

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

Moon Miners’ Manifesto

& The Moon Society Journal

www.MMM-MoonMinersManifesto.com



Grytviken, South Georgia Island, once a thriving whaling station, is now a peaceful tourist-visited ruin. Why? What economic opportunities did they miss? There is a “**pitfall lesson**” here. Send us your suggestions! We’ll print the best and most promising ones.

Feature Articles:

2 In Focus: The Lessons of Grytviken – Peter Kokh

3 Avoiding “Cabin Fever” on the Moon and Mars – Peter Kokh



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/)
 - **MMM Glossary:** new terms, old terms/new meanings: www.moonsociety.org/publications/m3glossary.html
 - **MMM retains its editorial independence** and serves many groups, each with its own philosophy, agenda, and programs. Sharing MMM may suggest overall satisfaction with themes and treatment, requires no other litmus test.
- Opinions expressed herein**, including editorials, are those of individual writers and may not reflect positions or policies of the **National Space Society**, **Milwaukee Lunar Reclamation Society**, or **The Moon Society**. **Copyrights** remain with the individual writers. Reproduction rights, with credit, are granted to NSS & TMS chapter newsletters.
- **MMM color online downloadable PDF file version option for Moon Society Members** using their username and password – do write secretary@moonsociety.org if you need help with your password.
 - **For additional space news** and near-term developments, there is a daily RSS feed space news section on <http://www.moonsociety.org>. You can also read **Ad Astra** magazine mailed to **National Space Society** members.
 - **Milwaukee 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. MLRS serves as the Milwaukee chapter of both **The National Space Society** and **The Moon Society**: – <http://www.moonsociety.org/chapters/milwaukee/>
 - **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.
 - **NSS chapters and Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.
 - **Publication Deadline:** Final draft is prepared ASAP after the 20th of each month. Articles needing to be keyed in or edited are due on the 15th, Sooner is better! – **No compensation is paid.**
 - **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 The lessons of Grytviken, South Georgia Island

By Peter Kokh – For a view of Grytviken, see the cover art, this issue.

Grytviken, doubly sheltered on a bay within a bay along the North coast of South Georgia Island just north of the Antarctic Circle, may be famous as the end point of Ernest Shackleton's long trek out of Antarctica, as well as his burial place. But in 1902, it became to this date the first and only thriving settlement (with real families) that far south, because of its importance in the whaling industry. – <http://en.wikipedia.org/wiki/Grytviken>

Sixty-four years after establishment of the whaling station, the whaling industry collapsed, and the last permanent resident left for warmer locations in 1966. Grytviken became a historical site, no more. Yes, it is a very popular stopping point on Antarctic Cruises, mostly out of Ushuaia, at the southern tip of Argentina. That said, there are no manned facilities in Grytviken. Visitors are brought ashore from visiting ships, with accompanying guides. No one “lives” there, even “for the season,” other than seals, penguins and other Antarctic species.

What was Grytviken's big mistake? Easy, it had **only one industry, one product**. When whaling collapsed, Grytviken collapsed and every last resident left. A site to visit, if you can!

For those of us interested in settling the Moon and Mars, the lesson is clear. No one Export Product is sufficient as a foundation for a settlement. **Our settlements must be economically diversified.**

Several video tours of Grytviken are available on YouTube. ##

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



Avoiding “Cabin Fever” on the Moon and Mars

By Peter Kokh

http://en.wikipedia.org/wiki/Cabin_fever – **Cabin fever** is an idiomatic term, first recorded in 1918 for a claustrophobic reaction that takes place when a person or group is isolated and/or shut in a small space, with nothing to do for an extended period. Cabin fever describes the extreme irritability and restlessness a person may feel in these situations.

A person may experience cabin fever in a situation such as being in a simple country vacation cottage. When experiencing cabin fever, a person may tend to sleep, have distrust of anyone they are with, and an urge to go outside even in the rain, snow, dark, or hail. The phrase is also used humorously to indicate simple boredom from being home alone.

BACKGROUND: Purdue students pitch Moon colony plan to NASA

www.jconline.com/story/news/college/2014/04/17/purdue-students-propose-mars-colony/7845383/

April 17, 2014 – A Purdue University senior design class has a plan to colonize the Moon. The mission’s overall success rate is 80 %, The odds of the colonists not returning safely to Earth is about 17%.

“This is a little bit high. But we have to consider that we’ve never done this before. This is 8 times longer than our astronauts have ever stayed in space.

“Cabin fever is a real concern.”

How to Avoid “Cabin Fever”

Myopic and minimalist plans of NASA (or of other space agencies) for a “starter” outpost on Moon or Mars in support of scientific field work, including experimentation with materials made from Moon dust or Mars dust, would seem classic cases of design myopia, sufficient for short tours of duty but no more. Yes, “anything worth doing is worth doing right!” But **you can’t do anything “right” if you don’t look ahead, far ahead.**

Mentality is Number One:

Drop the “minimalistic” approach to Moon and Mars Outposts! We go not just to explore and investigate – yes, we do do that! – but more importantly, we go to prepare the establishment of a permanent presence on a new human world and expand that presence Moon/Mars-wide.

Getting used to scheduling tasks appropriate for Dayspan, then Nightspan

- Power-hungry tasks must be done in the two week long Dayspan: mining, manufacturing, construction, etc.
- Labor-hungry tasks saved for the two week long Nightspan: repairs, inventory, planning, packaging, etc.

An “Interesting” Site: Picking a site not just for resources, but also for interest

Here we are not concerned with where to set up camp first, though personally, we disagree with the “rush” to the Moon’s south pole. No here we are concerned with the design of an outpost, the amenities afforded, the diversity of tasks needed to support the outpost operation, and more. The needs for morale may seem irrelevant in choosing a site. But that is short-sighted. Long term, **a site that is interesting enough to keep morale high and motivate crew to “re-up” for another tour of duty, cuts in half the cost of supplying crew from Earth.**

Here are some considerations that will minimize boredom and boost morale:

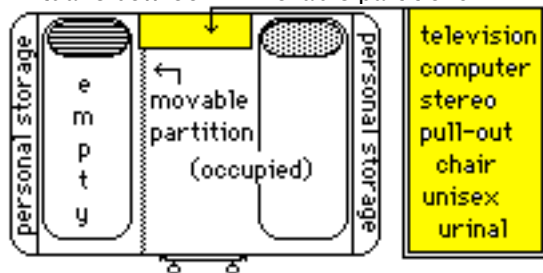
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Site features that reduce boredom

