

“Towards an Earth–Moon Economy – Developing Off–Planet Resources”

Moon Miners’ Manifesto

& The Moon Society Journal

www.MMM-MoonMinersManifesto.com



The future of the Moon as a Puzzle of Tasks we could have been putting together – It’s not too late!

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Glass-Glass Composites (GGC) – Could we stain glass fibers and embed them in clear glass matrix to produce high end furniture and ultimately all sorts of products on the Moon?

That would be an example of “spin-up” – enormously more powerful than “spin-offs” – see p. 3

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [/mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

About Moon Miners' Manifesto – “*The Moon - it's not Earth, but it's Earth's!*”

- **MMM's VISION:** “expanding the human economy through off-planet resources”; early heavy reliance on Lunar materials; early use of Mars system and asteroid resources; and 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.
- **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first twenty years plus have been re-edited, reillustrated, and republished in 23 PDF format volumes, for free downloading from this location: http://www.MoonSociety.org/publications/mmm_classics/
- **MMM THEME Issues:** 14 collections of articles according to themes: [.../publications/mmm_themes/](http://www.MoonSociety.org/publications/mmm_themes/)
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- **MMM Glossary:** new terms, old terms/new meanings: www.moonsociety.org/publications/m3glossary.html
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- **The National Space Society** is a grassroots pro-space member-ship organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.
National Space Society 1155 15th Street NW, Suite 500 Washington, DC 20005 (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.
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- **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, Text files, and pdf file attachments or mailed CDs, DVDs, or typed hard copy [short pieces only, less than 1,000 words] to:
Moon Miners' Manifesto, c/o Peter Kokh, 1630 N. 32nd Street, Milwaukee, WI 53208-2040

In Focus Are we ever going to Settle the Moon?

By Peter Kokh

The quick answer to this deceptively simple question is “No” and “Yes!”

- “No,” if we leave it to government(s) and space agencies. As visionaries, we are a decided minority and must remember that many congressional decisions are not made on any logic except what is best financially for the individual Congressmen and Senators – and/or for improving the chances of their re-election. We are fooling ourselves if we think we can make this “lunar settlement” a popular campaign.
- “Yes,” if we do what we can, as entrepreneurs, and supporters, to predevelop technologies needed on the Moon, especially those that could also be profitable here on Earth >
- A rationale for determining what must be imported and what can best be made on the Moon will insure the best use of funds – both expenses and profits
- Giving priority to those technologies that could be adapted to solving problems (especially environmental) here on Earth. That settling the Moon can help preserve and even restore Earth's environment, is a concept that will earn us the support of many who are quite disinterested in “space” and things related to “space.”

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- We can work, slowly but surely and methodically to put the key pieces together so that beginning settling the settlement of the Moon makes sense to those otherwise disinterested in “space” in general.
- That many of the technologies needed to create and maintain self-sufficient mini-biospheres on the Moon, on Mars, or elsewhere in space might help clean up our bad environmental habits here on Earth could win us allies. Settling the Moon, or Mars, is a lot more than a matter of nuts and bolts!
- We must develop transportation systems in which everything is reused as is, or designed to serve new purposes once its initial service is complete. The number one reason space is so expensive is the throwaway philosophy inherited from the rocketeers of Peenemünde, including von Braun: “If it is not the payload (read warhead), it is expendable.” Can you imagine flying from New York to Los Angeles, if at an intermediate stop (Chicago, Dallas–FT. Worth, etc.) it took 10,000 man hours to get your plane ready for takeoff? Or your plane was junked and a new one rolled out for the rest of the trip? Can you imagine driving that distance and everytime the fuel tank showed close to empty, you threw away the car and bought another one fully fueled? Absurdities like this come from the scouting mentality. We go to the Moon or Mars not to stay and set down roots, but to scout and report back. So there is no need for infrastructure.
- Meanwhile, we concentrate on what we can do now, without megabucks, but with carefully chosen “foundation projects” and earned investments. PK

A fresh look at the idea of “Spinning-up” Industries Needed on the Moon

By Peter Kokh

When it comes to the Moon, why have we who would go been wasting time, waiting for others who would not pioneer. to pave the way? It makes no sense!

Early Period Industrial Materials and products made from them

(1) **GGC: Glass fiber–Glass Composites:** some 27 years ago, back in 1987, I wrote a paper “Spinning-up” Glass–Glass Composite Technology – www.moonsociety.org/publications/mmm_papers/glass_composites_paper.htm

The idea of Glass–glass composites was that of Dr. Gerard K. O’Neill, founder of the Space Studies Institute (Princeton, NJ) and of the L5 Society. O’Neill reasoned that we could make components for Solar Power Satellites with such composites, more easily than by starting up aluminum alloy or iron alloy industries. Glass fibers with a high melting point would be embedded in glass with a lower melting point, thanks to an immixture of lead. The result of his experiments was an ice-cube-sized chunk of glass with amazing strength.

And that one demonstration was as far as it got. SSI was content and did not investigate further, leaving development of GGC was left to the future – SSI showed no imagination at all. No one asked what we could do with such a material that would have physical or esthetic qualities with such appeal and marketability, that we could develop GGC here and now, and make a lot of money doing so, ending up with an industry adaptable to the Moon so that when we got there, we could hit the ground running.

One of our suggestions was that if we could color the glass fibers that would then be immersed in a clear glass matrix, we might find that we had an ideal high-end furniture material.



Could we produce Glax™ products with colored fibers to look like this? For “high end” furniture? We haven’t tried.

Glax products could replace wood in markets where wood was scarce (desert countries, plains countries), The potential applications are enormous: boat hulls, countertops, tableware, window panes, skylights, -----?

Never mind that Space Studies Institute dropped the ball! Its not too late!

(2) **Basalt fiber–Basalt Composites:** meanwhile people in India and elsewhere have discovered the magic of **basalt fibers**. Basalt happens to be the dominant material in the lunar maria or dark “seas” of frozen lava, that give the Moon’s near side its familiar “Man in the Moon” personality. But unlike GGC, BBC (basalt/basalt fiber composites) did not remain in the laboratory. Rockbar, the basalt composite answer to “rebar” is sweeping the concrete structure industry: it has a very low coefficient of expansion and does not rust. By the time we get to the Moon, a cornerstone Basalt–Basalt Fiber Composite industry will be ready to hit the ground running.

What can be made of BBC? Habitat modules? countertops? bath tubs? Planters? Molded seating? We can find out by experimenting here and now. All such BBC items made on the Moon, will be that much less to import. Could we make durable, no tear, no rip fabrics to spread over a frame on which to pile moondust shielding for unpressurized “hangers” in which to park and connect pressurized living modules? (?) alternative to contour crafting?

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

(3) **“Spin-up” not “Spin-off!”** – In the usual “spin-off” paradigm, NASA embarks on a crash research program at exorbitant cost and then turns over the resultant technology at no cost to commercial enterprises with the **tax-payer** footing the bill.

In “spin-up,” however, a private enterprise, motivated by profit, examines a technology needed on the space frontier and endeavors to identify potentially profitable terrestrial applications. The company then develops the technology, specifically for those terrestrial applications, with the consumer paying the bill.

As a result, when the technology is needed on the space frontier, it is **already “on-the-shelf”, at least in an analogous form in need of relatively inexpensive adaptation only.** Taxpayers and consumers are materially the same people, but unwilling in the first instance, and quite willing in the second.

Bear in mind, that on the “oreless” Moon, familiar industrial and manufacturing materials may not be practical or economic, More appropriate industries may now be just conceptual. But we can examine them for potential profits in our down to Earth market, and “spin-up” such technologies for application on the Moon.

