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

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

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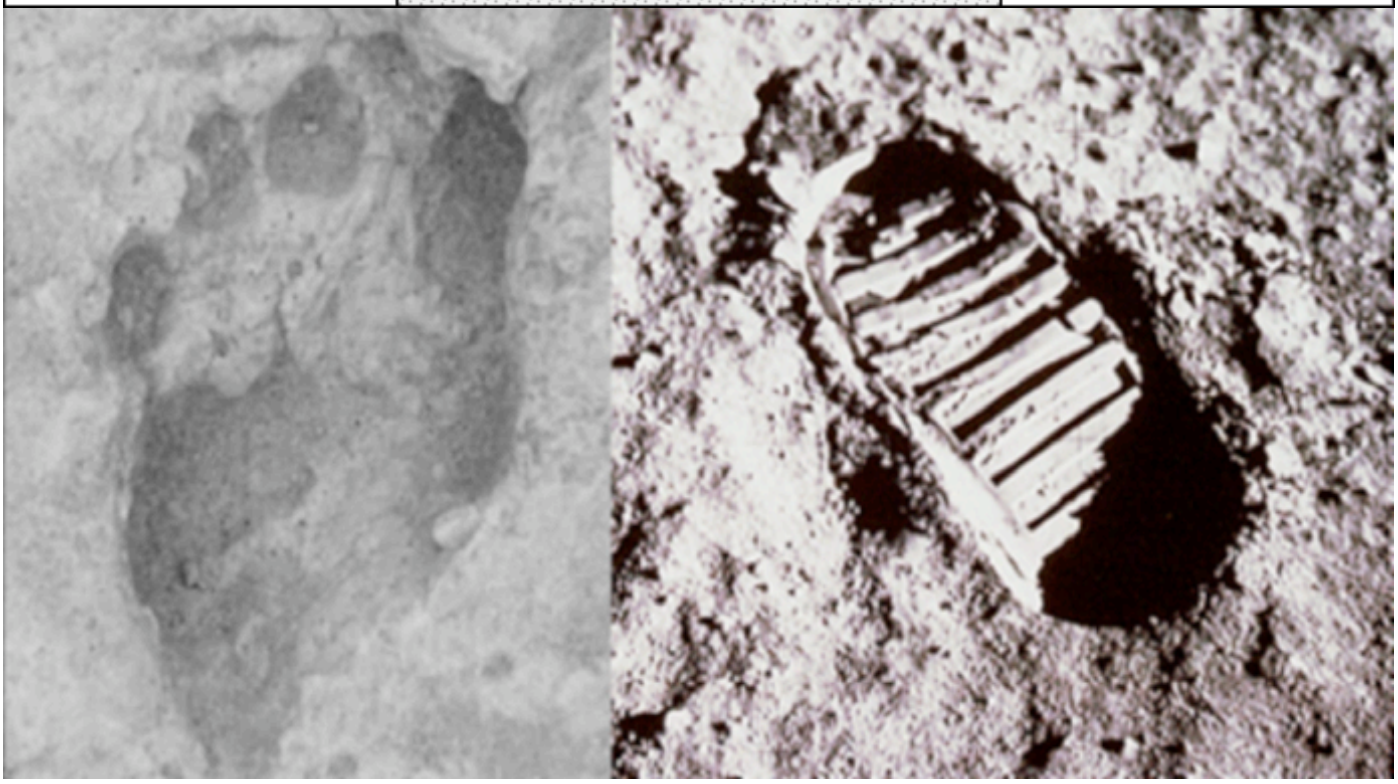

Above: *From the oldest known footprint, 1.5 mya in Kenya to the first bootprint on the Moon.*

Feature Articles in This Issue

The Mars 500 Hab Complex at U. Moscow >>

The Mars 500 habitat complex has been heavily engineered to help crews of six accurately simulate the conditions they would experience and endure for 500 some days on a round trip to Mars and back. The stress has been on finding a compatible mix of personalities, yet representing all the expertise needed. But that alone will not prevent failure, for the activities planned to keep crew busy for long cooped up periods are flawed. pp. 1-2

IN FOCUS The "Mars 500" Experiment: What they are Missing

On March 31st, a crew of two Europeans and four Russians entered a sealed chamber in Moscow to simulate interpersonal crew dynamics on a pretend 105-day mission to Mars. Later, another crew will use the facility for an full 520-day mission to Mars and back including a lengthy stay on the Red Planet itself. *See page 15, col. A.*

In our opinion, this well-intentioned experiment is missing the point. In an article we published almost twenty years ago, in MMM #30, Nov '89 [=> p. 2, col. 2]

Moon Miners' Manifesto

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• **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first eighteen years have been re-edited, reillustrated, and republished in 15 PDF format volumes, 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" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.
• **MMM retains its editorial independence.** MMM serves several groups, each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test.
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• **The Lunar Reclamation Society** is an independently incorporated nonprofit 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. National Space Society, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 - www.NSS.org
• **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon." - Contact info 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 by email** to KokhMMM@aol.com - Email message body text or MS Word, Appleworks, pdf attachments √ Mac compatible CD / or typed hard copy must be mailed to:
Moon Miners' Manifesto, c/o Peter Kokh,
1630 N. 32nd Street, Milwaukee WI 53208-2040
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⇒ In Focus Editorial continued from p. 1.

pp 6-7 and republished in MMM Classics #3, pp. 55-7 http://www.moonsociety.org/publications/mmm_classics" WANTED: Split personality types for Mars Expedition," we pointed out a problem no less important than potential interpersonal conflicts: a crew designed for intense high-powered work on Mars surface had to be equally content with prolonged periods of inactivity and boredom. Lot's of luck trying to find people like that!

Mission designers are missing the point. What has to go is not personnel incapable of switching gears in such a radical fashion, but the premise that the trip out and trip back must be spent twiddling thumbs.

The Outbound Trip

What we suggested (to get people thinking) is that during the outbound mission, the crew could be kept productively busy with at least two activities:

1) **Cross Training for maximum redundancy.** Rather than look for chimeric persons who were jacks-of-all-trades, **each specialist** would hold classes to teach the basics of his/her special expertise to the others, including test applications. In other words, a good part of the transit time en route to Mars would be spent in school with the result that once the crew was on Mars, no sickness, illness, or accident would impair the success of the mission because trained student personnel would be available to fill in any shoes. Considering all the expertise needed on Mars, such an en route cross-training program would occupy many hours
2) **Practice Assembly and Disassembly.** All equipment being delivered to Mars, having been assembled and tested before loading the Mars-bound craft, could be taken apart and reassembled over and over until every crew person was adequately familiar with it and ready to make on site repairs.

Such a double activity program would keep hands busy as well as minds. We could do more. An uninflated structure intended for elbowroom space on Mars could be inflated en route to serve as an exercise gym, and then re-deflated for the trip down to the surface.

The Long Trip Home

On the return trip, crew members could keep busy analyzing return samples as well as data accumulated during their stay on Mars. Writing preliminary reports and papers would be the goal of this activity. As the craft approached Earth and Earth-crew conversation time lags dwindled, live conferences could be held.

Another idea would be to include of a "puttzing" lab where those with arts and crafts talent could try their hand on making something of spare sample materials brought along for this purpose. Anything produced this way would be of incalculable outreach and financial value back on Earth.

Again, there should be some provision on the return ship for exercise and other physical activity. These things are important and the results of the Mars 500 exercise which neglects them, will in turn be of negligible value. Such a waste of time! We can hope that someone will get the message and that a redesigned "Mars 500" crew experiment be run. We have the time *to do it right.* Is there any other way to do anything? ````````````**PK**

Space Debris

Space Debris Remediation Actions Already Taken

by Larry Jay Friesen ljfriesen@peoplepc.com
Moon Society Advisor

It would appear from the "In Focus" article "Space Debris and 'The Tragedy of the Commons'" on pp. 1-2 of Moon Miners' Manifesto #224 that the writer, Peter Kokh, is under the impression that no actions have been taken, and that no international agreements have been reached, to prevent the growth of man-made space debris in Earth orbit. I must respectfully but emphatically disagree. I used to work studying that problem, so I can say something about it.

Actions were being taken and agreements were being reached even back in the late 90's, when I was working in the field. Readers probably know the name of Donald Kessler, now retired, who worked very hard to bring the problem to the attention of the space faring world. Readers may not be as familiar with Joe Loftus, also now retired, who was back then an associate director of Johnson Space Center, as I recall. Loftus did a lot of the behind-the-scenes negotiating on the U.S. side to get international agreements for "best practices" to reduce orbital debris, which have been adopted by most if not all spacefaring nations and agencies.

The current status of these practices was described very well a few days back on the NASA TV channel (our cable service carries it). I don't recall the name of the person being interviewed, but he is someone currently involved with the field. He pointed out that we used to do things like throw away bolts that fastened payloads to rocket stages, etc. We try very hard not to do that any more. We capture bolts, straps, and otherwise try to minimize what is called "launch debris". By "we" he meant most or all launch agencies around the world, not just NASA or the US.

The second policy is that people are enjoined to safe their upper stages when they have finished their last burn. When we launch a payload, we nearly always also launch the last stage of the rocket that put it into orbit. "Safing" means to vent propellants and pressurant gasses and to discharge batteries. The idea is to prevent explosions that might be caused by pressure buildups, by leftover propellants getting together and reacting, or by battery chemicals. People are also encouraged to safe their payloads in a similar manner at the end of the satellite's useful lifetime.

A third policy is what the spokesman called a "twenty-five year rule". To limit the growth of the number of large objects in orbit (the chances of collision between large objects grows as something like the square of the number in a given orbital altitude zone), when a satellite approaches the end of its mission, users are requested to leave it in an orbit where atmospheric drag will cause it to re-enter not later than twenty-five years after end-of-mission. Launch agencies are likewise asked to leave their upper stages in orbits that will decay within twenty-five years, once the stages have finished their jobs. This "25 year rule" was adopted first by NASA, then by all US launch services, then internationally.

Every so often, some fools come along like the Chinese military, when they performed their infamous satellite interception test. It turns out that the military authorities who carried out the test had *not* consulted their own orbital debris experts before the test; they just wanted to make a point to the US military. Those self-same Chinese orbital debris experts were hugely embarrassed at what their own government had done when they attended the next orbital debris conference. (I have this from my contacts who are still in the orbital debris field.)

When I read the referenced editorial, I was surprised at first that such a space buff as the MMM editor would not seem even to have a clue that any agreed upon practices were in place. But when I thought some more, I was less surprised. The orbital debris effort, at least in this country, works on a shoestring budget. They certainly don't have much money for publicity, so the word usually gets out only to people and agencies directly and currently involved in space launches or Earth-orbit space activities.

