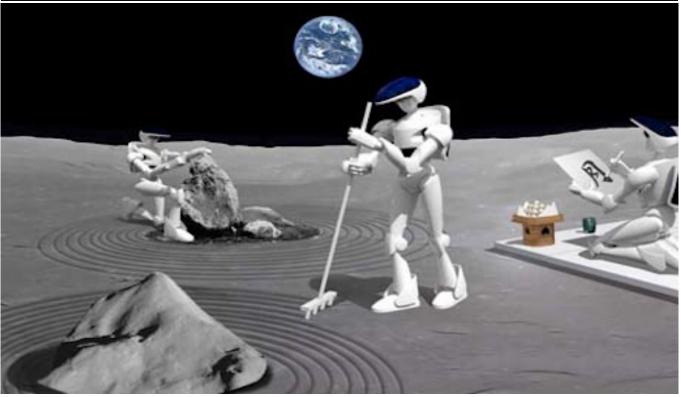
# "Towards an Earth-Moon Economy - Developing Off-Planet Resources" Moon Miners' Manifesto & The Moon Society Journal www.MMM-MoonMinersManifesto.com

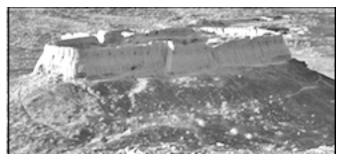


Robot creating "**Zen Pocket Gardens**" – the zen-raked patterns in effect say "do not walk here!" (http://www.plasticpals.com/http://www.plasticpals.com/wp-content/uploads//2009/11/Toyota-moon-7sm.jpg)

In Focus: MMM has a new domain name: www.MMM-MoonMinersManifesto.com

- 3 Priorities: Just getting back to the Moon? International Lunar Research Parks? Settlements? Peter Kokh Integrating Cycling Orbits to Enhance Cislunar Infrastructure Al Anzaldua
- 6 AAC Autoclaved Aerated Concrete: a 2nd Look David Dietzler & Peter Kokh





Using AAC components to build "retaining walls" for moondust shielding over rural lunar Hotels could create such luring and fanciful structures as these decolorized "Desert Castles" found in the Middle East & Central Asia

# **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: <a href="http://www.MoonSociety.org/publications/mmm\_classics/">http://www.MoonSociety.org/publications/mmm\_classics/</a>
- MMM THEME Issues: 14 collections of articles according to themes: ..../publications/mmm\_themes/
- MMM Glossary: new terms, old terms/new meanings: www.moonsociety.org/publications/m3glossary.html
- MMM retains its editorial independence, serving 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 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 <a href="mailto:secretary@moonsociety.org">secretary@moonsociety.org</a> 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 <a href="http://www.moonsociety.org">http://www.moonsociety.org</a>. 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: <a href="http://www.moonsociety.org/chapters/milwaukee/">http://www.moonsociety.org/chapters/milwaukee/</a>
- 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 for articles.**
- Submissions by email to <a href="KokhMMM@aol.com">KokhMMM@aol.com</a> Email message body text, or as Word, Text files, or pdf file attachments or mailed 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

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# In Focus MMM has a new domain name: MMM-MoonMinersManifesto.com

We must confess our embarrassment when we noticed, how belatedly we are not sure, that our original domain name, <a href="www.MoonMinersManifesto.com">www.MoonMinersManifesto.com</a> had expired and subsequently been bought by somebody else. Try it, and you get a site in a Chinese-type script for Pro Trade Marketing Inc.in Selangor, Malaysia (traced through the phone number provided). As I do not know Chinese characters much less the Chinese or Malaysian words rendered in it, I can't tell you what this company markets (looks like food items) or why they would want our name.

As .net, .biz, and .org were already taken, we decided to change the domain name, and the one above seemed to be the best choice. Click it, and you will be transferred to <a href="https://www.moonsociety.org/publications/mmm/">www.moonsociety.org/publications/mmm/</a>

While we are at it, we are making some other changes. The former home page of the Society had a feature called Changing Images. Each time you pulled up the page, a different image would pop up, linking to an explanation of something we have talked about in MMM through the years. Now all these images and their links will be on a page to themselves, the **Cue Images Library** at <a href="http://www.moonsociety.org/publications/cue\_images.html/">http://www.moonsociety.org/publications/cue\_images.html/</a>

We have updated the MMM Classics page, adding MMM Classics #24 and #25.

We have also updated the **MMM Theme**s page, adding more Themes: **Earth** (what's in it for Earth) and **Legal Issues**, bringing the number of theme issues to 17. Each of these has been updated to include more recent articles. In the process we redid all of them in the same font and same larger font size, added "Thread" subindexes, fixing typos as we noticed them.

Someone could use these theme issues to write "MMM the Book" should I not be able to do so myself. PK

Check out the MMM Theme Issues - http://www.moonsociety.org/publications/mmm-themes/

Priorities: Just Getting to the Moon? or Establishing one or more International Lunar Research Parks followed by Corporation Towns that morph into true "Settlements?"

#### By Peter Kokh

To many, even most readers, who have been getting MMM for a long time – or who have explored back issues available in the Classics and Theme Issues freely downloadable by anyone, it may appear that we habitually putting the cart before the horse, the settlements before the rockets that will get us there. But we have a counterquestion – "what good is the horse, if we have no "cart" for it to pull?"

There is a method to my madness: I am not a rocket scientist. But I do see lots of things rocket scientists are doing wrong e.g. the throwaway mentality, and tweaking performance at outrageous costs.

But the real barrier to opening the Moon, is not transportation, but the lack of desire to go there to settle in order to provide products that alone will allow Earth to realize the full potential of Geosynchronous Earth Orbit, GEO, and thus realize the vast economic potential of "Greater Earth." We need to stop thinking about the Moon as being something that does not belong to "Greater Earth" and start thinking about it as an "8th Continent" across a different kind of sea." **The Moon–GEO collaboration** is the economic engine that will power the coming century.

If the desire was there, not to explore and come home, but to settle and stay, then, those who are capable of making design revolutions in the way we make "rockets" would make those changes, and the prices would fall by orders (yes with an "s") of magnitude. We owe much to Elon Musk, who is doing just that.

Designing Attractive Settlements is much more than a matter of architecture and town planning. It includes designing the "biosphere" itself: the "Middoors" as we have dubbed it, and with it. laying the foundations for cuisine and other byproducts. It includes the kinds of recreation, sports, festivities, and arts and crafts to be enabled.

It includes built-in opportunities for entrepreneurial enterprise: for those retiring from their contractor jobs to begin earning a living on their own, doing what they have the talents to do, and thus to become permanent citizens, but not at the mercy of contractors who originally brought them to the Moon for limited temporary assignments. For indeed, "astronauts" will become lunar citizens by finding ways to support themselves "on their own" or banding with others who want to stay, contractor job or not.

Lunar settlements may start as, God forbid, "company towns," but unlike McMurdo Sound in Antarctica, they won't remain such, and the sooner the founding companies are themselves "citizens," not "owners," the better.

Those long familiar with MMM will realize that from day one we have emphasized the opportunities for company employees to start enterprises in their after hours spare time, then "quit" the company, and find a way to make a living on their own, providing services and materials to "the company" but more importantly, to others whether still working for "the company" or not, all to make their lives better, more satisfying, more rewarding.

Part time "cottage industries" could provide the path that bursts the bounds that keep Antarctica a "science only" continent. It will help if we succeed in amending the Antarctic Treaty when it comes up for review in 2041. In the meantime, we hope that among Antarctic crews, there will be some employees with an "entrepreneurial" spirit to find ways to strike out on their own. The 7th and "8th" "continents" are in this game together.

In the MMM Theme issues, in addition to the chronological index, we have added "thread" indexes, one of them being "Cottage Industries and Free Enterprise." PK

# **Integrating Cycling Orbits to Enhance Cislunar Infrastructure**

By Al Anzaldua\*

Much has been said about NASA's recent proposal to put a human-tended waypoint, i.e. a crewed station and staging area, at Earth-Moon L2 (EML2)<sup>1</sup> as a starting point for further expansion into the solar system, and in particular, as a waypoint to Mars. Also stirring comment is NASA's proposal to "lasso" a small near-Earth asteroid (NEA), or take a chunk out of a larger NEA, and bring it into orbit within the Earth-Moon system so that astronauts can visit it to take samples. Parties interested in these proposals in and out of NASA also see the potential of EML2 as a multifaceted infrastructure hub.