Biospheric Technologies

Surely, the spin-up “wish list” will include more than these two “composite” materials. For example, on the Moon, we must live in sealed mini-biospheres, in which pioneers will essentially be living “downwind and down-stream of themselves.” Biosphere II was a noble start in that direction. We learned a lot from its shortcomings and in that sense, to call it a “failure” is a contemptible attitude. Pioneers will need new technologies to manage wastes and other “outputs” be they solid, liquid, or gaseous.

If we could develop such technologies here and now, that would help us here on Earth gradually halt our downward environmental slide, while trouble-shooting technologies that must succeed on the Moon. Here is another example of “spin-up” – developing technologies absolutely essential on the Moon (and Mars) but also quite useful and valuable here on Earth.

Other Spin-up technologies

We don’t claim to have a complete list, just these very important examples. But you get the picture. By “spin-up” we develop technologies essential for lunar (or Martian) settlement and pay the bill for that R&D by sales of kindred products here on Earth.

By pursuing the “spin-up” path – just the opposite of NASA’s “spin-off” – we advance the day when lunar settlement will not only be possible but also affordable.

For more on “spin-up” read <http://moonsociety.org/publications/m3glossary.html#ST>

What else can you/we do? Have an idea for a lunar appropriate technology which does not yet exist on Earth? Brainstorm that idea for possible profitable applications on Earth, then pre-develop that technology to put money in your pocket now, and to put “on the shelf” a technology most useful on the lunar frontier.

For years we have heard the litany of NASA “spin-offs” – Bah humbug! Let’s turn that paradigm on its head with “Spin-ups.” PK

Exports to Earth must be greater in value than imports from Earth The “M.U.S./c.l.e.” Equation

By Peter Kokh

They lie when they say that there is no up or down in space. In reality, everything is in a series of “gravity wells” in which climbing up and out requires much more fuel than dropping down and in. It takes 23 times as much rocket fuel to boost a given payload off the Earth’s surface into Geosynchronous Earth Orbit, GEO, some 23,000 miles above the surface, than it does to boost the same payload off the Moon and down the gravity well to that same destination. And it costs much more fuel than that to ship anything to the Moon from Earth than it does to ship something from the Moon to Earth’s surface.

It makes sense to preferentially import lightweight items to the Moon, and pay for them with heavy items shipped off the Moon – when we can. And that gives us an ideal guide for choosing what to import and what to manufacture for Earth/GEO markets.

Note that building materials, furnishings, even food can be “downported” from the Moon to hotels and stations in Earth orbit at significantly less cost than can equivalent (and probably more sophisticated) items can be “upported” the much shorter distance from Earth’s surface. And that is the foundation of the lunar economy. Again, in choosing what to export as well as in choosing what to import, the “M.U.S./c.l.e.” equation works. oo

Orbiting space hotels with “made on Luna” decor and furnishings, would give those who could not afford a trip to the Moon, some feeling for what lunar settlements are like.

Early lunar industries will be simple ones. It pays to export simple products that have some value, if not on Earth’s surface, then in GEO and LEO markets which may include orbiting hotels, stations, shipyards, and more.

In our 1988 paper, **“MUS/cle Strategy for Lunar Industrial Diversification”** – “A Strategy For Following Up Lunar Soil-Processing with Industrial M. U. S./ c. l. e.”

http://www.moonsociety.org/publications/mmm_papers/muscle_paper.htm

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

“You will have noticed that our “muscle” was spelled as a two part acronym, “M.U.S. / c.l.e.”. For our strategy calls for the M.U.S (**Massive, Unitary, Simple**) parts to be made by the settlement and the c.l.e. (**Complex, Lightweight, Electronic**) components to be made on Earth for support and mating on the Moon (or early space colony). Here then is the logical formula for giving industrial muscle to the early settlement still too small to diversify into a maze of subcontracting establishments. It is a path that has been trod before. It plays on the strengths of the lunar situation and relies on the early basic industries: lunacrete, iron-steel, ceramic, and glass-glass composites (glax). And not surprisingly, it is the path of lunar development that will produce the most in exports to LEO, GEO, L5 (?), and even Mars.

This “strategy” is a ‘wish list guide’ for settlers in choosing what to manufacture for both use on the Moon and for “downport” to GEO, LEO and other in-space markets, and what to “upport” from Earth. Its all about the all too real “up and down.”

The goal, of course, is to reach and maintain a positive trade balance with Earth, thus keeping “the books” of the lunar economy in the black, or as close to it as possible. For lunar settlements, nothing could be more threatening to long term security than a mounting debt with Earth, leading eventually to abandonment and a set of “ghost towns” on the Moon. PK

Biospheric Technologies needed on the Moon – and on Earth

By Peter Kokh

There is no air – or free flowing water – or plant life on the Moon. Just vacuum and radiation bombardment. But we can learn to life safely, and stay healthy in those conditions in properly shielded structures with interconnected common space full of vegetation.

The challenge is in keeping both air and water fresh. We will live in self-contained settlements, “downwind and downstream from ourselves.” If we pollute this environment, we all die. That means changing countless generations of bad habits learned worldwide, because “we can get away with it.”

One bad habit we have, putting all wastes in one drainage system, was invented in Mohenjo-Daro on the Indus River in the India-Pakistan area some four and a half thousand years B.C./B.C.E.(before common era.) We live like “monotremes” – animals in which the cloaca and urethra are one and the same.

We need to develop “Tri-treme” plumbing. That will help keep our closed biospheres clean. In MMM #49, we wrote an article about this, “CLOACAL VS. TRITREME PLUMBING” – republished in this theme issue.

http://www.moonsociety.org/publications/mmm_themes/mmm_t_EdenOnLuna.pdf

This and other “adjustments” to the way we live in our “throwaway” culture, in which wind and water carry our pollutants “downwind” and “downstream” to our hapless neighbors, passing on the bad habits and bad air and water which had been given us by our own neighbors upstream and upwind.

We will be learning many ways to “treat” our problems rather than pass them on.

Now if we can pre-develop the needed systems before we get to the Moon, we will help keep Mother Earth as clean as she deserves to be, and make money doing it.

The point is that these closed biospheric technologies can be pre-developed for a profit here and now so that they are ready at no extra cost when the doors to settlement are open.

Will NASA do this? No! It’s up to us. PK

An Ambitious Visitor-&-ByProduct-Paid Analog Lunar Settlement

By Peter Kokh

I have had the privilege of being on two 2-week crews at the Mars Desert Research Station, #39 in 2005, and #45 in 2006, the later as crew commander. The analog research program has been the flagship project of the Mars Society to this day.

But as valuable as the “simulations” and the lessons learned in them may be, many opportunities are lost. This is because M.D.R.S. in Utah and its older sister F.M.A.R.S. on Devon Island in northern Canada are conceived as “first” “toe-in-the-water” Outposts. In both locations, the original Hab remains the only Hab.

We need an Analog “Settlement”, with an ever growing number of modules serving a growing list of functions besides living quarters, with “pressurized” hallways and streets connecting them, growing farms, manufacturing units, schools, parks etc. At such an installation, we can gradually improve the various systems and thus learn in advance “the right way to do a settlement!”

Whoa! Who is going to die and leave us a fortune? Backup! “Rome wasn’t built in a day!”

We start with a dorm/commons/toilet unit and add, add, add, all modules interconnected, all shielded with several feet of soil (keeping the analog “settlement” cool in summer and warm in winter” (for year around use) while modeling reality on the Moon.