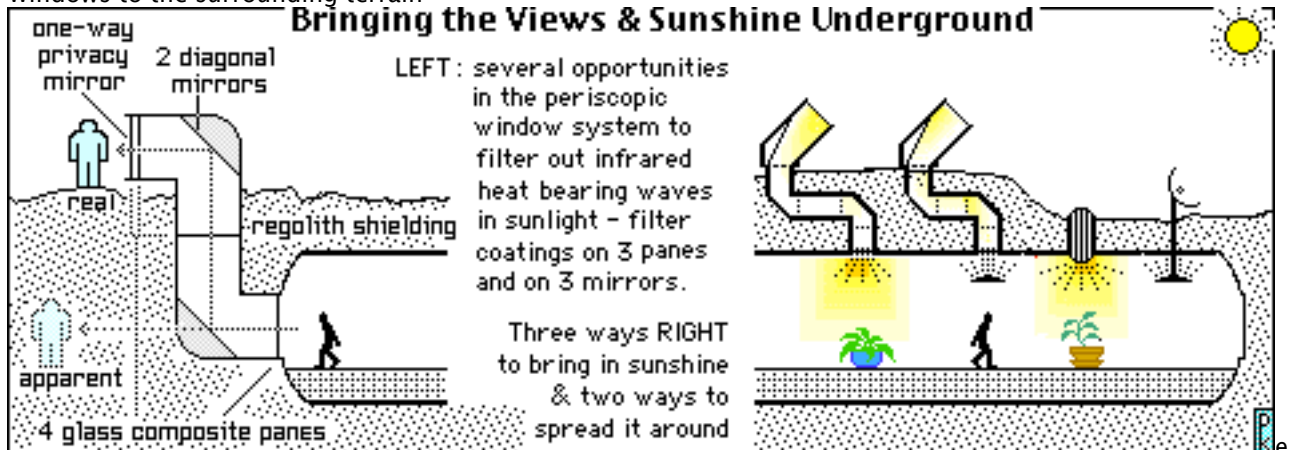
- Pick a “border” site where two or more types of terrain converge: highlands and mare plains, for example. This will accelerate local production of items that won’t need to be shipped from Earth.
- Nearby scenic attractions: hills, rilles, overlooks, lavatube skylights, etc.
- Interesting “explorable” scenic locations with scenic overlooks
- Outlying camps and activity areas
- Alternate paths and trails for different lighting conditions as well as just for variety
- Planned and opportunistic road and path construction as a supporting activity
- Sorties to out-of-area locations reachable overland or by hop flights.

Interesting Accommodations

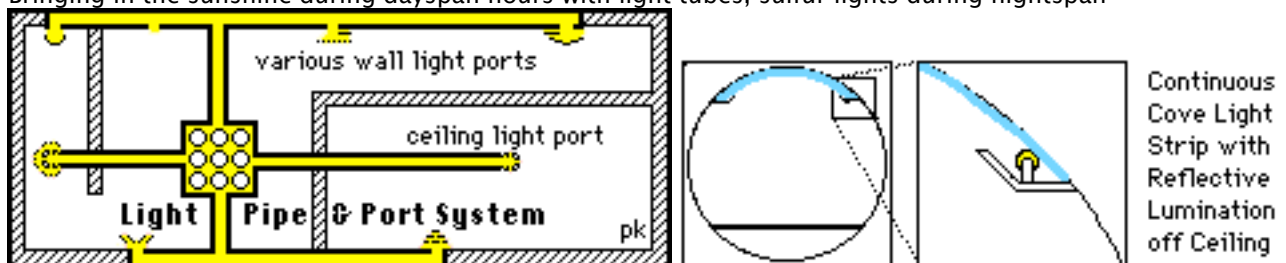
- Modular Design: pop-out, fold-out module designs (cf. current travel homes/coaches)
2 floor horizontal cylinders are the best compromise between portability and floor space per ton
- Comfortable suites/personal customizable quarters with changeable decor
- Virtual elbowroom – movable partitions



- Windows to the surrounding terrain



- Bringing in the sunshine during dayspan hours with light tubes, sulfur lights during nightspan



- Left above: Fighting the “black sky blues” with uplit “sky blue” vaulted ceilings
- Right: Greenery to keep air fresh, provide fresh food, process waste water, and a connection to Mother Earth

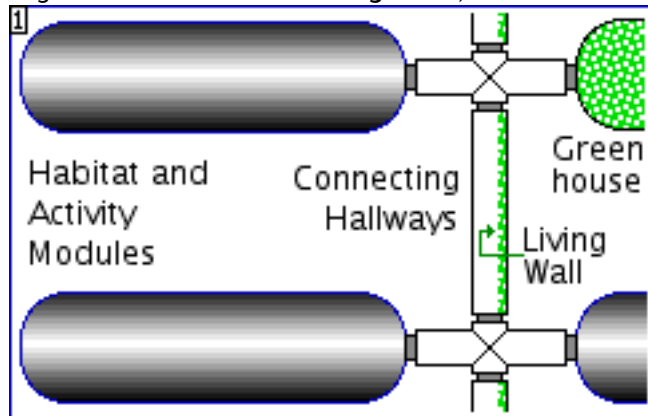
One Improvement at a time

Many, if not most of the suggestions below can be introduced as the number of personnel on the Moon grows. And as the physical complex expands, and as the scope of activities broadens, new features can be introduced. If this expansion-diversification strategy is followed, enthusiasm, morale, and role satisfaction will tend to remain high, and that will translate into greater productivity, both of the outpost and of its crew.

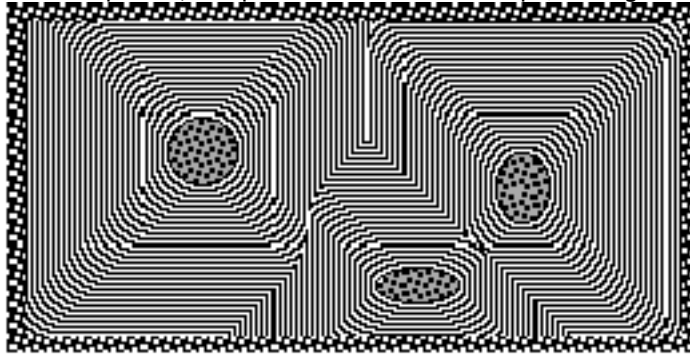
And an increasing number of personnel will chose to “re-up” again and again, until they come to feel like permanent pioneers.

Commons that support a variety of recreational and social activities

- Tubular walkways between connecting habitat and activity modules into a town and provide more space for vegetation in the form of **Living Walls**, with **water features**, flowers, maybe some small birds.



