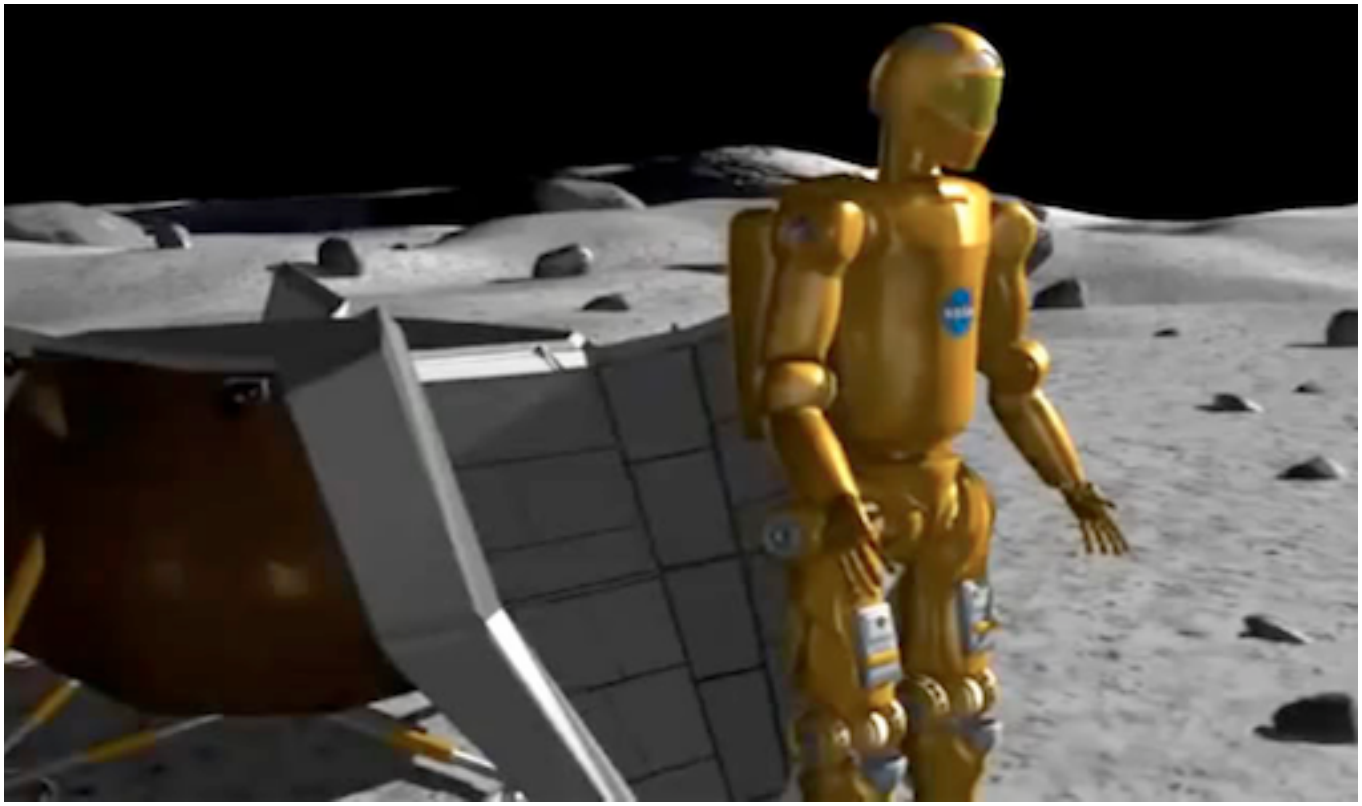
"Towards an Earth-Moon Economy – Developing Off-Planet Resources"

Moon Miners' Manifesto

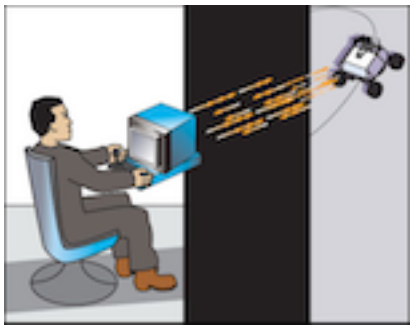
& The Moon Society Journal www.MMM-MoonMinersManifesto.com



Robonauts on the Moon at the Service of Paying Private Customers? See pages 3–6.

Feature Articles

The Next Lunar Explorers could be Teleoperated Robots



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

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● **MMM color online downloadable PDF file version option for Moon Society Members** using their username and password – do write secretary@moonsociety.org if you need help with your password.

● **For additional space news** and near-term developments, there is a daily RSS feed space news section on http://www.moonsociety.org. You can also read **Ad Astra** magazine mailed to **National Space Society** members. ● **Milwaukee Lunar Reclamation Society** is an independently incorporated nonprofit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. MLRS serves as the Milwaukee chapter of both The **National Space Society** and **The Moon Society:** – http://www.moonsociety.org/chapters/milwaukee/

● **The National Space Society** is a grassroots pro-space member-ship organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.

National Space Society 1155 15th Street NW, Suite 500 Washington, DC 20005 (202) 429-1600 – www.NSS.org

● **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon." – Contact info p. 9.

● **NSS chapter**s and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.

● **Publication Deadline:** Final draft is prepared ASAP after the 20th of each month. Articles needing to be keyed in or edited are due on the 15th, Sooner is better! – **No compensation is paid.**

● **Submissions by email** to KokhMMM@aol.com – Email message body text or MS Word, Open Office Text files, and pdf file attachments or mailed CDs, DVDs, or typed hard copy [short pieces only, less than 1,000 words] to:

Moon Miners' Manifesto, c/o Peter Kokh, 1630 N. 32nd Street, Milwaukee, WI 53208-2040

In Focus The Moon and Private Enterprise: "toes in the water"

So far, only the national space agencies of Russia (and the former Soviet Union", the United States, Japan, China, and the European Union have sent missions to orbit the Moon or to land on it. To this list may soon be added private Google Lunar X-Prize rovers. The reason is obvious: it's epensive!

But new rocket technologies and private operators may bring costs down to a point where private enterprise will make its debut. **Space-X**, **Boeing**, **Obital Science**s, and **Bigelow Aerospace** have won contracts with NASA to bring cargo up to the International Space Station. Other companies will soon be ready to compete.

It is not unlikely that NASA may contract with private firms to deliver equipent nd even personel to the Moon. A Russian team had been offering to fly two deep-pocket individuala around the Moon and back. Firms like Clestis, Inc. May deliver personal ashes to the Moon.