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

The simulated biosphere would include “house plants” – vegetation-based toilet treatment systems – living walls as room dividers and hugging corridor walls – intermittent verdant parks – etc. We would not try to model zero exchange of air between the “indoors” and outdoors as did Biosphere II.

Who's got the Money? Visitors, and companies that want to test their products, and more.

Visitors: general public; passersby, etc.

At M.D.R.S. and F.M.A.R.S., occasional reporters aside, visitors are not allowed as they would distract serious efforts to “simulate” conditions on Mars. But if simulations ran 13 days, with one open to tourists day in between, that could provide a source of income for further improvements.

Tourists can be distracting. But with proper design of tourist trails and “duck blinds” it can be manageable.

The point is not to run simulations of activities, but to design and redesign living systems and quarters and to make money doing so.

How to start – Kickstarter?

The author admits to an original skepticism about Kickstarter financing. But there has been a growing number of success stories with Kickstarter. This would be a way to secure a site and build the original “starter core” of the “Analog Settlement.”

Again, NASA is not interested. Industries may be. The interest, the ideas, the can-do enthusiasm is there. We can do it. And when the time comes to pioneer the Moon, we can be ready.

Playing with Analog Outpost/Settlement Architectures

In 2006, after I had digested the M.D.R.S. Crew 45 Commander experience, I drew up some ideas for a dream lunar analog station, that went way beyond what the Mars Society had been trying to do. You will find a presentation on these ideas in a pdf file presentation

- <http://www.moonsociety.org/presentations/pdf/AnalogMoonbaseProposal.pdf>

Later, after working intensely on plans and designs for the since abandoned **Moon Mars Analog Research Station proposed for the Atacama Desert in Northern Chile**, our ideas and the possibilities grew significantly.

Demonstrate dayspan/nightspace operations to minimize power storage needs. (Continuing productivity through the nightspace by use of “change of pace” task sequencing – This would be simplest to do in subsurface voids such as handy lavatubes, caves, or mine galleries. But there is a way to do it in shielded surface facilities. The goal is to determine the optimum power demand ratio between dayspace and nightspace operations.

- Energy intensive and manpower light) tasks during dayspace
- Manpower intensive and energy light tasks during nightspace, The goal is to see to what extent various typical outpost operations can be sequenced to go with power availability

Demonstrate nightspace power storage systems

Fuel cells producible with lunar elements (Platinum-free): Flywheels; Other options? Closed loop hydro systems are simple and doable if there is a nearby change of elevation. Civilization was built on the packs of power storage technologies. Being afraid of two week long nightspace is crazy!

Passive Geo-Thermal Management Systems: Storing Nightspace cold for Dayspace cooling & Storing Dayspace heat for Nightspace heating

Experimenting with Lunar Fuels and Engines

Expanding the envelope of teleoperable tasks: There is one thing in common with all “new frontiers” in the early stages of establishment. “There is always more work to be done, than people to do it.”

Site Preparation: (grading, leveling, removal of boulders, trenching, etc.)

Soil moving of any kind for any purpose, Shielding emplacement; Sortation; Mining Equipment; Prospecting Equipment; Sand bag filling; Block/brick production

Development of “Poor Ore” processing technologies. Sale or licensing of proven technologies

Demonstrate Production of Lunar building materials: Concrete varieties, Glass, fiberglass, glass-glass composites, Ceramics, Metal alloys, Cast and hewn basalt, basalt fiber/basalt composites

Experiments with inorganic substitutes for things made of organic materials

Test manufacturing domestic/export items

- Cast. hewn, carved basalt, basalt fiber composites & products
- Glass fiber composites & products
- Sulfur-glass fiber composites
- lunarcrete and Marscrete compositions
- Regolith sintered blocks and bricks etc.
- Including fabrics that can support regolith over a truss framework Etc.

Incorporation of local Lunar materials into the settlement modules as soon as possible

Interior partitions made of steel stud frames clad with Duroc™ cementboard (no wood or other combustible materials!)

Cast basalt floor tiles, table tops, countertops, wall tiles, etc. (Simulation of interior environments is more important than simulation of module shells themselves which, being shielded, are unseen)

Replacement of other items “made on Earth” as soon as practical

Arts & Crafts & Games with simulated lunar materials

Sodium silicate paints, potassium silicate paints, ceramics, cast & carved basalt, basalt fiber/basalt composites, various types of lunar cement, other

Overall Architecture, not of a “Hab” but of a “Settlement” – We could build our Analog Station with a mix of simulated hard hull modules, inflatable modules, and modules made of materials we should be able to process on the Moon or Mars. Perhaps the core operations would be in the hard hull starter units:

1. Operations & Control: Computer workstations: communications, controls, monitors, reports, teleoperations, CapCom, Office
2. Crew Quarters – library – “Quiet Spaces Module”
3. Kitchen, Pantry, ward room, meeting space
4. Bathroom, showers, exercise & fitness area, First Aid
5. Lab space for work on geological and mineral samples
6. Utilities: power, thermal control, and engineering workbench
7. Airlock and suit-up area. Dust decontamination
8. Workshop & Fabrication space – support of continuing expansion
9. Shielded and exposed warehousing/storage areas
10. Greenhouse food growth chambers suitable for Inflatable units
11. Gym/Exercise/Fitness space; interior sports

External applications of easily made sintered bricks and blocks

Shade walls, retaining walls, canopy support pillars, approach aprons, etc.

Experiments with various methods of shielding emplacement

Dust Control & Management Systems

Testing “sunlighting” systems

(On “the Moon,” the pathways provided for sunlight could be used by light from intensely bright external sulfur lamps during simulated nightspan.)

Testing “window” systems

Self-sufficient food production

What plant varieties do best in hydroponic systems, in geponic systems?

Experiments automating and teleoperating a growing percentage of agricultural tasks

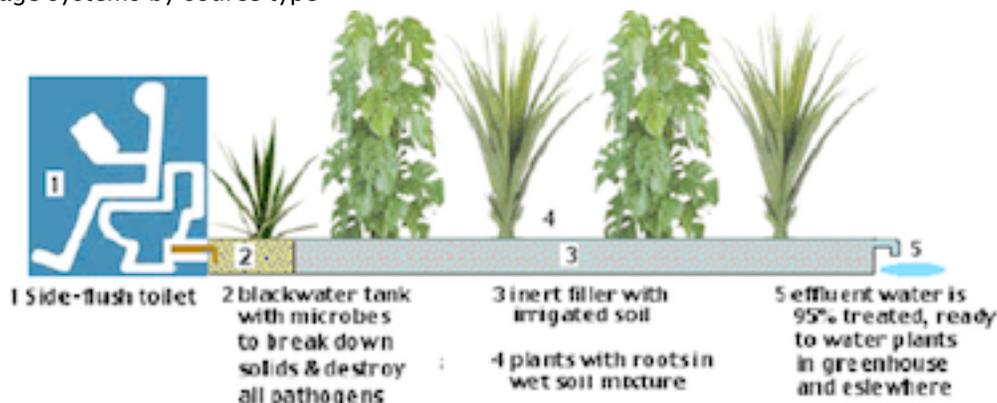
Experiments breeding plants that produce harvest in shortest number of dayspan/nightspan cycles

Starting and growing a Lunar/Martian Frontier Vegetarian Cookbook

Gray & black water recycling

Try alternative systems; simplicity and trouble-free goals

Separate drainage systems by source type



Experiments with inorganic substitutes for things usually made of organic materials

- Living wall systems (Design competition between Schools)
- Test analog expansion modules and modular languages Contests
- Warehousing & Storage Systems
- Spacesuit improvements,
- Development of Spacesuit “locks” that bypass airlock cycling
- Safety measures: Visibility and identification measures
- Transportation Systems, Vehicles
- Way stations for refueling, recharging, resupplying, storm shelter
- “Transformer” Designs: Parts of delivery craft designed for reuse on location and thus part of the payload
- Product redesign for thorough proper recycling of diverse materials.
- Developing and testing lavatube access systems
- Developing geological/prospecting tools and methodologies that work for suited personnel and for remote operation from pressurized rovers
- Incorporation of any available subsurface voids such as lavatubes, caves, abandoned mine galleries
- Test manufacturing domestic/export items
 - Cast. hewn, carved basalt, basalt fiber composites & products
 - Glass fiber composites & products; Sulfur–glass fiber composites; Lunarcrete and Marscrete compositions
 - Regolith sintered blocks and bricks etc.; including basalt fiber fabrics etc.

