloon Project Archimedes Outline by Hannes Griebel on an "amateur radio enabled" Mars Atmospheric Explorer that slows down by interacting with the atmosphere, while inflated, at thousands of miles an hour. The result of doing this is several hours of "hang time" in the aero environment with eventual surface impact/ landing. A support craft, in orbit, will also be going to Mars: the P5A-Mission. This will act as a relay as well as its job as an additional investigative tool in physics and a comsat for ham radio operators. See the Mars Society website for progress on the probes development and Amsats as well (.orgs) There where many other good talks, including that of George Whitesides, President of the NSS, Dr Robert Zubrin, President, The Mars Society, and many more great members and speakers from the Society and friends. I particularly liked a presentation by Penelope ("Penny") Boston of New Mexico Tech on the merging of biologic and technologic entities. One of the reasons I enjoyed the talk was that her research includes the current development of unconventional exploratory devices, rovers if you will, that could operate as a coordinated swarm composed of lots of "simple" elements (at least for now). And this is only a small part of the presentation. And much more. See the Mars Store for some of the humorous tee shirts and other items displayed.

http:// cafepress.com/mathomehouse/584181

One shirt that was at the convention was the classic long drive question: "Are we there yet?" with a Martian scene and a lander in the foreground. There is more stuff through the Societies website and from connected organizations. For the amateur space launches I have picked up some go-mars.org stickers on there activities.

Earl Bennett, President, Pasa

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We will be limited by a lack of imagination and determination
long before we will be limited by physics.
Bob Perrry, MSStL

CALI FORNIA

OASIS: Organization for the **A**dvancement of **S**pace **I**ndustrialization and **S**ettlement
Greater Los Angeles Chapter of NSS

P.O. Box 1231, Redondo Beach, CA 90278

Events Hotline/Answering Machine:(310) 364-2290
Odyssey Ed: Kat Tanaka - odyssey_editor@yahoo.com

[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.
• Sept. 16th - Oct. 21st - Nov. 18th

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

Upcoming Events

- **Sat. Sept. 16th, 3 pm** - OASIS Monthly Business Meeting at the home of Bob Gounley and Paula Delfosse, 1738 La Paz Rd, Altadena.
- **Sat Sept 30th, sunset to 10 pm** - Los Angeles Sidewalk Astronomers Star Party, Autry Museum of Western heritage, 4700 Western Heritage Way 90027
- **Sat. Oct. 7th, 3:30-4:30 pm** - OASIS Lecture Series: "First Light: a Presentation on the Renovated, Expanded Griffith Observatory by Kara Knack. FREE. Long Beach Public Library, 101 Pacific Avenue
- **Thurs. & Fri. Oct. 12 & 13th, 7pm** - "Looking for Life in all the Strange Places, with all the Right Tools" by Tim Krabach, Manager, JPL Life Detection Science and Technology Progam. FREE.
  Oct. 12th- Von Karman Auditorium, JPL, Oak Grove Dr., Pasadena;
  Oct 13th - Vosloh Forum at Pasadena City College, 1570 E. Colorado Blvd, Pasadena
- **Sat. Oct. 14th 1-2 pm** - Reuben H. Fleet Science Center Lecture: Mars Rover Update by Nagin Cox. 1875 El Prado, Balboa Park, San Diego. (619) 283-1233 - www.rhfleet.org
- **Sat. Oct. 21st 3 pm** - OASIS Monthly Business Meeting, Location TBD. Check Hotline and Website.

Looking Ahead

- **Nov 24-26, 2006 - Loscon**, annual regional science fiction convention. OASIS will again be providing science programming and doing public outreach.

Recuring Events

- **Fridays** -- Mike Hodel's Hour 25 webcast. The world of science fact and fiction with interviews, news, radio dramas, artists, writers, stories, reviews, and much more. Information: http://www.hour25online.com/.

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- **Hardcopy MMM:** U.S. & Canada **$35** Elsewhere: **$60**

P.O. Box 940825, Plano, TX 75094-0825, USA

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Member Dues -- MMM/MMR Subscriptions:
Send proper dues to address in chapter news section

=> *for those outside participating chapter areas* <=

○ **$12** Individual Subscriptions to MMM/MMR: Outside North America ○ **$50** Surface Mail --**Payable to "LRS"**, PO Box 2102, Milwaukee WI 53201

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○ $25 Regular Dues

OREGON L5 SOCIETY
○ $25 for all members

O.A.S.I.S. L5 (Los Angeles)
○ $25 regular dues with MMM

PHILADELPHIA AREA SPACE ALLIANCE
○ Annual dues for all with MMM $25, due in March or $6 times each quarter before the next March

SHEBOYGAN SPACE SOCIETY (WI)
○ $15 regular, ○ $10 student,
○ $1/extra family member

"SSS" c/o B. P. Knier, 22608 County Line Rd, Elkhart Lake WI 53020

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Moon Miners' MANIFESTO

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