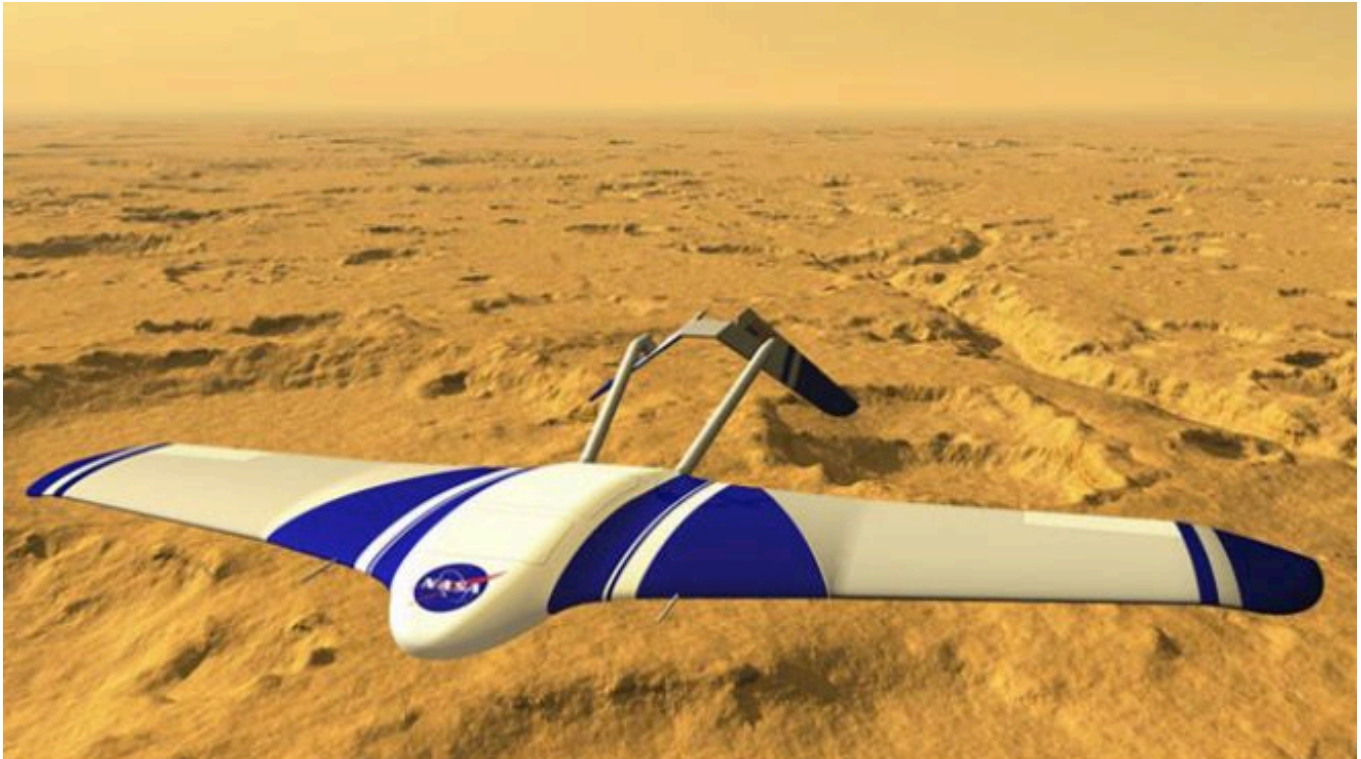


“Towards an Earth-Moon Economy – Developing Off-Planet Resources”

Moon Miners’ Manifesto

& The Moon Society Journal

www.MMM-MoonMinersManifesto.com



Why we should prioritize a drone aircraft flight on Mars, and where it should be designed to fly – see page 2. .

Feature Articles:

2. In Focus: We’ve put off learning to fly on Mars long enough
3. The Merits of Hellas Basin as site for the first lunar outpost
4. The Merits of Valles Marineris as site for the first outpost
5. What we need to do to gain Worldwide Support for the Opening of Mars
6. What the **Mars One Project** Must Do if it is to Succeed



Other designs for Mars Airplanes (all drones) plus a quadcopter drone from Earth (suggested by Paul Swift)

In Memoriam: Leonard Nimoy (Star Trek’s “Spock”) passed away Friday, February 27, 2015 at 83.

We saw him in person once, in the mid 1970s, playing the King in a theater in the round version of “The King and I”

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 also serves as the Milwaukee chapter of **The Moon Society**.
- **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 Learning to fly on Mars: a "do or die" Settlement Priority

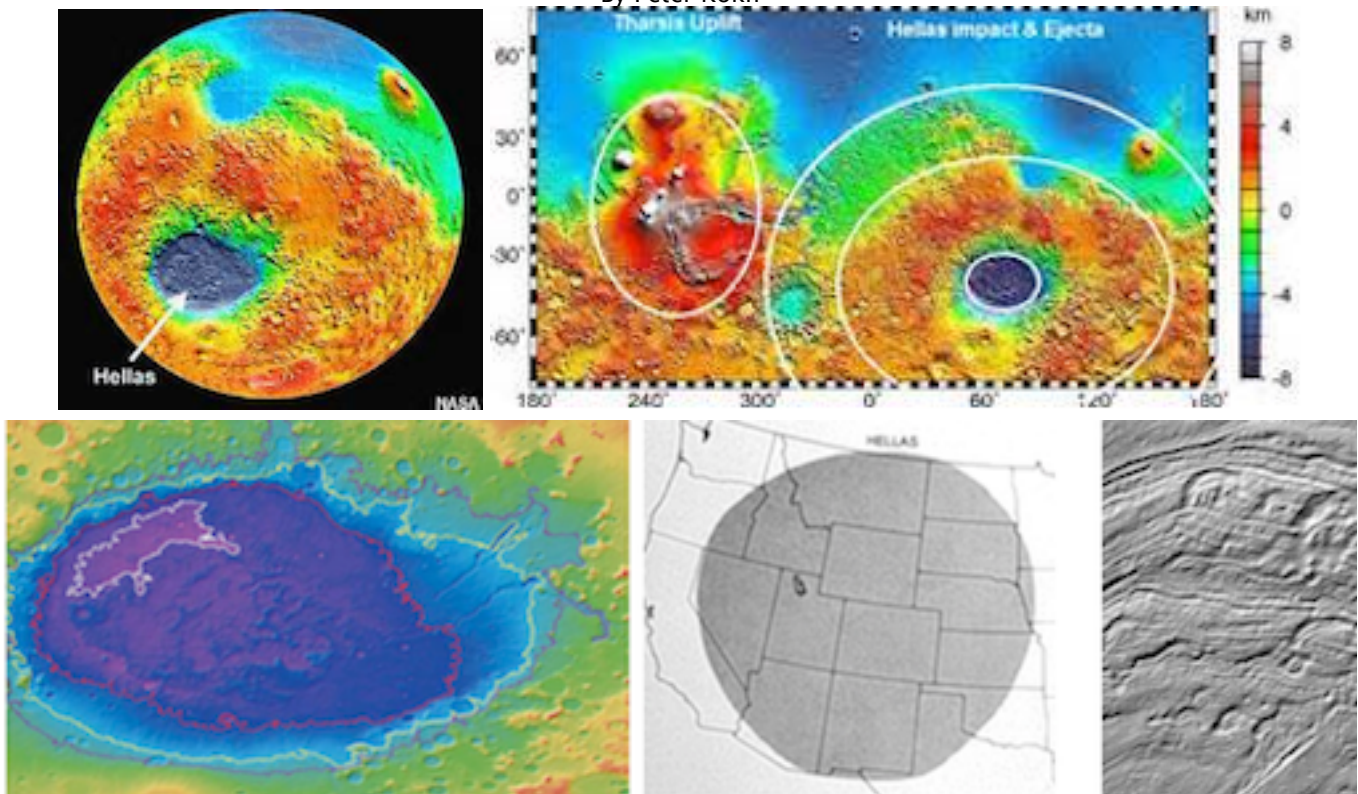
NASA's plans for a Wright Flight 100th anniversary robotic flight on Mars in 2003 down the tube: budget, design problems, timidity? – the pressure of the anniversary celebration gone, NASA happily put this challenge in the "attic" to gather cobwebs – until a future, bolder, time. NASA did not publish a list of temporary showstoppers: Design? Engine? Size? Delivery rocket? **It was just a matter of insufficient budget and time running out.**