Student Involvement

Maintenance chores, Teleoperation, Telecasts, Reporting, Design competitions Engineering competitions, Essay Contests

Analog Site Location:

Unlike the Mars analog sites, visitors should be encouraged. There are ways to minimize visitor interference with ongoing programs by both proper design and scheduling. They are a source of income both for tours and for souvenirs, such as cast, hewn, and carved basalt.

Thus a **basaltic location not too far off the traffic routes** would be best, **for example adjacent to the Craters of the Moon National Monument in Idaho, where access to lavatubes is available.** Such an outpost could be reached via Salt Lake City, as is the MDRS. But there are other site options.

Crews: In addition to crews that spend 10–12 day stints, there could be paying tourist crews every other weekend. Those on such “short crews” will tell friends and family and may become supporters and contributors.

Analog Station Museum

Books, magazines, films of crew activities, cast basalt, basalt composite, glass composite souvenirs.

Giving away a year’s subscription to a supporting grass roots organization may be helpful.

A Quarterly Lunar Settlement Analog magazine could be given free for the first year.

Summary

These are just some of the ways we can advance technologies needed on the Moon, increase public support, and recruit members to the cause of settling the Moon.

We will need continuing and growing funding. This will come from companies involved in “spinning up” the needed technologies for profitable down-to-Earth uses now, and from enthused individuals at large, confident that these efforts will pay off in a first lunar settlement that will be bigger, better, and start to become real sooner.

Three approaches – without which, nothing will happen

1. “Spin-up” research
2. Concentrating on the “MUS” part of the “MUS/cle” Import/Export Equation
3. Getting public and corporate support for an ever-growing first lunar settlement “analog” here on Earth.

NASA won’t and can’t do this. We would-be settlers can. ##

RECOMMENDED VIEWING AND READING:

<http://www.moonsociety.org/presentations/pdf/AnalogMoonbaseProposal.pdf>

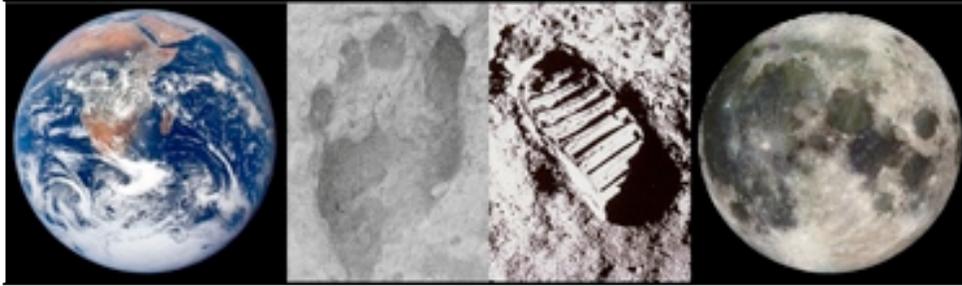
http://www.moonsociety.org/publications/mmm_papers/glass_composites_paper.htm

http://www.moonsociety.org/publications/mmm_papers/muscle_paper.htm

http://www.moonsociety.org/publications/mmm_themes/mmmt_Analogs.pdf

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From Africa
to the Moon,
the Human
Epic, told in
footprints,
Continues
to the Stars!



Our Goal is
Communities
on the Moon
involving
large scale
industrializa-
tion and
private
enterprise.

The Moon Society Journal Section (pages 9–12)

About the Moon Society

Objectives of the Moon Society include, but are not limited to:

- **Creation** of a spacefaring civilization, which will establish communities on the Moon involving large-scale industrialization and private enterprise.
- **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 and utilizing the Moon.
- **Informing** the public on matters related to the Moon
- **Provision** of suitable recognition and honor to individuals and organizations that have contributed to the advancement of the exploration, research, development, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says it all – “Who We Are and What We Do” – www.moonsociety.org/spreadtheword/whowhat.html

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: to inspire and involve people everywhere, from all walks of life, to create an expanded Earth–Moon economy that contributes solutions to the major problems that challenge our home world.

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

Interested in having input? Any member may ask to join the Leadership Committee and attend our Management Committee meetings held twice monthly. You may even express opinions. Decisions are often made by consensus, so this input has value. Write president@moonsociety.org

The Epix Documentary “Lunarcy” will be shown at the St. Louis Conference

Cast; The roles played by Christopher D. Carson, Alan Bean and seconded by Peter Kokh, are replete with lessons. Filming was done in 2011 and the film debuted in 2013 – It can be streamed from Netflix

<http://www.imdb.com/title/tt2319002/>

<http://en.wikipedia.org/wiki/Lunarcy!>

<http://filmswelike.com/films/lunarcy/>

<http://www.rottentomatoes.com/m/lunarcy/>

<http://www.thespacereview.com/article/2270/1>

“With wry humor and affection, Simon Ennis' "Lunarcy!" follows a disparate group of dreamers and schemers who all have one thing in common: they've devoted their lives to the Moon. From the young man who's resolved to depart for Luna (permanently) to the ex-ventriloquist who's made millions selling Moon lots.”

This film will be featured at the upcoming “Gateway To Space” NSS Regional Space Development Conference, Friday–Sunday, November 7–9, 2014 in St. Louis, MO – <http://gatewaytospace.org/>

- **Why not register for this event?** <http://gatewaytospace.org/registration/> More information just below.
- Chris Carson and Peter Kokh will be on hand to handle questions.

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

St. Louis NSS/TMS Chapter to host Regional Space Development Conf.. Nov 7–9

“explore, discover, settle...creating a spacefaring civilization” – GatewayToSpace.org

Crown Plaza Hotel Downtown: Room Rates \$119 – register soon as St Louis hotels will be busy.
200 N. Fourth Street St. Louis, Missouri 63102 Reservations 1-314-621-8200



<http://www.ihg.com/crowneplaza/hotels/us/en/st.-louis/stlrf/hoteldetail>

Calling all space enthusiasts, aerospace professionals, planetary investigators, rocket scientists, science fiction buffs, educators, dreamers makers... Are you interested in exploring the cosmos? Do you dream of living and working beyond Earth? Do you have an eye on asteroids for mining or deflection? Do you want to learn about and participate in space science? If so, join us! **TMS members AND MMM readers get 10% discount – code MOON**

While you are in “the Gateway City” visit some of St Louis’ Legendary Tourist Attractions



Gateway Arch: ride inside to the top for a stupendous view

The sprawling Botanical Gardens and Dome



Mississippi paddlewheel tourist boats

St. Louis Science Center

Boeing–St Louis Prologue Room

(and Busch Stadium (Cardinals), the Zoo, Washington University, a vibrant night life & much much more)

\$100 for the weekend. If One day registration fees are **\$75 for Saturday** and **\$35 for Sunday**. Saturday registration includes a boxed networking luncheon and Cosmic Celebration. Sunday’s registration includes brunch.