Another reason the editor may not have heard about these agreements and practices is that they *have not* been codified in formal treaties. They are more in the form of what Joe Loftus described to me as a "Good Housekeeping seal of Approval", when I once discussed the question with him. There is a reason for that, a reason Joe Loftus explained to me (he had a good deal of experience in international negotiations on space matters). That reason is that we are still in the process of gaining understanding of the consequences of various policies.

The policies I described above represent what the spacefaring agencies think are the best practices now, based on studies done up to this date. *But we're still studying, and still learning.* Suppose we discover that some policy doesn't actually work to reduce orbital debris as expected. Or we discover that some practice has an unintended consequence we hadn't thought of, that generates a hazard as severe as the one it was designed to prevent. Once a practice is codified in a treaty, it is infernally difficult to change, even if all the engineers in all countries agree it should be changed. If it has been adopted in this less formal way, there is more flexibility to change if needed.

That lower degree of formality does not mean the policies are less effective. Space operators, both governmental and private, adhere to them, because everyone, at least all the major players, know that it is in their own interest to adhere to them. And most of these practices, as I understand it, have been endorsed by appropriate United Nations committees on space activities.

<LJF>

[Editor: Thanks, Larry. Your comments greatly clarify the present situation, as well as point out how complex a problem we have on our hands. And you are right. There has been little publicity on the remediation actions that have been taken and which you describe. Space Debris remains a very serious threat to our future in space. Once again you have vindicated my nomination of you to the Moon Society Board of Advisors. In future, I will run such draft articles by you *before rushing to publish them!*] **PK**

See also, next page

NASA Space Debris Remedial Actions

From Mike Mackowski Michael.Mackowski@gd-ais.com

The editorial in MMM #224 on Space Debris, while well intended, was a little off the mark.

Spacecraft designers DO give attention to debris and parts not pertinent to normal spacecraft operation. First, the aerodynamic launch shrouds of most launch vehicles are released while the vehicle is still in a sub-orbital trajectory. The idea is once above the atmosphere, to shed weight that is no longer needed. Those shrouds then fall into the ocean (for Western launchers). Russian and Chinese vehicles may be different, but they have the same mass constraints so I doubt it. I thought Peter Kokh's emphasis on this issue was a bit misplaced.

Additionally, American satellite manufacturers are often required by contract to ensure their designs do not generate debris. Any deployment devices or actuators must be completely self-contained. This is actually done out of self interest, as small pieces of junk can come back and collide with the host satellite and damage sensitive components. Also propellant systems (and any other pressurized components) are required to be "safed" or pressure-relieved at the end of the mission. This is to reduce the chance of an old fuel tank building up pressure and bursting. I believe there may already be international agreements regarding that particular issue.

Pressurized tanks are the biggest problem

Instead of focusing on shrouds as a significant cause of debris, the big generators are pressurized tanks of dead satellites, collisions, and anti-satellite activities. You stated that "we do not know what are the most common sources of debris". I would challenge that statement since a lot of NASA and USAF folks work full time on those issues. They have analyzed what's out there and where it comes from. I don't know how much research you did for your otherwise thoughtful article, but there is a lot of activity in this area and I imagine that certain protocols have already been discussed, much as you proposed.

Keep up the good work,
Mike Mackowski, Moon Society Phoenix

[**Editor:** Mike, Thanks for your corrections. One point: when I wrote that "*we* do not know what are the most common sources of debris" I was using the editorial "*we*" i.e. "*I*" did not know etc. I failed to make that clear.]

NASA Standards for Orbital Debris

[Thanks to Mike Mackowski for this]

<**N_PR_8715_006A_.pdf**> <**NASA-STD 8719_14.pdf**>
are available from: http://nodis3.gsfc.nasa.gov/

[Mike sent us both pdf files as attachments but we could not find either on this site. However, by entering "Space Debris" into the search box, got **NPR 8715.6A** NASA Procedural Requirements for Limiting Orbital Debris]

NPR 8715.6A

Procedural Requirements for Limiting Orbital Debris
Office of Safety and Mission Assurance
http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_8715_006A_&page_name=Preface&search_term=Space%20Debris

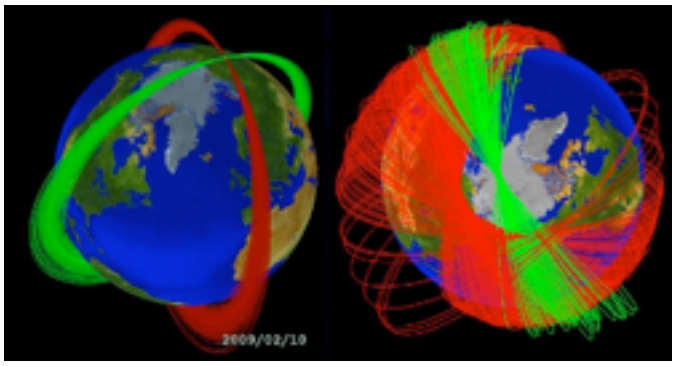
"to provide requirements to implement NASA's policy for limiting orbital debris generation per the U.S. National Space Policy of **2006**, Section 11, the U.S. Government Orbital Debris Mitigation Standard Practices" Note date!

"Note: It is recognized that the current state of existing spacecraft, spacecraft components and instruments, and launch vehicles may preclude full compliance with this NPR."

"NASA spacecraft, launch vehicles, and instruments that passed Preliminary Design Review (PDR) prior to August 1995 (release of NSS 1740.14, Guidelines and Assessment Procedures for Limiting Orbital Debris) are not required to perform an ODA unless a large change in design, as determined by the SMA Technical Authority for Orbital Debris, or changes in space object capability or risk affect the ability to achieve compliance with the requirements." **<MM>**

EDITOR: "exemptions" of this nature are quite reasonable, but tend to show that current NASA regulations may have come "after the horse was out of the barn." NASA has no doubt been concerned about this problem, as it poses a threat to the longevity of its expensive spacecraft in orbit. It is also understandable that the full implications of clouds of space debris in orbit were slow to catch the attention of NASA and other organizations.

While NASA does seem to be increasingly proactive in "designing out" identifiable sources of space debris, the amount now in orbit is large enough to "ignite a chain reaction of ever more frequent collisions that could in time make low Earth orbit off limits to human activity. The recent collision of a spent Russian Cosmos 2251 satellite and an American Iridium satellite have raised the level of international and public awareness considerably. *Before collision paths of these satellites and after collision of their derived debris are seen below.*



The space debris population has increased significantly

For those of you who get the black/white/graytones hard copy version of MMM you can view this illustration online:

http://www.astroengine.com/wp-content/uploads/2009/04/satellite_collision.jpg

Readers are encouraged to study the documents Mike has brought to our attention. Yet, these big questions remain:

1) Are all other space-faring nations working as hard to diminish the growth of the problem?
2) What more can be done to avoid adding further to the amount of debris coming from satellites yet to be launched?
3) Are there any *practical, yet affordable* ways to remove debris already in orbit?
4) Are there any low mass ways to shield satellites and spacecraft and orbiting habitat modules from the larger amount of smaller debris pieces?

At stake is keeping orbital space open for human activities, *including tourism* and manufacturing. **<PK>**

Building Solar Power Satellites with "Lunar Materials"

SPS Material Alternatives

by Dave Dietzler pioneer137@yahoo.com

While Helium-3 fusion is but a theoretical energy option at this time, solar power technology is very mature. The only real barrier to space solar energy is the high cost of rocket transport, but this might come down in price in the future with standardization and mass production of private sector rockets for everything from communication satellite launching to orbital tourism.

Solar power satellites built from lunar materials could supply a large fraction of civilization's energy some day. They would probably be built in pieces or "modules" assembled at a space station at L5 mostly with robot labor and these modules would then be assembled into complete SPSs. The finer tasks of making the modules would be done on a large fixture that was part of the L5 space station that held the many pieces together as they were pieced and welded together and wired up by robots, some attached to the fixture and others moving around in space that use cold gas thrusters for maneuvering. Once completed, the module would be released and the coarser task of mating the modules together would be done by robots in free space.

Most of us have long presumed that SPSs would be made mostly of aluminum with silicon solar panels.

SPS Illustration:
http://www.nss.org/settlement/ssp/SSP04-600.jpg

While **silicon** PVs will probably be used rather than solar thermal turbogenerators of much greater complexity that will also require more maintenance, is aluminum really the best choice of metals for the frame? Aluminum production on the Moon offers many challenges unlike iron and magnesium production, mostly because of the upported* chemicals and complex recycling equipment needed. Titanium production on the Moon is also less reliant on upported chemicals and recycling than is aluminum, barring the success of a device like Dr. Peter Schubert's all-isotope separator.

[*"upported" – this is a term coined by the MMM Editor many years ago Some have objected that there is no "up and down" in space. That is not quite so when you are dealing with steep gravity wells, such as Earth's. It is definitely "uphill" to the Moon.]

Titanium has the highest strength to weight ratio of any metal. In its unalloyed state it is as strong as some steels but 45% lighter and it is twice as strong as aluminum but only 60% heavier. *The mass of titanium required to build an SPS frame of equal strength, given Ti's superior strength to weight ratio, would actually be less than that for an Aluminum frame.*

So why don't we build SPS frames with titanium? Given the simplicity of Ti production compared to Al production on the Moon, barring an all isotope separator, Ti should be cheaper to produce on the Moon. Unalloyed titanium has a tensile strength of 63,000 psi. Plain 1000 series aluminum has a tensile strength in the range of 13,000 to 27,000 psi. The only element available on the Moon with which to alloy Al is magnesium. Titanium can be alloyed with aluminum. Although titanium is superior to aluminum in many ways, its cost is higher on Earth at least. The FFC process should reduce the price of Ti that has been produced by the Kroll process since 1935. Refining, working and welding titanium is difficult on Earth because of problems with contamination by atmospheric oxygen and nitrogen and this increases its price, but in the free vacuum of the Moon and outer space, this will not be a problem at all.

Numerous processes have been put forth for extracting aluminum on the Moon. They all rely on reagents like sulfuric acid, chlorine, carbon, sodium hydroxide, sodium carbonate, manganese and/or lithium fluoride. These processes involve numerous steps and elaborate equipment for the extraction of aluminum and the recycling of all the reagents. See:

http://www.nas.nasa.gov/About/Education/SpaceSettlement/spaceres/V-5.html *and*
http://www.nss.org/settlement/nasa/spaceresvol3/plsoom1.htm

Titanium production, by comparison, is much simpler. Ilmenite could be separated from mare regolith with electrostatic separators and treated with hydrogen obtained by solar wind implanted volatiles harvestors at about 1000 C. to obtain water that is electrolyzed to recover hydrogen and gain oxygen, and titanium dioxide mixed with iron. The particles of TiO2 and iron could be heated in solar furnaces in the vacuum to boil off the iron and the TiO2 could be deoxidized to get sponge or powder titanium in FFC cells. The FFC cells with their carbon electrodes and calcium chloride electrolyte would be upported. Unlike the electrolysis of aluminum chloride, chlorine gas that would have to be recycled does not evolve at the electrodes of FFC cells. Oxygen is released at the anodes of FFC cells and I have read nothing indicating that the carbon anodes burn up to produce CO or CO2.