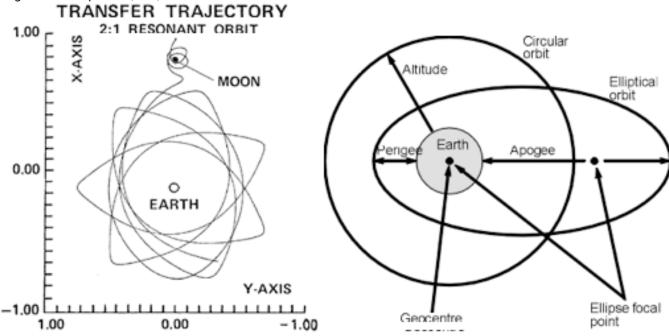
What could such a hub consist of? To begin with, structures in halo orbits around EML2 would only need propellant for station–keeping and could form the nexus of an integrated transportation system, equipped with docking and fueling stations and connected to reusable in–space tugs, tankers, ferries. Beside transportation capacity, other EML2–based infrastructure could include or be connected to: 1) lunar materials processing and shipping sites, 2) near–Earth asteroid (NEA) resource processing areas, 3) lunar farside telerobotic science platforms, 4) assembly and staging sites for solar power satellites (SPS) and spacecraft, 5) communications platforms to facilitate lunar farside radio astronomy, 6) radiation–shielding test sites, 7) variable–gravity centrifuge test sites, 8) test beds for controlled or closed ecological life support systems, and 9) tourism facilities.

The potential for EML2-connected infrastructure is indeed staggering, and the same could be said of EML1, although in the latter case, lunar farside telerobotics or telescopes would not be feasible. One thing that rarely mentioned about EML2 infrastructure, however, is that EML2 is also a perfect jumping off site to a perpetually cycling Earth–Moon 2:1 Resonant Orbit (EMRO) and other cycling Highly Elliptical Orbits (HEOs), which would enhance any infrastructure architecture connected to it.

T. A. Heppenheimer in his landmark book, Colonies in Space,<sup>2</sup> described the advantages of putting a space habitat in a cycling 2:1 EMRO. According to Heppenheimer, a spacecraft could reach such an orbit from EML2 with a delta V (i.e. change in velocity) as low as 9.1 meters/sec (30 feet/sec or 20.5 mph). And once a vehicle, station, or habitat is built or emplaced in such an orbit, it will cycle indefinitely in slightly less than every two weeks, with each revolution passing around the Earth as close as 160,000 km, and then cycling very close to the Moon and back.

A structure built or emplaced in Heppenheimer's cycling EMRO would conceivably need no propellant, except possibly for attitude control or docking maneuvers. As a supplement to reaction wheels, light propulsion could be supplied by Solar Electric Propulsion (SEP) engines. While a structure in a bean-shaped orbit around EML4 or EML5 would be in the same happy situation, it would take much more propellant to get from EML2 to either of these latter sites, than to reach EMRO or other HEOs.

(Delta v from EML2 to EML5/L4 = 427 meters/sec or 1400 ft/sec versus 9.1 meters/sec or 30 ft/sec to get to EMRO.) Moreover, according to John S. Lewis in his 1996 book, Mining the Sky, the propellant cost to reach HEOs³ from Low Earth Orbit (LEO) is less than to get to geostationary orbit (delta v of 3 km/sec [1.86 mi/sec] versus 4 km/sec [2.48 mi/sec]) because in the former case there is no need for an orbit-circularization engine burn. It is also much easier to get back to LEO from HEO to Low Earth Orbit (LEO) than from geosynchronous (GSO) or geostationary orbit (GEO).



The point here is that spacecraft, crewed stations, and habitats in EMRO and other perpetually cycling orbits could synergistically enhance and expand a cislunar transportation system and economy. Habitats, whether hotels or worker camps, could be spacious, rotated for artificial gravity, and built up incrementally to withstand galactic and solar radiation. For vehicles, the disadvantage of Earth–Moon HEOs is that they generally offer a slower route to cislunar destinations than other trajectories. Earth–Mars Cyclers, however, have a different problem in that small high velocity "taxis" and freighters would be needed to reach such cycling structures. In either cycling system, the main benefit is that reusable spacecraft carrying cargo or well protected passengers would be able to save many tons of propellant by connecting to cycling orbits to reach various solar system destinations.

#### **Enhancing the EML2 Integrated Transportation System with Cyclers**

An Integrated Cislunar Space Transportation System is "Milestone 3" of the recently published, National Space Society Milestones to Space Settlement, also known as the "NSS Roadmap." Furthermore, National Space Society (NSS) member John Strickland has in recent papers and lectures elaborated the essential elements of such a system. From all these sources it is clear that structures in halo orbit at EML2 or EML1 are central to any effective

cislunar transportation system, and facilities connected to these sites are critical to maintaining cislunar infrastructure.

For example, lunar ice and other volatiles from perpetually dark south pole craters could be transported first to a EML2 site in halo orbit for processing into fuel, drinking water, and oxygen to breath — and then to EMRO facilities for delivery to refueling and life-support stations in Earth orbit. The same procedure could be used to deliver lunar metals to make solar power satellites (SPS) or comsats, which then can be moved to geosynchronous or other Earth orbits. The top of Malapert Mountain, near the Moon's South Pole, because of its continuous illumination and line-of-sight to Earth, could be an initial lunar base to exploit lunar resources and coordinate these deliveries.

Other Earth-Moon cycling orbits exist, which require little propellant to perpetuate, and might be even more advantageous for certain applications than Heppenheimer's EMRO. For example, John S. Lewis in Mining<sup>5</sup> speaks of HEOs, which could reach in as close as 1000 to 2000 kilometers at perigee and as far as 100,000 to 400,000 kilometers at apogee. According to Lewis, the beauty of these orbits is that HEO is not only easier to reach from EML2/L1 than GEO (see above), but is also much easier than GEO to get back to Low Earth Orbit (LEO) or cislunar orbits. For this reason, a HEO base would make an attractive staging and processing site for the retrieval of asteroidal metals and propellants, the fueling and launching of planetary exploration missions, and the construction of large permanent space structures. Using a factory in HEO to carry out the construction of solar power satellites (SPS) mostly from lunar and asteroidal resources also makes tremendous sense. And since HEOs can reach almost to the Moon, moving lunar materials from HEO to EML2 or L1 would require very little propellant.

#### **Cislunar Cycling for Tourism**

The tourism potential for cislunar cyclers deserves special mention. We have already seen that some people are willing to pay handsomely for a trip to the International Space Station or even for a suborbital trip. One can only imagine the people that would line up for the awesome views a cycling trip to the Moon and back would provide. Buzz Aldrin in his recent book, Mission to Mars, 6 says of cycling lunar tourism destinations:

"I foresee an**X** interplanetary cruise ship, a lunar cycler. Assembled in Earth orbit, this liner is given a powerful push – sending it on its way to the Moon. The lunar cycler will...loop around the Moon, return to Earth, slingshot around the Earth, and return to the Moon again [in] just over a week. And every time the lunar cycler swings by Earth, it'll be met by a supply ferry...restocked...and boarded by a fresh group of travelers."

Clearly Dr. Aldrin's proposed Earth-Moon cycler is not the same as Heppenheimer's two-week EMRO or Lewis's HEO, but the idea is the same. The beauty of the cycling concept is that many such orbits are possible within our solar system, each bringing its own special enhancement to living and working in space. Some of these orbits would need propellant to maintain, but the payoff might be worth it.

#### **Connecting to Mars Cyclers**

Heppenheimer's EMRO and other Earth–Moon cycling orbits could conceivably be integrated into other cycling orbits to bring solar system infrastructure to Mars and beyond. The cycling orbits proposed by Dr. Buzz Aldrin in Mission<sup>7</sup> make a rational case for establishing the equivalent of a "transcontinental railroad system" in space by making use of perpetual cycling orbits to Mars and back. Dr. Aldrin proposes constructing a pair of "Purdue/Aldrin" cyclers with trajectories that would make close flybys of Earth and Mars every 2 1/7 years and needing only small amounts of propellant to give well–timed "nudges."