TOURS: ✓ Washington University Earth & Planetary Science Laboratories ✓ Greater St. Louis Air and Space Museum

COSMIC CELEBRATION: Visual Arts, Music, Poetry, and a space–theme fashion show

MOVIE SCREENING: “Lunarcy” – a movie about people who love the Moon – meet two of them

BOARD GAMES: Play Sci-fi and Space related board games with board game enthusiasts

SC-FI book club discussion: award–winning Sci-Fi novel “Ancillary Justice”

St. Louis Retrospective at Boeing’s Prologue Room – Lowell Grissom, brother of Gus Grissom

Speakers & Panelists: •Michael Snyder, Made in Space, in–space 3D printing •John Mulholland, Boeing, CST–100

•Dr. Ray Arvidson, Washington University, Mars missions •Dr. Brad Jolliff, Washington University, Moon expert

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

Registration for the “Gateway to Space” Regional Space Development Conference Online registration is open:

All-inclusive registration is for all three days of the conference, Friday, Nov. 7, Saturday, Nov. 8 and Sunday, Nov. 9, including the St. Louis Space Retrospective Friday night and the Cosmic Celebration Saturday night.

All-inclusive registration: \$110

Two-day conference: \$100

Friday only: \$10

Significant other discounts (with a fully-paid registrant):

All-inclusive registration: \$60

Two-day conference: \$50

Friday only: \$10

Student discounts:

All-inclusive registration: \$85

Saturday and Sunday: \$75

Saturday: \$50

Sunday: \$30

Friday: \$10

Friday for under 13: \$5



One of our goals with the Gateway to Space conference is to promote STEM education.

Students with a valid, current student ID (presented at registration) can register with the discounts above.

Note: The National Space Society’s Board of Directors will be attending and having meetings to direct the future of the Society. This will be a good opportunity to meet some of them and express your interests and concerns

There will be an art show, and displays.

If this “regional SDC” is successful, our joint Moon Society/National Space Society St. Louis chapter may well be granted the privilege of hosting a full “International” Space Development Conference in the near future.

Your attendance could help.

You will come away inspired and motivated!

As the MMM editor will be present (and speaking) this will be an opportunity to share your input and concerns with him.

Download this NSS Silicon Valley Plan for a doable Moonbase

<http://www.spacesociety-sv.org/files/93539948.pdf> – <http://www.spacesociety-sv.org/library.html>

An interesting and well thought out pdf slide presentation,

With help from Chris McKay and NASA-AMES

Using existing proven elements and doable architectures

“How Can We Build a Permanent Moon Base?

How can we do this cheaply?” By Michael Abramson

September

Chapters & Outposts

2014

OUTPOSTS (2 or more local members in search of more)

Bay Area Moon Society, CA Outpost – **South San Francisco Bay** – <http://www.moonsociety.org/chapters/bams/>

Contact: Henry Cates hcate2@pacbell.net Meeting the 1st Tuesday of the Month at Henry’s home

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

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

The Moon Society – Lunar Frontier Settlement – www.moonsociety.org p. 4

ORGANIZED CHAPTERS – JOINT TMS/NSS CHAPTERS

Milwaukee Lunar Reclamation Society – www.MilwaukeeLunarReclamation.org

<http://www.meetup.com/Milwaukee-Space-Exploration-Meetup/> – <http://www.space-Milwaukee.com>

Contact: Peter Kokh – kokhmmm@aol.com – Meetings, 2nd Saturday 1–4 pm monthly except July, August, at Mayfair Mall lower level room G110 – MEETINGS – OCT 11 – NOV 8 – DEC 6 (note: 1st Sat) annual anniversary & potluck meeting. (the 2nd Sat slot was not available)

Moon Society St./NSS Louis Chapter – <http://www.moonsociety.org/chapters/stlouis/>

<http://www.meetup.com/Saint-Louis-Space-Frontier-Meetup/>

Contact: Robert Perry surfer_bob@charter.net – Meetings 2nd Wed monthly at Buder Branch Library, 4401 S. Hampton, in the basement conference room

September 10th Meeting Report by Bob Perry: The St. Louis Moon Society Chapter had their regular meeting on the 2nd Wednesday at Bruder Branch Library with Rufus Anderson, Dave Dietzler, Tom Kullman, and Bob Perry attending. No planned program but the free roving conversation generally covered new and old high technology.

Recommended websites are

- <http://www.kurzweilai.net/mits-mars-space-suit> with video

People have been predicting the future from far in the past. Here is a blog site that was on its own for a while, then was picked up by the Smithsonian and is now at Gizmodo, discussing newspaper and magazine articles from the 19th and 20th century

- <http://www.paleofuture.com/> original blogs with archives and
- <http://paleofuture.gizmodo.com/> more recent blogs – one example:
- <http://paleofuture.gizmodo.com/how-one-1920s-feminist-imagined-our-futuristic-high-tec-1620153807>

Our chapter has been invited to a joint meeting on October 18th with the St. Louis Space Frontier, a chapter of the National Space Society, hosted by the Astronomy Club of Southwest Illinois College and SWIC Adjunct Instructor Kyle H. Stumbaugh. Then on the first weekend of October both of our chapters will participate in Archon 38, the area science fiction convention. <http://www.archonstl.org/38/>

The St. Louis Chapter of the Moon Society and the St. Louis Space Frontier NSS, had a joint display the the St. Louis Regional Airport 2014 Open House, Fly In and Car Show, in Bethalto, Illinois on Saturday, September 27..

The SLSFNss floating meeting floated to Belleville IL this month to meet with the SWIC Astronomy Club on September 18, Thursday, 6:30pm–8:00pm Rm MC1060. The Astronomy Club presentations are hosted by SWIC Adjunct Instructor Kyle H. Stumbaugh. Their meetings occur on the SouthWestern Illinois College Belleville campus. After the meeting, weather permitting, there was a viewing session at the campus Observatory after sundown.

Christine Nobbe, SLSFNss secretary, STEM educator and space geek, lead the talk: we explored the Universe, learned of new discoveries, and found out who (or what) is at the center. Topic: Are YOU the center of the Universe? Has your mother, best friend, or significant other retorted "You are not the center of the universe" when you demanded things go your way? Did that make you question, "well, who (or what) is the center of the universe?"

NSS/Moon Society Phoenix Chapter – <http://nssphoenix.wordpress.com/> – c/o Mike Mackowski,

<http://www.meetup.com/NSSPhoenix/events/161939572/>

Meeting 3rd Saturdays monthly at Humanist Community Center, Mesa, 627 W. Rio Salado Parkway.

The September 20th meeting featured a presentation on NASA's MAVEN mission, which entered orbit around Mars the following day, September 21, 2014. The speaker was Ms. Tracey Dodrill, a science teacher from Scottsdale, who was named to be a NASA Educator Ambassador for MAVEN earlier this year. The mission is part of NASA's Mars Scout program and will explore the Red Planet's upper atmosphere, ionosphere and interactions with the sun and solar wind. Scientists will use MAVEN data to determine the role that loss of volatile from the Mars atmosphere to space has played through time, giving insight into the history of Mars' atmosphere and climate, liquid water, and planetary habitability. See the blog at <http://nssphoenix.wordpress.com> for more details and commentary.