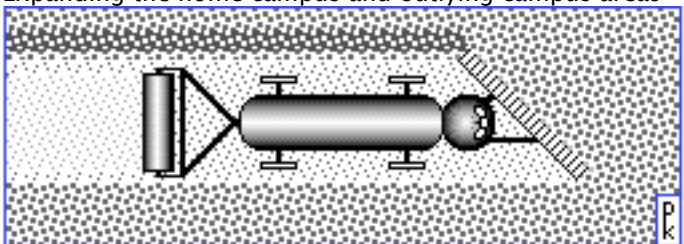
- Outdoor spaces that can be given a human touch (raked **zen gardens** with placed lunar boulders; carved basalt sculptures, sculptures made out of scrap (no longer needed items))



Left: Toilet systems in all habitat and activity modules

Expansion Options

- New modules as population grows and activities diversify, new activity areas, new scenes
- Expansion activities of all sorts
- Nearby sites with access to additional resources:
- Adding new out-back support facilities for science, materials hunting, tourism
- Expanding the home campus and outlying campus areas



grading a road. Rock row serves as median strip

Expanding “Local Sourcing” to minimize imports

- Cultivation of new low-gravity vegetation and garden varieties to supplement upported food items and other products which can be made from plant materials
- Making useful items from local materials: moulded and sintered moondust, carved basalt

Escapes; Changes of Scenery

- Switching assignments with personnel at other outposts

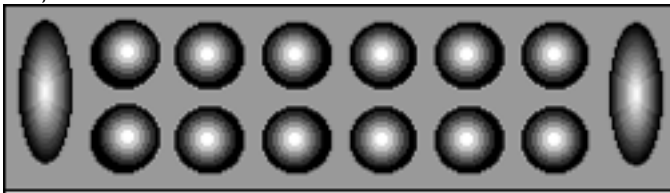
- Lee-Vac Game/Sport fields: for trying out new games that play to low gravity and zero air resistance XXX
- Virtual Reality Vacations elsewhere, including other worlds.
- Vacations at L1 or L2 stations for those too adapted to lower gravity levels to return to Earth itself
- Vacations at a resort in the heart of the “Peekaboos” (the shifting boundary between “nearside” and “farside” within 7° either side of 90° East or 90° West) from which Earth and the Farside Heavens are alternately visible. Add various fun activities and excursions, and personnel will return to duty refreshed and renewed. The view of the farside heavens with Earth “out of sight and out of mind,” will be mind and soul-expanding.



Incredible views of the Milky Way

Part time Hobbies and Recreation Options

- Agriculture and intermixed floral gardens in the commons as well as in one's home space
- Fish tanks, birds, indoor pets
- Hobby provisions of all kinds, especially those adapted to lunar materials and conditions
- Low gravity dancing, even ballet!
- Low gravity acrobatics
- Low gravity sports (caution, momentum remains the same!)
- Experimental and adapted games, indoor, outdoor
- Rock collections, rock and moondust-based arts, crafts, creations
- Landscaping, rock gardens
- Experimenting with other arts and crafts based on local lunar or Martian materials
- Rotating assignments between locations for a partial change in “base mates”
- Designing and creating Lunar/Martian Frontier furnishings and furniture (cast and sculpted basalt, rocks; glass, sintered moondust etc.

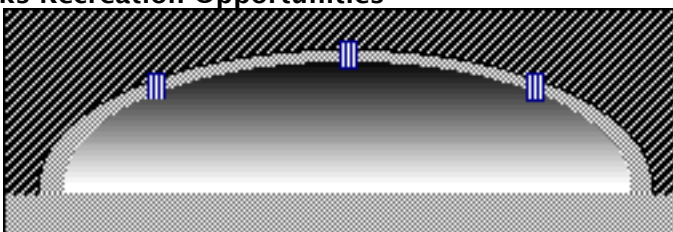


A cast or carved basalt Mancala or Oware game board – plus a set of pebbles



Floor and wall tiles, planters, sinks, tubs, countertops and sculptures from cast, hewn, or carved basalt

Outlooks Recreation Opportunities

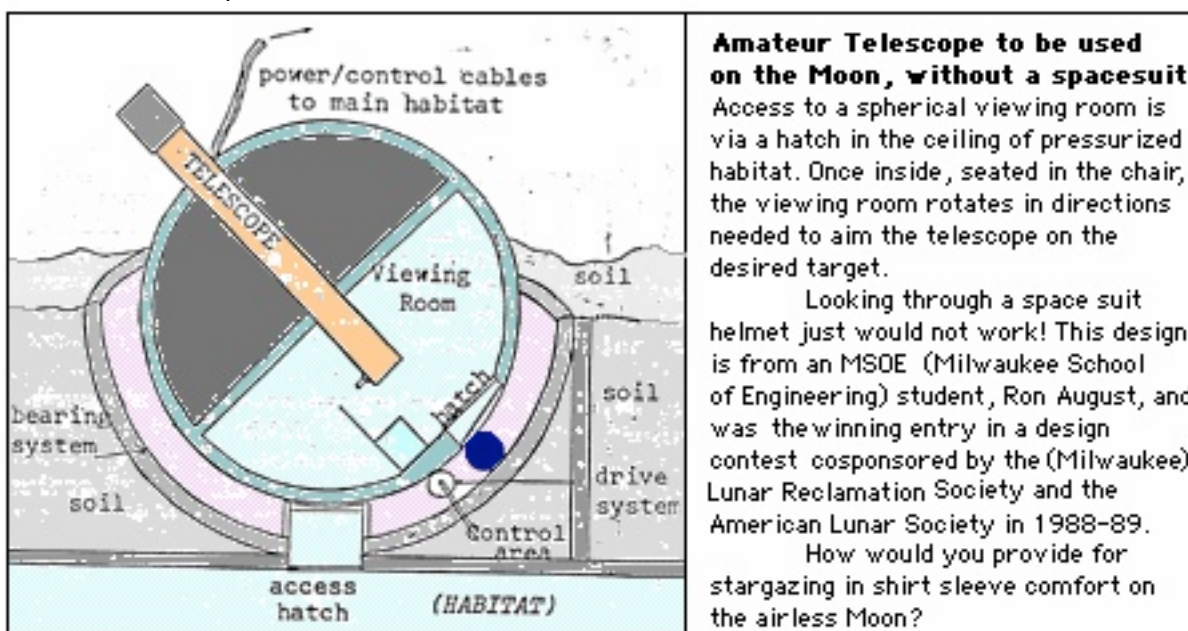


For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

- **Shielded unpressurized canopies** for outvac activities in light-weight suits will allow development or new sports for Lunar and Martian conditions. Warehousing frequently accessed items could use such a facility too.
- Hiking trails, especially in non-flat highland terrain
- Unique vehicles: go-anywhere cagemobile and spiderhig-riding coach



- Reinventing the space suit: pressure skin-suit plus loose thermal outerwear. "Skinsuits" can be embarrassingly revealing. Loose outerwear solves the problem and allows individual expression
- Amateur Astronomy



Varied Job Assignments

- Rotating job assignments
- Shifting assignments between separate but reachable locations
- Prospecting, etc.
- **Nightspan – Dayspan assignment rotations**, specialty free time opportunities in each

End of Tour Opportunities and Alternatives

- Freedom to "re-up" (stay for another tour of duty without going back to Earth first)
- Freedom to mate
- Eventually, freedom to bear and raise children (a very big leap and commitment!)