With each new inroad into what was once a government only area, the more interest brainstorming entrepreneurs will show. And it will be the commercial companies that bust, shatter, even demolish the cost barrier. They will find ways to tap the commercial and tourist markets so long closed because of financial limits, many of which are grounded in unnecessary protocals. Even persons of modest means may get a ticket to visit the Moon through special lotteries. A new age is coming. The High Priests of Space will be pushed aside. PK

Teleoperated "Enterprises" feasible on/from the Moon – no crew support
Or "Making Money on the Moon without Anyone Going There"

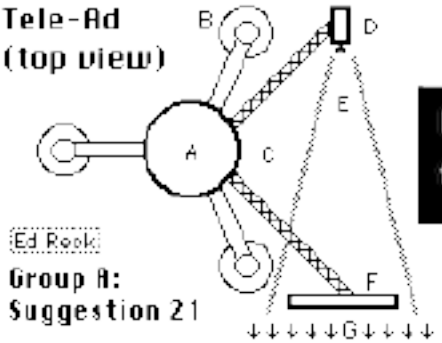
By Peter Kokh

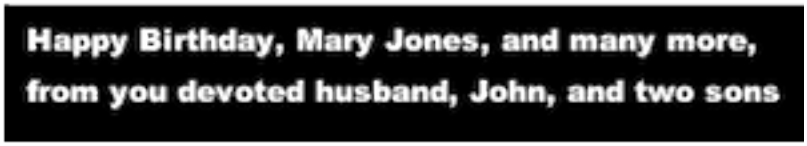
There follows a number of ideas for √ **income making devices located on the Moon** that can be √ **seen, watched, or operated by people on Earth**, √ **for "a price**." **or as a lottery prize.**

The idea is to start a lunar economy with **Enterprises** in which √ **all the equipment** can be put in place by **unmanned rockets** and, **once set up, teleoperated from Earth.**

---------- ART, MESSAGES, GAMES, WORK, FUN, SOUVENIRS ----------

- **A Robotic electronic message board** – designed by **Edwin Reck** in a "**Commercial Moonbase Brainstorming Workshop** at **First Contact II**, a "Science-Science Fiction" Convention in Milwaukee, October 7th, **1995**. .(Workshop chaired by Peter Kokh, Convention founder)



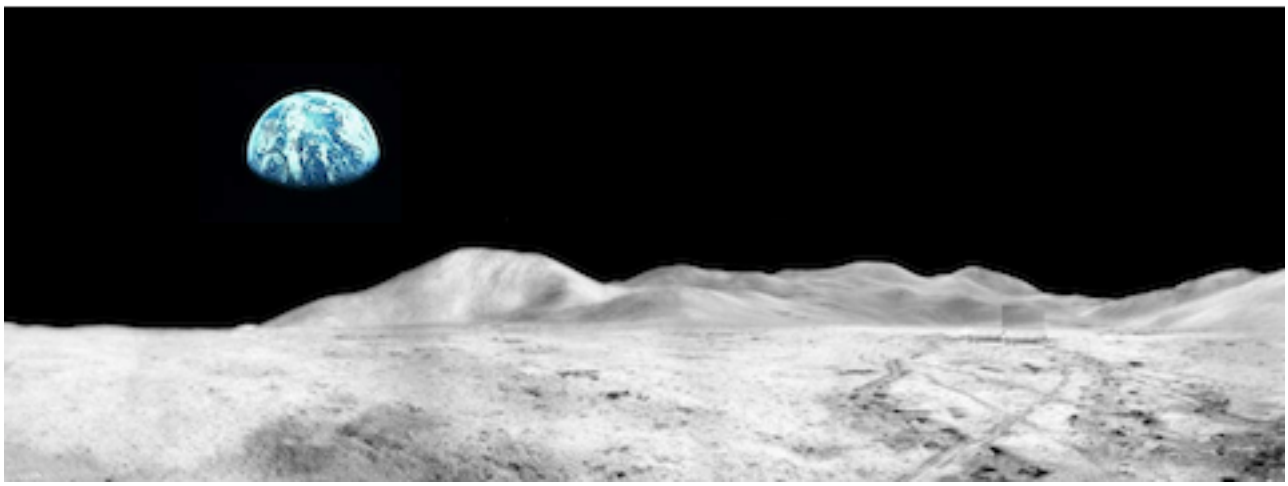


KEY: A Lander core with power and communications package; **B**. One of three landing pads; **C**. retractable booms; **D.** videocam; **E.** Videocam field of view; **F.** Electronic message board tele-changed from Earth; **G.** Background scenery.

Electronic signs on the Moon whose message can be telechanged from Earth, with image of sign in lunar setting transmitted to Earth – i.e. Near real time (3 sec time delay) unobtrusive advertising on the Moon – message and background seen on Earth.
The sign could be printed (and reprinted at interval) word by word for a paid length of time.

- **Draw messages on sand with a stick controlled from Earth**, and photograph these.[anything from ads to expensive but cherished Valentine Day "I love you" cards – authenticated.] – PK

- **Wallpaper Mural Pictures** of scenery near the landing site photographed by a programmed rover.



Such Murals, in a choice of sizes, could be purchased for an office, den, rec room, or bedroom

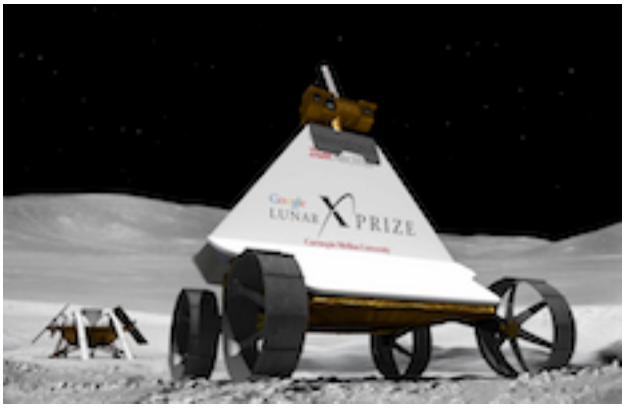
In a deluxe version, the Earth image would be on "a mural-integrated electonic screen" **Showing Earth in its current phase as seen from the Moon** – farout? It's doable, for a price.

- **For 3D Printers on the Moon – Email 3D physical specs of a person, couple, family, and/or pet "micro-labeled" on one base as 3D printed statues** to be placed in a "memorial" park or along a path of a planned outpost, settlement or other special location

- **Solar powered puppets delivered to the Moon, that can dance against a lunar background to a customer supplied tune - all televised back to Earth**
- **A giant 2.4X3.6 m (8x12 ft) or more flat screen TV** for bedroom ceiling or office wall which would show (**below left**) a live view of the Milky Way relayed from L2, 4, or 5 from the Moon's farside

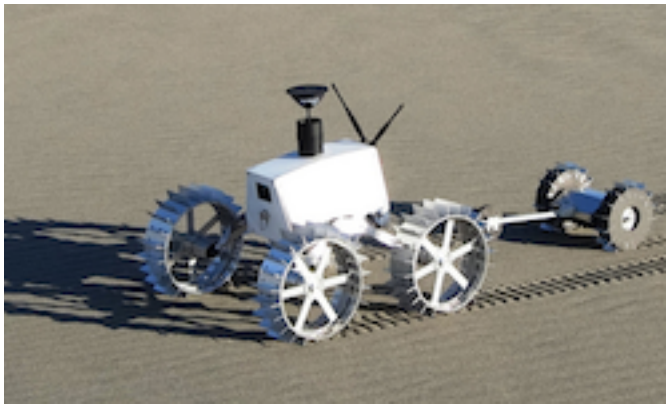

A**t right:** live Earth view from some point on the Moon's nearside, the camera automatically following the libration cycle: phases, cloud patterns, city lights, lightning, forest fires, with cameras operating "24/7"

- **A simple minimal Moon buggy that you can "tele-drive"** (slowly) from Earth and that shows you what the vehicles scanner sees 3 second time delay taken care of by limiting speed. Might just work. You could then "**explore**" on your own within the buggy's range. Solar-powered or solar-charged batteries. The buggy would be able to stop itself if it approached "unnegotiable" terrain. This cxoule be one or more of the Google Lunar X-prize rovers that made it to the Moon and are still teleoperable - with earnings going to the outfit that fielded the rover.



After a new or dublicate such vehicle was landed in an area never visited before, one could bid (or enter a lottery) to be the first to "drive it" and "see what it sees" as "tele-exploration"/"discovers."