Tucson L5 Space Society – <http://www.tucsonspacesociety.org/>

<http://www.meetup.com/NSSPhoenix/events/161939572/> Now serving Moon Society Members

Contact: Al Anzaldúa – Meets monthly, every 2nd Saturday, 6:30 PM

Clear Lake NSS/Moon Society Chapter (Houston) – <http://www.moonsociety.org/chapters/houston/>

Contact: Eric Bowen eric@streamlinerschedules.com – Meeting 7 pm in the conference room of the Bay Area Community Center at Clear Lake Park – Even # months:

Greater Fort Worth Space Chapter c/o Patricia Ferguson tricia3718@gmail.com

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

SEPTEMBER 2014 NEWS BROWSING LINKS

SPACE STATIONS + COMMERCIAL SPACE

<http://www.space.com/27095-nasa-suborbital-space-tech-companies.html>
<http://www.space.com/27128-darpa-robotic-satellite-repair-droids.html>
<http://spaceref.com/orion-1/the-first-orion-crew-module-is-complete.html>
<http://www.space.com/27234-spacex-texas-spaceport-groundbreaking.html>
http://www.spacedaily.com/reports/China_to_launch_second_space_lab_in_2016_official
www.spacedaily.com/reports/China_eyes_working_with_other_nations_as_station_plans_develop_999.html
www.spacedaily.com/reports/Chinas_Space_Station_is_Still_On_Track_999.html
<http://www.space.com/27169-nasa-picks-spacex-boeing-spaceships.html>
<http://www.nasa.gov/press/2014/september/nasa-expands-commercial-space-program-requests-proposals-for-second-round-of/>
<http://www.space.com/27284-nasa-orion-test-flight-rocket.html>
<http://www.space.com/27169-nasa-picks-spacex-boeing-spaceships.html>
<http://www.nasa.gov/press/2014/september/nasa-expands-commercial-space-program-requests-proposals-for-second-round-of/>

MISSION TO PLANET EARTH

<http://www.nasa.gov/press/2014/september/us-india-to-collaborate-on-mars-exploration-earth-observing-mission/>

SPACE TOURISM

<http://www.space.com/27127-land-rover-virgin-galactic-space-competition.html>
<http://www.space.com/27269-spacewalk-simulator-crowdfunding-project-mets.html>

MOON

<http://thefutureofthings.com/6233-waterless-concrete-for-the-moon/>
http://www.spacedaily.com/reports/How_much_gravity_is_enough_999.html
www.space-travel.com/reports/Lunar_explorers_will_walk_at_higher_speeds_than_thought_999.html
<http://thefutureofthings.com/6233-waterless-concrete-for-the-moon/>

MARS

<http://www.space.com/27274-mars-rover-curiosity-drill-mount-sharp.html>
<http://www.space.com/27217-nasa-mars-maven-spacecraft-arrival.html>
http://www.marsdaily.com/reports/Indias_Mission_to_Mars_New_Contender_in_Asian_Space_Race_or_Technological_Breakthrough_999.html
<https://www.indiegogo.com/projects/exolance>
www.nasa.gov/press/2014/september/us-india-to-collaborate-on-mars-exploration-earth-observing-mission/

ASTERIODS + COMETS

<http://www.thespacereview.com/article/2589/1>
<http://www.space.com/27158-us-military-meteor-explosion-data.html>
http://www.esa.int/Our_Activities/Space_Science/Rosetta/J_marks_the_spot_for_Rosetta_s_lander
www.esa.int/Our_Activities/Space_Science/Rosetta/Rosetta_to_deploy_lander_on_12_November
<http://www.space.com/27139-rosetta-spacecraft-comet-map.html>

OTHER PLANETS + MOONS

http://www.spacedaily.com/reports/Twelfth_Batch_of_MESSENGER_Data_Released_Water_Ice_Exploration_Tool_Unveiled_999.html
www.spacedaily.com/reports/Scientists_Find_Evidence_of_Diving_Tectonic_Plates_on_Jupiters_Moon_Europa_999.html
www.spacedaily.com/reports/Titans_subsurface_reservoirs_modify_methane_rainfall_999.html
<http://www.space.com/27293-saturn-moon-titan-sea-mystery.html>
http://www.spacedaily.com/reports/Miranda_An_Icy_Moon_Deformed_by_Tidal_Heating_999.html

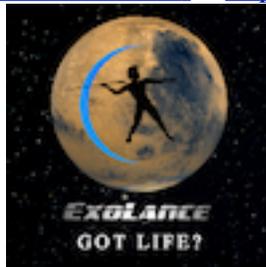
VIDEOS

<http://www.space.com/26753-skylon-space-plane-will-be-both-truck-and-bus-video.html>
www.space.com/27170-spacex-crew-transport-vehicle-progresses-to-manufacturing-phase-video.html
www.space.com/22714-train-like-an-astronaut-nasa-s-physical-fitness-program-video.html
<http://www.space.com/27221-sniffing-mars-atmosphere-like-never-before-nasa-gsfc-chief-scientist-explains-video.html>

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.mmm_themes/)

EXOLANCE – A Mars Mission Designed to Find Live, if it is there

<http://exploremars.org/exolance/the-mission/> - <https://www.indiegogo.com/projects/exolance>



ExoLance incorporates a delivery system that was originally designed for military purposes. It uses small, light-weight penetrator probes (Arrows) that will deliver a life detection experiment several meters below the Martian surface. Each arrow impacts the surface, deposits a transmitter at the surface to communicate with an orbiter, and kinetically “drills” to five or more meters to deliver the life-detection equipment. It combines the experiments of the 1970s Viking landers and the Curiosity rover with bunker-busting weapons technology.

Specifically, ExoLance dispenser – or “Quiver” – will be integrated into the same aeroshell as the lander. It will deploy the individual Arrows as the main lander is braking from supersonic speed .

ExoLance Development & Testing

Within 12 –14 months of completing our \$250,000 funding campaign, we will build ExoLance prototypes and test them at a test range in the New Mexico desert. Many areas of the Mojave Desert feature Mars-like characteristics. There, we will be able to test both the delivery system (from an aircraft) as well as the ground penetrating arrows. These tests will verify the average depth of penetration as well as testing the necessary parameters for a viable life detection experiment within the arrows.

Once the concept is sufficiently tested and we have proven the viability of the mission concept, we will approach NASA, other space agencies, and potential commercial providers to carry ExoLance on one or more future Mars missions. ExoLance will be developed in two phases:

- Phase I will focus on the delivery system. Once Phase I has been fully funded, development and testing should be accomplished within 12 months, Phase II will begin.
- Phase II will focus on developing the microbial life detection experiments needed to search for life below the surface of Mars.

The 2015 Humans to Mars (H2M) Summit – <http://h2m.exploremars.org>

H2M 2015 will take place on May 5–7, 2015 at The George Washington University in Washington, DC. H2M is a comprehensive Mars exploration conference that addresses the major technical, scientific, and policy challenges of getting humans to Mars, as well as how such missions can have positive impacts on STEM education, American Competitiveness and other important collateral issues

Other Upcoming Conferences

Explore Mars Inc. & the Space Policy Institute at The George Washington University present:



The Humans to Mars Summit

May 5–7, 2015 – [3 weeks before the International Space Development Conference in Toronto, Ontario]

<http://h2m.exploremars.org> – George Washington University in Washington, DC.

H2M is a comprehensive Mars exploration conference that addresses the major technical, scientific, and policy challenges of getting humans to Mars, as well as how such missions can have positive impacts on STEM education, American Competitiveness and other important collateral issues.