Back to Basics and Number One: Recruiting People with the "Right Stuff"

- **"WANTED: Persons who are:** Curious, creative, adjustable, questioning, Inventive, multi-disciplinary, multi-hobbled, exploratory, cheerful, friendly, cooperative etc. – qualities as important and as crucial as occupational talents and expertise."

Other ways to Cut Expenses

- **Paying (not paid) volunteers:** people pay good money to participate in paleontological and archeological digs. There will be plenty of well-heeled volunteers ready to pay for the privilege of pioneering the Moon and Mars on both short and long-term assignments
- **No throwaway transportation equipment:** rockets refueled in space, cargo holds designed to serve as storage modules, corridor modules, even habitats,
- Nothing should be landed on the Moon without being "co-designed to serve new functions on the Moon.
- Any scrap is fair game for wood-be sculptors

Antarctica's McMurdo Sound base is the ideal place to practice and preview

Ideally, many features of such a plan might be pioneered in Antarctica by granting appropriate privileges to volunteers at McMurdo Sound, the “metropolis” of the 7th continent. This has to be thought out carefully, but “any enterprising expansion” of the McMurdo operation will help pave the way for what we need to do on the Moon.

- **Securing the right to try startup enterprises** using local materials (in so far as allowed by Treaty, e.g. loose rock that isn't “mined,” abandoned objects and materials, and the base scrap pile)
- **The right to stay on after a tour of duty is finished**, if housing is available and one is self-supporting (or funded by a benefactor or outside organization)
- **The right to contract with the base** for desirable services not previously provided
- **The right to apply for open jobs** when one's tour is over.
- **The right to form, with others, an “enterprise” “village/suburb”**

Upshot – the writer's view

If we follow the above suggestions in planning a serious outpost/base/station (that is, on site materials based industries – not just scientific exploration and sampling,) **the chances of “Cabin Fever” setting in will be greatly reduced.** And as an invaluable consequence, the number of “quality” volunteers from Earth – **with the real “right stuff”** will continue to grow by leaps and bounds, many of them choosing to stay for another round of duty and service, reducing crew replacement costs. Some may choose to stay indefinitely, making the Moon “home.”

But we cannot rely on the political process to make the right decisions. As justly proud as we may be of NASA's achievements, **settlements beyond Earth are economic ventures, and the commercial sector must take the lead.** Only the commercial sector, by doing things for economic reasons, can bring down the cost of humanity's expansion beyond our home planet, **as it already has in GeoSynchronous Orbit** where the economic value of operations there already exceeds \$300 billion a year, enough to warrant giving GEO a seat in the G-20!

Nor will an International coalition of national space agencies get the job done right on the Moon, much less escape the pitfalls of “Cabin Fever.” We can be grateful that these agencies continue to undertake scientific scouting missions in an era before economic opening of the Moon becomes feasible.

Mars is the tougher challenge. There are multiple economic reasons for opening the Moon, as by far the cheapest source of materials and products needed in Geosynchronous orbit, but to our knowledge, no one has come up with a single economic motive for opening the Martian Frontier, however much we all want to see that happen. Yet Mars is a natural trading partner of a lunar frontier, and that prospect may be the place to start.

It follows that without the Moon, the Martian frontier might never get beyond the scouting stage, however much more “Earthlike” a world it seems to be, or could someday become.

More significantly, the first real step to Lunar (and eventually Martian) Settlement will have been taken. That may not be NASA's goal nor the goal of any other national Space Agency, but it must be Our Goal and the Goal of those who sign up for a tour of duty.

To succeed, we must take measures to avoid “Cabin Fever.”

PK

Read also:

Assuring Mental Health Among Future Lunar Frontier Pioneers © 2008

http://www.moonsociety.org/publications/mmm_papers/pioneer-mental-health.html

Reprinted in **To The Stars International Quarterly #6**, pp. 83–91

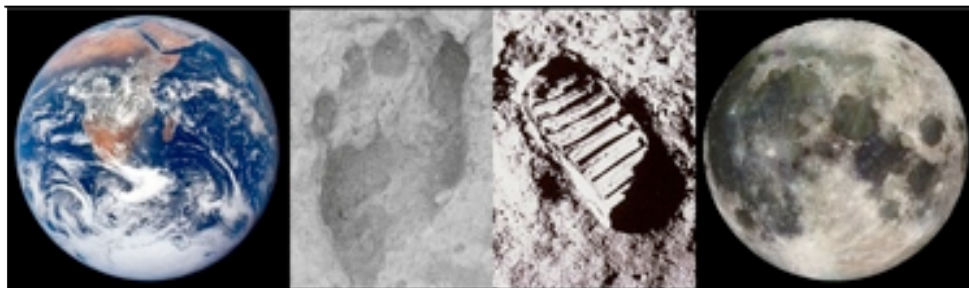
The Outpost Trap: Technologies Needed to Break Free

http://www.moonsociety.org/publications/mmm_papers/outpost_trap.html

The various “Theme” issues, currently 17 in number.

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

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

From Moon Society President Ken Murphy

Howdy Members! It's that time of year again – annual elections! This is your chance to make a difference in The Moon Society, by becoming a Leader and moving the organization forward. Several positions are up for voting, so if you want to shape The Moon Society of the 21st Century then step on up and make your mark.

The leadership of a healthy organization should be a mix of the steadfastness and cultural memory of the greyhairs, the leadership and experience of the middle-aged, and the energy and ideas of youth. While we're well stocked in the first two, the last group continues to elude us, and so I challenge our younger members to step up and help shape the organization into what you think it should be to achieve our goals of humans living and working on the Moon. It's time to represent!

On the administrative front, we're moving forward in the re-design of the logo, and we continue to migrate content from the old website to the new. There's a lot, we could use help.

Also, I haven't heard from anyone regarding being an editor for Moon Miners' Manifesto. I was hoping a couple folks would contact me, but the e-mail-box has been empty. I've got a few ideas for content, but I can't replace Peter, and frankly I don't think that any one individual ever could. The Moon Society is undergoing a metamorphosis of sorts, and having an editorial team for MMM is a key part of that. Please contact me if you'd like to be part of the team that will re-engineer it.

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

The Moon Society – Lunar Frontier Settlement – www.moonsociety.org p 2

I do want to extend a special congratulations to TMS member Dave Dunlop, who put together this year's Moon track at the ISDC, and is laying the groundwork for an international Lunar conference in the next few years.

History happens to those who show up! Will you be remembered as one of the Lunar pioneers of the 21st Century! Ken

Note: Once again, it's Moon Society Election Time for Officers and Board Members.

This time, instead of taking up article space in MMM, we will be sending out a special paper and email ballot with the list of candidates, the positions they are running for, and their campaign statements. This will also be sent by email to those members for whom we have current email addressed.

Please take time to read their statements, mark your ballot and return it by Postal mail or by email in time for the August 1st voting tally.

We'd like to thank our candidates once again for taking time out of their busy lives to help the Society conduct its business and make progress towards our goal of human settlers, settlements, and industries on the Moon!