Ditto with a more complicated tethered rover setup loweried down into a lavatube skylight pit and line-of-sight exploring such as the Japanese Google Lunar X-Prize entry shown below. (note trailer)



- **Blocks and Bricks**

Above left √ Name on building blocks facing outwards on landing pad exhaust splashout barrier
√ other block uses for battiers along walkways at edge of drop offs and as steps on hilly traii

Above right Raking robot that lets you create "Zen Gardens" around large boulders

- **Wrap around full field of view glasses** that let you see what your walking robot sees as you guide it to explore the area. Warnings about areas to avoid, and when to return "home.
- **Explore the heavens through a telescope on the Moon:** A program that lets you see on your computer or projected on a bedroom ceiling or Den wall what **an actual telescope on the Moon** is vewing, and allow you to aim the scope and explore its entire field of vision. Time on "the scope" may be extra expensive because of high demand. More so, if the telescope is located on the Moon's farside. Time on "the Scope" could be a lottery prize.

Your very own Lunar  **without setting a foot on the Moon**

- **√ Moonboot Print Maker – 3D printed copy here on Earth – Peter Kokh**

Here on Earth;

1) Have a set of boots, one foot only (right or left) in sizes to fit most people
2) Invent equipment that when someone puts on this boot and steps in a box of special grain mix "earth dust" a special impression-print is generated as an electronic message

On the Moon, place a machine that will

3) Pick the appropriate size boot
4) Apply the appropriate pressure and step motion that matches that of the customer on Earth
5) In a real Moon regolith "moondust" box
6) Scan in 3 D the impression made in the Lunar sand box
7) Transmit that information back to Earth
8) Reproduce a casting of this person's unique Moon Boot Print
9) Sell it to the customer
10) The customer could watch the process

- You would have a major investment in putting the needed equipment on the Moon at a friendly place.
- "This is your bootprint on the Moon, **using your size boot, your pressure pattern**, applied in a lunar moon dust box, then transmitted to Earth and recast here. It is **what your bootprint would be like if you were there in person to make it**."
- The set up, especially the part on the Moon, would cost money to put in place
- But only equipment would be sent to the Moon, equipment which could be used over and over again.
- The patterns would be transmitted electronically
- Once set up, the cost should be market worthy, as only signals are sent back and forth.
- Our reasoning is that the bootprint made on Earth and the one robotically made on the Moon would be different because of gravity and other considerations
- The bootprint made on Moon would be noticeably different from the print made on Earth, less so because of differences in the sand/moondust mediums, than becaue of the step pressure in low gravity.

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Caveats:

1) The nore complex a device, the more points of failure. So simpler ideas should be tried first.
2) With no people on location, baring simple "self-repairs," these devices may have limited working time. A telerobotic "Repair bot" would protect investments in these devices on the Moon.
3) What is not addressed are the various hazzards and difficulties of operating on the Moon: the insidious fine dust, the short "midmorning" dates when it is not so cold that lubricants fail, and not too hot either.

That said, there are some rovers that have operated for more than a month. And there have been ideas ("Lunar Thermal Wadi" [MMM #234 APRIL 2010) MMM republished in the theme issue Lunar Surface Activities.*) of how to keep a rover "warm enough" through the two week long lunar night. But we feel that none of these undesirable features of the lunar environment would make any of the inventive suggestions above impractical. As the old saying goes, "Where there is a will, there is a way." Of course, that does not always apply. For example, in our understanding, FTL, faster than light travel, is not only impossible, it is likely a contradiction in terms. PK.

* http://www.moonsociety.org/publications/mmm_themes/mmmt_surfaceactivities.pdf

- **Lunar Teleoperations Park(s)** – And finally, co-locate all or some of these teleoperable devices in one place (unless the site is unsuitable for a specific project. That would allow one (or more) teleoperated "service robots" to fix minor problems and glitches in various teleoperable apparatus that ceases to perform adequately.

Where on the Moon would such teleoperation parks best be located?

The sense the viewer will have of **being on/having been transported to the Moon** will be enhanced if the Earth is in the background above the horizon.

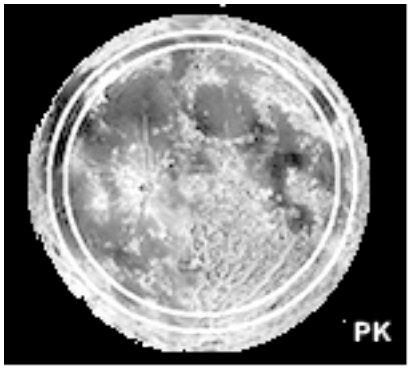
Keep in mind that the Moon "**librates**" in its path around the Earth.

Libration (http://www.wwu.edu/skywise/lunar_libration.html)

Libration of longitude is an effect of the Moon's varying rate of travel along its slightly elliptical orbit around the Earth. The Moon travels faster when it is at its closest to Earth, and its slowest when it is farthest away. Its rotation on its own axis is more regular, the difference appearing again as a slight east-west "no" oscillation.

Lbration in latitude is due to the Moon's axis being slightly inclined relative to the Earth's axis. From our angle we can at one time peek over the north pole of the Moon, and then later in the lunar month we peek over the south pole. Over the entire four week cycle it gives the the effect of the Moon slowly "nodding its head yes."

What this means for locations too close to the "edge" of the Moon, N, E, S. W, Earth will at times be below the horizon. How close is too close? About 7-8 degrees. In the **illustration below left**, the best locations for comfortably viewing Earth above the horizon will be between the two white circles. From anywhete inbetween those circles, Earth will be above the horizon at all times, sometimes a bit higher, and sometimes a bit to the right or a bit to the left of its average location. In the **illustration below right,** the zig zag path of Earth's apparent location is shown.



The Moon's libration taken into account, **any location between the two white circles** will feature Earth at a comfortalbe height above the horizon, a perfect background for viewing whatever teleoperated actibvity one picks. Some of the suggestions above are rather simple, requiring less shipping weight and size than others.

Multi-user Teleoperations Parks

Some will require more power than others, sunlight prefered if available, batteries charged during the daylight period for use during the night.

Some suggestions will be more compatible than others for various reasons, including "personal" ones.

The advantages of multi-user parks include:

- Sharing a ride to the Moon
- Sharing power generation and power storage systems
- Sharing teleoperated service and repair robots

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We hope this has got your brain and imagination in high gear to come up with another teleoperated idea that puts a person on Earth "on the Moon" virtually.

- **Send us your idea for teleoperable equipment on the Moon that can generate income!**
- **Send to: MMM, 1630 N. 32nd St., Milwaukee, WI, 53208** or **email** us at **kokhmmm@aol.com**
- **Don't forget to give your name and contact information.**

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

Telescopes on the Moon: Professional and Amateur alike

Artist rendering of proposed telescope on the Moon – Moon Express & International Lunar Observatory Association

The International Lunar Observatory Association (ILOA) – www.iloa.org/4MissionUpdate0215.html

"The ILOA has an opportunity to engage in an international effort with major and emerging space powers – as well as non spacefaring entities – **to advance the frontiers of astronomy, exploration and enterprise** to the **South Pole of the Moon**.

"Characterizing the surrounding area for ILO-1 landing site and payload operations will be a major focus of 2015 ILOA activities. ILOA is revitalizing its flagship mission, **ILO-1** in collaboration with its two prime contractors.

Moon Express will be working on characterizing and **identifying potential landing site**s in the Malapert Mountain area of the Moon South Pole.

Canadensys Aerospace will continue to **advance the observation / communication payload device** as it determines South Pole locations best for observations, power and communications.