Because each cycling vehicle as a leg to get to either Mars or Earth in less than six months, however, travelers can avoid the 20 month leg by hopping off one cycler near Mars and then waiting for the other vehicle to take for a six month trip back to Earth. Dr. Aldrin also notes in Mission that at least four other Earth-Mars cycling trajectories have been inspired by the Purdue/Aldrin Cycler concept idea.

According to Alan Bellows, NASA in 1999 estimated that a rocket-powered manned mission to Mars would require 437 metric tons of mass to be lifted into space. This translates into \$8.74 billion to orbit the materials for one round trip to Mars. Over half of that weight—250 tons—would be propellant. As Bellows notes, a cycling spacecraft approach would represent rational re-use, rather than a system that litters space with discarded multi-billion-dollar vehicles and other structures. Of course, a vehicle would need an initial thrust to insert it into the cycler "sweet spot". After that, however, only minimal propellant would be necessary to maintain the rhythmic encounters or to move to another orbit.

#### **Going Beyond Moon and Mars**

Finally there is the "Interplanetary Superhighway," proposed by Martin Lo and Shane Ross, a gravitationally determined set of pathways between solar system Lagrange (L) points within which a spacecraft can traverse. Also known as the "Interplanetary Transport Network," a vehicle traveling through this system could make use of cislunar and other L points to change trajectory and move on with very little fuel cost. Such a spacecraft would move slowly, however. Yet it could be well worth exploring whether automated tankers and freighters from cislunar points and cycling orbits could connect to this system to make deliveries that are not time sensitive.

X This article serves the purpose of expanding the concept of cislunar infrastructure by introducing the possibility that it can be enhanced by use of various solar system cycling orbits. I also hope that others will develop more comprehensive and detailed descriptions of such expanded transportation networks. The overall goal should be to facilitate people living and working in space so that we humans can eventually become a multi-world species, and thereby ensure our long-term survival.

#### Notes

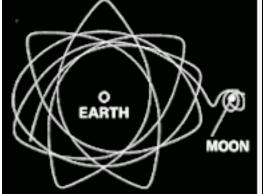
- 1. Technically, EML2 is in the "trans" position vis-à-vis the Earth-Moon system. But I bow to common usage and will treat EML2 as part of cislunar infrastructure.
- 2. T. A. Heppenheimer, Colonies in Space, 1977, pp.110 112.
- 3. J. S. Lewis, Mining the Sky, 1996, p.134. Lewis calls HEOs Highly Eccentric Earth Orbits.
- 4. J. Strickland, "Cis-lunar Transportation The Space Trucking System," The Space Review, Jan. 21, 2013 and "The Cis-lunar Gateway with No Gate," The Space Review, Oct. 1, 2012 and "Orbital Propellant Depots: Building the Interplanetary Highway," NSS Website, Aug. 15, 2011.
- 5. J. S. Lewis, Mining the Sky, 1996, p.132.
- 6. B. Aldrin, Mission to Mars, 2013, p.52.
- 7. B. Aldrin, Mission to Mars, 2013, pp. 195 199.
- 8. A. Bellows, Blog: Damn Interesting: The Martian Express, 2008, Article #319.
- 9. M. W. Lo and Ross, Shane D,. 2001, The Lunar L1 Gateway: Portal to the Stars and Beyond, AIAA Space 2001 Conference, Albuquerque, New Mexico.
- \* Al Anzaldua is President of the Tucson Space Frontier Society, a National Space Society chapter in Tucson, Arizona, US. He has also recently served on the Moon Society Board of Directors, and co-authored (with Peter Kokh) an article, titled "The Triway of Space." Published in Space Review.

  May 7, 2012 http://www.thespacereview.com/article/2078/1

# Cycling Orbits for Earth-Moon "Cruise Ships?"

By Peter Kokh

Trading the cost of getting their faster for a slower trip at the same cost (more consumables)





Lunar cycler <a href="http://en.wikipedia.org/wiki/Lunar cycler">http://en.wikipedia.org/wiki/Lunar cycler</a>

"A **Lunar cycler** (or **Earth-Moon cycler**) is a hypothetical spacecraft on a special trajectory that encounters both Earth and the Moon on a regular basis, typically every 9 or 14 days.[1]

"Cyclers may be useful for transporting people or materials using little propellant. Instead, they rely on gravity assist mannouvers to keep them going with occasional powered corrections to maintain the trajectory. There would be Earth-cycler and Moon-cycler shuttles at each end."

**References:** <u>Lunar cycler orbits with semi-monthly transfer windows</u>, Uphoff, Crouch & Loucks, Colorado University First Annual Symposium Volume 1: Plenary Session, 1989–10–01.

[ Advantages are two: **fuel savings** (possibly spent on) more spacious and **comfortable cruise cabin quarters and amenities**.]

Cyclers, spending their operational years in space, could be large, with artificial gravity.

√ The "Frontier Builder": an Earth-Moon HoteL-Cruise Ship: a Define & Design Exercise © 1992 http://www.moonsociety.org/publications.mmm\_papers/transitel.htm

Going from Earth's surface to the Moon's surface in one cabin would be for those in a big hurry! ##

Check out the MMM Theme Issues - <a href="http://www.moonsociety.org/publications/mmm-themes/">http://www.moonsociety.org/publications/mmm-themes/</a>

#### AAC - Autoclaved Aerated Concrete - a 2nd Look

By Peter Kokh and Dave Dietzler

[MMM #181 DEC 2004 Carving & Sculpting on the Early Frontier - By Peter Kokh - A Gift from Santa - AAC] "I (PK) reached for my tools, and discovered that

- You can easily saw it with a hack saw, and even with a regular wood saw.
- You can carve it with a wood chisel or a shaping tool.
- You can cut it with a sharp knife (but it produces granular debris rather than shavings because, unlike wood, the material lacks fiber and an oriented grain.)
- You can easily drill it with a metal bit, and even with a paddle wood bit
- You can pound a spike into it without splitting the material.
- You can drive a screw into it
- Working AAC produces a "sawdust" more coarse than wood working dust, but, surprisingly, not very abrasive.
- You can sand it to produce a smooth surface"
- all experiments performed by the author on a real sample, a large block 8"x8"x24" weighing only 25 lbs or so.

#### Just what is AAC and how is it produced? Sources:

http://www.cement.org/homes/ch bs autoclaved.asp http://en.wikipedia.org/wiki/Autoclaved\_aerated\_concrete

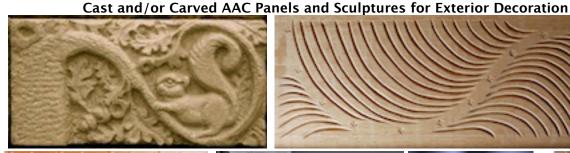
From Wikipedia - "AAC is produced using no aggregate larger than sand. Quartz sand, lime and/or cement and water are used as a binding agent. Aluminum powder is used at a rate of 0.05%-0.08% by volume (depending on the pre-specified density). In some countries, like India and China, fly ash generated from thermal power plants and having 50-65% silica content is used as an aggregate.

When AAC is mixed and cast in forms, several chemical reactions take place that give AAC its light weight (20% of the weight of concrete) and thermal properties. Aluminum powder reacts with calcium hydroxide and water to form hydrogen. The hydrogen gas foams and doubles the volume of the raw mix (creating gas bubbles up to 3mm (1/8 inch) in diameter). At the end of the foaming process, the hydrogen escapes into the atmosphere and is replaced by air.

When the forms are removed from the material, it is solid but still soft. It is then cut into either blocks or panels, and placed in an autoclave chamber for 12 hours. During this steam pressure hardening process, when the temperature reaches 190° C (374° F) and the pressure reaches 8 to 12 bara, quartz sand reacts with calcium hydroxide to form calcium silicahydrate, , which gives AAC its high strength and other unique properties. After the autoclaving process, the material is ready for immediate use on the construction site.

Depending on its density, up to 80% of the volume of an AAC block is air. AAC's low density also accounts for its low structural compression strength. It can carry loads of up to 8 MPa (1,160 PSI), approximately 50% of the compressive strength of regular concrete.[4]"

A google image search for AAC reveals a surprising variety of product shapes, textures and even colors













AAC is apparently a very versatile material, but to what practical uses can it be put?