Forgotten Celebration: Liftoff of A17 from the Moon: "The End of the Beginning"

Above: Harrison Schmidt walks back to the rover, then drives to the LEM, and with Gene Cernan, they liftoff from the Moon in the Lunar Module ascent stage on December 14, 1972, at 5:55 PM EST.

Before reentering the LEM for the final time, Gene Cernan expressed his thoughts

"...I'm on the surface; and, as I take man's last step from the surface, back home for some time to come – but we believe not too long into the future – I'd like to just [say] what I believe history will record. That America's challenge of today has forged man's destiny of tomorrow. And, as we leave the Moon at Taurus-Littrow, we leave as we came and, God willing, as we shall return, with peace and hope for all mankind. "Godspeed the crew of Apollo 17."

Cernan then followed Schmitt into the Lunar Module after spending approximately 7 hours and 15 minutes outside during the mission's final lunar excursion. – http://en.wikipedia.org/wiki/Apollo_17#Return_to_Earth

Most of us space nuts who followed every Apollo Mission with rapt attention, did not suspect that this moment was "The End of the Beginning." Three follow-on missions would be canceled, Apollos 18, 19, and 20.



According to "NASA OMSF, Manned Space Flight Weekly Report" dated July 28, 1969, Apollo 18 would have landed at **Schroter's Valley**, Apollo 19 in the **Hyginus Rille region**, and Apollo 20 in **Copernicus** crater.

http://en.wikipedia.org/wiki/Canceled_Apollo_missions – Of course, had these missions not been cancelled, the provisional targets might well have changed..

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

The Moon Society – Lunar Frontier Settlement – www.moonsociety.org p. 3

Contractor Visions

Things keep disappearing from the Internet which institution is far more fragile than most people realize. You can't find anything on the web anymore, but I can remember that **several contractors had well-advanced plans for the first lunar outposts**, and at the time, I had no means of "saving" these plans.

The point is that **we cannot let the Apollo 17 crews lift-off from the Moon, remain the "end."** It was, and still is, the "end of the Beginning." But this date, **December 14, 1972**, is one which we should celebrate, by vigorously making clear to the public, and to politicians, that this was not the end, only "The End of the Beginning."

Now we must switch gears. NASA and other national space agencies may return to the Moon, but what we need is a "secure return, a permanent return." The best we can hope from any multinational government coalition is the establishment of an "International Lunar Research Park" that would develop ways to produce usable materials from lunar regolith. Then, it will be up to enterprise, and above all, to people willing to go to stay, to settle.

Return to the Moon Day, December 14, 2014

Our first opportunity, in a few months, will be the **42nd Anniversary of the "End of the Beginning"**

With the support of our parent organizations, NSS and Moon Society chapters can get this effort off the ground and earn the attention of the media.

Let's work to make **December 14th** a day to remember, a day to re-energize, a day to commit.

It is time to get beyond "The End of the Beginning."

Chapter-arranged public events could be cosponsored by Commercial Space Companies like **Space-X, Sierra Nevada, Orbital Sciences, Bigelow Aerospace, Golden Spike** and others as more commercial companies are formed. ATK, Boeing, and Lockheed Martin might join in as they have commercial sectors also.

There could be TV programs on progress reports, presentations on attractive manned outpost locations, new technologies, and equipment, and more.

Student contests could be involved. Presentations on **attractive landing sites** such as, :

- **The lavatube skylight in the Marius Hills**, an area that seems to be rich in industrially useful volatiles.
- **A crater central peak** that might possibly be made of extruded mantle material
- **Thales crater** 30° S of the North Pole with the southern part of the crater interior in permanent shade and pre-serving a **thick ice sheet**, on the NE edge of the **150° wide Sinus Roris–Mare Frigoris area** rich in basalt while also offering highland material – the perfect place for a commercial-industrial start up.
- **A tourist complex at 90° East or West** that offers just-over-the-horizon views of Earth, alternating with views of the awesome Farside Heavens. And so on.

Chapters could produce presentations that other groups can use. College level design competitions would have a wide variety of relevant subjects to tackle.

Then at the annual Spring **International Space Development Conference**, there could be a **Manned Moon Return track or half track** at which progress reports could be give of projects underway, or soon to be under-taken. Student papers and presentations on any of the aspects involved.

We plan to make a presentation on this effort at the St Louis Regional SDC November 7–9 coming up.

IF YOUR CHAPTER IS INTERESTED, email chapters-coordinator@moonsociety.org

Meanwhile, we'll be gathering existing presentations and other useful media.

June

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

JOINT TMS/NSS CHAPTERS

Milwaukee Lunar Reclamation Society – www.MilwaukeeLunarReclamation.org

Contact: Peter Kokh – kokhmmm@aol.com – Meetings, 2nd Saturday 1–4 pm monthly except July, August, at May-fair Mall lower level room G110 – **JUN 12 – NO MEETINGS July August – SEP 13 – OCT 11 – NOV 8**

July 19 Field Trip to Bong Recreational Area for Tripoli Rocket Club launches in conjunction with the Chicago area chapters. This year, our **annual anniversary banquet will be on Nov 8th** as we do not have a room for December.

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

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

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

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

Members of the St. Louis Chapter of the Moon Society and the St. Louis Space Frontier, a chapter of the National Space Society have been very busy for the month of May. On Wednesday the 7th Bob Perry gave a presentation titled "STEM and Earth's Cosmic Address" at Doris Elementary School, a grade school close to his home.

Paul Baldwin, Amy White, Jim Merriman, and Bob Perry had three displays at the St. Louis Science Center's Astronomy Day event on the 10th of May – representing the St. Louis Space Frontier NSS, the the Space Museum of Bon Terre, Missouri, and the Moon Society. Dabney Tolson dropped by for a good part of the day and Christine Nobbe came by after lunch. They helped with the "meet and greet".

Jim and Bob each brought ten handouts of ISS flyover and when they got low, John of the Planetarium printed up quite a few more, three different times. We must have handed out over seventy of them. We got contact information from one potential new member,

Amy brought flyers with the general information about RSDC and a calendar of moon phases as handouts. Paul had lots of books and Jim had many items from the Space Museum including a model of the Apollo rocket.

Dabney was the first to leave, and then Amy – she had to prepare for the Astronomical Society of Eastern Missouri's dinner that evening. Paul left shortly thereafter because he was the invited speaker. As a break, we each went around and visited the other displays. We were there for six hours and talked to lots of people.

On Wednesday the 14th the Moon Society meeting was held at the Buder Branch Library, Rufus Anderson, Dave Dietzler, Dabney Tolson, and Bob Perry attending. Dabney brought his DVD with the first three episodes of "Cosmos, a Personal Journey" with Carl Sagan and Bob procured the library's DVD player and monitor. We watched the first segment. We found it as fascinating as it had been a generation ago. Recommended.