The **Lunar Ultraviolet Telescope** on the **Chang'e-3 lander** continues to operate ≠nominally on the surface of the Moon. In late 2014 ILOA collaborated with CNSA / NAOC to obtain LUT imagery of spiral galaxy M101. In 2015, ILOA will continue to **work with China on astronomy from the Moon** and take advantage of future opportunities for collaborating on additional historic imagery.

ILO-X precursor mission launch schedule should be announced this year as prime contractor Moon Express prepares to make its attempt at the Google Lunar XPRIZE. The **7-cm optical telescope** will then be advanced to flight status to be ready for this pioneering mission.

ILOA Human Service Mission conceptual planning continues to progress through regular interactions and updates with Golden Spike Company, Principal Operating Partners, and other Organizations / Agencies.

Reason & room enough for a Separate Amateur Lunar Telescope

By Peter Kokh

Location: ILOA is focusing on a South Pole location, in hopes of piggybacking on proposed efforts to establish a manned South Lunar Pole outpost to engage in power generation and ice-mining in permanently shaddowed craters in the area.

But **the real prize for amateur astronomers is the Earth-free heavens of the lunar Farside**. From locations in that area, the splendor of the heavens will stand out as we cannot imagine. The Lunar Farside is the **only location in the Solar System** in which Earth is never visible, and the skies are the blackest.

The true splendor of the heavens, staring the Milky Way and assorted other star clusters and nebula will be at their best. Putting an amateur telescope, hopefully much bigger than the one ILOA hopes to piggyback, on the farside will be expensive and require some sort of relay to send the telescoes view to viewers on Earth. That can be done by a relay from the Earth-Moon L2 Lagrange point, some 100 km/60 mi above center farside. There will be the added expense of power genertion with solar panels and some sort of power storage. The reward? "**WOW!**"

Two moonlets, Phobos & Deimos, may be Mars' Export Trump Card

By Dave Dietzler and Peter Kokh

Dave Dietzler: one nice thing about Mars is that it already has two asteroids in orbit....even if they don't contain water and organics they will still be made of rock and metal for construction.....plain old rock in space is valuable just because it is in space....all rock will be mostly silicon dioxide and with that you can make glass and glass fiber reinforced glass composites for all sorts of constructions.....plain old powdered rock can be used as mass driver reaction mass if we go that way for freighters perhaps.....asteroids will probably also contain iron, calcium, magnesium and aluminum....it's all good....

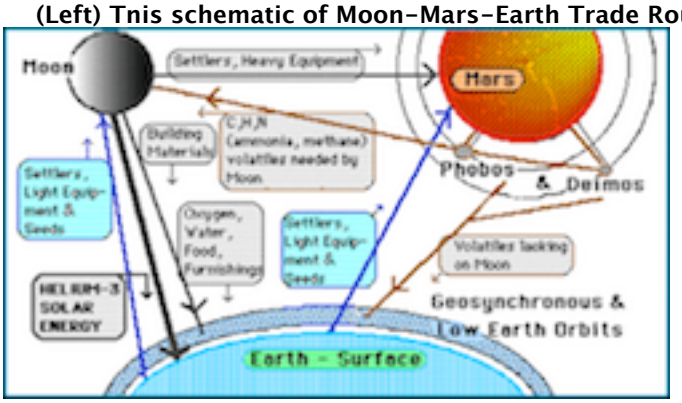
Peter Kokh: Dave, you make a Good [scratch that] GREAT point!

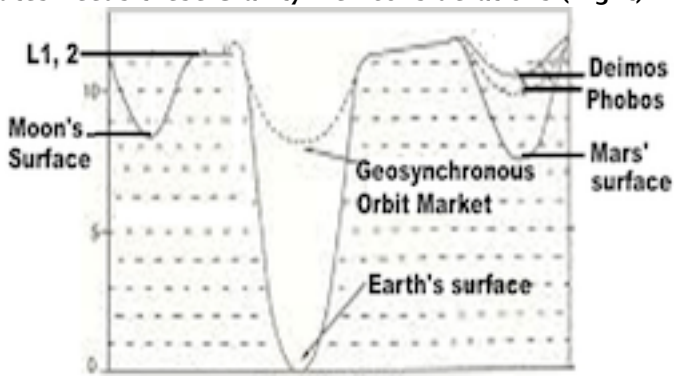
- Mars' gravity well is much deeper than the Moon's, so it would be an "uphill" battle for Mars to export anything to Earth at prices competitive with same item exports from the Moon.
- Unless the major Mars export industries were n**ot on Mars at all, but on Deimos and/or Phobos.**
- All along I have been saying that the Moon would be Mars only market.
- Yes, the Moon would have the edge when an off-planet item was needed right away, simple because the launch windows are always open, whereas shipping windows MarsPhD to Earth open only 25-25 months
- When price was more important than time, PhD (Phobos and Deimos would have the edge, Deimos best..
- People on Mars, a much nicer place to live than either moonlet, would teleoperate industries on PhD.
- As to nuke engines, I have written about Lunar Thorium transformed to nuke fuel.

From MMMs Past [www.moonsociety.org/publications/**mmm_themes/mmmt_Mars.pdf**]

- MMM #6 Mars, PHOBOS, Deimos
- MMM #18: Importance of the M.U.S.-c.l.e. Plan for the Opening of Mars

(Left) Tnis schematic of Moon-Mars-Earth Trade Routes needs these Gravity Well considerations (Right)





NOTE: Things made on Mars itself that cannot be made on Phobos or Deimos could not compete in the Earth Orbit market with comparable goods made on the Moon.

What can be made on Deimos and Phobos?

That's the big question – one we cannot yet answer – We need to prioritize missions to Phobos and Deimos. Two past Russian missions failed. W**hat elements are abundant on these two moonlets**?

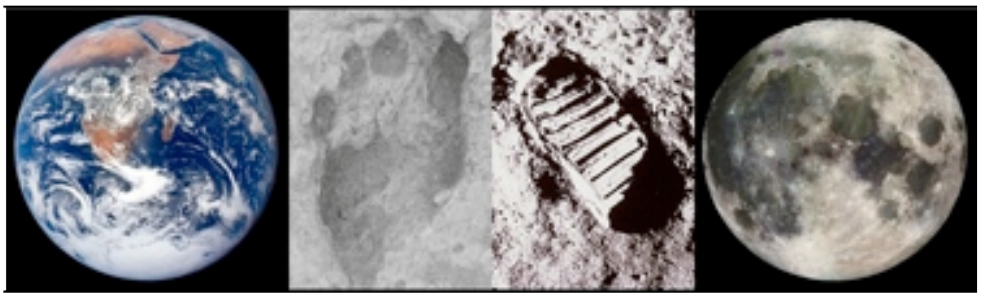
1) If, as had long been thought, these are captured carbonaceous chondrite asteroids, they would be rich in carbon and nitrogen, two elements very rare on the Moon in comparison to what settlers will need for air and food. They could be shipped as **liquid methane** (CH4) and l**iquid ammonia** (NH3). They could also provide rocket fuel needed in Geo-synchronous orbit.

2) If, as is now believed, they have the same makeup as Mars' crust, having consolidated from a dust cloud of Mars crust material thrown into space from a major asteroid Mars impact, they will have "resources"similar to what we can make on Mars, but at the considerable logistical advantage of being higher up Mars' gravity well. In this case, the principal market for PhD products would be Geosynchronous orbit: building materials not available from the Moon for construction of Solar Power Satellites, power beaming relays (Earth to Earth), and large platforms that can each host hundreds or more GEO satellites as by treaty thre are only 180 open positions for GEO satellits, 2° apart, to avoid collision and/or interference. Here Phobos and Deimos edge is that they are higher up the gravity well than is Mars surface, and so can be shipped to GEO and/or Moon using considerably less fuel.