In 2014, H2M had an onsite attendance of almost 650 people and also boasted over 100,000 viewers on-line. In 2015, Explore Mars intends to dramatically increase both of these numbers, making a clear statement in support of humans to Mars to leaders in the United States and around the world.

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/



2015 International Space Development Conference
May 20th – 25th, 2015 in midtown Toronto, Ontario, Canada
At the Hyatt Regency Hotel, 370 King Street West

Save the dates!

Hosted by the **Canadian Space Commerce Association & the National Space Society**
<http://isdc2015.nss.org/wordpress/> – Sign up now for low advance rates

(The MMM Editor has signed up – 1st ISDC since 2010 Chicago)



Hyatt Regency

Toronto

Can't go because you don't have (or can't afford) a passport?
IF you are driving by car or entering by ship, (that is, not by airplane!)
there are two other less expensive options:
 (1) a US Passcard with microchip, available anywhere,
 (2) an **EDL - Enhanced Drivers License** available now in
 Washington State, Vermont, New York, and Michigan
 (and "soon" in Arizona, Texas, and California)

<http://www.dmv.org/driving-abroad/passport-license.php>

See you in Toronto!

NSS Chapters that share Moon Miners' Manifesto



Space Chapter HUB Webiste: <http://nsschapters.org/hub/>
 Feature Page: Project Menus Unlimited <http://nsschapters.org/hub/projects.htm>

WISCONSIN



MLRS – Milwaukee Lunar Reclamation Society

PO Box 2101, Milwaukee, WI 53201 – www.moonsociety.org/chapters/milwaukee/
www.Space-Milwaukee.com – <http://www.meetup.com/Milwaukee-Space-Exploration-Meetup/>

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

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• James Schroeter (414) 333-3679 – james_schroeter@yahoo.com

TREASURER/Database – • Robert Bialecki (414) 372-9613 – bobriverwest@yahoo.com

(• Current Members of the MLRS Board of Directors)

Meeting place Mayfair Mall Garden Suites East G110 – OCT 11 – NOV 8 – DEC 6 (note: 1st Sat) **our annual anniversary & potluck meeting with displays and a sci-fi movie.** (the 2nd Sat slot was not available)

WISCONSIN



SSS – Sheboygan Space Society

728 Center St. Kiel, WI 54042-1034 – www.sheboyganspacesociety.org

c/o Will Foerster 920-894-1344 (h) astrowill@frontier.com

SSS Sec./Tres. c/o B.Pat Knier dcnpatknier@gmail.com

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

Meetings are at The Stoelting House, 309 Indian Hill, Kiel WI 53042 - 3rd Thurs even # months

NEXT MEETINGS: OCT 17 - DEC 6 (SAT in Milwaukee)

CALIFORNIA

OASIS

OASIS: Organization for the Advancement of Space Industrialization & Settlement
 Greater Los Angeles Chapter of the National Space Society
 PO 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 www.oasis-nss.org/articles.html

Regular Meeting 3 pm 3rd SAT monthly – OCT 15 – NOV 18 – DEC 20 – JAN 17

No information about coming meetings and chapter events could be found by press time.

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

COLORADO



DSS: Denver Space Society fka Front Range L5

1 Cherry Hills Farm Drive, Englewood, CO 80133

Eric Boethin 303-781-0800 eric@boethin.com - Monthly Meetings 6:00 PM on 3rd Thursdays, 7 pm
 Englewood Public Library, Englewood, CO 80110 - 1000 Englewood Parkway, First Floor Civic Center
 NEXT MEETINGS: OCT 16 - NOV 20 - DEC 18 - JAN 15

ILLINOIS



CSFL5: Chicago Space Frontier L5 - 610 West 47th Place, Chicago, IL 60609

MINNESOTA



MSFS: Minnesota Space Frontier Society - <http://www.mnsfs.org>
 c/o Dave Buth, 433 South 7th St. #1808, Minneapolis, MN 55415

OREGON

ORL5 - Oregon L5 Society - <http://www.OregonL5.org>

PO Box 86, Oregon City, OR 97045

(LBRT - Oregon Moonbase) moonbase@comcast.net - Charles Radley: cfrjlr@gmail.com

Shari's in Oregon City on 99E (sharis.com) 1926 SE McLoughlin Blvd Oregon City, OR
 The Third Saturday of the Month at 2:00 PM OCT 15 - NOV 18 - DEC 20 - JAN 17

PENNSYLVANIA



NSS-PASA: NSS Philadelphia Area Space Alliance - 928 Clinton Street, Philadelphia, PA, 19107

c/o Earl Bennett, Earlisat@verizon.net - 856/261-8032 (h), 215/698-2600 (w)<http://pasa01.tripod.com/> - <http://phillypasa.blogspot.com>

NSSPASA Report for August 2014

Due to moving activities on my part I have been disconnected from the web more than usual. I have to recover my contacts and normal news channels, the first one having been Space.com, and I will thus give an "Earl Centric" report.

On China's Yutu rover and possible successors: In a report from July it was stated that the instrumentation package was still functional after several "Sols." Basically the devices on the rover are doing measurements in the lunar environment and straight down into the ground. The chief designer, Jia Yang, believes the mechanical problems that have locked the rover in one spot (during the first "Sol") can be fixed for the next Lunar Rover and will then allow the development of a future Mars "Rabbit" The only problem I see is that the time frame may put the device on Mars in the next decade.

From the Amsat Journal: The hams are getting some more spacecraft for the rest of us into orbit! The most recent launch being the UKube-1. This system includes scientific experiments and a sub system called

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

Funcube-2. This is a communications system that will allow various parties, including students, educators and hams to access the data from the experiments and, for the hams, the ability to talk through the satellite. The primary job of the UKube is educational outreach and support of the S.T.E.M. programs around the world. To this end there is a “dashboard” interface that can integrate directly with the Funcube Central Data Warehouse. This can be found at: <http://funcube.org.uk/{placeholder-for-FUNcube-2-dashboard}>. There are requirements to get this software: you must register and create a user name and password. If you already have these, from use of the original Funcube launched last year, these can be used. As that system is still functional you can get involved with that crafts educational outreach possibilities at <http://funcube.org.uk/education-outreach/>. This craft has an unusual added feature in that it has a microwave system that can send data at 1mega bit per second at 2401.00 mhz. Most other current and near future ham satellites operate in the V.H.F. and U.H.F. range. This is derived from an article by Gramshirville, G3VZV (g.shirville@btinternet.com) titled UKube-1 with FUNcube-2 Transponder aboard Launched on July 8. From the Amsat Journal for July/August 2014.

There was much more. On a recent launch that include both amateur and other small satellites: a June 19 Dnepr vehicle launch had 37 satellites on board. A number of these were amateur systems from around the world. The listing on page 25 of the journal includes twelve ham primary craft and four ham secondary application systems. There is a listing of satellite team web pages for much more information. There is much in this issue on the new Fox satellites under development and I highly recommend this avenue to space exploration information and activities. If you have capabilities and time they are looking for volunteers.

And another type of spacecraft: from the June Solstice Planetary Report: on page 14 of the issue: Preparing to Sail, by Doug Stetson (manager of the Planetary Society’s lightSail program). The Society has a launch date for the new LightSail: in May 2015. The detail of how they have recovered from the loss of the first LightSail in 2005 and the new techniques they have developed are described. These include the adoption of the the Cubesat paradigm and the partnering with with the Georgia Institute of Technology that will use the LightSail craft as part of a measurement system they are working on (Prox-1 for close approach maneuvers). See the Planetary Report for more on this and Icy Moons.