We must also think about reflectors to increase silicon solar panel output. These might be made of **magnesium** – a metal that can be obtained on the Moon without any upported chemicals by the process of silicothermic reduction aided by the free vacuum of the Moon. Reflectors will not bear any extreme loads and magnesium is only two thirds as dense as aluminum.

Aluminum will not be driven completely "out of the picture." We need it for wiring and cabling, although calcium might often substitute for it, and it is a titanium alloying ingredient. The most common titanium alloy contains aluminum and vanadium, but vanadium is present at only about 100 ppm in the regolith. We must look at other alloys of titanium made with aluminum, iron, manganese and/or chromium. We might obtain vanadium via bioleaching. Thin aluminum films deposited on thin magnesium sheets might increase reflectivity.

While aluminum is much cheaper than titanium on Earth, this might not be true on the Moon. Until we know what the economics of materials production are like with real world experience on the Moon, or some very clever foresight on Earth, decisions regarding material choices cannot be finalized. It would be very surprising if steel, given the rarity of carbon on the Moon, turned out to be the cheapest metal available on the Moon! <**DD**>

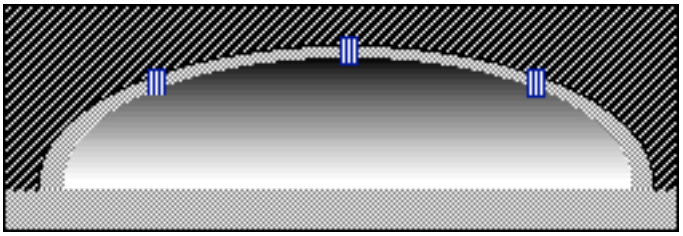
[Dave appends these helpful links and illustrations:
http://www.moonminer.com/Powersat-Fixture.html
Powersat Construction Fixture
http://www.moonminer.com/Lunar-Titanium.html
Benefitiation, Extraction, and Challenges of Titanium
http://www.moonminer.com/Regolith_refining.html
Refining Moondust

Check out www.moonminers.com Dave's great site!

By Peter Kokh kokhmmm@aol.com

In his latest book, "**How to Live on Mars**" Robert Zubrin comes to the topic of skinsuits, that hug the body, allowing much greater freedom of movement, and with much less fatigue. That's the good part!

While skinsuits will most likely be inferior when it comes to handling radiation and thermal extremes, these dangers are excluded in sheltered or shielded "lee" vacuum situations within lava tubes and in unpressurized warehouses and sports arenas (*illustration below*) that are sheltered from the cosmic weather. It is in these environments that we are to see widespread skinsuit use. Such suits are lightweight in comparison and allow much greater freedom of movement. More comfortable to wear, they will allow people to work and recreate for longer periods without becoming tired or exhausted.



See www.moonsociety.org/images/changing/lee-vac_arena.gif

Skinsuits are revealing

But we gain this comfort and ease at the price of embarrassment. Because a skinsuit is form-fitting, it will showcase all the varied imperfections of one's own body shape. Potbellies, wide hips, flat breasts would all be revealed. Some of us will take that in stride. Others would predictably not be caught dead wearing such a suit.

Or so Bob Zubrin predicts! But there is an answer: lightweight *outerwear* that can partially moderate body shapes, and distract with color and pattern as well.

Skinsuit "Outerwear"

There could be hats, capes, robes, overalls; you name it. Meant for wear in vacuum over a skinsuit, these apparel items could be made of most anything cheap and easy to work with: woven metal fibers, even wires, yes even medieval style chain mail; scrap cardboard, fiber glass fabrics, metal plates strung together – the adventures of "trashure" (transforming trash into treasure.) Any material or style that will distract attention from bodily imperfections, yet not make movement cumbersome or awkward, will become something with which to experiment. And for inspiration; anything from historical periods, from science-fiction/fanstasy, from imagination is fair inspiration for creative designers.

One can imagine periodic fashion shows in Luna City, perhaps in a lee-vac arena, where models with very imperfect physiques, both male and female, would strut down a runway before onlookers behind glass observation areas, with a variety of materials, colors and designs.

Over a skinsuit, of course! Whether stylish, fanciful, sheer fun, what does it matter? Skinsuit outerwear fashions will say "we belong here, out on the moonscapes!"

This may become an anticipated periodic event even for those not anticipating lee-vac or out-vac excursions. With successive shows, and over the years, skinsuit "outerwear" items available in Luna City retail shops will grow in number, design variety, and sophistication.

Start of a Cottage Industry

Periodic fashion shows should be popular, and drive a startup cottage outerwear fashions industry. Over time, more and more pioneers, whatever their physique, will feel encouraged to explore what the out-vac and lee-vac environments have to offer. And for those venturing out, the great variety of outerwear fashions would make emergency identification easier, and people watching that much more fun.

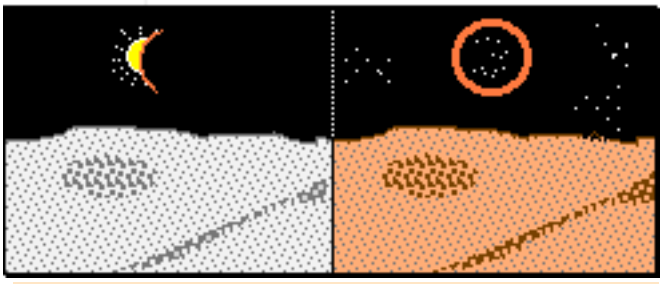
Skinsuit outerwear and new performing arts

Lee-vac activities would become more varied as well. Can you imagine ballet not only in one-sixth G, but in vacuum as well? Lee-vac arena sports team uniforms would be more interesting and fanciful as well – all part of team sports enjoyment.

Beyond the protection of "lee" space

But these "fashion" developments might also encourage more and more lunar residents to wear skin-suits with outerwear even in full out-vac, the unprotected "vac"uum "out" on the lunar surface. Such sorties would be less risky during the "moderate risk" conditions of "early morning" days and "late evening" long shadow days. Remember it is not quite 15 days from lunar sunrise to sunset! Temperatures will be lower, but not the radiation level.

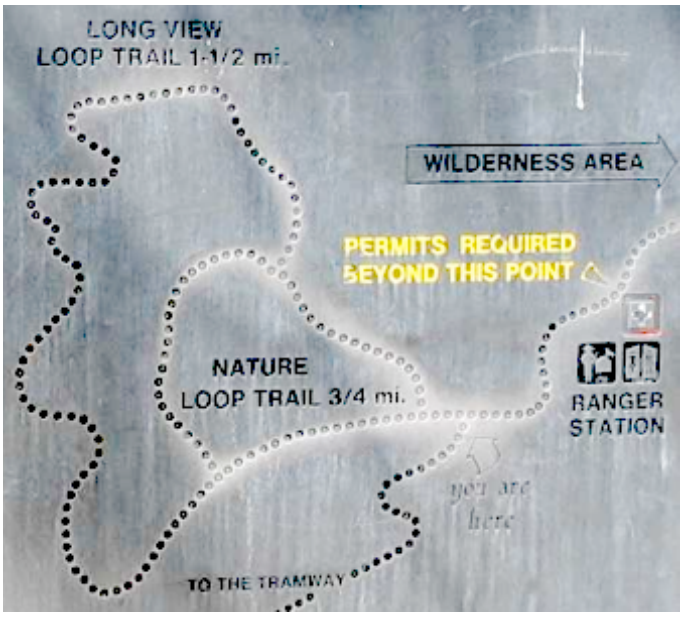
Another "low risk" opportunity lies during the1-3 hour long solar eclipses when the surface of the Moon is lit with the ruddy light of the ring of sunrises and sunsets that circle Earth when Earth itself is blocked out as the sun slips behind it. (An event paired with total lunar eclipses seen on Earth.) During such periods, the out-vac will take on the appearance of marsscapes in twilight!



Every now and then, Earth-facing moonscapes take on the hues of a dimly lit Mars. But there will be no mistaking where you are. In the sky in place of Earth will be a black hole outlined with a ring of orange tones with only one ten thousandth the brilliance of sunlight. And in that black hole, clusters of lights, Earth's cities and fires, dotting otherwise dark continents. It is Umbra. * See MMM #164 p. # – APR 2003.

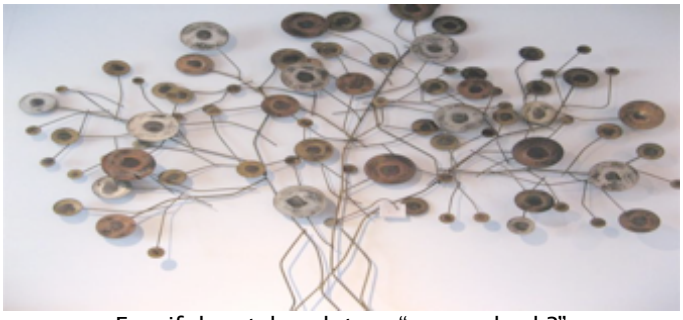
Surface paths and trails for strolling

But before such surface recreational strolls can become popular there needs to be some encouragement in the form of "excuses to venture out:" something worth going out on the surface to see and experience. Most people will not just wander out on trackless wastes just for the sake of doing so, at least not often! But Luna City Fathers can encourage people to get out from the confines of the settlement encouraging the creation of "nature" paths that showcase local geological features of interest. Compacted and sintered, these paths will be relatively dust free yet allow enjoyment of the "natural" moonscapes to either side. Such a path could encircle the settlement, with bridges and underpasses where the path intersects roads into and out of the settlement. After sundown, rocks and cut breccias selected for phosphorescence could trace the way.



Art and Sculpture along the way

Sculptures of an ever more varied variety and originality along such paths could also attract exo-pedestrians. In turn, the opportunity to have their works seen and admired by many will encourage artists and sculptors to create objects of interest and fascination



Fanciful metal sculpture "moon shrub?"

Free scrap metal is manna from heaven for sculptors

. There could also be benches, each of a unique design (how about a pioneer design competition to stir extra interest?) and an objet d'art in itself would encourage walkers to take a rest, the better to appreciate the art and views along the way.

Animated Sculpture

On Earth, mobile sculptures are powered by the wind or sun. On the Moon, the solar wind blows at hundreds of miles per second, but is too thin and lacks the oomph to power anything. What about solar power? Solar panels could easily drive small motors and actuators to create mobile sculptures on moonscape paths and trails frequented by walkers after sunrise and before sundown. They'd work during high noon, of course, but few people would venture out on the trails at those times.