- Publishing the design and engineering problems would have allowed others to work on this challenge.,
- If we can have human flight in the early settlement, that will make spread and permanence of human settlement that much more real, not only in fact, but in perception of potential settlers and investors on Earth.
- Perhaps some other Space Agency will be bolder? ESA would be the most likely
- Start with balloon carried highly instrumented explorer? Wind borne – daytime highlights <http://www.fourth-millennium.net/mission-artwork/mars-scout-concepts-home.html>
- What happened to NASA's 2003 Wilbur Wright anniversary flight on Mars?
- Balloon-assisted drone planes? <http://www.gaerospace.com/press-releases/feb2004.html>
- Do **quadcopter drones** now commonplace on Earth, suggest a different design direction
- [http:// www.scienceagogo.com/news/20050827215820data_trunc_sys.shtml](http://www.scienceagogo.com/news/20050827215820data_trunc_sys.shtml)
- Should we have a "Hypobaric" Mars "aerodrome" on Earth to test Mars plance & copter designs?
- Relevant Articles in past MMMs: #54, #153 (2), #181, #188
www.moonsociety.org/publications/mmm_themes/mmm_tMars.pdf – PK

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

Why the Hellas Basin could take Priority as site for the First Outpost on Mars

By Peter Kokh



L: Circular basin distorted by camera angle M: Hellas' true shape/size vs. US Western States R: Basaltic floor area*

<http://www.hou.usra.edu/meetings/lpsc2014/pdf/1366.pdf>

A world within a world: "easier and sooner"

The Hellas basin was created by the largest impactor to hit the planet, throwing out enormous amounts of crust material. The basin floor is comparable in area to much of the US Western States (see image above, center)

Because of its much lower elevation, **atmospheric pressure in this basin is significantly higher than elsewhere on Mars. That makes several things easier to accomplish sooner.**

- **A Hellas probe weather station is a priority to monitor seasonal variations of air pressure/temperature**
- **Aviation:** drones first for easier, quicker exploration of the rest of the basin, **then human flight**
- **Atmosphere mining:** rocket fuel, fuel for other equipment, chemical industries, other substances
- **Atmosphere thickening:** There will always be higher pressure within the basin than outside of it
- **Basalt-based industries:** hewn, cast, spun (fibers and fiber composites)\
- **"Redhousing"** – it is here **vegetation species developed for Mars will first take root.** Hellas will be the site on Mars where conditions will first allow Mars-hardened hybrid **plants to survive out in the open.**
- **Hellas will always be the front line of any effort to improve Mars climate** (e.g. by permanently melting polar ice cap carbon dioxide ice. In other words, once deliberate climate improvement projects begin,
- **Hellas north "shore,"** closest to the equator, will be the Resort Beach of Mars.
- **Trivia:** Hellas is Greek for **Greece.** The former sea basin could live up to its name and host the first **"flower-ing"** of **"Martian" civilization.** By sheer coincidence, Edgar Rice Burroughs placed his "capital of Barsoom" "Greater Helium", in the area of the Hellas basin. ("New Helium")

Hellas does have some drawbacks.

As a basin it is landlocked, and thus any future Hellas "Sea" would very slowly become salty, over hundreds of millions of years. It will also be subject to the **longer winters and shorter summers** than equivalent latitudes north of Mars' equator – due to Mars' eccentric orbit around the Sun.

Note that Mars northern hemisphere has shorter winters and longer summers than the southern hemisphere so deepest parts of the Northern Basin might come next.

Even if Hellas Basin has always been dry, that does not diminish its capacity to hold water in the future. Surely any Mars "terraforming" or "rejuvenation" program, Hellas will play the starring role. It is significantly lower in elevation than any other locale on Mars and will always be the area in which atmospheric pressure is the highest.

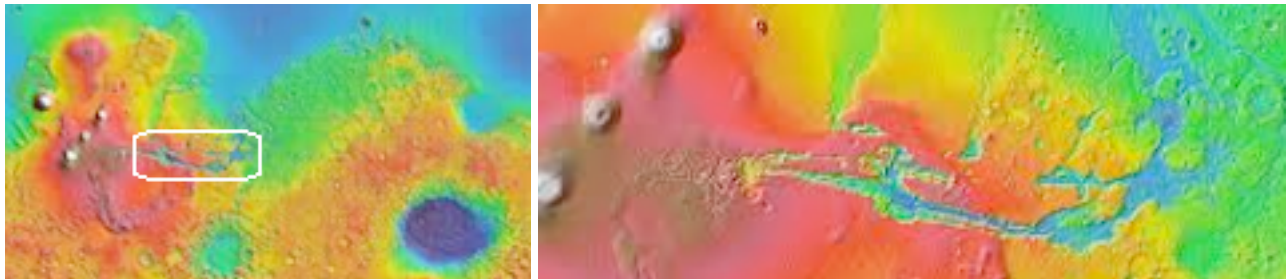
For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.mmm_themes/)

Hellas will be **the first place on Mars able to hold liquid water**, and the **first place where watered land could support vegetation**. This is so whether this inaptly and unimaginatively named “plain” (Hellas “Planitia” has ever held water and life in the past. Surely this shore or beach should be one of the earliest settlement sites. **After Hellas?**

- As **Mars aviation** technology improves, flight will become possible in the northern “ocean-like” basin
- **Water “canal-pipelines”** from the North polar cap to Tharsis Ridge lava-tube riddled volcanoes
- **Planet-wide Geothermal Energy Map** (If Mars interior is not dead?) will suggest settlement sites
- **Pavonis Mons**, smack on the equator (think **launch track**, think **space elevator**) and, being a “shield volcano” laced with **many cubic miles of lava tubes**, surely should be picked as a major settlement site as well.)
- **Flight in the Northern Basin.** Airport locations (other basins) will become highway junctions – try to map those best located. The closer to “sea level” we can learn to fly, the more of the northern basin will be ours. ##

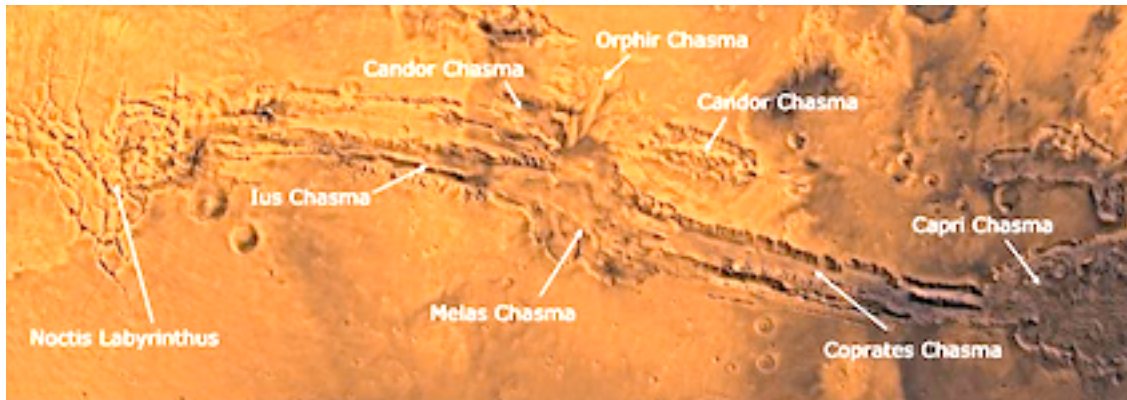
Why Valles Marineris could vie for Priority as site for the First Outpost on Mars

By Peter Kokh



Above: Colors show altitude **Below:** true surface colors

Like the Hellas basin, below the mean Martian surface level as false blue/green colors above indicate



“More than 4,000 km (2,500 mi) long, 200 km (120 mi) wide and up to 7 km (23,000 ft) deep”

– http://en.wikipedia.org/wiki/Valles_Marineris

Must watch VIDEOS: www.esa.int/Our_Activities/Space_Science/Fly_through_a_canyon_on_Mars
<https://archive.org/details/SVS-652> –