3) Anyway you look at it, if economics strategically trumps "pure science" missins to Phobos and Deimos should get top priority, as much as our present fixation is to find out if Mars ever hosted life, and if so, whether it still does.

4) Industries on Phobos (good) or Deimos (higher up the gravity well) could be largely operated and maintained telerobotically (with a fraction of a light second delay) and not require a large human contingent on either mini-moon, both all but gravity-free. **We need the Moon, yes, but also "Mars PhD"** ## PK

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: 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 – On outreach

One of the most important things you can do as a member of The Moon Society is to share your knowledge of the Moon with your community. There is a terrific amount of ignorance out there regarding our Moon, and that ignorance is part of why the Moon and its development for the benefit of humanity is such a low priority for pretty much everyone. During April I participated in a couple of outreach opportunities. At the Yuri's Night event in Fort Worth I had my usual display with cratering exercises, gravity bricks, genuine fake Moon rocks and other educational tools, and gave a short talk on 'Why the Moon?' Oe notable bit of feedback came from folks who were all about humans to Mars, but indicated that they were reconsidering their position once they realized all of the wonderful things we still have to do on the Moon. Things of which they were totally ignorant until I had informed them of the myriad possibilities during my presentations.

More recently, I gave a presentation on Cislunar Space to a local group of Civil Air Patrol cadets. Apparently cislunar space is now covered in their aerospace curriculum materials, and none of the cadets ever got it right on the tests. They will now, and there were many dazed expressions when I was done as a result of the massive info dump I had done into their brains. One in particular indicated that he had been a big fan of Mars efforts, but realized now that there was so much more to be done with our Moon, and that the Moon really should be the focus of our near-term efforts. That's our challenge. Mars gets all of the press, has all of the famous scientists behind it,

and folks at NASA are more than happy to tell everyone that Mars is The Goal. But when you educate people about what our Moon offers, they often realize that it deserves far more attention than it receives. We can change that, but it takes work to inform and to educate. Not everyone can give good public presentations, but everyone can write editorials for your local paper, ask questions at local science events, and drag out the telescope for some sidewalk Moonwatching.

One item that we're looking at as part of our website overhaul is a calendar of Moon events, highlighting historical dates of importance, as well as offering the opportunity for members and chapters to upload Moon-related events in their communities. In this way we can help generate publicity for Moon-related activities, serving to further inform the general public about our wonderful Moon. We'll hopefully have this available soon.

Another challenge for Moon Society members is remembering to vote for your officers. The slate of candidates is listed in this month's MMM, so be sure to read over the candidate statements and get your vote in!

If you have something you'd like to see us do, let me know! Members can always e-mail me at president@moonsociety.org.

Moon Society Elections 2015 – Ballot

Dear Moon Society member,

We are now conducting the annual election of officers and directors of the Moon Society. This election is being conducted by both email and paper mail ballots. You may vote either way. Your ballot must be received (email) or postmarked by August 1, 2010.

Three of the five **Directors** will be elected or re-elected this year: all for 2-year terms

Two **Officer** positions of **Vice-President** and **Treasurer** are up for re-election as usual in odd # years, for 2-year terms. An electoral statement for each candidate is included at the end of the ballot [pages 10-11]. Please consult these statements for guidance in voting.

We have sent an email ballot out to all current members with valid email addresses on file. If you did not receive them, it may mean that we do not have your current address or it was blocked by your spam filter.

If voting by email, please include your member-ship number, if you know it, and email your completed ballot to this email address: mailto: elections@moonsociety.org

If you vote by postal mail, print out, check and send the paper Ballot to:

Moon Society, PO Box 940825 Plano, TX 75094-0825

Postmarked by August 1, 2015. Do not forget to sign the ballot and, if you can, enclose your member-ship number.

OFFICERS VOTE

VICE-PRESIDENT for 2-year term ending in 2017

[ ] Paul Banyai #1126 (since August 22, 2001

[ ] write in candidate _____

TREAURER for 2-year term ending in 2017

[ ] Dana Carson #10 (since eptember 1, 1994)

[ ] write in candidate _____

DIRECTORS VOTE (in order of seniority)

VOTE FOR 3 ONLY or your ballot will be invalidated

[ ] Rosalie Dieteman # 1340 (since October, 14, 2004

[ ] Chris Carson # 1478 (since November 2007)

[ ] Jim Keravala # 1677 (since September 09, 2012)

[ ] write in candidate _____

YOUR NAME (print) _____**Signature**_____

Your Membership # (if known) _____

Moon Society Elections – Candidate Statements

VICE-PRESIDENT Paul J. Banyai # 1126 member since August 22, 2001

It is time to enter the 21st Century. We need to keep up with the times in order to keep growing and improving. We need to become a single united social network representing the dreams and hopes of an age of true space colonization. I have been a member of the Moon Society since 2001. While I was aware of the Artemis Society for several years before joining the Moon Society, I did not join it because it was already starting to look outdated and ineffective. When I originally noticed the statement about "Our Virtual Lunar City" my first thought was "how awesome that this group is so tech savvy that they have something like Everquest or Ultima Online." However, I soon learned that instead of a cutting edge representation of lunar colonization it was instead an 80's style text game with some basic instant chat included in it.

I joined both the Moon Society and the Mars Society a few months before graduating college with a bachelor degree in geology with a personal focus on space. I kept my membership in the Moon Society since it was more focused on what individuals can. We need to expand our connection to lapsed/non-subscribed members and to new potential members. Our presence on Facebook is in fact almost double that of the Mars Society with over 2800 people familiar with us which makes me wonder why we have less than 200 active subscribed members out of at least 1600 enrolled members. Assuming that a quarter of our enrolled members are on Facebook we could have over 2000 potential new members. We need to give them an incentive to become paid members, to stay paid members, and to invite their friends to become members. I would revitalize our social network pages with current Moon Society events and activities as well as teasers of membership benefits and how volunteers can help get us back to

the Moon. I would also bring our internal communication system into the 21st Century and bring back the eye catching wow factor that the Moon Society can actually lead the way to lunar settlement.

Outside of online social networks there countless individuals who only show their interest in space by purchasing space related items i.e. books, magazines, DVDs, etc. For example we have "endorsed the Space Settlement Initiative as the most realistic and achievable method for encouraging private enterprise in outer space", yet there are countless people who are purchasing Virtual land deeds without any true forum for representing their interest in space colonization. These people are essentially stuck with the same archaic situation as our text-based Virtual Lunar city. There can be no Space Settlement without first real representation.

TREASURER Dana Carson # 10 member since September 1, 1994

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DIRECTORS (Vote for three) – listed in order of seniority (when they joined the Moon Society)

Rosalie Dieteman # 1340, Director (member since October, 14, 2004)

I became involved with the Moon Society in 2001, brought in by The Lunar Resources Company's SimsHost project. I headed the development of a new web site for the Moon Society, which went live in time for the 2013 International Space Development Conference. I plan to join outreach efforts to increase membership. I headed the development of a new web site for the Moon Society, which went live in time for the 2013 International Space Development Conference.

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Chris Carson # 1478 (member since November 2007)

Search though you may, you will scarcely find anyone more dedicated to the conjoint propositions that "Technology has made it possible, and history has made it necessary, for the life which has developed on Earth to extend itself into the cosmos; and that, in present conditions, the first step which can be accomplished the soonest and has the greatest promise of success is the planting of a human colony in Luna."