Let's use our imagination! Solar powered animatronic guides to explain landscape, rock, and geological features? Even programmed to answer routine questions? {"Where is the nearest restroom?" "Are there any vending machines nearby?"). Why not fanciful alien creatures that would leap out from behind a boulder to scare and delight children? Holloween when it occurs near local sunset could become a trail-event must!

The oldest, easiest hobby?

But perhaps the most interesting things to observe and study will be provided by the walkers themselves. They will no doubt appreciate this special opportunity to partake in the perhaps humanity's oldest hobby: going somewhere *just to see and be seen – people watching!* "Oh look at what she's wearing!" "If he thinks we can't see that he has a potbelly, he's fooling himself."

Bringing the Lunar Frontier to life
while preventing neurosis and psychosis

Is all this idle diversion? What has all this got to do with anything? Getting pioneers to venture outside the pressure hulls of their settlement is absolutely vital to the long term mental health not just of individuals, but of future lunar frontier society in general. We on Earth see the lunar surface as hostile, barren, life squelching, and some thing to be avoided at all costs. To tell the truth, those of us who see it that way are poor settler material.

> It is imperative that the pioneers learn to make themselves feel "at home" on the Moon *not just within their comfortable settlement homes and commonspaces, but out on the surface as well.*

The penalty of not doing so will be neurosis and psychosis not just of individuals, but very likely of lunar frontier society in general. If we are going to make ourselves at home, we need to do it in a "no holds barred" fashion.

Life-squelching cosmic rays and solar flares?
Tissue-burning ultra-violet?
The incessant micrometeorite rain?
The insidious, potentially poisonous moondust?

A lesson I learned from my mother is that *"every apparent disadvantage remains so as long as we are looking at it wrong."* "Change your attitude and try to see how that feature can be turned into an opportunity!" Then you will see it in its true light for the first time!

` Not a common attitude to be sure, but try it! It works. Now that's the stuff of which those pioneers who will survive and strive will be made of. Attitude is everything, and the naysayer, the timid, the "Oh, we can't …" crowd just doesn't get it, doesn't understand, and we have to ignore them and move on. The Lunar Frontier is our dream not theirs, and it is ours to pursue. The above attitude works on everything: from apparent life setbacks to obstacles on the road to the Moon and beyond.

Beyond the visions of "fellow travelers"

Some "pro-space" writers want to see robots do everything. "There is no need to put humans in such alien and hostile and god-forsaken places," they advise.

But they have it all wrong. Venturing into new turf, into spaces that at fist seem hostile to human life, is something we have been doing *even before leaving our homeworld in Africa* to settle the rain forest jungles and the parched deserts of the first human continent, in a journey that would someday see us settle the north arctic which would have seemed as life-squelching to an early African in what is now Kenya, as life on the Moon must now seems to many of us incapable of getting past intimidating first impressions.

We have got to where we now find ourselves, a truly global species, by venturing into one new land after the other, where the wildlife, the vegetation, the climate, and the available resources were different from where we came from, from what we were used to and had taken for granted. And guess what? Each time we learned to make ourselves at home. Each time we learned to live with the "dangers" and "challenges" posed by the new territory.

From a more meta-historical vantage point, each time we developed ever more of our amazingly adaptive unsuspected human potential. Each time we realized more *hidden human talents.* Each time we brought out more of the potential that gives glory to the creative agency or agencies that have driven us and drawn us forward and upward. Why would some put a cap on what we humans can do? A cap based on past accomplishments in Africa 200,000 years ago would have been quite immature. A cap based on our accomplishments to date in the early 21st Century would be just as premature. Our fellow travelers, those who would see robots explore space and access its resources but leave humans at home, are just that. Fellow travelers. We can use their limited support, *but we must never accept the limits of their vision.*

So you thought that this would be just a "far out" article on whimsical spacesuit outerwear fashion! *Everything bears on everything else.* Where we are and where we will be in the future is a web of endlessly varied possibilities. *Let the adventure never end!*

The Moon, its capacity to support a full flowering of human life quite unsuspected, will be the first of many new worlds. Why should this surprise anyone. Every element in our bodies, and in everything we see around us, other than hydrogen which is primordial, originated in the furnaces of star core explosions.

"Of stardust thou art
And to the Stars thou shalt return"

Now that is a "pilgrimage", a "directive", that will take us centuries, millennia, maybe eons to pursue. We are at the "baby's first steps" stage, the most critical of all. We have yet to truly integrate Antarctica into our human metaworld, and timidity, self-doubt, and endless diversions threaten to stifle our next frontier-exploring efforts. Are humans up to the challenge? Despite every thing that should give us pause, a look at our past should encourage us. *We have always taken that next step* and we have *always succeeded*. Now is certainly not the time to doubt either our own capacities our our destiny.

But each time, only a few pioneer the new "world" and they do so despite the discouragement and disinterest of the many who remain behind. <**MMM**>

The Moon Society www.moonsociety.org

An international nonprofit 501(c)3 educational and scientific organization formed to further the creation of communities on the Moon involving large scale industrialization and private enterprise

Objectives of the Moon Society

include, but are not limited to:

- Creation of a spacefaring civilization which will establish communities on the Moon
- Promotion of large-scale industrialization and private enterprise on the Moon
- Promotion of interest in the exploration, research, development, and habitation of the Moon, through the media of conferences, the press, library and museum exhibits, and other literary and educational means
- Support, by funding or otherwise, of scholarships, libraries, museums and other means of encouraging the study of the Moon and related technologies
- Stimulation of the advancement and development of applications of space and related technologies and encouragement their entrepreneurial development
- Bringing together persons from government, industry, educational institutions, the press, and other walks of life for the exchange of information about the Moon
- Promoting collaboration between various societies and groups interested in developing & utilizing the Moon.
- Informing the public on matters related to the Moon
- Provision of suitable recognition and honor to indivi-duals and organizations which have contributed to the advancement of the exploration, research, develop-ment, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says Who We Are

We envision a future in which the free enterprise human economy has expanded to include settlements on the Moon and elsewhere, contributing products and services that will foster a better life for all humanity on Earth and beyond, inspiring our youth, and fostering hope in an open-ended positive future for humankind.

Moon Society Mission

Our Mission is to inspire and involve people everywhere, and from all walks of life, in the effort to create an expanded Earth-Moon economy that will contribute solutions to the major problems that continue to challenge our home world.

Moon Society Strategy

We seek to address these goals through education, outreach to young people and to people in general, contests & competitions, workshops, ground level research and technology experiments, private entrepreneurial ventures, moonbase simulation exercises, tourist centers, and other legitimate means.

Our Full Moon Logo above:

The Moon in its natural beauty, empty and deceptively barren, waiting for human settlers to shelter and to mother as their adopted second human home world. We have work to do!

Masthead Design: Charles F. Radley, Society Vice-president\

Elections 2009 Ballot:

Officers & Director Candidates

By Peter Kokh, President

Three of the five Board of Directors slots are open for election or re-election. These seats have been held by R. Scott Gammenthaler (chairman of the board), and by James Gholston and David Dunlop. Of these, only Scotty is running for re-election. Dave and James are stepping down both to concentrate on other efforts and projects that serve the Society, and to make way for two new vibrant candidates.

Two of the four Officer positions are open for election or re-election: Vice-President (currently Charles F. Radley) and Treasurer (currently Dana Carson) – both Radley and Carson are candidates for re-election.

With the publication of this issue of MMM, nomi-nations for any of the above positions become closed. Any member in good standing who will have completed one full year of membership as of August 1, 2009 was eligible to run for any of these positions. That includes anyone with a membership # of 1518 or lower. If you did not get your nomination in on time to be included on this year's ballet, please do consider running next year when two board positions and two officer positions will be open (President and Secretary)

As there was no candidate for the position of Secretary, vacated by appointee Chuck Lesher whose time schedule did not allow regular meeting attendance, we expect to be filling this position by appointment for the coming year.

The 2009 Moon Society Elections Ballot

You can print this page and put a check √ in the supplied brackets to indicate your support, and mail your ballot to the address given below.

Those members with current email addresses in our database will also receive a ballot by email.

Officers:

Vice President: [ ] Charles F. Radley
Treasurer: [ ] Dana Carson

Board of Director positions

[ ] R. Scott Gammenthaler
[ ] Shaun Moss
[ ] James Rogers

Candidate Statements follow on pages 10 and 11.

Please take a moment to Vote!

While once again, we have only one candidate per open position, and thus no "races," your vote of approval will encourage all of these qualified candidates and will be much appreciated. **Ballots must be in by August 1st**

Again, you can vote either by email – send to elections@moonsociety.org or mail your ballot to Moon Society Elections, PO Box 940825, Plano, TX 75094-0825

Elections 2009 - Candidate Statements

OFFICERS

Nb. The office of President will open in 2010 as will the position of Secretary (currently vacant)

Vice-president: incumbent Charles F. Radley #868

Former Moon Society Director, 2005. I have been working on lunar development for 40 years. In 1968 I read about Solar Power Satellites and said "Yes, this is *the* solution." In 1976 I read about Gerard O'Neill so in 1977 I read the High Frontier, and said, yes, finally a plan which makes sense. In the last 30 years I have not heard a better plan, so I am continuing to work on the original O'Neill vision. I joined the original L- 5 Society in 1979.

I have an extensive track record in NSS, L-5, AIAA and many other organizations. The American Institute of Aeronautics and Astronautics made me an Associate Fellow of their prestigious society, primarily because of my contributions in revitalizing their Ventura Pacific Section, as well as my professional record.

Began posting to theusenet sci.space.* newsgroups in 1989. I operated an NSS BSS on fidonet from 1990 through 1992. Was a regional director of the National Space society from 1994-5 and have been active in the following NSS Chapters: Ventura County (CA), Cuyahoga Valley Space Society (OH), Oregon-L5; as well as active in the California Space Development Council and Midwest Space Development Corporation.

My professional background includes B.S. Physics, M.S. Systems Engineering, 10+ years aerospace experience. Was a part time technical consultant for Transorbital Corp., the first private company licensed by the U.S. government to explore and land on the Moon. Was a member of the subcontractor teams for the Galileo and Magellan space probes, the International Space Station, Spacelab-MSL-1 and several comsat projects.

Achievements as VP of Moon Society:

Has established a Moon Society presence on all the major internet social networks as follows (as of May 2, 2009): Facebook cause - 941 members; Facebook page - 838 fans; Facebook group - 692 members; Myspace page - 381 friends; Yahoo group - 132 members; Linkedin group - 120 members; Twitter - 109 followers; Plaxo group - 77 members; Orkut - 70; Digg - 59 friends; Google group - 14 members

Has actively recruited members almost every day.