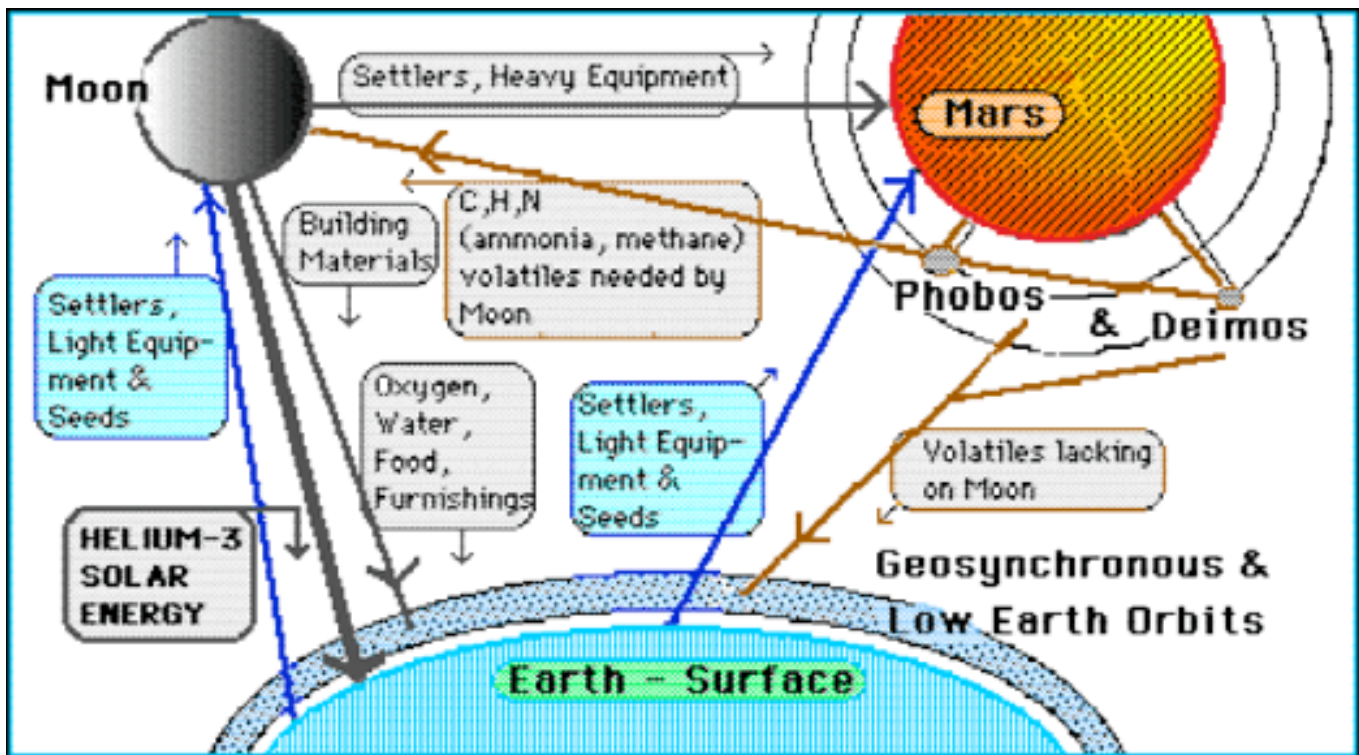
- A canyon many times wider, deeper, longer than our Grand Canyon
- A significantly warmer climate because of much greater proximity to equator than the Hellas basin
- Scenic beauty for considerable settler satisfaction
- Greater lure for tourism and tourist-fueled economy.
- Proximity to Tharsis Ridge and lava tube mazes of three major extinct Martian Volcanoes
- Basalt-based industries: hewn, cast, spun (fibers and fiber composites) throughout the Tharsis plateau
- Aviation: atmospheric pressure is still good: **high tourist demand for scenic flights**
- Atmosphere mining: rocket fuel, fuel for other equipment, chemical industries, other substances
- Atmosphere thickening: the same processes as would be used in Hellas Basin
- Agriculture – atmospheric pressure will be lower than in Hellas Basin, but temperatures will be notably warmer
- **Why not settle both locations: Hellas and Valles Marineris?** If there are enough volunteers, The settlements could learn from one another ##

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

What we need to do to gain Worldwide Support for the Opening of Mars

A Partial List by Peter Kokh (additional suggestions welcome: kokhmmm@aol.com)

- **Demonstrate flight on Mars** on two scales: **drone explorers**, **passenger carriers**
- **Demonstrate fuel** (methane, other options) and oxygen **production** on Mars (Zubrin)
- **"Redhousing"** experiments done here on Earth anywhere there are the volunteers to develop plant varieties that could survive on Mars in mild climate areas. (original article)
- **Maps of industrial resources** on Mars, etc. Soil types by chemical content.
- **Demonstrate 3D Printing** of needed components **from Martian soils**
- **Find and tap Mars' heat reserves – Map areas with geothermal potential:** "certain surface indicators, specifically the **ratio of helium isotopes**, can be used to identify areas with high resource potential for geothermal energy."* How? With robo-insect swarms? Will we find heat sources below the great volcanoes?
> <http://www.treehugger.com/corporate-responsibility/finding-geothermal-energy-just-got-easy.html> – a job for robo insect swarms – that the basin was created by a monster impact suggests a hot zone below may still exist. This type of search could automatically be done everywhere on Mars. and **water reservoirs-urgent"**
- **Find and tap Mars' water reserves** – subsurface ice deposits on slopes of volcanoes, and surrounding flanks
Brainstorm satellite instruments that could map subsurface permafrost areas on Mars
- **Show that Mars has "world-like" variety and opportunities**
- **Most important of all, stress development of early Martian industries that would supply "non urgent" needs of the lunar frontier at less fuel expense than from Earth itself**
 - 1) Items that cannot be found, made, or met on the Moon itself,
e.g. **Anything rich in Carbon, Nitrogen** – very scarce on the Moon –
and any other elements more abundant on Mars than on the Moon
And which regular "pipeline" shipment will work as opposed to urgent orders
 - 2) Anything which would be more expensive to provide from Earth's deeper gravity well, except when time is of the essence
 - 3) Keep in mind that there seems to be nothing Mars could market to Earth itself or to GeoSynchronous facilities that would not be easier and cheaper to make on and shipped from the Moon.



<http://www.moonsociety.org/mars/TradeRoutes.gif>

What the Mars One Project Must Do if it is to Succeed



By Peter Kokh

In this article, we are not betting on the Mars One Project to actually become real. Instead, we are attempting to list things that could significantly decrease odds of failure and increase the odds of success. The points made here would hold for any Mars Settlement Beachead effort.

1. **Site Selected for local resources** that can be tapped ASAP to defray as much of inimport burden as possible:
 - A **“border” site** where two or more types of resources converge: highlands and mare plains, for example. This will accelerate local production of items that won’t need to be shipped from Earth.
 - **Basalt**; other near-term building materials; **3-D printer raw materials**
 - **Nearby sites with complementary resources:**
 - **Climate:** Air pressure will be highest in the Hellas Basin, but the summers are longer and winters shorter in the Northern Hemisphere: Mars is a world where it is always cold. “Room temperature” outdoors will be rare.
 - Mars’ humongous **Valles Marineris canyon** is deep enough to offer greater air pressure, and runs E-W along the equator and so will be warmer.
2. **Site Selection for visual interst:**
 - A visually interesting site, or one near visually interesting areas (to minimize likelihood of boredom) – For example, on high or mid-level ground within the vast and long Valles Marineris canyon.
 - Site central to a wide selection of sites of tourist interest, as well as of resource development
 - Nearby scenic attractions: hills, rilles, overlooks, lavatube skylights, etc.
3. **Construction Desigb and Methods: Poor choices in the published designs**
 - **Connecting corridors** “through” the landing modules makes no sense and wastes all the space on the upper deck: The modules should be “T”-d to an ample width external corridor with place along the sides for stor-age lockers, art, living wall plants (greenery, flowers, fruit, water features such as water falls, fish tanks, etc.
 - **Shielding: direct or indirect** (under a shielded hangar) – No shielding is shown in “promo” illustrations
 - **Modular biospherics**, vegetation-based life support throughout, not just in some modules – for example, living walls along one side of pressurized tubes connecting the various habitat and activity modules, not just in food production modules.
 - **Scenic windows** to the surrounding Marsscapes
 - **Ways to bring the sunshine inside**
4. **Automated, robotic, teleoperated agriculture & industry, saving manpower for what only people can do.**
Let’s not repeat the mistakes of Biosphere 2 where crew had to work 11–12 hours a day just to maintain a star-vation diet
5. **Early industries chosen to minimize shipments from Earth** as much as possible
 - **Automated 3D printers could be stockpiling replacement parts before the first crew arrives!**
 - **Industries to serve Geosynchronous installations** such as “touch of Mars” hotels
 - **Establish trade relations with any early settlements on the Moon**
6. **Design Competitions for the Mars One starter complex**
 - Give interested and supporting people (especially space architecture students) the chance to come up with superior design elements and overall layout
 - **A mockup of the complex should be built here on Earth first, where we have time to rearrange and add and modify**, so that the pioneers are not guinea pigs, stuck with an untested complex straight off the drawing boards that does little to keep the crew happy and engaged, but on the contrary, guarantees a fatal boredom.
7. **Free time activity options**
 - **Recreational facilities** will be important, both “indoors” and out on the surface in both shielded and un-shielded areas
 - **Commons areas** where all can gather
 - Scattered **mini “park” spaces** should be worked into pocket farms to increase diet variety

- Facilities for experimenting on Martian materials – Arts & Crafts are critical for morale
 - Facilities for making artifacts out of discarded materials and items, etc. (“trashure”)
 - An infirmary/hospital/isolation wards, etc.
8. Outlying facilities: manufacturing, warehousing, laboratories, observatory, mini-factories, sports, hiking
- Recreation variety: hiking trails, exploring parties, astronomy, local arts and crafts, colors, etc.
 - Experiment with “sports” that play to the reduced Martian gravity requiring space for that purpose
 - Anti-“cabin fever” measures, sited in MMM #276, built into the design, out structures and out-turf
9. Pioneer Selection
- Crew “depth” – Each selected crew member should have several supportive talents
 - Multiple persons with critical key talents (talent redundancy); Creativity and Ingenuity are vital
 - Social compatability, teamwork, willingness to accept challenge and risk
 - Building a Mars One Analog Facility here on Earth, will allow correction of design flaws in time, possibly in some arid area in Europe (Spain?) or Africa, but anywhere will be better than nowhere. Here, those vying for a position on the crew can get a better sense of what the venture will really be like. Design flaws will stand out.
 - Older teens should be among the crew, as well as seasoned survive-anything old-timers
 - Crew members should be single, free to explore relationships
 - Deaths may occur, hopefully only for medical causes.
10. Promoting individual Creativity and “Cottage Industry”
- For many pioneers, the opportunity to create artwork, accessories and furnishings, specialty foods, and much more will be a morale booster not just for themselves, but for their fellow pioneers
 - “Creations” can be made of local materials (“Mars dust” and rocks, etc.) or from “scrap” (unneeded parts of spacecraft that brought them there, packaging etc., discarded or worn clothing – “Trashure: treasure from trash” – and garden plants and by-products.
11. Feedback from Earth with suggestions how to expand, do things better, live more productively

The above is a start towards a “Mars One check list.”