The next Friday and Saturday, the 16th and 17th, Paul, Amy, Jim, and Bob again had displays at the St. Louis Science for an early celebration of the 45th anniversary of the Apollo Moon landing, with Gene Krantz as the invited speaker. He stopped by our tables and picked up the gravity bricks with the comment "That's neat!" Also, we got contact information from fifteen potential new members,

On the 24th the St. Louis Space Frontier had their meeting at noon at Falon's Pub and Grill with Amy White, Larry Krupp, Bob Perry, Phil Newell, Karl Strassman, Stephen Block, Judy Tippet, Paul Baldwin, Dabney Tolson, and Dave Dietzler attending. Amy gave an adaptation of the "Meteors and Meteorites" lecture she gives in her astronomy class at St. Charles Community College. She also passed around meteorites from her personal collection and a shatter cone rock from one of the craters in Missouri. One of the items was a polished slice of a nickel-iron meteorite with thumb sized crystals resulting from the slow cooling of the meteor and its unperturbed existence until it became a meteorite. -- RP

The St Louis chapters are planning a Regional Space Development Conference NOV 7–9, 2014 to gain experience for a bid for an upcoming International Space Development Conference

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

Meeting 3rd Saturdays monthly at HSGP Community Center, Mesa, 627 W. Rio Salado Parkway.– Mike Mackowski

Tucson L5 Space Society – <http://www.tucsonspacesociety.org/> Now serving Moon Society Members

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

Joint Meeting of the Phoenix and Tucson Chapters of the NSS & TMS, Saturday, May 10, 2014

This joint meeting was held in Tucson at a Total Wine store, using their wine tasting classroom. It included the usual Tucson potluck feature, with plenty of food for all. There were about twenty people in attendance, with eight from the Phoenix club and the remainder from Tucson.

After general socializing, eating, and a wine tasting of some pleasant California varieties, the heart of the meeting began. It was actually rather casual, with no formal presentation. The presidents of each club, Mike Mackowski(Phoenix) and Al Anzaldúa (Tucson) gave an overview of their chapter activities.

A general idea exchange ensued, with an emphasis on future activities. Mackowski mentioned the Phoenix group is considering some sort of Mars symposium for the fall and a SpaceUp event in February.

The upcoming ISDC was also discussed, as well as opportunities for future joint activities. Overall it was a very successful get together. Report by Mike Mackowski

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 [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

GREAT BROWSING LINKS**SPACE STATIONS + COMMERCIAL SPACE**

<http://www.space.com/25765-spacex-falcon9r-reusable-rocket-video.html>

<http://www.space.com/26056-virgin-galactic-faa-airspace-deal.html>

ASTRONAUTS

http://www.esa.int/spaceinimages/Images/2014/05/Telerobotics_exoskeleton

SPACE TECHNOLOGY

<http://www.space.com/26011-solar-sail-tech-space-exploration.html>

<http://www.nasa.gov/press/2014/may/nasa-june-2-kauai-media-day-for-first-supersonic-saucer-shaped-vehicle-test/>

<http://www.space.com/26063-spacex-unveils-dragon-v2-manned-spaceship.html>

EARTH

<http://www.space.com/25782-climate-change-visible-space-nasa-chief.html>

<http://www.space.com/25825-space-junk-real-life-gravity-disaster.html>

MOON

http://www.spacedaily.com/reports/Chinese_lunar_rover_alive_but_weak_999.html

http://www.space-travel.com/reports/Water_in_moon_rocks_provides_clues_and_questions_about_lunar_history_999.html

http://www.spacedaily.com/reports/First_broadband_wireless_connection_to_the_moon_999.html

http://www.space-travel.com/reports/Astrobotic_Technology_Partners_With_NASA_To_Develop_Commercial_Robotic_Lunar_Landing_Capability_999.html

<http://www.space.com/25884-radar-telescopes-moon-subsurface-features.html>

<http://www.space.com/25935-private-moon-landers-nasa-lunar-catalyst.html>

MARS

<http://www.space.com/25710-mars-size-planet-formation-theories.html>

<http://www.space.com/25860-earth-microbes-could-colonize-mars.html>

www.marsdaily.com/reports/Mars_Curiosity_rover_may_have_transporting_Earth_bacteria_to_Mars_999.html

http://www.marsdaily.com/reports/A_habitable_environment_on_Martian_volcano_999.html

<http://www.space.com/25971-mars-moon-phobos-grooves-origin.html>

ASTEROIDS

<http://www.space.com/25897-asteroid-deflection-enhanced-gravity-tractor.html>

<http://www.space.com/25968-nasa-slooh-seek-citizen-asteroid-hunters.html>

OTHER PLANETS + MOONS

<http://www.space.com/25916-european-spacecraft-plunge-venus-atmosphere.html>

www.spacedaily.com/reports/NASA_Seeks_External_Concepts_for_Mission_to_Oceanic_Jovian_Moon_999.html

<http://www.space.com/25877-alien-life-water-vapor-plumes.html>

<http://www.space.com/25720-jupiter-moon-ganymede-ocean-life.html>

www.spacedaily.com/reports/Sunsets_on_Titan_Reveal_the_Complexity_of_Hazy_Exoplanets_999.html

<http://www.space.com/25500-dwarf-planet-solar-system-life.html>

ASTRONOMY + ASTROBOTICS

<http://www.space.com/25913-nasa-kepler-telescope-new-mission.htm>

<http://www.space.com/25716-alien-life-hotter-stars.html>

<http://www.space.com/25999-alien-life-search-tools-luck.html>

<http://www.space.com/25868-variable-stars-milky-way-structure.html>

<http://www.space.com/25881-sun-sister-star-found-hd162826.html>

<http://www.space.com/25788-amazing-universe-evolution-simulation-video.html>

STUDENTS

<http://www.nasa.gov/press/2014/may/nasa-announces-global-award-winners-of-the-2014-international-space-apps-challenge>

<http://www.space.com/25786-how-to-become-an-astronaut.html>

www.jconline.com/story/news/college/2014/04/17/purdue-students-propose-mars-colony/7845383/



Marshall Mike Moondust and the Sinister Selenian Subterfuge

[MMM Fiction by George von Mond]

MISSED PREVIOUS INSTALLMENTS? The whole series is now online, Chapters I–XVI (1–16):

<http://www.moonsociety.org/publications/fiction/MMSSS.pdf>

Chapter XVII

Marshall Mike Moondust gripped the console to steady himself as another blast shook Tychoville, or what remained of it. Systems were failing all around him and the remaining defenders were retreating to the control area looking for direction. His time was running out, and so were his options.

"Marshall!" came a cry from one of the techs. "Something's happening!"

Mike strode over to the station and looked at the display. "What am I looking for?" he asked.

"There," the tech pointed at the screen just as an assault vehicle disappeared in a plume of dust. "They've just started disappearing in these puffs of dust!"

Mike watched as several more vehicles disappeared, and sprung into action. "I need some observers up top. It may just be that the cavalry is on the way!"