- It is not strong enough to be pressurized. So we can't use it to make habitat modules.
- But we can use it to make retaining walls and panels to hold moondust shielding in place.

If settlers are not going to be long content for living in a community that looks like a maze of mole hills, AAC provides many options. AAC panels can be used to make shielding retaining walls that can be shaped, textured, and colored in amazing variety of ways, to give their homes, neighborhoods and cities as much variety and interest as their counterparts on Earth, that has value.

Lunar settlement architects and artists, with relatively few alternatives, should find that AAC gives them quite a lot of design freedom. Tourists from Earth could find settlement neighborhoods – seen from the outside – as variegated as those in our cities on Earth. AAC panels will be joined by sculptures.

Lunar AAC would be gray-toned in color, but the shading could range from lighter to darker shades. If steamed, the iron fines in the outer layers could perhaps be rusted to provide a second color pallet.

And there is no reason why carved and cast black basalt products cannot be mixed in to provide "dressing" and color contrast, Now AAC is much softer than cast, hewn or carved basalt, so after long periods of occasional exposure to lunar dust winds and micrometeorite rain, AAC products will show some softening of shapes. But that will not be much of a deterrent.

#### Other uses

- AAC panels make excellent thermal insulation and this may have some value in construction of unpressuized warehouse structures for incoming and outgoing (import, export) items.
- Pairs of AAC panel walls with moondust filler in between could act as barriers around rocket land/lauch pads to protect outside neighboring structures from sandblasting by rocket exhaust.

#### Reader input welcome.

Let's hear your ideas and suggestions as to how this versatile material could be used. We already have one input from a friend who grew up with interlocking wood Lincoln Logs out of which to build all kinds of structures. he suggested that for a playful design alternative "in the frontier spirit" the retaining walls of some homes or other structures could be build of AAC "Lincoln Logs!." Another pointed out that smaller-scale sculptures in the spirit of those that guard the coasts of Easter Island have been carved out of AAC! Sculptures of a wide variety (why not AAC flower pots with AAC flowers or bushes?) could flank homestead entrances.



Well, why not? Variety is the spice of life and lunar frontiers are going to want variety as much as we do. Instead of all lunar settlements looking alike, we are likely to see a wide range of artistic and architectural variety, not so much by the way various pressurized modules are combined to make homes, offices, and other structures, but in the way we "retain" or "constrain" the shielding we heap over our living spaces to provide moderate temperatures and shielding from radiation and the micrometeorite rain.

Designers and architects of these retaining façade structures will be aiming at the street level impression, not the view from overhead.

#### Additional AAC links:

http://globalmodularconcepts.com/Aerated%20Autoclaved%20Concrete.htm

http://www.cement.org/homes/ch\_bs\_autoclaved.asp

http://www.aacgreenbuilders.com/architects\_engineers.html

http://www.apartmenttherapy.com/thermacrete-aerated-autoclaved-136064

http://www.greenbuildingadvisor.com/blogs/dept/qa-spotlight/does-autoclaved-aerated-concrete-make-sense

http://www.deepgreenarchitecture.com/concrete.html

http://www.e-crete.com

http://www.thisoldhouse.com/toh/article/0,,1638888,00.html

http://www.aeratedconcreteblock.com

http://www.litebuilt.com

http://www.paulabakerlaporte.com/healthy-home-architectural-design/autoclaved-aerated-concrete-portfolio/

http://www.concrete.org/pubs/newpubs/523409web.pdf

http://www.houzz.com/autoclaved-aerated-concrete

http://evstudio.com/construction-material-aerated-autoclaved-concrete/

##

#### THE MOON SOCIETY - LUNAR FRONTIER SETTLEMENT - WWW.MOONSOCIETY.ORG

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 industrialization 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**

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

#### **Moon Society Strategy**

We seek to address these goals through education, outreach to young people and to people in general, 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 <a href="mailto:president@moonsociety.org">president@moonsociety.org</a>

# From Moon Society President Ken Murphy

October was a big month for space fans, and the Moon in particular. The movie 'Gravity' continues to pack them in at theaters. Released on DVD were the films 'Europa Report' and 'Stranded', the latter a mystery set at a Moon base. October 12<sup>th</sup> was International Observe the Moon Night (InOMN), a global event that encourages the general public to take some time to look at our Moon and learn a little more about it. Your president also moderated a panel on the topic of "The Moon be Domed!" at the FenCon science fiction writer's conference, and gave several Moon lectures at the Fall Astronomy Day at the UT Arlington Planetarium.

Public lectures are fun, because you never know what kind of questions you'll get, because also it's a way of learning just how much ignorance exists regarding our Moon. At Astronomy Day the audience was all ages, and so some folks were asking about Moon phases, others about the Inter-Planetary Superhighways. Several teachers noted afterwards that they had never ever heard of Lagrange Points.

So one of the key roles that Moon Society members can play in advancing our cause of humans living and working on our Moon is that of educator. Our website at moonsociety.org is a massive store of knowledge about the Moon, and members are encouraged to take some time and delve into topics of interest. Our Theme issues of Moon Miners' Manifesto are particularly helpful in that regard, as is our Lunarpedia wiki.

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

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The public doesn't support Moon exploration efforts not because they are against them, but rather because they just don't know what is possible. The fault for this lies in our education system, in the media, and in our governance. None of these factors are particularly motivated to change the status quo in that regard, in part because the investment needed isn't seen as worth the benefit delivered. Teacher success is measured by standardized test results, not the actual knowledge imparted to their students, so space topics are of marginal interest. If the media doesn't think that publishing more space coverage will increase sales, then they won't cover space topics other than your standard astronomy/big picture astrophysics topics. If politicians think that supporting a Moon base will cost them voters, they won't support a Moon base.

This has broader socio-cultural implications. If retail buyers don't think space products will sell, they won't stock space products. Bookstores will stock a few standard astronomy/solar system books, plus some franchise science fiction, but not books that teach about our Moon (at least above an elementary school level). And as everyone knows, decent space-set films are few and far between, and when they do show up in the market they get limited distribution (Moon, Europa Report, Postcards from the Future, et al). So we're trapped in a vicious cycle of ignorance begetting ignorance.

You can be part of the solution. If you take the time to share your Moon knowledge with your community, you can help stem the tide of Moon ignorance. It might be a talk at your local Rotary Club, or a presentation at your local library. You might have a display at a local science fair. At Astronomy Day, the Greater Fort Worth Moon Society ran a series of exercises in Moon cratering, scale size, and gravity bricks that helped local Girl Scouts earn credit towards their Science STEM patch. Maybe you write a Letter to the Editor of your local newspaper extolling the virtues of cislunar space development.

At a time when our nation is in economic, political, environmental and cultural distress, we need a new story, one that offers solutions to these problems and a path to a better future. We here at The Moon Society know that the exploration and development of the Moon offers many of the solutions we need, but if no one else knows what those are, then of what use is that knowledge?

Please, do what you can to bring the Moon to your community. Share what we know so that we can work towards a better future for our planet Earth. - KM

# **Expanding our Chapter Network through "Joint" TMS/NSS Chapters**

By Chapters Coordinator Peter Kokh

**How it began** – Back in May, 2005, at the annual Memorial Day Weekend International Space Development Conference, held that year in Washington, DC, as newly elected President of the Moon Society, I presented the National Space Society with a proposal for mutual affiliation between NSS and the Moon Society. This document was approved as written without a single change. http://www.moonsociety.org/reports/affiliation\_report.html

NSS had already came aboard as an equal financial sponsor with the Moon Society and the Milwaukee Lunar Reclamation Society of our moonbase simulation exercise at the Mars Society's Mars Desert Research Station outside Hanksville, Utah earlier that Spring.

# The Affiliation Agreement TEXT covering Chapters of NSS and the Moon Society "Moon Society Chapters in the context of our affiliation with NSS

"Our chartered chapters, should they so choose (and if they include 3 NSS members), should be listed on their own in the NSS Chapter list. This would be a plus for NSS which would stand to gain a vigorous chapter in St. Louis, where it now has no organized presence. Others may follow.