From the August 9 Science News: Habitable Planets’ Reality Questioned by Andrew Grant. The planets in question are around Gliese 581: on analysis of the data available from Doppler shifts of the parent stars light emissions at the hydrogen line wavelength it was found that the apparent shift may have been caused by star spots (sun spots on another star). One of the studies found a clear link between the star’s measured wobble and the magnetic activity of the star. This is still, as of the August report, controversial and multiple groups are reviewing the available data again. Also in this issue: Fast Radio Bursts by Christopher Crockett. Short bursts of radio energy have been observed: they were found initially in data from the Parkes Radio Telescope in Australia. When data from other telescopes was examined this phenomenon appeared to occur all over the heavens. See report page 23ff.

On other topics: Michelle Baker and I travelled to Virginia and the Washington D.C. area to visit several space science museums and facilities with public exhibits. The best were the Smithsonian Air and Space Museum on the Mall in Washington, with the Udvar-Hazy Center in Virginia a close second with material not found at the main Smithsonian location. Next came the Wallops Island Visitors Center where we have begun to launch interplanetary probes. We did not keep going down to visit the actual launch facilities, but, think it might be desirable when the next vehicle is launched in October (see the facilities site for more). Although we really liked the Goddard centers displays we wished there was a larger space, and staff, devoted to this part of the great NASA space exploration and research operation. All of these are worth visiting if you come to the nations capital and the surrounding metropolitan region.

As previously noted the Philcon Science Fiction convention will be held at the Cherry Hill Crown Plaza Hotel. This will be from November 21 to 23 with Principal Speakers Sharon Lee and Steve Miller (authors of the Liaden Universe series). Other guests and track presentations to be announced.

And finally Mitch Gordon is working on a public outreach event for late September or during October in the University City part of Philadelphia. There will be more on this, and Hank Smiths report on Philcon and that events guests, in the September report. Submitted by Earl Bennett, KD2CYA, now in Pennsylvania

The NSSPASA Report for September 2014

Meeting locations and times: We will meet at the Liberty One Food Court on October 18: go to the second level of the building, located on Market Street between 16th and 17th streets, and go towards the 17th street side of the building. Look for our table display(s). In November we will be at The Philcon Science Fiction Convention, at the Crown Plaza Cherry Hill (N.J.). We usually meet during the dinner hour on Saturday (which will be November 22nd) the exact time being arbitrary.

Meeting notes: We had a slightly smaller gathering than usual, but, enjoyed the company that attended. Only Dennis was away this month.

Larry reported that our website continues to have a limited number of visits but our Facebook attention is doing well. Since he made our pages have been modified to be compatible with tablets Our Twitter account is not as active but we do have comments. The discussion ranged over the technologies coming along now like the I – watch from Apple and the new Samsung device (nothing implanted...yet!).

He also reported on the Suns polar magnet fields inverting (North and South changing places) and that Earths field is also changing. During our talk the possibility of the Earths field declining and a Coronal Mass Ejection happening, and the possible subsequent damage to infrastructure, was discussed. Some of our members thought this was a possibility, but, we have no data to back this up.

Dorothy brought material from her Dotty's Dimensions and from the web: She brought a draft of her publication of her, and husband Larry's , travels. These included visiting The Intrepid Sea– Air– Museum in New York Harbor, Lunacon, and some of that Cons events, and the fun of the Nations Museums: like The Smithsonian in its various locations (including the Udvar Hazy in Chantilly, Virginia) for space and other things that are interesting to a wide range of people. One exhibit caught Dorothy's eye: Americas Treasure Chest: this is a showcase of exhibit material from various parts of the Smithsonian. She was a travel agent and enjoys reporting on a wide range of subjects including space exploration and locations involving the past and present (and future!) of our creation of a Solar Civilization. She also recently visited The New Jersey Astronomy Association Observatory. This location is where Frank O'Brien is to do his talk on the Apollo Program and the Apollo Flight Computer in particular. See her Facebook page for much more.

Wallace brought in material on the Mars Rover(s) and "its" ongoing exploration. I say "its" because one of the two rovers is doing "one site exploration" (stuck in one spot) while the other is the one we still have roving after Ten Years! Nice reminder of what careful design, and some great managing, can achieve.

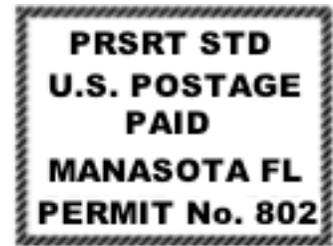
Hank brought more handouts on the upcoming Philcon Science Fiction Convention> This prompted some talk on the volunteer aspect of the event: Dorothy told us of her contacting the Philcon committee to give them Mitch and Earls' e-mail contact information. Earl has recently added an Outlook address earlisnowat@outlook.com as well as his Verizon address. Hank is still working on getting the event back to the city, but, the next year will see the Con in New Jersey again.

Mitch brought "Sexier Space Suits" from the October 2014 Discover magazine. The suit is designed by Dava Neuman as a replacement for the present E.V.A. suit. It is called "the Biosuit" and it works on the principal of compression (counter pressure?). He also brought news from Ad Astra (the N.S.S. magazine) which included a tribute to Fredrick Ordway the 3rd, a long time member of N.S.S., member of the earlier L-5 Society, was on the board of Governors and Board of Directors and participated in most I.S.D.Cs since there inception. His professional life included working on spacecraft propulsion systems at Reaction Motors in New Jersey and authoring a large number of papers as well as consulting. In that capacity he worked with Stanley Kubrick for three years on a film you may have seen. See his works and Ad Astra (and .org) for more. There was much more from that publication including: "A Commercial Approach to Debris Control" on this important topic. Donald F. Robertson, a freelance space industries journalist, wrote this article which includes descriptions of incentives for designing and developing systems for removing this dangerous material. See the Fall 2014 of Ad Astra, for this and a summary of a new report on the possibility of building the Space Elevator between 2036 and 2055. Mitch also reported on his next outreach event, which he hopes to do at Drexel University, in early October.

Earl reported on his, and Michelle Bakers, trip to Washington as mostly reported last month. One location not mentioned was The National Geographic Society's headquarters display of images of Mars. This showed the amazing detail that our Mars Global Surveyor and other craft we are using at Mars. They created a wonderful display that looked like artworks. Excellent! Earl also brought a number of publications including NASA Tech Briefs for September 2014. The cover feature was "Robots are (almost) People Too" with a description of the various systems that NASA is using and developing for independent space exploration (as in autonomous and semi-autonomous systems) and as assistants to human explorers. The featured robot, R-5, is the most recent of these assistive devices. See the publication and NASAs website. One other article of note, out of many, is "Inkjet-Assisted Creation of Self Healing Layers Between Composite Parts." The title speaks for itself. By Alma Hodzic and Patrick Smith of the University of Sheffield in England.

And lastly: MAVIN is a Martian! The atmospheric and environmental exploration craft arrived on September 23rd. On arrivals: this reminds me that New Horizons will arrive at Pluto next year. Instead of the short trip of MAVIN, about a year, New Horizons was sent to Pluto about a decade ago. And we expect it to work as well as the other NASA created exploration systems. Go NASA! O.k.,one more thing: Michelle and I visited the Makefaire Festival on September 21 and talked to a NASA representative at there booth. I asked if Zack Manchesters tiny space craft had made it into space (he had a crowd funded design of a large number of craft as thin as a flat mint candy and the area of a commemorative stamp.). There was a failure after launch and the craft where destroyed on reentry. However: he is going again and the launch may occur in July! Go Zack! Submitted by Earl Bennett, KD2CYA.

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