Half-hearted cheers went up from the shell-shocked men, and several peeled off to head up to the observation areas at the top of the central peaks.

"Give me a slow playback of that last scene," he ordered the tech. As they scrolled forward frame by frame they saw something flash down from the sky and impact the vehicle. But what was it? Mike had an idea.

"We need the attackers to bunch up. Transmit a surrender message and start opening up the remaining passageways into the base. We need them rushing to get under cover, but not able to actually get to cover."

Men started working feverishly at the few stations still left functioning and started working on the orders. Outside, he could see that the raiders were starting to converge on the main entryways into the mountain. If Mike was right, that was the worst thing they could do. Shortly, he heard from the observation posts that there were a large number of spacecraft overflying Tycho and dropping rocks on the encroaching troops.

"What's going on?" asked the tech.

"Have you ever heard of Dunkerque?" replied Mike. Back in World War II, when the British Army was trapped against the sea by invading Germans, the citizens of England pulled out every floating vessel they could find and went to go rescue their troops. I think we may be seeing something similar here."

Outside, the scattered puffs of Moondust became a torrent as more and more Moon ships passed overhead and dropped rocks on the invaders. The Moon had no formal defense force, but once word got out from the women and children who had fled north that not only was Marshall Moondust alive, but also leading the defense of Tychoville, a patriotic fervor of Moon fever spread like wildfire through the citizenry. Every skiff, bus, transport and anything else that could make orbit was loaded with debris to unload on the invading force.

On the ground, Captain Min was aghast at what was happening to his troops. The planning for the invasion of the Moon presumed there would be no "air cover", as there were no weapons on the Moon to provide such. Yet here were his troops getting bombarded, and he had no good way of countering the 'aerial' offensive. He tried ordering his troops to disperse, but they had panicked once vehicles started disappearing around them and were rushing to get under cover all at the same time.

Once the raiders realized that they couldn't actually get into the mountain, they panicked even more and the fight became one for oxygen. There is no honor among thieves, and the slaughter was horrific even as the bombardment from orbit continued. It didn't take long for the survivors to start surrendering. But they had dug their own grave when they destroyed the communications equipment for Tychoville. With no way to talk to the ships on orbit, there was no way to call off the bombardment. It continued for hours, until no more movement was seen around the Tycho peaks. At that point, ships started landing to disgorge a makeshift militia of ex-Earth soldiers who had retired to the Moon (where the lower gravity eased the ache of their battle scars) began a clean-up operation. Before long, a rag-tag band of spacesuited figures began clambering out of the wreckage that was the front entry to Tychoville.

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

Cheers enveloped the short-wave comms as the survivors thanked their rescuers. These ended as they together began dealing with the remaining malefactors. The population of the Moon had a reputation for warm friendliness masking a certain detachment. The detachment arose from the knowledge that they were all just a hair's breadth from death on the Moon, and it would be that way for a long time. It was also from the knowledge that those who increased the risk couldn't be tolerated. There was no mercy for the surviving mercenaries that day. They died to a man as the Lunarians grimly and swiftly eliminated what had been the greatest threat ever faced by the Moon's citizenry and their liberty. It would be known for a long, long time that the Moon would not be invaded, by anyone.

Once back at Armalcolopolis, Mike found himself overwhelmed with work, just the way he liked it. He had his original face back, and was in constant demand from the media. Still, there was one thing he dreaded...

A knock on his office door distracted Mike from the report he was preparing. "Come in," he mumbled. Looking around he saw Deputy Diana Selenesdottir striding into his office, her eyes afire with rage. Mike rose from his chair just in time to receive a violent slap across the face.

"You son of a..." she choked out. "Don't you ever do that to me again!" she hissed. "I watched you die!" she exclaimed as her eyes filled with tears and she collapsed sobbing into his arms.

"I'm sorry," he soothed as he held her tight. "I never meant for it to be like that."

"You could have told me," she declared. "You could have trusted me enough to tell me," she stated ccusatorily. "I've cried my eyes out over you."

"Diana, I'm sorry. It wasn't my choice, and you know my duty. But being out there and helping keep the Moon free has led me to ponder just what kind of legacy I will leave for the Moon. And frankly, I can't think of a better legacy than the one you and I can create together."

"What are you saying?" Diana stammered.

"I love you Diana. Marry me and we'll share this adventure together. There's no one I'd more want to share the future with than you."

"Oh Mike," she exclaimed, "I..."

Thus ends this chapter of the story of Marshall Mike Moondust and how he saved the Moon from invasion.

What future adventures does the Moon hold for Marshall Moondust? Stay tuned. ##



2015 International Space Development Conference

May 20th – 25th, 2015 in midtown Toronto, ON

At the Hyatt Regency Hotel, 370 King Street West

Save the date!

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)

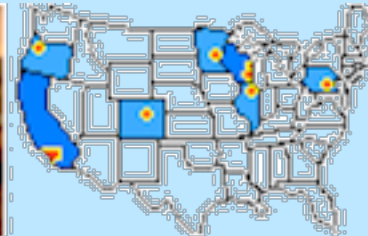


Hyatt Regency

Toronto

As Usual there will be **NO MMM** next month (July)
January and July are the Editor's two months off to "recharge!"

NSS Chapters that share Moon Miners' Manifesto



Space Chapter HUB Website: <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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TREASURER / Database – • [Robert Bialecki](mailto:bobriverwest@yahoo.com) (414) 372-9613 – bobriverwest@yahoo.com

(• Current Members of the MLRS Board of Directors)

Meeting place Mayfair Mall Garden Suites East G110 JUN 12 (showing the documentary Lunarcy)–

NO MEETINGS July August – July 19 Field Trip to Bong Recreational Area for Tripoli Rocket Club launches in conjunction with the Chicago area chapters – SEP 13 – OCT 11 – NOV 8

NOTE: This year, our annual anniversary banquet will be on Nov 8th as we do not have a room for December.