#### "NSS Chapters and the Moon Society

"Currently three NSS Chapters are listed on the Moon Society website as collaborating or partnering NSS chapters: (1) Oregon L5 (because of its strong lavatube interest) and (2) the (Milwaukee) Lunar Reclamation Society (because it publishes Moon Miners' Manifesto which has served Artemis Society International, and its successor in membership services, The Moon Society, since 1995) have enjoyed a decade of informal collaboration with the Moon Society. The relationship has no formalities, no requirements, and each NSS chapter is free to define it in whatever pragmatic way they wish. It is about working together on projects, not legalities. Recently, Minnesota Space Frontier Society requested to come aboard in this informal association. We would welcome any other NSS chapters with a strong interest in the Moon to actively collaborate in our projects and various endeavors, again with no legal or formal constraints. See <a href="https://www.moonsociety.org/chapters/">www.moonsociety.org/chapters/</a> for the list."

#### (3) Since then, a major "paradigm changer" - Joint NSS/TMS Chapters

In the summer of 2011, the Clear Lake NSS/Moon Society Chapter (Houston) was formed out of the "debris" of the local NSS and Moon Society chapters, both of which were short key officers, and were otherwise struggling. This merger was negotiated by Marianne Dyson of NSS and Eric Bowen of the Moon Society. The merged chapter has been doing well since then. And NSS has accepted this arrangement.

Noting this, I made a proposal to the Moon Society Board of Directors that the Chapter Rules be changed so that if an NSS chapter had a minimum of two active members who were also members of the Moon Society, the NSS chapter could market or brand itself as serving the Moon Society or "Moon Society members."

Since then, the **Tucson Space Frontier Society** (NSS) – two of whose officers and one other active member where members of the Moon Society. Indeed two of their officers, Ben Nault and Al Anzaldua had served on the Moon Society BOD. And at long last, the Milwaukee NSS chapter, **Milwaukee Lunar Reclamation Society**, publishers of MMM, which has served Artemis Society members since issue #90 in November, 1995, and ASI's successor organization, The Moon Society, from August 2000 forward – at long last, MLRS could brand itself as a joint chapter. Also this year, both **Phoenix** chapters, TMS and NSS have been struggling, and a merged chapter is in the works. And there is more. The Moon Society's strongest chapter, **St. Louis**, eyeing a possible bid for a future International Space Development Conference (2016 is the next open slot), under the initiative of Jim Merriman, who had been a member of the long defunct St. Louis Space Frontier Society, has succeeded in resurrecting that chapter in the past few months. Whether the two chapters will merge is on the table, but has not been put to a vote by the 15 new members of the new NSS chapter there. The St. Louis metro area spans 2 statesL Missouri and Illinois.

We have contacted half a dozen NSS chapters in whose area two or more Moon Society members live, and whose own members already get Moon Miners' Manifesto about the possibility of becoming joint chapters. While there are clear benefits for NSS in this development, the Moon Society stands to gain even more. Visitors to our website who are playing with the idea of joining the Society, and who live in an area where there is a joint chapter, will be more likely to take the plunge

#### In the background

Both the Moon Society and the National Space Society strongly support MMM. Moon Miners' Manifesto began as a product of the NSS chapter in Milwaukee, and within a year was serving NSS' chapter in Seattle. While Seattle pulled out way back, MMM currently serves NSS chapters in Sheboygan (WI), Chicago, Philadelphia, Minneapolis-St. Paul, Los Angeles, Portland, and Denver. Most other NSS chapters do not have a newsletter at all.

Proud of MMM as an NSS product, NSS put the editor on its Board of Advisors, then gave us the prestigious Gerard K. O'Neill Space Settlement Award at ISDC 2009 in Orlando, with a CD of the pdf files of the MMM Classics for the first 20 years included in the registration packets of all attendees. <a href="https://www.nss.org/awards/oneill-award.html">www.nss.org/awards/oneill-award.html</a>

So the climate is very positive for the formation of more "Joint Chapters" from which both Societies stand to benefit. For us in the Moon Society, that means more exposure, more incentive for visitors to join us, as well as more opportunities for the Moon Society to co-support or piggyback on National Space Society initiatives, without any loss of our independence. In Recent years, we have contributed the Moon Track to the annual ISDC.

On ISDCs: When the Moon Society was formed at a convention in Las Vegas in July, 2000, there was some consideration about us starting our own annual conference, with, from our point of view, very overly optimistic expectations of success. Cooperation with NSS at its annual conferences, has been a profitable alternative.

The bottom line – If you are a member of The Moon Society, and live in the Metro Area of an established NSS Chapter – check <a href="http://chapters.nss.org/a/lists/#US\_Chapters">http://chapters.nss.org/a/lists/#US\_Chapters</a> for a list of US Chapters with links to each. There you will find contact information, and consider joining that chapter. Note: you do not have to be an NSS member to join an NSS Chapter. Email <a href="mailto:chapters-coordinator@moonsociety.org">chapters-coordinator@moonsociety.org</a> or <a href="mailto:kokhmmm@aol.com">kokhmmm@aol.com</a> for information about any other TMS members in your Metro Area. Once there are two TMS members who are members of an NSS chapter, that chapter can list itself as a Joint Chapter, or less formally, as "also serving members of the Moon Society." PK

# Introducing the MMM "Cue Images Library"

Those of you who have been members of, or visitors to, our Moon Society Home Page before the current ongoing revision thereof, will remember that every time you visited <a href="https://www.moonsociety.org">www.moonsociety.org</a> you saw a different key image, and when you clicked on it, you got a larger image introducing a topic with a link to a past MMM article.

Well, that feature has not been integrated into the new homepage (not our decision) so we have created the MMM Cue Images Library to preserve it. On this page you will find all the images used previously (to which we will add) and the links to the larger images and articles preserved. This is a great way for new members and visitors to get a glimpse of the wide range of topics we have covered in MMM through the past 27 years!

Go to <a href="http://www.mmm-moonminersmanifesto.com">http://www.mmm-moonminersmanifesto.com</a> and click on top link ":Cue Images Library" and explore. Or directly to <a href="http://www.moonsociety.org/publications/cue\_images.html">http://www.moonsociety.org/publications/cue\_images.html</a>

PK

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

# November Chapters Coutposts 2013

**ORGANIZING "OUTPOSTS"** (an "Outpost" is 2 or more persons not yet formally organized)

Bay Area Moon Society, CA Outpost - South San Francisco Bay <u>http://www.moonsociety.org/chapters/bams/</u>
Contact: Henry Cates <a href="https://www.moonsociety.org/chapters/bams/">https://www.moonsociety.org/chapters/bams/</a>
Contact: Henry Cates <a href="https://www.moonsociety.org/chapters/bams/">https://www.moonsociety.org/chapters/bams/<a href="https://www.moonsociety.org/chapters/bams/">https://www.moonsociety.org/chapters/bams/<a href="https://www.moonsociety.org/

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

#### **ORGANIZED CHAPTERS**

Moon Society St. Louis Chapter - <a href="http://www.moonsociety.org/chapters/stlouis/">http://www.moonsociety.org/chapters/stlouis/</a>

Contact: Robert Perry <u>surfer\_bob@charter.net</u> - Meetings 2nd Wed monthly at Buder Branch Library, 4401 S. Hampton, in the basement conference room - Next meetings - NOV 13 - DEC 11 - JAN 8 - Feb 12

**Note:** The St Louis chapter now has a sister NSS chapter, **St. Louis Space Frontier Society**. It is to be seen whether they remain cooperating sister chapters or a combined Joint Chapter:

October 9th meeting notes: The St. Louis chapter of the Moon Society had their regular meeting on October 9th with Bob Perry, David Dietzler, and Jim Merimann attending. Bob reported that he had participated in three panels at Archon37, the great St. Louis science fiction convention – "Kalpana 1 – a new space habitat proposal", "Asteroid Mining", and "The Commercialization of Space" and manned our display table with Tom Kullman, Rufus Anderson, along with Paul Baldwin and Barry Branham, two members of the rebooted chapter of the National Space Society, the St. Louis Space Frontier (StLSF).