Space Renaissance Initiative:

Established a strong relationship with the new international Space Renaissance Initiative (SRI) organization, forged a strong partnership between SRI and the Moon Society. SRI is an group of like minded space activists who understand the importance of lunar development for releasing humanity from the bonds of closed world thinking. Moon society has cooperate with fundraising for SRI, and help numerous conference on Skype. We had a good press conference in London UK in April 09. SRI is proving very effectively to increase the number of activist involved in our mutual interests. We leveraged our respective internet social networks to mutual benefit.

Space Solar Power Demo

I received a suggestion from Colonel Peter Garretson of the US Dept of Defense - National Space Security Office (and a Space Frontier Foundation advocate) for the idea of a desktop microwave power beaming demonstrator. I suggested this to the Moon Society board for adoption as an official project, and was delighted that the board enthusiastically adopted the idea. I assisted our Chairman, Scotty Gammenthaler, to plan, design and implement the project. Also thanks to Phil Mills of SFF who built the stand. The device was successful constructed and transported to the 2007 ISDC and other events for display. We also achieved a great legal precedent, we applied for an FCC experimental license to radiate the power beaming device in a public event, and we were approved. As far as we know this is the first such government approval ever issued. All previous demonstrations were done under corporate or government laboratory permits, and did not allow public exposure.

I may have done some other things which I forgot to mention. In any event, I have enjoyed the opportunity to be active for promoting lunar development, and hope to continue for another term.

Treasurer: incumbent Dana Carson #10

I'm a computer consultant dealing in web based systems. Previously I worked for Westinghouse Aerospace building tools for the embedded systems developers. I've been a space enthusiast since Apollo and have been on the board of the Moon Society since its founding.

Three BOARD of Directors POSITIONS

Note: Director **David A. Dunlop** has chosen not to run for re-election in order to concentrate on his efforts as Director of Project Development. We thank Dave for his tremendous accomplishments and efforts in this position.

Note: Director **James Gholston** has also declined to run for reelection, likewise stating that he was busy enough with other Moon Society projects such as Lunarpedia.org. We thank James for his past service, his work on Lunarpedia.org and kindred wikis, and for getting us started on the Moon Colony Videos.

Incumbent R. Scott Gammenthaler #393 (current Chairman of the Board)

I was one of the founders of the Moon Society and have previously served as Treasurer, a Director, and Chairman of the Board. In my capacity as Treasurer from 2000 through 2005, I was responsible for collecting and depositing funds, paying bills, and preparation of financial statements.

I also led the effort to obtain 501(c)(3) nonprofit recognition from the IRS, and I developed most of the online membership registration system and other parts of the web site.

For the past four years as Chairman, I have led meetings of the Management Committee and Board of Directors, led the efforts to update our Bylaws to improve efficiency and the recent "face lift" to our web site, and participated in organizing and supporting our MDRS mission, our presence at ISDC 2007. I designed the electronics portion of our Solar Power Beaming Demo.

I feel that my previous experience as an officer, Director and Chairman of the Moon Society will be valuable to the Society in understanding our history and deciding future actions. I remain committed to the goals of the Moon Society as expressed in our organizing documents and in public statements of our position on various issues.

Candidate Statements Continued

New Board Candidate Sean Moss #1062

Shaun Moss has been a member of the Moon Society since 2001. A passionate advocate for space colonization, he has also been actively involved with several other groups over the past decade, including the Mars Society, Mars Foundation, Space Frontier Society and the Space Renaissance Initiative. He is also the founder of the Victorian Space Alliance, which connects different space interest groups in Melbourne, Australia.

Shaun travels regularly to North America to participate in space conferences and network with friends and colleagues in the space community, and has presented his own research into terraforming and in-situ resource utilization. A frequent participant in online meetings and discussions, Shaun has demonstrated leadership, and is often a source of good ideas, clear thinking and positive energy. He is a primarily an advocate for private space development, and believes that the Moon Society should be spearheading a grassroots initiative to construct a private international Moon base.

He has a degree in computer science and mathematics, with additional studies in robotics, and computer and information systems engineering. Shaun is currently writing his first book, and aspires to be a professional writer on the topics of space, science, technology and spirituality. He is also the architect of moonmars.com, an advanced online community designed to connect the various different space colonization groups into a coordinated effort to develop humanity into a multi-planetary civilization.

Shaun is a proud supporter of the goals of the Moon Society and is passionate about developing the Moon into a purposeful destination for humanity; to this end he will enthusiastically apply himself to the role of a member of the Board of Directors of the Moon Society.

New Board Candidate James A. Rogers #1454

A Moon Society member since 2007, James Rogers is a college student pursuing simultaneous bachelor degrees in the fields of Aerospace Engineering and Geology. Since joining, he has been an advocate for a rational, stair-step approach towards the utilization of space resources and environments, favoring commercial and open-source approaches towards humanity's future in space.

James moderates multiple forums in his spare time which are dedicated to bringing space enthusiasts together for the purposes of discussion of current events, amateur astronomy, space education, space utilization, and project planning. Recently, he has pushed for the use of new tools for raising awareness about space exploration and the Moon Society, including cooperation with other active members in the use of social networking mediums, Google maps, and an updated design for the Moon Society website.

Please take a moment to Vote!

While once again, we have only one candidate per open position, and thus no "races," your vote of approval will encourage all of these qualified candidates and will be much appreciated. **Ballots must be in by August 1st**

Again, you can vote either by email sent to elections@moonsociety.org or mail your ballot to Moon Society Elections, PO Box 940825, Plano, TX 75094-0825

Apollo Moon Party Planning Report

From Peter Kokh

www.ApolloMoonParty.org

www.moonsociety.org/events/amp/

As of publication time, parties are planned by these Moon Society Chapters & Outposts:

Houston, Phoenix, St. Louis, Milwaukee, Green Bay WI (College of Menominee Nation).

There will be a big party at the Space Frontier Foundation Conference at NASA-AMES.

In Mexico, parties are planned in Mexico City and Guadalajara. In Australia, in Melbourne and Canberra.

As we would like to link all these events in one big around-the-world Internet event via Skype, we need to fill in the big "time zone gaps" over the Pacific, Asia, Europe, and the Atlantic. We hope to encourage parties in Ireland, Britain, and elsewhere in Europe, and in India.

W are also collaborating with the **Echoes of Apollo** effort. Their main focus will be a "moon-boune" event, using major radio telescopes in Australia (Parkes) and California (Jamesburg) to bounce signals of the Moon, a feat first accomplished by radar in 1949 (highly motivating ye old MMM editor, 11 plus at the time.

echoesofapollo.com

http://echoesofapollo.com/moon-bounce/

To get involved, contact one of the following:

Peter Kokh kokhmmm@aol.com

Don Jacques djmitzlplick@yahoo.com

And/or attend a Town Meeting on Skype scheduled May 13th and June 10th - For directions on how to connect, contact Don Jacques, above.

Chapters & Outposts

Welcome to our newest Outpost in Nashville, Tennessee

Chuck Schlemm # 1252 writes:

As a long time subscriber to MMM and 5 year member of the Moon Society, I'd like to register as an official Moon Society Outpost. I would like to promote the exploration and use of Lunar resources and our ability to live and work on the Moon.

I am very active in space science and exploration public outreach as a NASA JPL Solar System Ambassador and NSS Middle Tennessee Space Society (MTSS) chapter leader. I generally do 2-3 events per month. I have already promoted the MS at Nashville's Barnard Seyfert Astronomical Society and at this past weekend's Astronomy Day at Nashville's Adventure Science Center. I had 2 Moon globes, maps, a Tycho crater sculpture, Apollo models and pictures of the new Constellation program Ares, Orion and Altair vehicles and Moon Society literature, all used as props to talk to the public about the history of lunar exploration and the possibilities for future Moon bases and colonies.

These outreach events are currrently my limit of volunteer action, but I want to support the Moon Society with some publicity here in Tennessee. I display regularly at Vanderbilt's Dyer Observatory and do other events in local schools, nature parks and libraries.

Another MTSS member, Mike Holmes (MS # 1545) will also be a MS outpost member, and member of our "chapter" if we can recruit a 3rd person. <**CS**>

Moon Society St. Louis Chapter

http://www.moonsociety.org/chapters/stlouis/
Contact: Keith Wetzel <kawetzel@swbell.net>
Next meetings – May 20th, June 17th, July 15th
Meetings **3rd Wed** monthly at Buder Branch Library
4401 S. Hampton, in the basement conference room.

Note: We have switched to the 3rd Wednesday so that members can be free to participate in the Moon Society Town Meetings held on the 2nd Wednesday evenings.

Moon Society Phoenix Chapter

http://www.msphx.org
http://www.moonsocphx.blogspot.com/
Contact: Craig Porter <portercd@msn.com>
Moon Society Phoenix' next meetings are on
3rd Saturdays: **May 16th, June 20th, July 18th**

April 18th Meeting: Denny's in Tempe**.** Don Jacques, Patti Hultstrand, Chuck Lesher, Mike Mackowksi, Stuart Scott.

Discussions:

1. Chuck will pursue the idea of including the activities of the Tucson Outpost on our website. This will be posted in the next few months as the details are worked out.
2. The calendar has been moved to the front page of MSPHX.org where it is available to all visitors.
3. We talked about using Skype to touch base with the folks in Tucson, San Diego, and St Louis. We anticipate that Skype will be an important part of the Apollo Moon Party and encourage all MS/NSS members to install the program on their computers.
4. May/June 2009 Meetings: We have reserved Denny's Restaurant for our next two meetings. Don and Patti have put together a sign directing members to the back room where our meetings are held. May 23 / June 20 at Denny's Restaurant, 4403 S Rural Rd, Tempe
5. Mike Mackowski will open a dialog with the NSS people in hopes of collaborating with them on future projects.
6. Apollo Moon Party (AMP): Flyers to be prepared, an "electronic baton" to be passed from party to party.
7. Challenger Center Display Project progress report: SpaceX has responded with offers of brochures/posters and Space Adventures responded with materials.
8. Upcoming Cons: Confirmed tables for FiestaCon and Disc-World. Reviewing our conference materials next meeting. It was suggested that we might use some of the materials provided by the New Space companies as well.

Moon Society Houston Chapter

http://www.moonsociety.org/chapters/houston/
Contact: Eric Bowen eric@streamlinerschedules.com

March 30th Meeting Report: The Chapter continues to make steady progress. At our last meeting on March 30, Eric Bowen was reelected as chair and Ken Sweeney II was elected to take over the treasurer position. We voted to actively pursue incorporation as a 501(c)(3) non-profit organization; we believe that this will open additional doors to allow us to support the Moon Society's programs and goals. Ken Sweeney Sr. has volunteered to be our point man in this project and he has our full support. We plan to file our initial paperwork with the state in a few weeks and plan to have a rough draft of our forms to be submitted to the IRS by our next meeting.