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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.org

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: APR 18 - JUN 20 - AUG 15 - OCT 17 - NOV 8 (SAT in Milwaukee)

CALIFORNIA



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 – JUN 21 – JUL 19 – AUG 16 – SEP 20

OASIS NEWS AND EVENTS

SAT JUN 21, 3 pm OASIS Monthly Meeting or Board Meeting

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: JUN 19 – JUL 17 – AUG 21 – SEP 18 – OCT 16 – NOV 20 – DEC 18

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 JUN 21 – JUL 19 – AUG 16

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

ILLINOIS



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

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>

May 2014 NSSPASA Report

Meeting times and locations: Our June meeting will be at The Liberty One Food Court on the second level of the building on the 17th street (West) side of the building. Look for our table top display (not the seven footer below!). Date: June 14. Then on July 12 at the same location. Mitch may arrange an outreach event sometime in the next two months

Larry brought word on our website activity (stable) and the solar condition (maximum sunspots period). The minimum will be in 2021. Our Facebook outreach is being well received. Larry posts our reports there first. He also brought a special report on determining weather or not you have been hacked for our members to read

Dotty brought material on articles and events from various sources: From Time Out New York (for April 17 to 230 a cover feature article "Next Stop: The Future" with neat illustrations of past futures and "our" present ideas on this topic. Many good topics including Smithsonian exhibits: "Red Bull Stratos: Mission to the Edge of space" which includes the balloon gondola that Felix Baumgartner used on his historic trip to 127,852 feet. He jumped at that altitude and dropped down, in his space suit!, toward the earth achieving several records in the process. This is a temporary exhibit and so you should go to the Washington D.C. location as soon as you see this on line. The suit and gondola will later be displayed at the Udvar Hazy site eventually. Also: "Spirit and Opportunity: 10 Years Roving Across Mars" Which will be on exhibit through September 14, 2014. And much, much, more at the Smithsonian and its' many satellite locations. See the website, ours and especially theirs, for more. Also happening in June at the Udvar Hazy location: a book signing on June 14th of "The World's Fastest Rocket Plane and the Pilots Who Ushered in the Space Age" with author John Anderson. The event will be from 1:00 to 3:00 p.m. on June 14. And more at the Maryland Science Center and NASA's Goddard Space Flight Center. Again: see the websites for listings including child friendly events. Also see Dotty's Facebook site for more on her activities on travel and events.

Mitch brought lots of material including on the Science Carnival event on the Parkway in Philadelphia. "we had a terrific spot directly across from the Franklin Institutes main entrance and next to the W.W. One Aviators Memorial". Mitch was joined by Rich Bowers, Hank Smith, and, Frank O'Brien. There were thousands of people circulating around the venue and quite a few stopped at the tables. Frank brought his Apollo Flight Computer, that impresses young and old alike, and his vast knowledge of space exploration. Mitch brought his D.I.Y. exhibition books with illustrations of space craft and habitats from the past and our hopeful future. He also brought the Mars Globe (donated by former member Gary Fisher), the original **Lunar Lava Tube display** (easily transported and kid friendly) and the Space Bricks for hands on learning about the difference between mass and effective weight. There was material on how the New Mexico Spaceport would affect the hopes and dreams of the small town where it is located as well as the young women from the Philadelphia University who are designing some of NASA's space suits (from The Metro newspaper for April 14).

Hank Smith brought the new flyers for Philcon, the science fiction convention here between November 21 and 23, and commented on the website which is being worked on. A number of our members commented on how they enjoyed being part of the Science Carnival in May.

On other comments and activities: Rich Bowers was delighted to see his lottery idea in Moon Miners, and: Dotty, Larry, and, Wallace are going to Balticon for that great Sci-Fi convention.

On a satellite applications: Janice has pointed out that the sea level rise reported in many studies are from models, but, satellite data shows a much faster rate (2.5 cm versus .5 mm per year).

Earl brought news on several topics but will confine myself to the Super Science Event in Trenton and the flowering of Cubesats from an idea that some amateur radio (Ham) professors came up with:

The Super Science Saturday event was scheduled on the same day in both location (Philly and Trenton). Since we have been doing Trenton for 25+ years I decided to split our forces and went to Trenton. At the last minute I was told that several of my volunteers would be unavailable and had to restructure my outreach activity. One

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

of the things I had built for this event was a building that I believe can be put into/ built inside of, such a natural feature. This was just one of a number of items I had brought to the event thinking there would be a number of us.

At fist I was speaking to a few people who went by (and often heading for a chemistry outreach table opposite me). Then Michelle came and admired the 7' + structure that I had built, complete with human figures to show the scale of our plans (the logo I had on the display) and strongly suggested I emphasize the display starting with the question "Can you see the people?" I began getting a lot more people stopping and listening. Quite a few children and young adults were entranced by the idea that they could build something that they could ultimately live in within the Moon. The figures I used are from "N" gauge railroad displays and really show the scale of what we want to do. And repeatedly mentioning that the structure is similar in size to the Empire State Building drove home the point of doability. We did this size structure in the first part of the 20th century. We, and our robots!, could easily do this on the Moon if we develop the support for this in the society as a whole with the government supporting the effort of our inventors and entrepreneurs. The building would be ~1400 feet tall with only the upper end emerging above the opening. Michelle suggested a "close up" of the greenhouse section (a vertical farm) to lend some more reality to the concept. I had some help from Dennis Pearson Besides Michelle's visit I also had help from Dennis Pearson for an hour. As happens sometimes he was over scheduled and could not stay for the six hour event. He also will be supplying pictures for various publications!

On the subject of Cubesats: in the 1990s a number of people were looking at the cost of satellites and the advances in miniaturization of technology that could be used for science experiments and ham radio applications. Two ham university professors came up with a plan to develop a standard for this new class of space vehicles: it would be a cube 10 by 10 by 10 centimeters and have a maximum mass of one kilogram. From this beginning a number of groups, like the Amateur Satellite Corporation, The U.S. Naval Academy, and an increasingly diverse group of people who wanted to achieve various goals using a low cost orbital platform.

Among the hams was the goal of enhancing communications and skills in various techniques. Some of these efforts included cameras and sensors as well as radio equipment. Thanks to the educational origins of this satellite concept a number of programs began to develop in the United States and around the world. And then the U.S. began to emphasize science education. Thanks to the new S.T.E.M. emphasis the number of satellites launched and being developed has flourished. And the form of the satellites has also been modified: several designs use the basic package, called a unit cube, and extended it to several units in a row when a specially version of the basic configuration is needed. The three U variation of the Delft satellite comes to mind. In one of the latest reports, from the Eclectic Technology column in the June Q.S.T. (by Steve Ford, WB8IMY) is a picture of the launch of several Cubesats from the I.S.S. using the Japanese Kibo Robot Arm!. There is also a picture of model of a satellite being built at the Kaunas University of Technology in Lithuania. It is being held by Vytenis Buzas a student at the school.

Also: the amateur community lost one of its long time proponents of engineering and science education via the development of small satellites. "Tony" Monteiro, AA2Tx, passed away in March. Tony had recently been working with students on the use of "super capacitors" as a way of storing energy for the satellites. He was also working on the Fox-1Cubesat and had given a report at last years Dayton Convention on this, and other, space related projects. Submitted by Earl Bennett, KD2CYA.

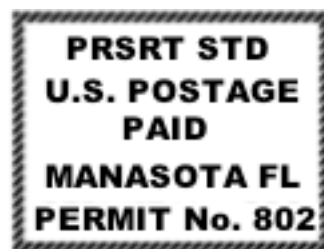
The NSS PASA Lavatube Settlement Exhibit at the New Jersey State Museum, April 26th

Lava Tube Building (center), cubesat single and triple at right



Left: in center of photo is a model of a settlement structure within a lunar lavatube. The light colored circular object is the town center on the floor of the tube. The black part of the structure is within the tube.

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