Since 2007 I have been traveling the world, largely at my own expense, to spread this message, even appearing in a documentary film ("Lunarcy!", 2012), while at the same time identifying and publishing implementable solutions to the practical problems which must be solved.

I also served as Region 3 director of the National Space Society for the 2012-2014 term, representing Texas, Oklahoma, New Mexico, and Arizona, in which office I promoted contact and cooperation among chapters at the local level, and direct action at the organization level.

If elected, I will make it my business to keep our Society unambiguously fixed upon "the human use and occupation of Luna, as the necessary First Step in the radiation of terrestrial life into the Cosmos;" and "to lose no opportunity of cooperation with others whose goals or agendas align with ours."

The Stars Are Ours!

Jim Keravala # 1677 Director (member since September 09, 2012)

The longest journey begins with a single step". In that capsule of wisdom Lao-tzu articulated not only the human drive that for thousands of years has driven us relentlessly to venture beyond our horizon, but also the truth of how we should do it. Today, save for a few robotic craft with remote sensors, our horizon remains firmly at Low Earth Orbit. The urgency for taking the next step is mounting geometrically as population growth, energy, resource and fresh water utilization put Earth and its ecosystem under ever increasing demands. By reaching out to the bounty of the solar system and opening Earth's closed economic sphere, we secure the future of humanity. The next step to take beyond LEO is the Moon. It is our neighbor, our nearest port of call in the stormy oceans of the cosmos that will provide us with a foothold to the stars. I've dedicated my life's work to achieving that step and am proud to be part of the Moon Society helping all of us better share in that journey. ##

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-Mlwaukee.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:**
April 11th Meeting Report: Yuri's Night celebration went well but short. We are exploring ways to reach Junior/ Middle High School Students before adolescence absorbs all their attention
Upcoming Meetings: MAY 9 (planning summer activities**), JUN 29,** ~~(JUL AUG))~~ **SEP 12, OCT 10, NOV 14, DEC 12**

Moon Society St./NSS Louis Chapter – **http://www.moonsociety.org/chapters/stlouis/**
www.meetup.com/Saint-Louis-Space-Frontier-Meetup/ – www.moonsociety.org/chapters/stlouis/Meetings.htm
Contact: Robert Perry surfer_bob@charter.net – We meet the **4th Saturday of the month** in room 162 of McDonnell Hall of Washington Univ., held jointly with the St. Louis Space Frontier, a chapter of the National Space Society.
MAY 23 – JUN 27 – JUL 25 – AUG 22 – SEP 26 – OCT 24

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.
Next Meetings: APR 18, MAY 16, JUN 20

The First "SpaceUp Phoenix" was a Success – Our March event was SpaceUp Phoenix, an "un-conference" held on Saturday, March 7, 2015 as part of the **Arizona Science and Technology Festival.** The event ran 9 am – 4 pm at Mesa Community College (MCC) and was sponsored by the Phoenix chapters of the National Space Society, the Moon Society, and the American Institute of Aeronautics and Astronautics (AIAA). The Arizona State U. (ASU) branch of the Students for the Exploration and Development of Space (SEDS) were very helpful in promoting the event to their members. Mike Mackowski served as chair. Speakers included Planetary Society president Jim Bell, Space Access Society president Henry Vanderbilt, former NSS president Charlie Walker, former deputy director of NASA Glenn Research Center Rich Christiansen, and Pete Swan, president, the International Space Elevator Consortium.

MCC provided several rooms for the event in building PS15 at no cost to sponsoring groups. Preregistration incl. Google Documents sign-up form, survey form, and Paypal registration payments, were provided by the AIAA section. Members of AIAA, SEDS and other volunteers did most of the on-site registration and hospitality staffing. MCC bought refreshments, arranged a coffee service from the campus food service, and pizzas for lunch.

Total attendance, with speakers, was c. 65, with 42 registered in advance. Average attendance at any one time was about forty. Remarks from visitors and guest speakers suggested that attendees enjoyed the conference and were happy with the content and quality of the presentations. Comments from attendees during the event were very positive. Folks seemed to be having a good time, and I observed a lot of side conversations and interaction among the invited speakers and other attendees. I thought this event went really well and was a lot of fun. For photos and other information, please see the SpaceUp Phoenix website:http://SpaceUpPhx.org – Mike Mackkowski

Tucson L5 Space Society – Now serving Moon Society Members **www.tucsonspacesociety.org/** (not updated) – **www.meetup.com/NSSPhoenix/events/161939572/** (not updated)
Contact: Al Anzaldua – 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: **JUN 15 – AUG 17**

APRIL 2015 SPACE NEWS BROWSING LINKS

SPACE STATIONS + ROCKETS + COMMERCIAL SPACE

www.space.com/28846-**spiderfab-space-structures-incredible-technology**.html
www.space.com/28990-**dream-chaser-space-plane-houston-landing**.html
www.space.com/29044-**blue-origin-new-shepard-spaceship-tests**.html
www.space.com/13672-**blue-origins-vertical-rocket-takes-hop**.html
www.planetary.org/blogs/jason-davis/2015/20150413-**united-launch-alliance-vulcan-rocket**.html
www.space.com/29117-**vulcan-aerospace-paul-allen-private-spaceflight**.html
www.space.com/29131-**reusable-rocket-technology-spacex-ula**.html
www.spacedaily.com/reports/**Russia_to_Launch_National_Orbital_Station_by_2023**_999.html
www.spacedaily.com/reports/**New_Space_Trash_Laser_May_Tidy_Up_Earths_Orbit**_999.html

MOON

www.space.com/29047-**how-moon-formed-earth-collision-theory**.html
www.space-travel.com/reports/**Yutu_finds_Moon_still_active_in_old_age**_999.html
www.space-travel.com/reports/**Japan_to_Land_First_Unmanned_Spacecraft_on_Moon_in_2018**_999.html
www.space.com/29086-**nasa-asteroid-mission-osiris-rex-first-person**.html

MARS

www.marsdaily.com/reports/**Ancient_Martian_lake_system_records_2_water_related_events**_999.html
www.marsdaily.com/reports/**Curiosity_Rover_Finds_Biologically_Useful_Nitrogen_on_Mars**_999.html
www.nasa.gov/press/2015/march/**curiosity-sniffs-out-history-of-martian-atmosphere/**
www.space.com/29001-**mars-rover-curiosity-ice-cream-rocks**.html
www.space.com/28985-**nasa-flying-saucer-mars-landing-test**.html
www.space.com/28983-**ancient-mars-oceans-big-waves**.html
www.marsdaily.com/reports/**Warm_or_cold_Mars_history_takes_a_watery_new_twist**_999.html
http://www.space.com/29072-**mars-liquid-water-at-night**.html
www.marsdaily.com/reports/**Curiosity_Eyes_Prominent_Mineral_Veins_on_Mars**_999.html
www.marsdaily.com/reports/**Curiosity_Sniffs_Out_History_of_Martian_Atmosphere**_999.html
www.marsdaily.com/reports/**Mars_dust-covered_glacial_belts_may_contain_tons_of_water**_999.html
www.marsdaily.com/reports/**Mars_has_belts_of_glaciers_consisting_of_frozen_water**_999.html
www.space.com/29208-**mars-life-search-iron-rocks**.html
www.spacedaily.com/reports/**NASA_Selects_Companies_to_Develop_Super_Fast_Deep_Space_Engine**_999.html