Members who may have missed this last meeting can contact Ken or Eric with their suggestions for mission and goals proposals to eric@streamlinerschedules.com

In hopes of providing support for a larger mission, the Chapter voted to establish dues for chapter membership. Membership in the Houston chapter for those who are also Moon Society members will now be $15 per year or $10 for students and seniors. Membership for those who are not Moon Society members but who wish to participate as non-voting chapter members as permitted by the chapter rules of the Moon Society will be $20/year or $15/year for students and seniors. The proposal was accepted and passed unanimously. However, we won't "close our shop"; we will keep our meetings and activities open for all who are interested, members & guests alike.

We also discussed what we as a chapter could do in support of the Apollo Moon Party proposal. As we are currently a small chapter in a very big space city, we decided that the most effective move we could make would be to find another organization(s) to partner with and co-sponsor a joint activity. We will be contacting other space enthusiasts as well as professional organizations to see what kinds of joint venture may be possible.

We concluded with a capsule discussion by Larry Friesen of the 40th Lunar and Planetary Science Conference, which he recently attended. – Eric Bowen

College of the Menominee Nation-Green Bay* Student Chapter (*Formerly, Green Bay, WI Outpost)*

Contacts: Dan D. Hawk hawkd_0212@menominee.edu
David A. Dunlop dunlop712@yahoo.com
Meeting some Saturday afternoons at the College of the Menominee Nation, 2733 South Ridge Rd, Green Bay, WI

Activities: Recent Rocket Launching in Hunstsville, Al Attendance at ISDC 2009, Experimental lunar agriculture.

===== Moon Society Outposts =====

www.moonsociety.org/chapters/chapter_outpost_map.html

Bay Area Moon Society, CA **Outpost** – South Frisco Bay
http://www.moonsociety.org/chapters/bams/
Contact: Henry Cates hcate2@pacbell.net

Moon Society Longview, TX **Outpost**
Contact: James A. Rogers jarogers2001@aim.com

Moon Society DC Metro, DC-MD-VA **Outpost**
Contact: Fred Hills Fredhills7@aol.com

Milwaukee, WI **Outpost** (MSMO)
www.moonsociety.org/chapters/milwaukee/msmo_output.htm
Contact: Peter Kokh kokhmmm@aol.com

Moon Society Tucson Outpost
Contact: Avery R. Davis tuslan@earthlink.net
Chuck Lesher of Moon Society Phoenix will pursue the idea of including the activities of the Tucson Outpost on the Phoenix website. This will be forthcoming in the next few months as the details are worked out.

Moon Society Nashville Outpost
Contact: Chuck Schlemm cschlemm@comcast.net

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/

Moon Society Mail Box Destinations:

Checks, Money Orders, Membership Questions
Moon Society Membership Services:
PO Box 940825, Plano, TX 75094-0825, USA

GREAT BROWSING

Could life have started on Ceres first?
http://www.space.com/scienceastronomy/090305-am-ceres-earth-life.html

Current Galilean Moons may be 5th Generation Gas Giants may cannibalize early moons
http://news.softpedia.com/news/Jupiter-Used-to-039-Eat-039-Its-Own-Moons-106318.shtml

Study finds clay sediments formed by water Lie under NE side of Mars' Olympus Mons
http://www.marsdaily.com/reports/Rice_Study_Hints_At_Water_And_Life_Under_Olympus_Mons_999.html

Sustainable Space Exploration & Space Development – A Unified Strategic Vision
http://www.spaceref.com/news/viewsr.html?pid=30702

Moonwake: Lunar Frontier Complete Novel (4.8 Mb)
www.spudislunarresources.com/Moonwake/mw.htm

NASA may send fleet of spacecraft to Venus
http://timesofindia.indiatimes.com/Health--Science/Science/NASA-may-send-fleet-of-spacecraft-to-Venus-/articleshow/4286572.cms

JAXA planning Space Solar Power unit
http://www.engadget.com/2008/02/07/japans-space-agency-planning-space-based-solar-power-arrays/

South African Space Portal Homepage
http://www.space.gov.za/

Nigeria's Space Program: Satellites, Spaceport
http://www.wired.com/science/space/news/2007/10/nigerian_space

Subterranean Oceans on Titan?
http://www.physorg.com/news158234875.html

Unrealized 1966 Plans for Manned Mars Landings
http://beyondapollo.blogspot.com/2009/04/manned-mars-surface-operations-1966.html

Sundiver: Hybrid Propulsion Emerges for Solar Sails
http://www.centauri-dreams.org/?p=7014

PG&E makes deal for space solar power: to buy orbit-generated electricity from Solaren in 2016, at no risk
http://www.msnbc.msn.com/id/30198977/

No Solar System Planets of Note remain undetected
http://www.universetoday.com/2009/04/15/constraining-the-orbits-of-planet-x-and-nemesis/

"Silent Running", running deeper – reexamination of this environment-concerned Sci-Fi film
http://www.thespacereview.com/article/1337/1

Global space lobbying organization: Yuri's Foundation
http://www.thespacereview.com/article/1336/1

Review: Final Countdown (book about the Shuttle)
http://www.thespacereview.com/article/1342/1

The case for a suborbital COTS program
http://www.thespacereview.com/article/1356/1**Medical**

Medical Requirements for Space Tourists?
http://www.thespacereview.com/article/1353/1

Novel way to change threatening asteroid's path
http://www.universetoday.com/2009/04/17/how-to-keep-asteroids-away-tie-them-up/

One Group's Call for a Venus Orbiter Mission *next*
http://discoveryenterprise.blogspot.com/2009/04/venus-not-mars-first.html

Aerostat settlements on Venus?
http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20030022668_2003025525.pdf

GREAT SPACE VIDEOS

MOON COLONY VIDEOS – The Moon Society

30 plus thought-provoking videos, produced for the Moon Society by Chip Proser (Celestial Mechanics, Inc.) can be found at.
http://www.moonsociety.org/video/
http://www.mooncolony.tv/
http://www.stickymedia.com/

ASSORTED SPACE VIDEOS

Video on Spaceplane "Skylon"
http://www.space.com/common/media/video/player.php?videoRef=SP_090223_skylon1

Magic in the Mohave – New Space Visionaries
http://www.space.com/common/media/video/player.php?videoRef=SP_090303Mojave20082

Dawn: Mission to Vesta and Ceres
http://www.space.com/common/media/video/player.php?videoRef=090707_dawn062607&mode=

Trailer for new film "Moon"
www.sonypictures.com/classics/moon/trailer.html

Be a doer, not a watcher.
The watcher is likely to be disappointed.
The doer has the comfort of knowing
that he has tried,
and perhaps laid foundations,
for others who follow,
and who may reach the goal.

Help us put MMM in a Library near You!

Whether you are a member of an NSS Chapter or of a Moon Society Chapter or Outpost, or a Moon Society member at large, you all get Moon Miners' Manifesto as a membership benefit.

A library subscription to a library in your community will help spread the word, whether about local or national or international Moon-focused programs and projects.

For chapters and outposts such subscriptions will be good advertising for your local efforts.

For Moon Society members, as all copies of MMM include the Moon Society Journal centerfold section, community library or school library copies of MMM will help grow name recognition and invite readers to join.

As membership services are not involved, the cheapest way we can do this is by submitting these subscriptions directly to the publisher at a cost-minus rate of $10 a year, available for libraries only.

How to participate in this program

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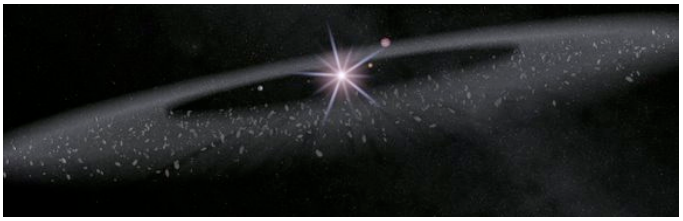
MMM PHOTO GALLERY

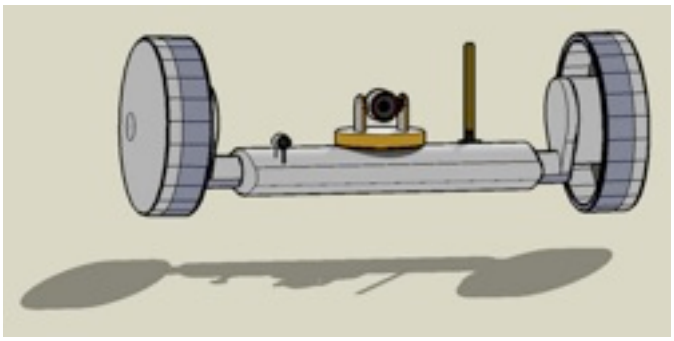


Artist Depiction of the Asteroid Belt

Below: rover designs for Google Lunar X-Prize Competition

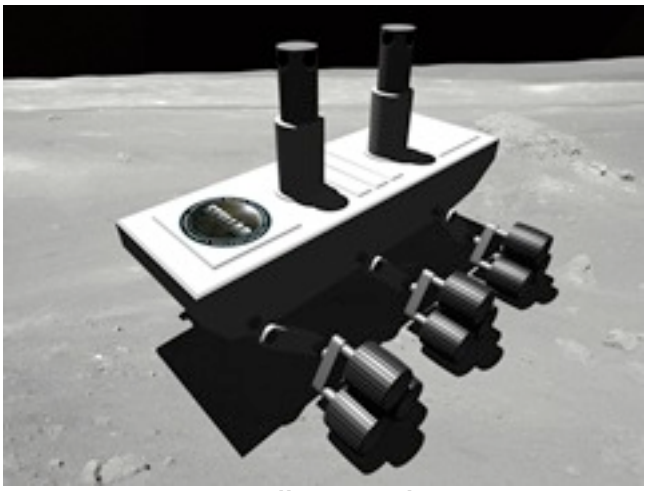
[from Google Image Search – some oif these designs may not be the current ones of their respective groups]

Astrobiotics – Carnegie Melon design



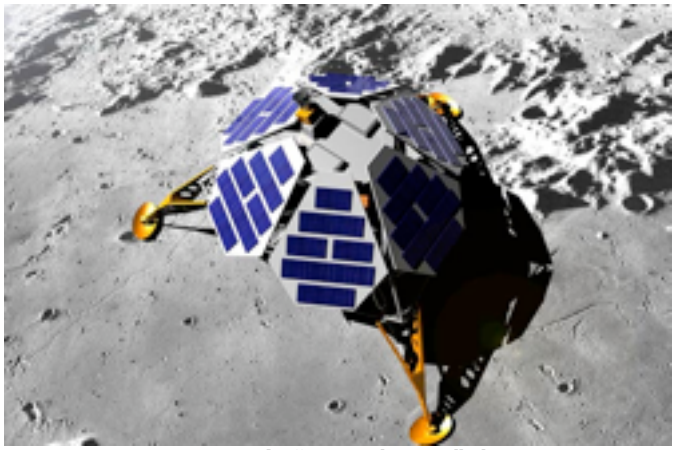
Team Frednet 1-axel rover design

Team Italia design

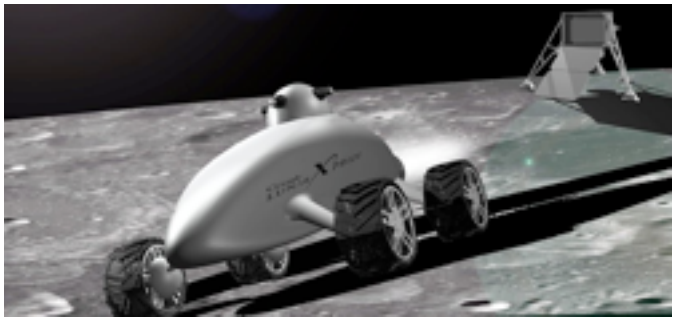


Team Steller rover design

Team Eruo-Luna design



Quantum-3's "Moondancer" design



LuRoCa 1 rover design

Russia's "Mars 500"
The Ultimate Analog Experience?

http://www.marsdaily.com/reports/Final_European_Crew_members_Announced_For_Human_Mars_Mission_Simulation_999.html

The full Mars500 study will start later in 2009, when another crew of six will be sealed in the chamber to experience a complete 520-day Mars mission.