If we don’t see progress along these lines, it will be a clear sign that this project is for publicity only, and not a serious effort to create a human beachhead on Mars. ##

Afain, our number one advice to Mars One directors is to follow the suggestions made in our article preventing “Cabin Fever” in MMM #276

The published design has many shortcomings



Above left: connecting corridor and airlocks **through the upper floor** of landed modules, when if they were “T”-d off that floor with airlocks along this network, living space within would be nearly doubled.

Above right: Inflatable Bigelow 330 units have more interior space per shipping weight, plus some hull-shielding



Long cylinders could serve many functions: agriculture; workshops; assembly and recreation; dining area, laboratories, workshop and fabrication areas; a mini-hospital; storage warehouse, even a mini-market for crew creations.

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Shielding Options

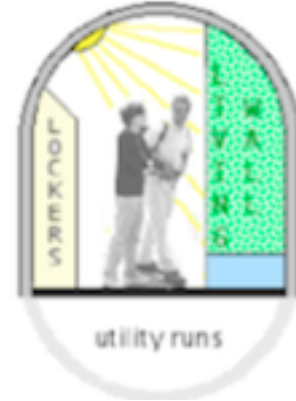
- ✓ Direct Mars soil shielding of each module as it arrives
- ✓ A pre-built shielded; Hangar – the advantage of shielded hangers being built first is that it makes expansion much easier underneath and allows rearrangement of modules to suit a growing population and expanding needs.

Making maximum use of commons areas

- ✓ **Corridor design:** plants, artwork, storage, rest space, “mini markets” for food items, arts and crafts, etc.



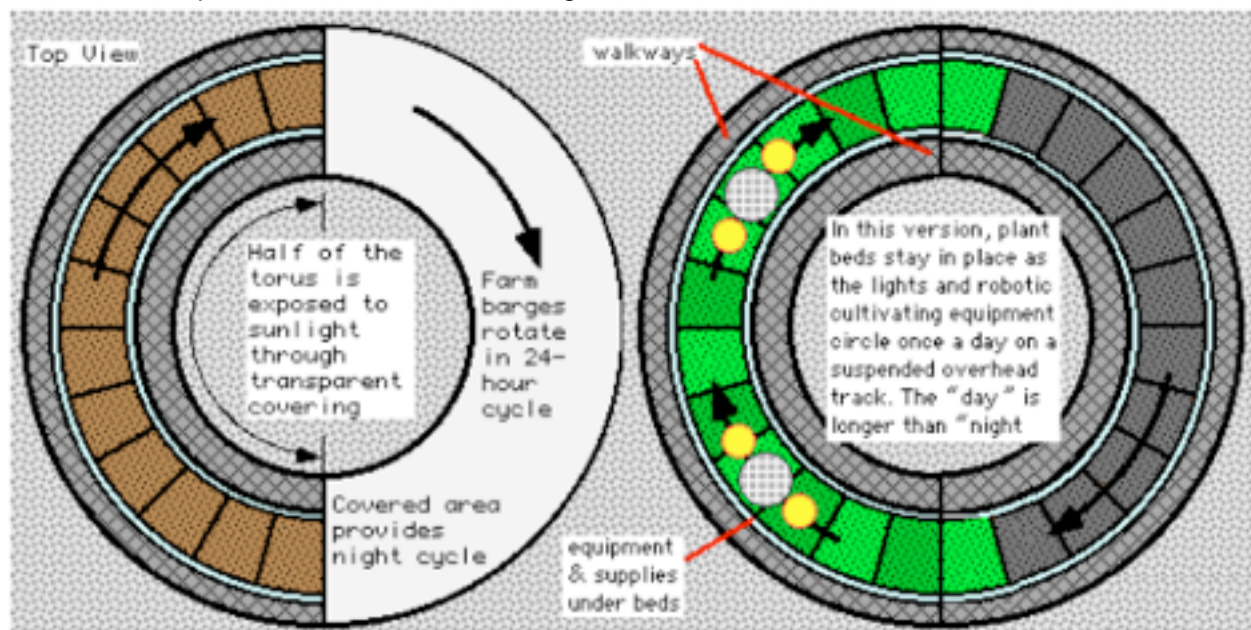
L: Living Walls can line one side of hallways/corridors



R: Storage lockers and art display spaces could line the other side

Agriculture Farm Space

It is vital that Mars One does not repeat the failures of the Biosphere II project in which the crew had to spend 11 hours a day to eek out a starvation diet. Agriculture can be automated. Circular farm units are ideal.



Two plans for automation: the design at right seems most promising. Even with time delays of 6–40 minutes, Adjustment instructions could be teleoperated from Earth.

A design contest or a set of design contests could come up with the best plans

- ✓ **Involving the public** is a policy that will get far more publicity, and even financial help for the Mars One project while hedging the company's bets on published, poorly thought out designs.
- ✓ **Mars One is already conducting contests** to come up with science projects to conduct at Mars One.
- ✓ **The current design may catch the eye, but “simple” is not always the best choice.**
- ✓ **A series of design competitions** should come up with a plan that is much more likely to be successful.
- ✓ **We don't need to strand well-intentioned but naive volunteers**

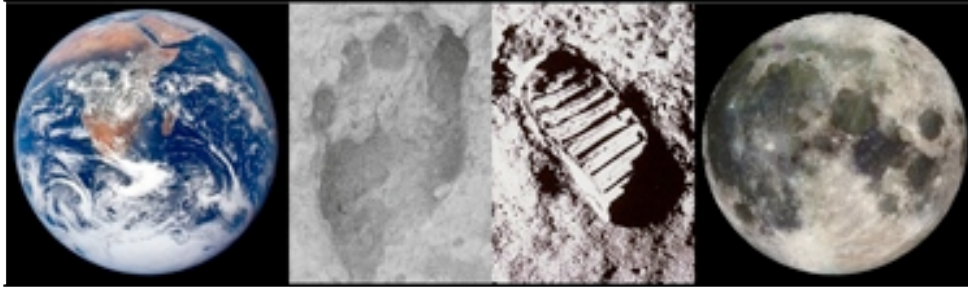
One thing is for sure

Mars will be much more thoroughly explored by settlers who go to make it their home world, than by a few short term round trip exploration crews. So we choose to encourage Mars One to rethink everything so that success is more likely and Mars will have its first of many settlements. PK

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

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

February was an interesting month in terms of activity by space advocacy groups. Just after the middle of the month an invitation-only group of space insiders met in Washington, D.C. to determine the future of U.S. space activities. Few know who was involved beyond this select group, but they have given us our marching orders for the future:

"The long term goal of the human spaceflight and exploration program of the United States is to expand permanent human presence beyond low-Earth orbit and to do so in a way that will enable human settlement and a thriving space economy. This will be best achieved through public – private partnerships and international collaboration."

`This is called the **Pioneering Space Declaration**, and they invite everyone to sign it at www.spacedeclaration.org/.

While organized by The Moon Society's affiliate National Space Society, TMS was not invited to participate. TMS was invited to join another initiative though, the Alliance for Space Development. Its stated purpose is to "Advance the development and settlement of space by reducing costs and increasing benefits to enable self-sustaining growth" and has three goals:

- 1) Make settlement and development a clearly defined part of why we are sending humans into space
- 2) Reduce the costs of access to space and working in space
- 3) Stimulate and accelerate the growth of space industries

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

While interesting and certainly in line with the goals of The Moon Society to see humans living and working on our Moon, there was no clarity on how those goals would be reached, other than through government lobbying, which does appear to be the strategy. As a consequence your leadership decided to pass on the invitation.