ASTEROIDS + COMETS

www.phys.org/news/2015-02-**cubesats-deep-space-esa-asteroid-probe**.html
www.space.com/29086-**nasa-asteroid-mission-osiris-rex-first-person**.html
www.space.com/29110-**mystery-bright-spots-ceres-dawn-maps**.html
www.space.com/29235-dawn-spacecraft-dwarf-planet-ceres-orbit.html
www.spacedaily.com/reports/**Scary_times_for_Europes_comet-chaser_Rosetta**_999.html
www.spacedaily.com/reports/**Scary_times_for_Europes_comet-chaser_Rosetta**_999.html

OTHER PLANETS + MOONS

www.spacedaily.com/reports/**Scary_times_for_Europes_comet-chaser_Rosetta**_999.html
www.spacedaily.com/reports/**New_explanation_for_Mercurys_dark_surface**_999.html
www.space.com/29017-**japan-venus-spacecraft-akatsuki-second-chance**.html
www.space.com/29141-**venus-airship-havoc-nasa-concept-gallery**.html
www.spacedaily.com/reports/Can_sound_help_us_detect_earthquakes_on_Venus_999.html
www.space.com/29088-**saturn-giant-storms-mystery-solved**.html
www.space.com/29019-**saturn-moon-despeckling-photo-technique**.html
www.space.com/29090-titan-methane-storms-sculpt-sand-dunes.html
www.esa.int/spaceinimages/Images/2015/04/**Saturn_s_sponge-like_moon_Hyperion**

ASTRONOMY + ASTROBIOTICS

www.space.com/29191-**exoplanets-tau-ceti-alien-life**.html

Moonscapes fiction

Simon Sidekick (cont. Part 4) By John E. Stith

MISSED THE PREVIOUS INSTALLMENTS? http://www.moonsociety.org/publications/fiction/SS-JES.pdf

Carl didn't really like to eavesdrop but, when he got home, May was on the phone in her bedroom and the door wasn't tightly closed. Besides, it sounded like it concerned him.

"But it's been almost a month," she said. "I don't think Simon is helping."

There was a delay and he couldn't make out the response. He supposed it could have been Uncle Pel, back on Earth. Carl couldn't see the screen.

"No. He's even more withdrawn than ever." She must have been talking about Carl, but he didn't feel withdrawn. Simon started to talk so he shushed him. This time there was a long pause.

"Well, all right, but only a week. If there's no change, I'm going to have to take Simon back and send Carl to Doctor Tamalind. No, I'm ...."

He didn't hear the rest. He backed out the door, softly closing it behind him.

Carl's eyes were moist as he walked down Row D. He didn't know where to go, or what to do, but he knew he wouldn't give up Simon.

"It's OK to talk again," he told Simon, realizing through his fog that he had asked him to be quiet. "She must have been talking to Pel."

"It would seem so. I am surprised that you would listen in."

"You're a fine one to talk. Pel's never taken a gift back before." He changed the subject, maybe to convince himself rather than Simon.

"Perhaps he will not this time either."

"I don't want to leave anything to chance though. Odds don't mean anything."

"I do not follow you."

"When my father died, everyone said things like, 'what a freak accident,' or, 'that wouldn't happen again in a million years.' What they meant was that the odds were small. I paid a lot of attention in school sessions when we were covering probabilities and permutations. I can tell you the odds for ten coins winding up all heads. But no one can tell me it won't happen. The odds are small, but they exist. It could happen. Pel could take you back even if he hasn't taken back a gift before."

"Or something could happen to you if you went on the search?"

"Well, yes."

"Or something could happen to a friend, someone close to you, like your father?"

"Yes, but we're getting off the subject."

"Are we?"

"Yes. I don't intend to give you back."

They reached the stairs that led to the warehouse below.

"And how do you propose to stop that?" Simon asked. "What is going to change your mother's mind about your being withdrawn and antisocial?"

"She didn't say anything about antisocial."

"Answer the question."

"The search is one way but it's not an option," he said. "Antisocial?"

"You mean that you would be more accepted if you went on the search?"

"It would at least get some of the kids off my back."

"Why is it not an option?"

"Simon, don't you listen? I told you about the last time I went outside."

"You have gone off the high board since the time you had the bad fall, right?"

"Yeah, but that's different."

"How different? The principle or the degree? Suppose once you had gotten an electric shock from a computer terminal. Think where you would be now if you were afraid to use one again."

"But you're--"

"Think about it, Carl." TO BE CONTINUED NEXT MONTH!!

NSS Chapters that share Moon Miners' Manifesto

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

WISCONSIN

MLRS – Milwaukee Lunar Reclamation Society

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

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@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:
MAY 9*, JUN 29, (SUMMER BREAK) **SEP 12, OCT 10, NOV 14, DEC 12**

WISCONSIN

SSS – Sheboygan Space Society

728 Center St. Kiel, WI 54042-1034

www.sheboyganspacesociety.org c/o Will Foerster 920-894-1344 (h) astrowill@frontier.com
SSS Sec./Tres. c/o B.Pat Knier dcnpatknier@gmail.org
DUES: "SSS" c/o B. P. Knier, 22608 County Line Rd, Elkhart Lake WI 53020
Meetings are at The Stoelting House, 309 Indian Hill, Kiel WI 53042 – **3rd Thurs even # months**
2015 MEETINGS: JUN 18 – AUG 20 – OCT 15 – DEC 12 (2nd SAT in Milwaukee)

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

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.com
oasis@oasis-nss.org – Odyssey Newsletter www.oasis-nss.org/articles.html
Regular Meeting 3 pm 3rd SAT monthly – 2015 SCHEDULE; MAY 16, JUNE 13, JULY 18, AUG 15, SEP 19

COLORADO

DSS: Denver Space Society fka Front Range L5
1 Cherry Hills Farm Drive, Englewood, CO 80133
http://www.denverspacesociety.blogspot.com/

Eric Boethin 303-781-0800 eric@boethin.com – Monthly Meetings every 3rd Thursdays, 7 pm
Englewood Public Library, **Englewood, CO 80110 –** 1000 Englewood Parkway, First Floor Civic Center
2015 MEETINGS: MAY 21, JUN 18, JUL 16, AUG 20, SEP 17, OCT 15, NOV 19, DEC 17

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 c. 2 hours. Each meeting features Board member introductions, general announcements,

- MNSFS (the Minnesota Space Frontier Society joined in the global celebration of **Yuri's Night**, Sunday, April 12th at Moscow on the Hil, 371 Selby Ave in beautiful St. Paul. http://moscowonthehill.com Party started at 7 pm pmt.

OREGON

Oregon L5 Society – http://www.OregonL5.org
PO Box 86, Oregon City, OR 97045

We meet the 3rd Saturday of the Month at 2:00 PM

2015 Meeting Schedule: May 16, June 13, July 18, August 15, September 19, October 17, November 21

Pearson Air Museum at Fort Vancouver National Historic Site, 1115 E. Fifth St, **Vancouver, WA**
From I5 take the Mill Plain Blvd. exit and head east, Turn right onto Fort Vancouver Way
Turn left when it dead ends at Fifth. Come Early and Enjoy the Museum

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

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

Meeting Times and Locations: We will meet at the Science Carnival in Philadelphia on May 2nd, and the next Saturday, at The New Jersey State Museums Super Science Weekend event on May 9th. Our June regular meeting will be back at the Liberty One Food Court on the second level of the Liberty One building between 16th and 17th and Market Streets. Mitch Gordon is also planning an NSSPASA outreach event at the Drexel campus part of University City (time and date will be posted on our website and calendar).