The study will take place at the Institute of Biomedical Problems of the Russian Academy of Sciences at Lomonosov Moscow State University, Moscow.

The purpose of the Mars500 study is to gather data, knowledge and experience to help prepare one day for a real mission to Mars.

The participants will act as subjects in scientific investigations to assess the effect that isolation has on various psychological and physiological aspects, such as stress, hormone regulation and immunity, sleep quality, mood and the effectiveness of dietary supplements.

http://en.wikipedia.org/wiki/MARS-500

Crew requirements:

Age — 25-50 years old.
Higher education
Professional requirements:
- General practitioner having medical 1st aid skills
- Physician-investigator clinical laboratory diagnostics skills
- Biologist
- Engineer - specialist in life support systems
- Engineer - specialist in computer techniques
- Engineer - specialist in electronics
- Engineer - mechanic

Language skills - Russian and English at professional and every day communication level

Note: For a critical review of the design shortcomings of this program, read the editorial, pp. 1-2.

New Book Notice

License to Orbit by Joseph Pelton & Peter Marshall
The Future of Commercial Space Travel

www.cgpublishing.com/Books/licensetoorbit.html

Two leading experts on space systems with decades of experience in the field provide important and current insights as to **The Billionaire Players**: the lives, ambitions and struggles of the billionaires who are funding and supporting the new commercial space in industry.

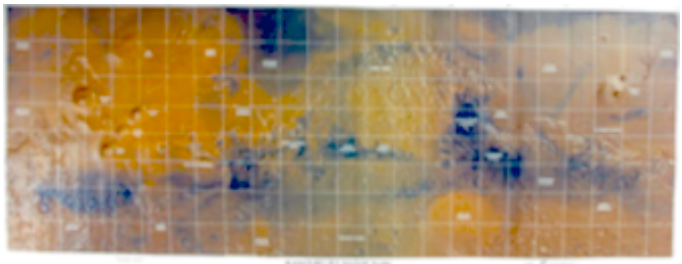
The Global Perspective: Who are the global participants in the commercial space business and their strengths and weaknesses.

Comprehensive Review: wide ranging review and assessment of the various launch systems, the ever expanding number of spaceports and even proposed private space habitats (also known as space hotels)

Future Space Technologies
Interdisciplinary Review
Private Space Strategic Concerns

ISBN 978-1894959-98-8
$23.95
CG Publishing, Inc.

New 3D Mars/Moon Maps for Table/Wall



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1-piece www.amep.com/detail_maps.asp?cid=5029
2-piece www.amep.com/detail_maps.asp?cid=5028

Preview of Astronomy from the Moon
Antarctica Astronomy In The Next Decade

France's Concordia Station on Antarctica's Dome C
© Space Age Pubishing Space Calendar-May 11-17, 2009

In their pursuit of ideal sites for the next generation of observatories, astronomers are often led to some of the most remote places on the planet. The Antarctic plateau has the world's coldest, driest and atmospherically stable location, making it second only to space or the Moon in observational perfection. International leaders in astronomy are exploring several Antarctica locations for future astronomical development:

USA is at the South Pole, France and Italy are at Dome C, Russia is working on the Vostok station, Japan is concentrating on Dome F, while China is working on Dome A. On May 11-15 in Rome. Antarctic Research, a European Network for Astrophysics (ARENA) will be holding the '3rd ARENA Conference: "An Astronomical Observatory at Concordia (Dome C) for the Next Decade."

The primary goal of the conference is to draw out the European roadmap for astronomical developments in Antarctica for the next decade. With an altitude of 4094 meters, Dome A is likely the best astronomical location on the continent. China, in collaboration with Australia and USA, is currently working on an ambitious plan for Dome A which includes three 50cm optical telescopes in 2010, two 4-meter optical telescopes, a 30-meter sub-millimeter radio telescope and year-round facilities within the next decade. (Credit: ARENA, CAS, classbrain.com)

[Research Relevant to our **Skinsuit Accessories Article** pp. 6-8 in this issue, *above*]

Skinsuit Research in Australia

http://www.marssociety.org.au/marsskin.php

The Marsskin Spacesuit Project

Introduction

Project MarsSkin aims to design, produce and test analogue mechanical counter pressure (MCP) space suits which, will behave in a near identical fashion to the real MCP suits which may one day be worn on Mars. The intention is produce suits which may be used in Mars analogue research projects undertaken in Australia and internationally.

The Mechanical Counter Pressure (MCP) Suit

The Mechanical Counter Pressure Suit (MCP) is an alternative space suit technology with many superior qualities to the gas-pressurisation technique that has been used unanimously on all space flights to date.

A MCP suit differs by exerting pressure on the body using form-fitting elastic garments.

Webb and Annis published the concept and early experiments of a MCP suit in 1967, and in 1971 described the first demonstration that highlighted the many advantages of the MCP approach. MCP garments were found to offer dramatic improvements to gas pressurised suits in reach, dexterity and tactility due to the replacement of stiff joints and bearings with light, flexible elastics.

Further advantages included safety (because a tear or hole would remain a local defect rather than cause a catastrophic puncture), lower suit costs and vastly reduced weight and volume. MIT conducted flexibility tests with basic MCP elastics during the mid 1980's and found MCP gloves to be measurably superior to gas-pressurised gloves.

The success of the original MCP suit, the considerable advances in textile technology for fibers, yarns, textile creation and automated knitting machines, and the continued drawbacks of gas pressurized EVA suits have prompted new interest in the development of a MCP glove and suit. Honeywell (LA), University of California, San Diego, and Clemson University have conducted physiological and design testing on gloves and arms.

MCP, though less proven as the gas-pressurization technique, is an innovative design offering many features which make it clearly superior as a Martian exploration spacesuit. The MSA acknowledges this fact and therefore seeks to be involved in the study and development of MCP EVA suits through Project MarsSkin.

REFERENCES

Webb, P., Annis, J., "The Principle of the Space Activity Suit", NASA CR-973, Dec 1967.

Webb, P., Annis, J., "Development of a Space Activity Suit", NASA CR-1892, Dec 1971.

Relevant Links

Physiological Effects of a MCP Suit (pdf)
http://www.dsls.usra.edu/dsls/meetings/bio2001/pdf/140p.pdf

Safety on Mars: Space Suits of the Future
http://www.space.com/businesstechnology/technology/spacesuit_sensors_010827-1.html

Putting the Pressure On
http://www.universetoday.com/html/special/spacesuit.html

<MS Australia>

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

2008 LRS OFFICERS | BOARD* | Contact Information

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< kokhmmm@aol.com > 414-342-0705
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< James_Schroeter@excite.com> . 414-333-3679
TREAS./ Database - *Robert Bialecki
<bobriverwest@yahoo.com>..... 414-372-9613

LRS News

• **Dave Dunlop** - Dave has been on his annual Spring tour of the south and southwest in his role as roving ambassador for the Moon Society, making stops in Longview, Dallas, Houston, Austin, Phoenix, Tucson, and Huntsville.

• **ISDC 2009:** In Orlando, FL this year, May 27th - 31st, the weekend *after* the usual Memorial Day Weekend schedule. Peter Kokh and Dave Dunlop will be attending.

• **April 11th LRS meeting:** Lightly attended (3) and adjourned early (3pm)

• **New local Moon Society member Dennis Groves** of Mequon (formerly of Johannnesburg, South Africa, treated Peter to lunch recently, to get acquainted. He is very much focused on the Moon. He and his wife like Milwaukee very much.

LRS Upcoming Events - May, June

Saturdays: May 9th, June 13th, 1-4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110

AGENDA: www. lunar-reclamation.org/page4.htm

May 9th Meeting

• Bob Bialecki will bring another video - We will show episode 5 of "Mars Rising" - "Six Minutes of Terror" (drama of the first human landing on Mars.)

• Planning for **Apollo Moon Party** the weekend of July 18th - 19th hopefully in conjunction witht the IMAX Dome Planetarium which will be showing "Astronaut" at the time

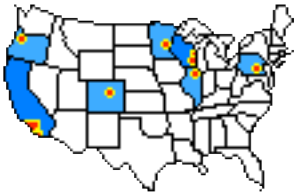
http://www.mpm.edu/planetarium/astronaut/

June 13th Meeting

• A Video is likely

• Planning for **Apollo Moon Party** July 18th - 19th

• **Note:** we do not meet in July and August. Our only planned event will be our Apollo Moon Party



News & Events of NSS' Nine "MMM" Chapters

Space Chapter HUB Website:
http://nsschapters.org/hub/

OREGON

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
• **Next Meetings: May 16th - June 20th - July 18th**

At a special meeting of Oregon L5 on **April 29,** 7pm in the Bourne Plaza conference room, we had the opportunity to hear Dr. Peter Schubert speak to us. In 2006 he was invited to NASA's Vision for Space Exploration workshop, a gathering of the top 200 space scientists in the world, discussing why the US should return to the moon. At this talk, we heard his answer as he gave his presentation, "Using Moon Rocks to Save the Earth."

http://www.moonsociety.org/spreadtheword/pdf/UsingMoonRockstoSavetheEarth.pdf

Given the staggering quantities of energy mankind will demand, space solar power is the ultimate alternative energy source for mankind. How do we make it economically attractive. Compared to terrestrial "green", sources of energy the capital requirements for SSP are enormous and the investment time horizon is longer. Using silicon from the lunar soil allows a scale-up, cost-down curve that closes the business case for SSP. Through space-based manufacturing, pollution on Earth is nearly eliminated. At the same time, we will establish permanent settlements, and long-term jobs, in space.