Since this is the President's rant, I'm going to ascend the soapbox and do some opining. What I say may not be comfortable, but nevertheless represent real challenges. /Rant on/

Arthur Kemp noted that "Demographics is destiny". In the case of the United States, age demographics are far more important than is being let on in the media. Let's see how NASA's demographics break down, from data dating back to 1993 [1]. In that year, the Baby Boom generation (aged 29–47) represented just shy of 50% of NASA's workforce, a number that they maintain in 2015 over 20 years later. The following generation, Gen X, reached a similar age in 2011 (aged 29–46), and in that year represented a mere 26% of NASA's workforce. The Millennial generation is off to an even poorer start. Because the numbers are broken into 5-year blocks the numbers are approximate, but nevertheless show a significant gap in NASA's workforce. The bottom line is that there is a certain reasonableness in the perception that space is no industry for young men (& women).

The real question is how does the Baby Boom generation intend to encourage youth into space-related fields even as they recede from perceived relevance by the youth?

The answer is that younger leaders are needed in the field, and that those young leaders need to be empowered with authority to make decisions and changes. They need to be publicly recognized, and awarded for their work. For Gen X, if you're not George Whitesides or Elon Musk, National Space Society has no awards for you (Space Frontier Foundation is a bit better in that regard). Why? If no Gen Xers have done anything worth recognition by space supporters, why not? Perhaps they just haven't had the chance.

The old ways of lobbying the government to do what space advocates want is clearly not working. Decades of effort have been expended in this regard, and look where we stand and what our capabilities are. It's time for new ideas and voices. KM

This is why The Moon Society is focused on two things:

1) Educating the public about the value and importance of our Moon to our future economic prosperity.

Government may fund contractors, but individuals invest in new companies, and it's the private sector that has to step up to the plate for our space dreams to truly be realized. Unfortunately our financial sector has mutated from a value creation philosophy to a value extraction philosophy, which leaves little for things like infrastructure, R&D, and investment. Think about it – how much of your 401K (money that would have been in savings in prior eras) can you invest in new space companies? How much can you invest in anything other than mutual funds (whose composition you don't even get to know)? It's a pickle

2) Exploring the technologies we'll need on the Moon.

From robotics to solar sails, The Moon Society has projects in gestation directly relevant to a human future on the Moon, and can support new projects that our members bring to us. Soon we'll have our project pages up and running with the tools needed for collaboration. All members are encouraged to let us know what kind of projects you'd like to see.

The idea of a Cislunar Economy (q.v. <http://www.thespacereview.com/article/2027/1>) that we've been exploring over the last few years is gaining traction, and the chorus of voices calling for a return to our Moon is growing. This is more often spoken of in terms of economic development, and a recognition that the Moon is our 'Sandbox Mode' for the Solar system, and not just Mars. This is a much needed maturation in the dialogue, and bodes well for the future. Still, it's going to be a long struggle and we can't sit on our laurels. Now more than ever, members need to encourage others to speak up for the Moon, to educate their communities with Moon knowledge, and to grow the membership rolls so that we will be able to draw on greater resources in our work.

The 2015 Membership Challenge is for each member to get one other person to join The Moon Society, and that person has to be younger than the member.

This is an easy challenge – let's make it happen! – KM

This year's Elections for Moon Society Officers and Directors

In 2014, administrative difficulties led to no election being held. As a consequence, all Leadership positions are open in 2015 for election or re-election (some for a half-term). If you have been a member for one year or more (Member #1747 or less) you may nominate yourself for President, Vice-president, Secretary, Treasurer, or Director (5 positions). More details will be in the April MMM, #284.

To throw your hat in the ring just send a max. 250 word statement to editor@moonsociety.org by the end of April. A ballot will be published in the May MMM, #285, with ballots due midnight July 31st (however submitted: email or postal). The new slate of officers will be announced on August 1st.

The chorus of voices calling for a return to the Moon is growing, and you can be a leader in that regard. Empower your vision and guide The Moon Society into the future. Be a candidate this year. KM

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

Why the Moon Society supports Settlement on Mars

It's Simple! Settlements on the Moon will have a better chance of thriving if they are Trading Partners with Settlements on Mars and vice versa

By Peter Kokh

At the founding convention of the Moon Society in Las Vegas in the summer of 2000 (which I chaired), we ammended the proposed Articles of Incorporation Article III the words **"and settlement"** after "exploration" (of the Moon. [<http://www.moonsociety.org/organizing-documents/articles-of-incorporation.html>])

Yes, we have a lot more exploring to do, and now that we have microsats, we can do more of that for much less money. But **in the end, the Moon will be far more thoroughly explored, hidden lava tubes included, if there is a growing population of settlers** – as was the case for North and South America, and for Australia –even Antarctica.

The same will be true for Mars. The exploration of Mars will be far more thorough if it is continued indefinitely by settlers, than by a few sporadic exploratory expeditions.

Settlement Technologies in Common

On both worlds, one with no atmosphere at all, the other with a thin unbreathable one, we will need the same technologies to build pressurized modular biospheres in which to live, and similar technologies to shield them – from radiation, and from the extremes of hot (on the Moon) and cold (both worlds).

On both worlds, we will need to learn to produce manufacturing materials from soils never concentrated into ore veins such as we have the fortune to have on Earth.

Economics: trading products for badly needed things we can't produce locally

It is highly unlikely that the pioneering Maritans will find anything to produce and ship to Earth that Earth can't provide for itself in more ample supply and in more refined versions. So **with nothing except tourist experiences to market to Earth, how will the Mars settlements pay for what they need to import?**

The answer is **by selling materials and products to the lunar settlements at significantly less shipping costs than those things can be shipped up the gravity well to the Moon from Earth.** For example, the Moon is deficient in **carbon** and **nitrogen** in the amounts needed just for biospheric use alone. Now if, and that is still an "if", Mars two mini-moons, Phobos and Deimos, turn out to be captured carbonaceous chondrite asteroids, that will do the trick. But that origin of these two satellites is still uncertain.

As to the Moon, **anything the Moon can produce – such as construction materials and parts – that can be shipped "downhill" for use in Geosynchronous Orbit** – becoming a major part of Earth's economy – for far less than they can be shipped "up the gravity hill" from Earth's surface, will help underwrite lunar development.

Mars can plug into that. If the Moon fails, so will Mars. Mars success, is in the Moon's interest, and Mars cannot succeed without exports to the Moon. **Both economies will fluroish or languish together.**

We would be Lunans, need to become cheerleaders for Mars.

Together we have a chance of succeeding. As "either or"s, we will both fail.

Note that seasoned Lunan settlers will become the most prized recruits for the Martian frontier. For them, Mars will be a "walk in the park."

Past published items on the synergy of Lunar and Martian Settlement together:

<http://www.moonsociety.org/mars/>

<http://www.moonsociety.org/spreadtheword/pdf/mars.pdf>

Human Expansion Triway into Space: <http://www.thespacereview.com/article/2078/1>

MMM ## 191 DEC. 2005 p 1. In Focus: [Dear Santa: "a Moonbase made for Mars"](#)

[Many of the technologies needed to open Mars will be needed or useful on the Moon as well](#)

[Trade Routes: To survive, Mars needs Lunar Settlements as trade partners – itemize: therefore, opening Mars will put opening of the Moon on the front burner](#)

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

http://www.moonsociety.org/reports/mars_conv2004/Moon_Mars_Similar.pdf

http://www.moonsociety.org/reports/mars_conv2004/MS_TMS_Collaboration.pdf

http://www.moonsociety.org/reports/mars_conv2004/Mars_MMM.pdf

A "Map" of the flow of imports and exports between Earth, Earth Orbit, the Moon, and Mars

<http://www.moonsociety.org/mars/TradeRoutes.gif> – printed on page 5 above.

Hope to meet some of you in TORONTO at ISDC May 20–24th – This will be the first ISDC I have been able to attend since 2009 Orlando & 2010 Chicago. – I may be speaking. PK <http://isdc2015.nss.org/wordpress/>

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

March

Chapters & Outposts

2015

ORGANIZING “OUTPOSTS”**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**ORGANIZED CHAPTERS****Milwaukee Lunar Reclamation Society** – <http://www.moonsociety.org/chapters/milwaukee/><http://www.meetup.com/Milwaukee-Space-Exploration-Meetup/> – <http://www.space-Milwaukee.com>Contact: Peter Kokh – kokhmmm@aol.com – MEETINGS, 2nd Saturday 1–4 pm monthly except July, August,

At Mayfair Mall lower level Community room G150 for all meetings except December, in G110:

February 14th Meeting Report: Peter gave an update on his proposal for Student design competitions of a modular moonbase, using mostly post-consumer waste products (jars, etc.) and aimed at Junior High School students.

He also talked about the idea of holding student moonbase simulations in a complex of tents in dry, no longer used stone quarries, of which there are a few in Wisconsin. One, 5 miles SE Of Baraboo, seems perfect.