On October 10, Jim Merriman, Amy White, and Bob Perry, sponsored by Paul Baldwin, a member of the American Institute of Aeronautics and Astronautics, attended a presentation by Sandra H. Magnus, PhD, "Perspectives from Space". Sandy is now the AIAA Executive Director after 16n years as a NASA Astronaut. There was a social at the Boeing Prolog Room prior to the presentation in the auditorium of Building 100 of the Boeing complex adjacent to Lambert Airport. Other attendees: Girl Scouts (Sandy is from Belleville, IL, and was a Girl Scout herself.)

On October 16th Rufus Anderson, Chris Nobbe, Amy White, and Bob Perry attended the StLSF meeting at Fallon's Bar and Grill. Paul gave a presentation, "The Universe and the Likelihood of Life", and some business was conducted, The November meeting of StLSF will be held at ArchReactor, a maker space, on the 19th.

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

In October, we celebrated World Space Wkee with a poetry reading. We also distributed posters for WSW.

**JOINT TMS/NSS CHAPTERS** – as of a Moon Society Board meeting on October 16, 2013, NSS chapters with a minimum of 2 active Moon Society members can list themselves as Joint Chapters: **Welcome Milwaukee Lunar Reclamation Society!** (It is fitting that the chapter that puts out MMM, now be listed as also a TMS chapter!)

Clear Lake NSS/Moon Society Chapter (Houston) - http://www.moonsociety.org/chapters/houston/
Contact: Eric Bowen <a href="mailto:eric@streamlinerschedules.com">eric@streamlinerschedules.com</a> - Meeting 7 pm in the conference room of the Bay Area Community Center at Clear Lake Park - Even # months: DEC - FEB ? - APR ? - Jun ?

NSS/Moon Society Phoenix Chapter - <a href="http://nssphoenix.wordpress.com/">http://nssphoenix.wordpress.com/</a> - c/o Mike Mackowski. Meeting 3rd Saturdays monthly at HSGP Community Center, Mesa, 627 W. Rio Salado Parkway. - Mike Mackowski. Our Saturday, October 26th Lava Tube field trip: Lava tubes exist on the Moon and Mars (and Arizona!) and have been proposed as habitat locations for future off-planet settlements. To get an idea of what these lava tube caves look like, the Phoenix chapters of the Moon Society and NSS joined up with the local chapter of the American Institute of Aeronautics and Astronautics for a 1.5 mile round trip through a cave near Flagstaff.

Note: the NSS/TMS Phoenix merger is as of now only informal. A formal merger is likely.

Tucson L5 Space Society - <a href="http://www.tucsonspacesociety.org/">http://www.tucsonspacesociety.org/</a> Now serving Moon Society Member Contact: Al Anzaldua - Meets monthly, every 2nd Saturday, 6:30 PM

Milwaukee Lunar Reclamation Society - <a href="http://www.moonsociety.org/chapters/milwaukee/">http://www.moonsociety.org/chapters/milwaukee/</a>
Now serving Moon Society members. Contact Peter Kokh <a href="https://www.moonsociety.org/chapters/milwaukee/">http://www.moonsociety.org/chapters/milwaukee/</a>
Now serving Moon Society members. Contact Peter Kokh <a href="https://www.moonsociety.org/chapters/milwaukee/">https://www.moonsociety.org/chapters/milwaukee/</a>
News on page 16.

Meeting the 2nd Sat. of the month (ex. July, August) Mayfair Mall Garden Suites East Room G110,1-4pm

### GREAT BROWSING LINKS

#### SPACE STATIONS + COMMERCIAL SPACE + TECHNOLOGY

http://www.space.com/23090-astronauts-caves-mock-space-mission.html

http://www.space.com/23162-nasa-sunjammer-solar-sail-test-complete.html

http://www.space.com/23230-spacex-falcon9-reusable-rocket-milestone.html

http://beforeitsnews.com/space/2013/10/dream-chaser-crash-landing-called-a-non-flight-issue-2468406.html

http://www.space.com/23160-cygnus-spacecraft-unloaded-international-space-station.html

#### CARTH

http://www.space.com/23336-earth-water-origin-asteroid-impacts.html

#### moon

http://www.space.com/23308-nasa-moon-laser-communications-record.html

www.space-travel.com/reports/Russia\_could\_build\_manned\_lunar\_base\_999.html

http://www.thespacereview.com/article/2201/1 (Golden Spike news)

http://www.space-travel.com/reports/China unveils its first and unnamed moon rover 999.html

http://www.space-travel.com/reports/Mission to moon will boost research and awareness 999.html

http://www.space.com/23244-moon-origin-sample-return-missions.html

http://www.space-travel.com/reports/Crowdfunded\_Lunar\_Spacecraft\_Reaches\_Funding\_Milestone\_999.html

#### MARS

http://www.marssociety.org/home/press/announcements/ma365-call-for-volunteers

http://www.marsdaily.com/reports/Russia\_to\_Make\_Second\_Attempt\_at\_Mars\_Moon\_Mission\_999.html

http://www.space.com/23316-europe-mars-rover-test-drive-exomars.html

 $Mars\ Origin\ of\ Some\ Meteorites\ \underline{www.jpl.nasa.gov/news/news.php?release=2013-298\&cid=release\_2013-298\&cid=r$ 

www.marsdaily.com/reports/Scientists\_discover\_how\_the\_atmosphere\_of\_Mars\_turned\_to\_stone\_999.html

#### ASTEROIDS + COMETS

http://www.space.com/23103-triple-asteroid-shape-amateur-astronomers.html

http://www.space.com/23344-asteroid-threat-earth-united-nations-response.html

http://www.space.com/23320-japan-test-fires-space-cannon-hayabusa2.html

http://www.space.com/23112-russian-meteor-explosion-meteorites-cosmic-crashes.html

http://world.time.com/2013/10/16/meteorite-pulled-from-russian-lake-one-of-worlds-biggest/

http://phys.org/news/2013-10-comet-ison-green.html

#### OTHER PLANETS + MOONS

http://www.space.com/21622-russia-europe-jupiter-probes.html

http://www.spacedaily.com/reports/Cassini\_finds\_ingredient\_of\_household\_plastic\_on\_Saturn\_moon\_999.html

http://www.spacedaily.com/reports/Cassini\_Gets\_New\_Views\_of\_Titans\_Land\_of\_Lakes\_999.html

<u>http://www.ciclops.org/view\_event/195/</u> (unusual terrain around Titan's Lakes)

http://www.space.com/23091-haumea.html (Dwarf Planet Humea beyond Pluto)

#### EXO PLANETS + ASTRONOMY + ASTROBIOTICS

http://www.spacedaily.com/reports/prnewswire-space-news.html Exo-planet's Patchy Clouds

http://www.space.com/23143-lonely-alien-planet-discovery.html

#### EDUCATION + OUTREACH + MEDIA

Dock a Soyuz Capsule to ISS - <a href="http://www.spacedroider.com/?p=soyuzSim">http://www.spacedroider.com/?p=soyuzSim</a>

37 ways to participate in Space Exploration - <a href="http://spacehack.org">http://spacehack.org</a>

http://www.esa.int/Our\_Activities/Human\_Spaceflight/Education/Robot\_challenge\_unload\_a\_spacecraft

www.marssociety.org/home/press/tms-in-the-news/

 $\underline{french mars society conducts successful artificial gravity demonstration}$ 

# GREAT SPACE VIDEOS

www.space.com/23346-asteroid-threat-cutting-through-red-tape-to-save-the-world-video.html http://www.space.com/9933-touring-jupiter-big-moons-io-ganymede-europa-callisto.html DIY Drones by Peter Diamandis https://plus.google.com/+PeterHDiamandis/posts/7uJ3BXxDxL6 Early 3-D printing on the Moon - http://vimeo.com/25401444

# GREAT PHOTOS

# SpaceX Hits Huge Reusable Rocket Milestone with Falcon 9 Test Flight (Video)

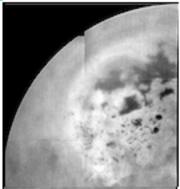


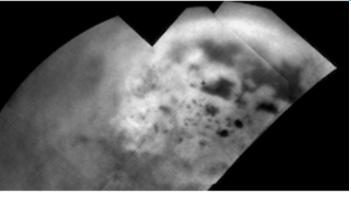
http://www.space.com/22994-spacex-falcon-9-rocket-launch-test-photos-california.html



The last Apollo Mission, 17 - Harrison Schmitt walks back to the rover to return to the LEM for takeoff

#### Cassini Finds Unusual Terrain within Titan's North Polar Lake District





White areas around dark lakes: salt flats? <a href="http://www.ciclops.org/view\_event/195/">http://www.ciclops.org/view\_event/195/</a>

"Always Bite off more than you (think you) can chew!" (you may be surprised!)