ILLINOIS

Chicago Space Frontier L5
610 West 47th Place, Chicago, IL 60609

INFORMATION: Larry Ahearn: 773/373-0349

MINNESOTA

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/]

Calendar: MN SFS 2009 Past & upcoming chapter events
www.freemars.org/mnfan/MNSFS/2009-12-Review/

- **May 12th, 2009 STS-125 Display**
  www.nasa.gov/mission_pages/shuttle/shuttlemissions/hst_sm4/index.html
- **May 12th MN SFS Meeting**
- **May 15th STS-127 Display**
- **June 09th MN SFS Meeting**
- **July 2nd-5th CONvergence** Connie's Quantum Sandbox
- **July 14th MN SFS Meeting**

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 Thurs even # months 7-9pm
At The Stoelting House in Kiel, WI
• **Next Meetings: Jun 19th - Aug 21st - Oct 16th**

COLORADO

Denver Space Society
(formerly Front Range L5 Society)
1 Cherry Hills Farm Drive
Englewood, CO 80113
http://www.angelfire.com/space/frl5/

Eric Boethin 303-781-0800 eric@boethin.com
Monthly Meetings, every 1st Monday, 7 PM
Englewood Public Library, Englewood, CO 80110
1000 Englewood Parkway
First Floor of the Englewood Civic Center - **Map:**
www.mapquest.com/maps/1000+Englewood+Parkway+Englewood+CO/

Meetings: Tues. May 4th, June 2nd, July 6th
May Meeting Speaker: Former Space shuttle and Space Station Astronaut James Voss. Topic: His space missions

PENNSYLVANIA

Philadelphia Area Space Alliance
PO Box 1715, Philadelphia, PA 19105

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

http://pasa01.tripod.com/
http://phillypasa.blogspot.com

● **PASA regular business luncheon/formal meeting 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 look *left*. We often have a table poster or magazines to identify us. Parking at Liberty One on 17th St. Call Earl/Mitch 215-625-0670 to verify all meetings.

Next Meetings: May 16th – June 20th – July 18th

This last may be at the Franklin Institute as part of our participation in events there. More later.

Our pre meeting talk was enhanced by the addition of Alex Howerton who became our first speaker: Alex brought brochures on an interesting new project he is working to help, Mars World™. This is a purpose made tourist resort with a large investment on a Mars themed center. I say center because the Major part of the location is under a geodesic dome that looks like a hemispherical view of Mars. Inside would be a casino, a hotel, a large theater, a spa (actually, Mars Resort and Spa), and much more. To go you start in a space ship and enter through "Mars Port". Lots of Mars oriented activities for visitors. This is also a possible investment opportunity (Mars World Enterprises LLC) and can be checked further at: Marsworldcorp.com, or email John Spencer (founder of The Space Tourism Society) jssdesign@aol.com. His business phone is 310-313-6835. His consulting staff includes Dr. Pascal Lee and Rick Searfoss for science and a number of financial advisors. Thanks Alex!

Mitch has reported that we are solvent. He gave the report as the new Treasurer! He also spoke on the World Future Societies upcoming conferences with this year's in Chicago and next year's in Boston. He also reported on the March/April *Futurist* Magazine which included comments on how oil importers like the U.S. will be "at risk", as well as an article "A Realistic Energy Strategy" that made the point that alternative energy sources must be a part of the sources we will depend on. No mention of our "Alternative Site" that would *really* reduce energy source waste heating: in orbit or on the Moon; still good reading though. This is the same issue that has the chart on "future space exploration" which we mentioned last month. Mitch did not mention if this road map included power beaming of any kind: the very conservative future??

Hank Smith brought us a neat publicity piece from PSFS for Philcon: a bookmark with the 2009 location and preliminary principal guest information. It will be at the Crown Plaza in Cherry Hill again and will be from November 20 to 22. Hank also mentioned his appointment as Space Science Coordinator for the event. He is planning to go to Balticon this year. We will help with speakers an outreach when we can.

Dotty Kurtz brought material on the Franklin Institute's events but also added to this post meeting: there will be a new Star Trek exhibit starting May starting 16th running through September. She Also related her trip to Washington DC, with Larry, to the Air & Space Museum and a number of Other places including The Franklin's special events that are connected to Philadelphia's exclusive showing of material from the life of Galileo. In connection with this will be a series of family oriented astronomy events with lots of hands-on for kids. The main exhibit is called "Galileo, the Medici and the Age of Astronomy". There will also be Medici Festivals: Art and Science held at the Philadelphia Museum of the Arts on May 19. Registration is required: 215-235-7469. Dotty also related how they where very lucky In finding an honest lot attendant during the Washington trip: a badly designed purse let their Amtrak passes and other valuable materials slip from the bag. The attendant found the material and called several numbers from the content until he made contact. Thanks, Dotty.

Larry was asked to post the time of our meetings as well as dates on our site. This is due to Alex arriving very early and waiting for an hour. Oops! He continued to ask for content for the site and fielded questions we asked about it. Unfortunately, I was unable to supply pictures to him from our Super Science weekend. Our next event should be better planned in this area.

Super Science Weekend: this year was a one-day event at the New Jersey State Museum on April twenty-fifth. We had a great day for the event and an interested audience with lots of questions related to space based energy production and living in space. There was a shift in emphasis from Habitation as the major theme due to Earl not completing the Island One display on time. However there was a back-up that was about living on the Moon that I, Earl, was able to enhance. The result was an enlarged *Lunar Lava Tube display* with added figures and equipment: this included a sun shielded chemical storage area that was used to explain some of the characteristics of living on the Moon, like temperature differences in the sunlight and in the shade in vacuum.

Mitch Gordon and Dennis Pearson did a lot to explain living in space and the display in particular as well as the material that they brought on their own. Mitch brought his book that he has built up with different space colonization concepts he has collected. Dennis had his Lunar Resources (especially Helium-3) display set that explained in another way how we could use space resources to solve our long term energy problems. Earl brought a large solar panel to discuss why moving energy production into space (and using a space habitat to house the construction people and more) by the simple expedient of throwing a blanket over the panel to show the effect of living on a turning planet on power production. I further explained how even a national system would still require storage for at least nine hours of darkness.

We did talk of this being a simplification and the visitors appreciated that we also talked of other energy sources and and other systems that are being developed for Earth bound uses. We also brought the book "The

High Frontier" and this excited interest from many people who had never heard of many of the concepts shown in the book. That he worked at Princeton and had been a professor at the University helped. We were happy to be there and hope to be invited next year.

Earl received The *AMSAT Journal* for March/April after our meeting and events as well as *Nuts and Volts* for April. The AMSAT magazine reported on the first ten years of the organization and several other interesting reports: for the Mars bound the operation of the Bochum Mission Control Station as a radar transceiver was reported. They bounced signals off of Venus to test the system! They will use this "amateur" system to communicate with the spacecraft they will be sending to Mars.

Yeah! Another report is on the tests of "Suit Sats" radio system. And much more: from *Nuts and Volts* is the continuing series on Near Space (a bimonthly report) and the development of a more complex flight computer for the balloon carried systems. This leads me to mention another useful source on the sciences: The Society of Amateur Scientists has an excellent site with links to a number of great sites. Near Space is here as well as The Society of Amateur Radio Astronomers. The main site is www.sas.org .

Reported by Earl Bennett

The Moon Society invites NSS chapters who share Moon Miners' Manifesto

To help celebrate the 40th Anniversary of the first Manned Moon Landing and Moonwalk by hosting "**Apollo Moon Parties**" during the weekend of July 18th and 19th.

www.apollomoonparty.org
has party ideas, ideas for memorabilia, a list of parties being planned around the world, and a list of collaborating organizations such as Echoes of Apollo.

We'd like to culminate this event in one big 24-hour online celebration on Skype.

As of publication date, parties were being planned in Milwaukee and Green Bay, WI
In Houston TX, St Louis MO, Phoenix AZ
In Mexico City and Guadalajara Mexico
In Melbourne and Canberra Australia

We hope to be announcing AMP parties and events in Europe and India as well

Echoes of Apollo http://echoesofapollo.com/ is planning a June 27th kickoff by using large radio dishes to bounce signals of the Moon http://echoesofapollo.com/moon-bounce/

To help with the planning, *anyone* may join the Moon Society Town Meetings May 13th, June 10th – Write Don Jacques djmitzlplick@yahoo.com for how to join the meeting on Skype

If you are planning a party, send details to Peter Kokh kokhmmm@aol.com for posting on the AMP Events & Party Registrations pages

CALIFORNIA

San Diego Space Society
http://sandiegospace.org/
info@sandiegospace.org

Quarterly Newsletter: ***The Bussard Scoop***
Meeting the 2nd Sunday monthly

- **May 9th Space Day: San Diego Air & Space Museum.** SDSS will be an invited presenter along with the San Diego Mars Society, NASA, Virgin Galactic, SDAA (San Diego Astronomy Association), DSN (Deep Space Network), JPL, SETI, UCSD EarthKAM, The Planetary Society, and many others.
- **Next Meeting: May 10th** 2:30 to 4:30 pm
  Serra Mesa Branch Library 9005 Aero Dr, San Diego
  Greg Meholic will talk on advanced space propulsion concepts for interstellar travel, including nuclear rockets, faster-than-lightspeed travel, quantum drives, wormholes, and some really exciting physics.

CALIFORNIA

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

Regular Meeting 3 pm 3rd Sat. each month
Next Meetings April 18th – May 16th – June 20th
Information: OASIS Hotline, 310/364-2290; website.

Regular Meeting 3 pm 3rd Sat. each month

Next Meetings: May 16th – June 20th – July 18th

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

THUR May 14, 7:00 pm – Jet Propulsion Laboratory – Kepler, a Planet-Hunting Missionby Dr. James Fanson – Project Manager, Kepler; Jet Propulsion Laboratory

SAT May 16, 3:00 pm – OASIS Board Meeting at the

Home of Bob Gounley & Paula Delfosse, 1738 La Paz Road, Altadena, CA 91001-3317

SAT June 20, 3:00 pm – OASIS Board Meeting, at the Home of Craig & Karin Ward, 1914 Condon Avenue, Redondo Beach, CA 90278-3403

SAT July 18 TBD – OASIS **Board Meeting/Annual Picnic** (potluck), Polliwog Park, 1601 Manhattan Beach Blvd, Manhattan Beach, CA

Moon Miners' MANIFESTO

Lunar Reclamation Society Inc.
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P.O. Box 940825, Plano, TX 75094-0825, USA

INDEX to #225 MAY 2009

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

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- US **$50** Surface Mail Outside North America

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- $15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)
- $12 low "one rate"

MINNESOTA SPACE FRONTIER SOCIETY
- $25 Regular Dues

OREGON L5 SOCIETY
- $25 for all members

O.A.S.I.S. L5 (Los Angeles)
- $28 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

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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