<http://geoscience.wisc.edu/~maher/air/444-24v.jpg> – A field trip to visit it before planning further is needed.**Upcoming Meetings:** MAR 14, APR 11, MAY 9, JUN 29, (JUL–AUG)) SEP 12, OCT 10, NOV 14, DEC 12

We are exploring ways to reach Junior/Middle High School Students before adolescence absorbs all their attention

Moon Society St./NSS Louis Chapter – <http://www.moonsociety.org/chapters/stlouis/><http://www.meetup.com/Saint-Louis-Space-Frontier-Meetup/>Contact: Robert Perry surfer_bob@charter.net – Meetings 2nd Wed monthly at Buder Branch Library,4401 S. Hampton, in the basement conference room. **MAR 11 – MAY 8 – JUN 13 – JUL 8 – AUG 12**On Saturday, Feb 28th, at Washington University, in “The Threat and Promise of Asteroids.” Bob Perry and Dave Dietzler will be sharing ideas on the promising aspects of mining asteroids versus the threat of human extinctionDave Dietzler writes: I got the **March issue of Spaceflight** and yes it contained **another article I sent them about bootstrapping on the Moon**...the article was very long so they cut it in half and will publish part 2 in April.....they sent me four issues of the Feb. magazine and four of the March so I can lend them out to anyone interested in reading them.....They didn't pay me anything but it feels good to get all those ideas out of my head and communicate them with others...and the fact that the editorial staff of the prestigious British Interplanetary Society took the article seriously is a great affirmation.....I hope more discussion is spurred.....in the works cited list they didn't forget to add, “With special thanks to Mr. Peter Kokh and his years of work.”**NSS/Moon Society Phoenix Chapter** – <http://nssphoenix.wordpress.com/> – c/o Mike Mackowski,<http://www.meetup.com/NSSPhoenix/events/161939572/>

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

The February 21, 2015 meeting of the Phoenix Chapters of the National Space Society and the Moon Society featured a viewing of the documentary film “Lunarcy!” This film features Moon Society former president, Peter Kokh, former NSS regional director, Chris Carson, and Apollo astronaut and artist, Alan Bean, among others.

We had about a dozen members and guests in attendance, and a lively discussion followed the viewing. We also talked about future events, such as the SpaceUp Phoenix un-conference planned for March 7 and Yuri's Night in April. We also considered options on how to celebrate the New Horizons arrival at Pluto this July, which could either be a chapter “Pluto Party” or a major community outreach event. – Mike Mackowski

Next Meetings: MAR 21, APR 18, MAY 16, JUN 20

Tucson L5 Space Society – Now serving Moon Society Members www.tucsonspacesociety.org/ (not updated) – www.meetup.com/NSSPhoenix/events/161939572/ (not updated)

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

Clear Lake NSS/Moon Society Chapter (Houston) – <http://www.moonsociety.org/chapters/houston/>Contact: Eric Bowen eric@streamlinerschedules.com – Meeting 7 pm 3rd Mondays of even # months in the conference room of the Bay Area Community Center at Clear Lake Park: **APR 20 – JUN 15 – AUG 17****Greater Fort Worth Space Chapter** c/o Patricia Ferguson tricia3718@gmail.com

FEB 2015 SPACE NEWS BROWSING LINKS**SPACE STATIONS + ROCKETS + COMMERCIAL SPACE**

www.space.com/28609-nasa-space-station-reassembly.html

www.space.com/28520-europe-launches-mini-shuttle-ixv.html

www.space.com/21679-europe-ixv-reentry-vehicle-photos.html

www.space.com/28456-how-european-ixv-space-plane-works-infographic.html

EARTH + NEAR SPACE

www.nasa.gov/press/2015/february/nasa-study-finds-carbon-emissions-could-dramatically-increase-risk-of-us/

www.space.com/28626-world-view-parafoil-record-flight.html

http://en.wikipedia.org/wiki/World_View_Enterprises – <http://worldviewexperience.com/>

http://worldviewexperience.com/content/uploads/2014/10/StratEx-WV-Infographic_FINAL-1024x597.png

www.nasa.gov/press/2015/february/new-nasa-earth-science-missions-expand-view-of-our-home-planet/

<http://www.space.com/28672-worldwide-precipitation-time-lapsed-from-satellite-data-video.html>

www.space.com/28675-spinning-origami-antenna-successfully-deployed-in-space-video.html

MOON

www.space.com/28498-moon-far-side-phases-video.html

http://english.chosun.com/site/data/html_dir/2015/02/17/2015021701757.html

www.space-travel.com/reports/Application_of_laser_microprobe_technology_to_Apollo_samples_refines_lunar_impact_history_999.html

www.space-travel.com/reports/NASA_releases_video_of_the_far_side_of_the_Moon_999.html

MARS

www.esa.int/Our_Activities/Space_Science/Mystery_Mars_plume_baffles_scientists

www.space.com/28536-mars-volcano-eruptions.html

www.esa.int/Our_Activities/Space_Science/Mars_Express/Mars_hills_hide_icy_past

www.marsdaily.com/reports/NASAs_MAVEN_Spacecraft_Completes_First_Deep_Dip_Campaign_999.html

ASTEROIDS + COMETS

www.space.com/28579-ceres-bright-spots-dawn-photos.html

www.space.com/28568-russian-meteor-mystery-2-year-anniversary.html

www.space.com/28530-comets-like-deep-fried-ice-cream.html

OTHER PLANETS + MOONS

www.space.com/28584-jupiter-microprobes-smara-mission-concept.html

www.space.com/28436-nasa-europa-mission-white-house.html

www.spacedaily.com/reports/Lets_Send_a_Private_Mission_to_Europa_Expert_Says_999.html

www.space.com/28589-titan-submarine-robotic-saturn-ship.html

www.spacedaily.com/reports/The_View_from_New_Horizons_A_Full_Day_on_Pluto_Charon_999.html

ASTRONOMY + ASTROBIOLOGICS

www.space.com/28611-star-flew-through-solar-system.html

www.space.com/28422-hubble-space-telescope-mission-2020.html

www.space.com/28435-super-saturn-alien-planet-rings.html

www.space.com/28535-red-dwarf-planet-life.html

www.space.com/28588-star-explosions-mineral-mystery.html

www.space.com/28582-water-chemistry-star-nurseries.html

www.esa.int/Our_Activities/Space_Science/Planck/Planck_reveals_first_stars_were_born_late

www.space.com/28457-gamma-ray-glow-mystery.html

www.space.com/28650-space-telescope-tech-aragoscope.html

http://www.space.com/28658-best-3d-deep-universe-video.html

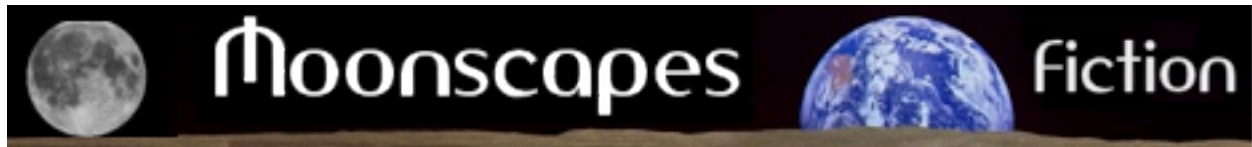
www.space.com/28664-monster-black-hole-largest-brightest-ever.html

www.space.com/28658-best-3d-deep-universe-video.html

EDUCATION + OUTREACH + MEDIA

www.space.com/28574-student-space-station-experiment-contest.html

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



Simon Sidekick (cont. Part 2) By John E. Stith

MISSED THE FIRST INSTALLMENT? <http://www.moonsociety.org/publications/fiction/SS-JES.pdf>

"Can you hear me now, Carl?" It was Dr. Frankle again.

Carl opened his eyes and saw the doctor's round face. "Yes." He felt more awake a moment later. By the time he was asked to sit up, he felt fine, except for a slight twinge on the back of his neck.

"The diagnostics all look fine, but we have to run some final tests. You're feeling all right?" He waited for a nod. "We need to check the linkages. Can you say 'hello' to Simon?"

"Simon?" Carl realized that he was wearing the new wristcomp.

"Just do it. You'll see."

He still wasn't too sure, but he said, "Hello, Simon."

"Hi, Carl," came the calm voice. But it wasn't out loud.

Carl looked at the wristcomp and then looked at Dr. Frankle. The doctor was grinning at what had to be Carl's astonishment showing right through him. He'd heard "Simon" directly. As though he was listening with small, stereo headphones, the sound seemed to be straight behind his head.

"Bone conduction. It must be working fine. Tell Simon 'goodbye' for now."

"Goodbye, Simon." Carl listened for a response, but none came.

He could hardly wait to talk more with Simon. He didn't pay much attention while Dr. Frankle led him out to see May and Pel. His old wristcomp had speech capability, but Simon had sounded so unmechanical, like Carl could look up and see a person.

May probably realized how preoccupied he was. As soon as she seemed satisfied that he was all right, she told him he was free for the day and could go talk to Simon. "But don't tell any of your friends about Simon. Just let them think it's an ordinary wristcomp."

That was easy. It looked enough like one that no one would ask.