"The best way to predict the future is to be busy inventing and creating it.

"Always listen to experts. They'll tell you what can't be done and why. Then do it." - Heinlein
"Only those who risk going too far can possibly find out how far one can go." T. S. Eliot



# 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-X (1-11): http://www.moonsociety.org/publications/fiction/MMMSSS.pdf

#### Chapter XII:

Marshall Mike Moondust scanned the cavern around him. It was a beehive of activity with preparations underway for a full-scale invasion of the Lunar cities. All around him modified mining equipment was lining up to exit through the huge airlock at the far end of the cavern. Ahead of him, the freight elevator to the surface that would seal his doom loomed ever larger with each step. On each side, Earther thugs had a grip on his arms, hands cuffed behind his back, indifferently guiding him to a choking, gasping death in the Lunar dust.

Overhead, a crane passed by carrying a load of cargo. Mike had an idea. He suddenly gathered his feet below him and jumped into a back flip. The surprised Earthworms lost their grips on his arms and stumbled back. Mike, meanwhile, had landed on his feet and proceeded to launch into a herculean jump straight up. He used his time in the air to curl up and bring his arms hands to the front, and them hooked the cuffs on a passing crane. The Earthers might be stronger, but Selenians knew the gravity of their home intimately, and were gymnasts in ways that Earthers couldn't conceive.

Mike swung his legs up and wrapped them around the cable and then unhooked his hands. Flipping around, he quickly climbed the cable to the girder on which the crane rose, and swung himself on top. Down below, he could see the Earthers working their comm systems, and Mike knew he didn't have much time to make good his escape. He scampered across the beams to a dark part of the cavern and worked on getting the cuffs off. Doing so gave him time to reassess the situation.

Below him, the tempo of operations had clearly increased, and parts of the cavern were emptying out. Was it more important to contact the Lunar Guard and warn them of the impending invasion, or to take the opportunity to stymie efforts of the malefactors? Maybe he could do both...

The ping of a ricochet brought Mike back to the present, and he quickly spotted some guards taking aim at him. He decided that the cavern was getting too risky to stay in, and started running along the girders in the direction of the freight elevator, bullets ricocheting around him. He leapt from the nearest girder to the elevator's support frame and started climbing up and around it in short leaps and bounds.

Reaching the top, his danger only increased. Climbing into the tunnel, he saw below him the freight elevator slowly ascending. If they couldn't shoot him they meant to crush him! Mike scrambled up the access ladder as quickly as he could, but still the elevator drew closer and closer. Reaching the first airlock door, Mike hoped it would automatically open as the elevator approached, but wasn't counting on it. Tearing the cover off the control panel next to the ladder, Mike started crossing wires in the hopes of shorting the door open, or at least confusing the computer around any overrides.

Finally, with a soft hiss, the airlock opened and Mike clambered inside. He quickly reached up behind his head and unlatched the emergency helmet and swung it up over his head, praising the inventor as he did so. Early on, folks on the Moon had realized that helmet faceplates were a weak link in survival on the Lunar surface. A bad jump could easily result in a cracked faceplate, and engineers were constantly searching for a solution, usually in the form of stronger and stronger materials. Eventually, someone came up with the idea of a back-up helmet that was little more than a plastic bag mounted in the neck ring of the spacesuit. In an emergency, someone on the surface could press a button and the bag would emplace itself within the helmet and provide a temporary seal. For someone in an airlock accident, the bag could be manually emplaced to provide a very temporary helmet, with its own 15-minute air supply. Mike set the alarm on his wrist unit accordingly.

As the elevator continued its inexorable progress towards him Mike turned his attention to the control panel on the outer airlock. If he timed it right, he could open the outer doors while the elevator cage was passing through the

inner doors. If he was right, the opening of the outer doors would trigger the automatic closure of the inner doors, which would jam on the elevator. The resultant venting of the cavern should be spectacular, if he survived to see it.

With a click, the outer doors started opening, and Mike was immediately buffeted by a torrent of air that quickly turned into a gale. He desperately grasped the access elevator as he was blown against the opening outer door. As he expected, the inner doors were trying to seal, but were blocked by the elevator, which was buckling under the effort. As the outer door finished opening Mike was flung up onto the surface. Rolling to a stop he looked around for cover. He scurried behind a work shack and looked back at the airlock, which had turned into a fountain of gases and small equipment spraying into the Lunar sky.

Mike was certain that alarms were already sounding at Lunar Guard headquarters. Remote sensing spacecraft in orbit would have immediately noted any kind of large scale venting of gases as evidence of a crisis. Mike was also certain that the source of the venting would not be at any location marked on the Lunar Guard's maps. Any close-up look at the area would immediately reveal the flotilla of vehicles headed towards Armalcolopolis and other Lunar cities. Still, he activated his suit's emergency beacon and headed into the work shack to look for a proper helmet. As the outer door opened, he saw the flicker of a laser sight on the plastic bag, and a moment later he could feel the air escaping his lungs. Time was up!

Will Mike survive the sniper's sneak attack? Will the cities of the Moon be warned of the impending attack? Can the madman be thwarted in his efforts? Tune in next month for the next thrilling chapter of Marshall Mike Moondust and the Subtle Selenian Subterfuge!

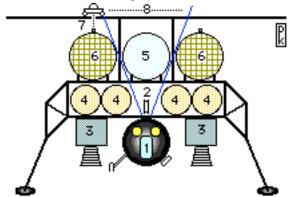


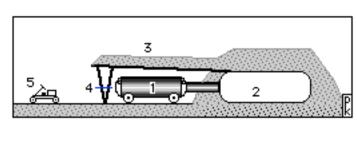
"MMM Speak"- New Words & Old Words with New Meanings http://www.moonsociety.org/publications/m3glossary.html

Amphibious Space/Surface Vehicles - In ordinary usage, an animal that is at home both in the sea and on the land is said to be amphibious. An Amphibious Vehicle on Earth means a craft that can ply the seas as well as land like the "Duck" of World War II familiarity. Here we apply it to a space craft that has an extendable chassis that allows it to drive on the lunar surface after landing.

See "The Lunar Hostel" and the term "Hostel" (in the glossary)

The **Frog** version is one designed for repeated use both in space and on the lunar surface where its use would be confined to trips between the landing-launch site and a lunar surface habitat with which it would dock, sharing systems aboard the craft with which the waiting habitat had not been provided.





**KEY Left Above:** 1 Frog (detachable mobile crew cabin) wheel on right retracted, wheel on left extended 2 Winch to lower/raise frog 3 Main rocket engines 4 Fuel tanks 5 Oxidizer tanks 6 Cargo pods 7 Overhead crane/winch for cargo 8 Central clear-vision area for top viewport navigation

**KEY: Right Above:** Frog vehicle docked/coupled to Hostel under shielded open-vac canopy for duration of crew visit. 1 Frog - 2 Hostel - 3 Canopy - 4 EVA airlock - 5 Open-vac rover

MUCH MORE AT SOURCE: www.moonsociety.org/publications/mmm\_papers/hostels\_paper1.htm (+ ......2.htm)

Are(o)zoogenic Preserves – (1) areas on Mars where it is suspected that native microbial life forms may still subsist; (2) areas on a rejuvenated Mars with a more favorable climate, in which Mars-hardened life forms from Earth might first take hold

# **NSS Chapters that share Moon Miners' Manifesto**





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

#### **WISCONSIN**



#### **MLRS - Milwaukee Lunar Reclamation Society**

PO Box 2101, Milwaukee, WI 53201 - <a href="https://www.moonsociety.org/chapters/milwaukee/">www.moonsociety.org/chapters/milwaukee/</a>

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

PRESIDENT/MMM EDITOR • Peter Kokh NSS 414-342-0705 - kokhmmm@aol.com

VICE-PRESIDENT Doug Armstrong NSS (414) 273–1126
SECRETARY – Charlotte Dupree NSS (262) 675–0941 grdupree@charter.net

• James Schroeter (414) 333–3679 – james schroeter@vahoo.com

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

Meeting place changes for some dates: On November 9 we will meet down the hall in room G150.