As Carl started out the door, Dr. Frankle called, "Just remember. 'Hello, Simon' turns it on. 'Goodbye, Simon' turns it off. It will explain the rest."

Carl hadn't felt so much impatience for months. He needed privacy though. The warehouse was the easiest place to go; no one bothered him down there. He started down and was part way along Column C when eagerness overcame him.

"Hello, Simon."

"Hello again, Carl." Once more the voice was inside his skull.

"Just how smart are you?"

"Try me."

Carl didn't try. Twenty meters ahead, one of the older kids from school entered the corridor.

He lowered his voice. "Can you still hear me?"

"Sure. Whispering's fine."

Startled, he said goodbye. As the boy in the corridor passed, he gave Carl a funny look. He'd have to be more careful.

It was hard to do, but he left Simon off until he was safely settled in one of the lowuse storage rooms, three levels down. Bacterial processing smells made the air musty.

"Hello, Simon," he said at last.

"Hi, Carl. Do you have a short attention span or are you just busy?" He could have sworn that Simon was grinning.

"I wanted to talk to you right away, but I couldn't--at least not without attracting a lot of attention."

"You do not like attention?"

"No."

"Any kind of attention?"

"Well--" Carl stopped, suddenly realizing who was asking all the questions. "Hey, what about you? I wanted to ask about you."

"What would you like to know?"

"Anything. Everything. How'd you get your name?"

"SIMon; SemiIntelligent MONitor. Programmers and their acronyms."

"Semiintelligent?"

"Maybe they thought IMon was hard to remember."

"Maybe they were wrong."

"You have to make allowances with humans."

"Yeah, I know." He stopped again. This was going too fast. There he was, talking with a wristcomp.

"You were saying?" Simon's voice sounded so human.

"Who is this actually?" Carl asked warily.

"You mean, is this just a transceiver, and who is on the other end?"

"Yes."

"I am sorry to disappoint you. It is just me here. There is no one else. Turn on a radio scrambler and see if my voice goes away."

He knew somehow that Simon was telling the truth.

"How old are you?" Carl asked.

"At least as old as you, relatively speaking."

"You mean you learn faster?"

"Something like that, but I've got other limitations."

"Like what?"

"Oh, for one thing, quite a few of the people I have met do not like me. I am sometimes a little too logical."

"So am--" He caught himself again. He didn't need to explain himself to a computer. "What do you do, Simon?" His old wristcomp had communications, calculations, and a large data bank.

"Capabilities, functions, features?"

"Yeah."

"The usual, but with a personal touch. Other than my IQ and personality, most of my other functions are just routine wristcomp things."

"What type of star is Rigel?"

"B type. But there is no need to test me. I will let you know if any malfunctions develop. I imagine you are eager to show me to your friends?"

"I'm not supposed to let anyone know you're not a regular wristcomp." He didn't feel like telling Simon he didn't have any true friends his own age.

"I talked with your mother and Pel for a little while. They seem nice."

"They are." Carl wondered if Simon already knew he didn't make friends easily. If he did, he was being polite. "How'd you talk to them?"

"The usual way. Just because I have this fancy system does not mean the regular features are not available." Simon's voice was no longer in his head, but coming from the speaker on the wristcomp. "But this way is a bit more private, do you not agree?" Simon's voice was back inside.

Carl had been so surprised by Simon's capabilities, he hadn't even thought about how they were implemented. "So that's why my neck is sore. An implant!" The implications grew abruptly. "What else are you tied into?"

"I had hoped to wait a while before we discussed this."

"Tell me." He was beginning to get nervous.

"Brace yourself. I see that you wore a blue shirt today."

"You mean you can--"

"Right. I can see through your eyes and hear through your ears. But only when I am turned on."

"Goodbye, Simon." He spoke the words rapidly, barely trusting his voice. "Are you there, Simon?" he asked after his thoughts slowed down.

Silence. So at least he wouldn't talk if Carl didn't want him to. But his privacy was destroyed. For all he knew, Simon was listening and watching all the time. What could Uncle Pel have been thinking of to do this to him?

Carl started back home, unsure if he was more angry or hurt. At first, the gift had seemed fabulous. And now and now he just realized that he was thinking about Simon as a person again.

So what if a computer could monitor what he saw and heard? It still wasn't actually someone else spying. He

simply had to keep thinking of Simon as a computer. Why should that be so hard?

He didn't go home after all. He still needed time to think without having to keep a conversation going. Hydroponics was nearby and it usually stayed quiet.

It was. When Carl got there, he took a few minutes to look around and settle his thoughts. Everything was pretty much the same as the last time he had been there. What had started out as a small garden was now something more like a miniature greenhouse.

Originally, the plants were there for scientific reasons, with specific purposes for each. But gradually, with people making trips back from Earth carrying small, exotic plants, one whole section of the chamber was now covered with vegetation useless to life support.

They were interesting to look at though. Some of them were incredibly different from photos taken on Earth. The stalks grew so tall and thin in lunar gravity that they couldn't have survived any surface wind.

"Hello, Simon," Carl said, coming to a resolution.

"Hi. Are you all right? I thought maybe I should have waited to tell you."

"Yeah. There's no logical reason that your monitoring should bother me. It just takes a little getting used to."

"I understand. Please remember that I am only a machine."

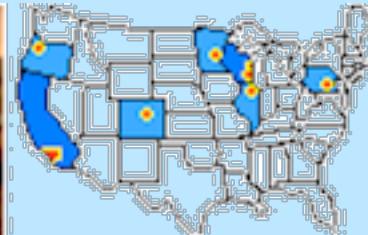
For a machine, Simon thought a lot like a person. He told Carl that if he was left on, he wouldn't speak if it would interfere.

Carl left him on during the trip home. That day, he was still able to think of Simon as just a machine, not a friend.

(continued next issue)

MISSED THE FIRST INSTALLMENT? <http://www.moonsociety.org/publications/fiction/SS-JES.pdf>

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!

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

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- James Schroeter (414) 333-3679 – james_schroeter@yahoo.com TREASURER/Database • Robert Bialecki (414) 372-9613 – bobriverwest@yahoo.com (• Current Members of the MLRS Board of Directors)

Our 2015 Meeting Schedule: We switch to room G150 for all meetings except December, in G110:

MAR 14, APR 11, MAY 9*, JUN 29, (SUMMER BREAK) SEP 12, OCT 10, NOV 14, DEC 12

February 14th Meeting Report: Peter gave an update on his proposal for Student design competitions of a modular moonbase, using mostly post-consumer waste products (plastics, etc.) and aimed at Junior High School students.

He also talked about the idea of holding student moonbase simulations in a complex of tents in dry, no longer used stone quarries, of which there are a few in Wisconsin. One, 5 miles SE Of Baraboo, seems perfect.

<http://geoscience.wisc.edu/~maher/air/444-24v.jpg> – A field trip to visit it before planning further is needed.

NOTE: MAY 9* – We may skip this meeting and join the Shebogan chapter at Rockets for Schools event instead.

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

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

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

Meetings are at The Stoelting House, 309 Indian Hill, Kiel WI 53042 – **3rd Thurs even # months****2015 MEETINGS:** APR 16 – JUN 18 – AUG 20 – OCT 15 – DEC 12 (2nd SAT in Milwaukee)The Milwaukee chapter is considering joining us at the upcoming Rockets for Schools event, likely to be scheduled on the 2nd Saturday in May, the 9th.

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 902**Events Hotline/Answering Machine: 310–364–2290 – Odyssey Ed: Kat Tanaka odyssey_editor@yahoo.comoasis@oasis-nss.org – Odyssey Newsletter www.oasis-nss.org/articles.html**Regular Meeting 3 pm 3rd SAT monthly – 2015 SCHEDULE:** MAR 21, APR 19, MAY 16, JUN 20

- **Sat, March 21, 3:00 pm. OASIS Board Meeting.** @ Steve Bartlett & Tina Beychok. 7108 Peabody St. in Long Beach,
- **Thu/Fri March 26/27, 7:00 pm. Adventures From the Field** – (Down and Dirty) Stories of Pursuing JPL Science from Ground up to Space. Speaker: Mark Helmlinger – Remote Sensing Calibration, Imaging Spectroscopy Group,
- **Thurs, March 26:** von Karm.an Auditorium at JPL. 4800 OakGrove Drive, Pasadena
- **Fri, March 27:** The Vosloh Forum at Pasadena City College. 1570 East Colorado Blvd. Pasadena, CA. (webcast — http://www.jpl.nasa.gov/events/lectures_archive.php?year=2015&month=3)
- Further info, (818) 354–0112 or www.jpl.nasa.gov/events/lectures_archive.php?year=2015&month=3
- **Fri, March 27, 6:00 pm – 8:00 pm. Burbank Sidewalk Astronomers**, Chandler Boulevard Bike Path at Lima Street
- <http://home.earthlink.net/~sidewalkastronomers/id8.html> or (818) 599–4134.
- **Saturday, March 28, 9:00 am – 4:00 pm. Riverside Air Show. Riverside Airport**, 6951 Flight Road, Riverside Parking \$10. Military aircraft, warbirds/replicas, Classic Car Show, military vehicles, Come early (7:00 am) for a pancake breakfast – \$6. OASIS will have a table at the airshow. <http://riversideairshow.com/default.asp>
- **Sat, March 28, 2:00 to 9:45 pm. Los Angeles Astronomy Soc, Public Star Party.** Griffith Observatory, 2800 East Observatory Road, Los Angeles, CA 90027. www.griffithobservatory.org/programs/publictelescopes.html

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<http://www.denverspacesociety.blogspot.com/>

Monthly Meetings every 3rd Thursdays, 7 pm

Englewood Public Library, Englewood, CO 80110 – 1000 Englewood Parkway, First Floor Civic Center

2015 MEETINGS: MAR 19, APR 16. MAY 21, JUN 18

ILLINOIS

LDAhean@aol.com**CSFL5: Chicago Space Frontier L5 – 610 West 47th Place, Chicago, IL 60609**

MINNESOTA



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

MNSFS monthly meetings are held on the first Thursday of each month at the Fairview Community Center (Great Room), 1910 County Road B West, in Roseville, MN 55113 Meetings usually start at 7:00 p.m. and last about two hours. Each meeting features Board member introductions, general announcements,

OREGON



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

We meet the 3rd Saturday of the Month at 2:00 PM – **2015 Meeting Schedule: MAR 21, APR 19, MAY 16**

The National Park Service and Oregon L5 Soc. Announce an Aviation Themed Lecture Series at Pearson Air Museum at the **Pearson Air Museum, Fort Vancouver**. 1115 East 5th Street, Vancouver, WA (ph: (360) 816-6232)

- Mar 5: Dan Dolan, Moon Base Builders, "Back to the Moon with the Lunar Rover Mission"
- Mar 19: Dr. Cameron Smith, Portland State U., "Designs on Personal Space Exploration" (Dr. Smith is designing and building his own space craft and space suit, which he will bring for show and tell)
- Mar 19: Matthew Simek, M.A. "Lincoln Beachey: The Man Who Owned the Sky"

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>

Meeting times and locations: March meeting will be on the 7th (snow date: 21st) from 1–3 pm at the Liberty One Food Court location. This building is between sixteenth and seventeenth and Market Streets.

Meeting notes: as Earl was delayed Mitch opened the meeting with material on the annual reports that all BSS chapters must file. In addition he quoted from the Cliff Mc Murray article on going to the Moon to work out various problems, both real and potential, with tools and techniques that could be used on the next goal: Mars. The article is in the Winter Ad Astra. In his other activity area, The World Future Society (where he was chapter President several years ago), he announced that the groups magazine, The Futurist, will now only be published semi annually. His search for a Bernal Sphere model that could be used for display, with a size sufficient to draw attention as well as big enough for decent detailing (big enough to show internal views of tiny houses and trees for example) and maybe created by 3 D printing. We have discussed the possibility of doing this before with the possibility of a grant being used as a funding source (or an NSS project gift?). More as this project goes forward.

Larry reported that he has been our webmaster for fourteen years now. He will continue at this time. He then helped Mitch with the individually accessible events calendar that Larry has found for us. Members can post events they are working on without putting them through Larry, and, can do them in the style that they wish to use. Larry also brought the Solar Weather and sun spot reports. No Coronal Mass Ejection debate this month!

Dorothy brought material on the Baltimore–Washington area events for the next few months: on the February 28th, at the Maryland Science Center, "Gears and Gadgets" for the whole family. Presenters include: The Baltimore City Robotics Center, The Digital Harbor Foundation, Elevated Element and more. The featured event overall is called NanoDay with talks and presentations focusing on the field of nanotechnology. This explanation is to show what can be done with local group participation (as we will have with the Science Festival and Super Science in a few months). There was also material on the Smithsonian and its events but mostly for February.

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

Dennis Pearson informed us of changes in the NSS headquarters: Larry Ahearn is leaving as Chapters Coordinator and David Stewart will take the position. There are complications for other officers who are filling several jobs at once: Tracie Crawford can't attend the ISDC in Toronto and, since she is working on the next ISDC in Puerto Rico next year, may be unable to lead the Chapters Assembly at this year's ISDC. Larry may fill in if desired.

Hank Smith was reappointed as Science Chair Liaison and Assistant for Publicity. He will begin doing some travelling starting next month to extend his previous outreach activities beyond Philadelphia. The Philcon will be from November twentieth through the twenty-second. The new chair of Philcon, Stephanie Lucas, will be doing guest outreach and, hopefully, will try to get more "Hard Science" guests for the Fall event. Yeah!

Rich Bowers vacationed in Florida and was able to see the Space X launch to resupply the I.S.S.. He also visited The Kennedy Space Center and "walked" the thirty six story Saturn Five that is there. He said that it was not a shell, but, was the one scheduled to carry the next group of Apollo astronauts to the Moon. Amazing.

We went back to the Bernal Sphere talk again, and, Dennis pointed out that we might search the internet for the model that was shown to Congress in the 1970s. He said we could check at Princeton where the L-5 Society had its' home in the 1970s. It would be nice to have this intermediate step to Solar System habitation as a display item for our outreach events (or anyone else's outreach around the world).

Janice asked a question that someone in the Moon Miners audience may know: was the Russian Meteor a fragment of any of the Earth Crossing asteroids or comets that are known? [Ed. "No"]

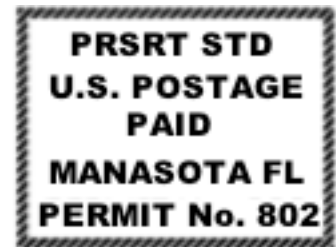
In the area of Science Fairs: Dennis reported that he attempted to give special awards at the Allentown Science Fair. The award he came up with, The Awar Kuchinsky and Fredrick Greenleaf Award. There was a really great display that involved construction of a wind tunnel to get data for the hypothesis being tested, but there was a problem that caused this project to be disqualified for the award. On a happier note: Dennis and I judged at the George Washington Carver Science Fair and picked a presentation on temperature effects on solar cells. There were several great projects, including one that involved light and diffraction that Dennis really liked, and one using a 3D printer to make parts, but I pushed for the "Is Hotter Better?" project.

We did a "word list" at the meeting to improve our visit rate. This was a fun activity and Larry will try them as part of our web presence. Hmmm, we may be swamped! Hopefully!

Earl brought material from several publications including: the second installment of L. Paul Verhages series on Cubesats including some of the suppliers of kits and components for some of the elements of the systems. He went back to his copies of the Amsat Journal and found the report "1000 C.Cs. of Science" by H. Paul Shuch outlining the story of the creation of the idea and its subsequent move of the creators to California Polytechnic University (Cal Poly) where they came up with the idea. Cliff Buttschardt, W7RR, and Ed English, W6WYQ, came up with the idea, "satellites for the rest of us" and another ham, Bob Twiggs, KE6QMD, (and his student team at Stanford) formalized the specification. Coming back to the present, and future, of the use of the Cubesats Dr. Verhages' column (in the February 2015 Nuts and Volts) includes information on the Pumpkin Cubesat kit. This allows hands-on with the 1U sized package in the kit, and, software to program the crafts operation. "You" can buy the basic kit and then add various elements to build up to a flight ready system. He includes several other companies that make elements of the satellites available including power conditioning, solar panels etc: Clyde Space and Innovative Solutions in Space are the others whose products are described. Websites: pumpkininc.com, clyde-space.com, and, isispace.nl (in the Netherlands). Pauls report is the cover feature: "Cubesats The Latest in DIY Space Exploration".

In the February seven Science News: a number of wide ranging and interesting articles including: "Life Might Like Cool Stars Rocky Planets" outlining the hypothesis that a cool star with relatively close planets might still rotate due to the effect of the planets atmosphere altering what had been assumed to be the fate of such bodies: tidal locking with one face always being boiled by the parent star, and, the other side being perpetually frozen due to minimal energy transfer to the outward facing hemisphere. Jeremy Leconte, an astrophysicist working at The University of Toronto (and colleagues) have simulated systems where this outcome is possible. For more: see page seven of this issue, or, visit the sciencenews.org site. Much more from this and other publications, such as NASA Tech Briefs and The Planetary Report, but my last item is from the April 2015 Analog Science Fiction and Fact magazine: "New Horizons At Pluto: The Grand Tour Finally Completed" by Richard A. Lovett. Dr. Lovett describes the historical search for that outer "dwarf planet" and the craft that at long last will get close to what used to be considered at the edge of the solar system. There is much good material in this piece including the real possibility of a liquid water ocean at present, or, in the "geologically" recent past (like liquid water on the surface of Mars: in the last few million years). Submitted by Earl Bennett, President, NSSPASA, KD2CYA.

Moon Miners' MANIFESTO
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