 $\sqrt{\ }$  The December 14th meeting, our annual Anniversary/Holiday special, will be in room G110 as usual  $\sqrt{\ }$  Bring a food dish or beverage to share.  $\sqrt{\ }$  Our movie, "" starts at 2pm. We expect a good crowd.  $\sqrt{\ }$  This would be a good time to bring a friend or two along!

#### **WISCONSIN**



#### SSS - Sheboygan Space Society

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

c/o Will Foerster 920-894-1344 (h) <a href="mailto:astrowill@frontier.com">astrowill@frontier.com</a>
SSS Sec./Tres. c/o B.Pat Knier <a href="mailto:dcnpatknier@gmail.org">dcnpatknier@gmail.org</a>
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: - DEC 14 (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 3<sup>rd</sup> SAT monthly - NOV 18 - DEC 21

**OASIS NEWS AND EVENTS** 

Nov. 16, 3 pm OASIS Board Meeting, Home of Steve Bartlett & Tina Beychok, 7108 East Peabody, Long Beach, Dec. 14, 3 pm OASIS Board Meeting Home of Bob Gounley and Paula Del Fosse, 1738 La Paz Road Altadena, CA

#### **CALIFORNIA**



#### SSDS - San Diego Space Society

8690 Aero Drive, Suite 115, #77, San Diego, CA 92123 - http://sandiegospace.org

#### **COLORADO**



**DSS: Denver Space Society fka Front Range L5** 

1 Cerry Hills Farm Drive, Englewood, CO 80133

Eric Boethin 303–781–0800 <u>eric@boethin.com</u> – Monthly Meetings 7:00 PM on 3rd Thursdays, 7 pm Englewood Public Library, Englewood, CO 80110 – 1000 Englewood Parkway, First Floor Civic Center NEXT MEETINGS: NOV 21 – DEC 19 – JAN 16

#### **ILLINOIS**



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

#### **MINNESOTA**



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

MNSFS NEWS - All

**OREGON** 



ORL5 - Oregon L5 Society - <a href="http://www.OregonL5.org">http://www.OregonL5.org</a>
PO Box 86, Oregon City, OR 97045

(LBRT - Oregon Moonbase) moonbase@comcast.net

Meetings 3rd Sat. each month at 2 p.m. - Big Dog Coffee, 107 Molalla Avenue, Oregon City, Oregon Regular Meeting 3 pm 3<sup>rd</sup> SAT monthly - NOV 18 - DEC 21

#### **PENNSYLVANIA**



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

The NSSPASA Report for October 2013

**Special Events notes**: Mitch did two public outreach events within a week of each other in early October. The first was the long awaited SEPTA Market Street East Concourse outreach activity. He and Steven were able to talk to a number of people from the city and the suburbs due to the prime location they had. This was a five hour event from early afternoon to seven in the evening. He has pictures!

The other event again involved Steven, who is a center city resident, but in the University City area on October 10 during Space week. Drexel and University of Pennsylvania are just two of the education institutions in the "City." This was in front of the U. of P. Book store and Barnes and Noble. The University supplied a tent, a table, and, several chairs. Mitch has developed two poster boards to inform the passers by and to illustrate various talk—

Check out the MMM Theme Issues - http://www.moonsociety.org/publications/mmm-themes/

ing points (and as conversation starters), which worked in the concourse event. The wind was up at the U. of P. location so the poster boards where laid out on the table for safety. Mitch again took pictures and described the incisive questions that the college students and academics asked. Great job Mitch and Steven.

I should note that Mitch has worked out arrangements for these events that took about a year, thanks in part to Hurricane Sandy, and involved getting the proper forms from the authorities and being able to provide the proper references to them (they asked for photo I.D.s. to be allowed to do the outreach) especially for the Concourse event. Our group's next event will be participating at the Philcon Convention. Starting on November 8 we will have a table (confirmed by Dotty and Larry) in the Dealers Room, several panel appearances that will include science and philosophy discussions from the Chinese space program to the need for humanity to experience a new frontier beyond this world.

Dotty and Larry where not present this time but went to the **Capclave Science Fiction Convention**. Todd Dashoff, of the Philcon committee, was there as well and confirmed our place at the convention noted above. Dotty called with a post event report saying that there where several interesting panels at this event held in Maryland. They will join us again at Philcon. Hank was away on business and Philcon prep where he volunteers.

Mitch brought his new display material and easels (that he and Dennis Pearson donated for our outreach activities) as well as the November/December issue of the Futurist (World Future Society) that included a quick description of interesting reports from the publication in 2013. There were several articles related to space exploration including one from the Jan/Feb issue on Astronauts Shielding Up to Explore the Other Planets, and, a later piece in the "In Brief" section on the great advantages that fusion power would have as the power source for space-craft. First you get an Acme Mr. Fusion power module.... O.k. we have been waiting for this for two generations. Maybe after the laser driven sails are in place\:\text{we can make the sails and these can be launched from Earth).}

Mitch will be talking to Drexel University about another outreach event before the end of the year. We also discussed the use of models for the Habitat we have been talking about for several months now. The use of Google images of landscapes came up again and there was some talk of using Shapeways companies iconic building models, both standard size and progressively scaled down, as part of the Habitats interior fill along with cutouts and pictures to create the impression of depth and potential reality for the audience. The building designs would be found on Thingyverse And Mitch also brought something for the astronomy buffs and all of us who look up: Discover for Fall 2013 had a detailed write up on Comet Ison which will be visible by the time you read this. I have read a comment that this one will be visible in the daytime! And finally: Mitch, Rich Bowers, Michelle and Earl have seen "Gravity" and all recommend it.

Earl brought a number of references with a number involving producing objects via some form of 3D printing: there was a report on choosing which technology to use, and when, if you have an idea that you created C.A.D. files to describe (Medical Design Technology for October, article by Gus Breiland of Proto Labs). From Today's Medical Developments for October we have: The 3DP/AM Revolution. There are several points in the article about how these technologies can be used to solve problems in medical equipment and surgically implantable devices. The legal issues involved with who owns what part of the things developed in this field, and the technologies that make them possible, are addressed. The report is by Patrick J. Comerford and Maureen T.F. Reitman .

When we go out from Earth something like the 3D printer and equipment for additive manufacturing will go with us. The uses include the subject of the articles for repairs of the space travelers when injured and tools that they may need going to, and exploring, other planets. To drive this point of these technologies being important for future space exploration is "Applications for gradient metal Alloys Fabricated Using Additive Manufacturing" from NASA Tech Briefs for October. There are a number of interesting pictures and examples of why additive manufacturing is very useful in building spacecraft, and other product components or complete assemblies. The crafting of alloys with desired properties as you travel through the object under study, which gives you best performance for the mass you are allowing for, is really neat (0.k., it's geeky to consider this property of additive manufacturing "cool", but it could also be looked on as making a space probe manufacturable). On the subject of buildable small satellites and upcoming launches; The Amsat U.K. Funcube should be up by the time this is printed (launch in November) and the fleet of small satellites created by Zack Manchester, and funded via Kickstarter crowd funding, will be going up in January. Amazing stuff! I looked on the Kickstarter website and found a number of efforts to get small satellites of several designs, including PocketQubes and SkyCube. Check out the sites and see if you want to put money into any of these. Or if you want to build a ground station! 0 Submitted by Earl Bennett, President, NSSPASA.

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MILWAUKEE LUNAR RECLAMATION SOC. ● \$15 low "one rate" to address above

MINNESOTA SPACE FRONTIER SOCIETY ● \$25 Regular Dues

**OREGON L5 SOCIETY** • \$25 for all members

O.A.S.I.S. L5 (Los Angeles) • \$28 regular dues with MMM

#### PHILADELPHIA AREA SPACE ALLIANCE

• Annual dues with MMM \$25, due March or \$6 per quarter before the next March

SHEBOYGAN SPACE SOCIETY (WI) • \$15 regular, • \$10 student/teacher/friend • \$1/extra family member Individual Subscriptions outside participating chapter areas: • \$15 USA • \$25 Canada;

US \$55 Surface Mail Outside North America - Payable to "LRS", PO Box 2102, Milwaukee, WI 53201