Meeting notes: Mitch says that NSS will be covering our event insurance costs for our May events. This is one of the advantages of being a chapter in good standing. He, and Dennis Pearson, have separately found space habitat models on line. However: these are only 10". We need something larger I think. Mitch also reported on the new book "The Orbital Perspective" by former astronaut Ron Garan. The book is about his development of a global perspective after his tour in space. "The Fragile Oasis Institute" was mentioned in association with the book. He also reported on an article in The Metro magazine on helper robots shown at the Consumer Electronics Show (C.E.S.) by the Five Elements Robotics company (inc?). Also mentioned where plans for a hotel with almost no human staff. Mitch also gave us the site for the science festival: philadelphiasciencefestival.org and how to navigate to the Astronomy Night locations part of the site.

Larry reported that we had 128 hits on our website last month. He thinks that having "This Day in NASA History" as part of our site links is the main reason for the improved hit rate. He brought the Sunspot report for April (61.4) and recommended that we should have more cards made for upcoming events (approved).

Dorothy told us of the film "Dark Universe" playing during the Festival Period, and, Philly Tech Week will be happening at the same time as part of the Science Festival. Check the papers and websites.

Hank informed us that there was not a contract for the 2015 Philcon that was said to held at the Crowne Plaza in Cherry Hill (N.J.) again. As he keeps trying to find out about this and other matters involving the PSFS organization he observes that "Transparency is not operating" in PSFS. Much talk in our group about a more "commuter friendly" location on the Pennsylvania side of the river. Several sites at the edge of the city where mentioned but Hank did not know if they would be considered by the Philcon committee (I think he will bring it up with them). Hank will be going to Balticon! This is one of the best "hard science" friendly Sci-Fi conventions on the east coast. He will try to be at both science outreach events we are part of in May. A number of visitors to the events enjoy talking about the range of stories, and their authors, and Hank enjoys doing this.

Rich Bowers has been "following" Elon Musk and read of his project to develop a transport system called "The Hyperloop". This "train" will travel in partially evacuated tubes at700 hundred miles an hour carrying freight (initially). The details are being worked out now. The super fast train has been part of fiction since the 1920s (I think) and now it finally looks like someone with drive and financial competence will "make it so". Basically what we are looking at is a gigantic freight mass driver here. This could get interesting!

Frank O'Brien is our only member who will do sidewalk astronomy on behalf of our group, but, several other members are going to visit various locations and Michael Stewart will be doing it as a part of his own "sidewalk astronomy" educational outreach activities in Philadelphia.

Dennis Pearson noted that we should send N.S.S. our various activities on a report form that N.S.S. has for the purpose. He will get this, or an address to d.l. it from, for us. He discussed the candidates for the Chapter of the Year Award and what level of activities, including public event outreach and publications they have created or appeared in, and the numerical ratings of some of them. Several are very active and really do a lot for space advocacy. Some even do rocket and balloon launches and I suspect that small satellites or other space deployed packages will be coming along soon!

Earl brought a number of reports from several magazines: from the March 21 issue of Science News: there was a report, on page 5, "Closest Star Approach to the Sun". This report is on the passing of Sholz's Star (actually a pair of stars) within .8 light years of the sun about 70,000 years ago. For more see the Feb. 10 "Astrophysical

Journal Letters. S.N. report by Christopher Crockett. This is the first time I have heard of such a close approach: the path of Barnard's star is to come within two light years of the sun (if I remember correctly), but, this will be tens of thousands, or millions, of years in the future. From the April 4th issue: Dawn Spacecraft Reaches Destination on page nine. This is also by Christopher Crockett and explains what the mission is about and the possibility of water being found inside (and possibility being seen on the surface now). Not only could this be a water source for space explorers but Mr. Crockett points out that liquid water may have existed in Ceres in the past and mentions that Deputy Project Scientist (J.P.L.) Carol Raymond says that the seas could even once been habitable. The previous visit to Vesta is also given a paragraph including speculation on where the dark material on Vesta's surface came from.

Then there is the March Equinox Planetary Report with the Countdown report" The Long Road to Lightsail's Biggest Test Yet" by Jack Davis who reports on the Lightsail at planetary.org. This report outlines the history of Solar Sails and the past effort to send one up. The Society has previously launched a sail package in June of 2005. Unfortunately the launcher malfunctioned early in the launch and the sail package was lost. Now the Society is about to do two launches: the first, in May of this year, will be to test out how the sail will open from the new package that is being used: the cubesat strikes again! The sail will be in a 3U size cubsat housing and, if everything works out, will open up to 32 square meters of reflective surface. This sail will be tested (think of sea trials for a sailboat) and will eventually deorbit relatively quickly. Since it will be launched with a cluster of other cubesats, on a launch opportunity found by NASA (who is sponsoring the launch under the ElNa program), it will not start deployment until four weeks after launch. Telemetry and other systems will be tested before the sail drops into the atmosphere (only two to ten days after deployment). The next launch will be, in 2016, on the Spacex Falcon Heavy vehicle! This sail will not be opening only to drop into the atmosphere a short time later. Not only will this sail gradually move away from the Earth but it will have company: Geogia Institute of Technology will have another cubesat in the launch bay: Prox-1 will be deployed with the object of trying out close approach software and examining the sail. This is going to be an exciting next few years in this area of space exploration: the data from these launch and deployment activities could spur further launches using sail technology and could aid in the flights of two future NASA launches: the Lunar Flashlight probe (a cubesat) and The NEA Scout. These probes, which will ride out on the inaugural lunar loop of the Orion spacecraft in 2018. That flight will be unmanned for testing various systems. The probes will be launched far from Earth and will spiral ever further away, in the case of the NEA probe, and could have very long mission active times. See the report for a number of related sites and videos. And think of a "hobby sail" that could go out to Mars and explore Phobos or Demos. High technology and little or no fuel means systems that could be funded relatively cheaply (millions, not billions, of dollars including earth launch costs). See the Planetary Report for more on this and some other exciting possibilities. And from Nuts and Volts for April, 2015: The Near Space special series "Cubesats- Part3: Atitude and Velocity". This article describes how several small satellite sensing systems work to determine the attitude and velocity of the craft. There is also mention of several craft that the NASA Jet Propulsion Laboratory will be testing two university built Cubesats beyond earth orbit. Back to the instruments: there are devices for stopping the spinning of the spacecraft and shifting its orientation in several ways. And there are propulsion systems: one is supplied by Clyde Space (who supplies a number of other Cubesat elements): the engine is called a pulsed plasma thruster with a specific impulse of 608 seconds. The Resistojet, a commercial system also, is described and is noted as having a specific impulse of 90 seconds (it uses butane for fuel). More in the report.

Two other comments: I agree with Dave Dietzlers comment on the 3D printer not being a panacea or even appropriate for many applications. Some things can be made, that require intricate patterning, with the device on site without the need for transport from Earth or an asteroid initially. Many objects that we find useful could be made with such devices, but, some critical elements would be made with other techniques: casting basalt and composites does not require the intricate patterning that the printer can do. We have plenty of energy in concentrated sunlight that can smelt concentrated iron fines and this can be cast into things that need strength and ductility, or, can be bonded together to form"rough" housings (the printers could build parts for the airlock and other parts that need a precision fit. "Finishing", to insure a good seal, would be required still (I think)). We can use the same light to fuse roadways, fraction regolith for "volatiles" (at thousands of degrees most materials are "volatiles"), and, power other processing systems, besides the printers, that require electrical energy.

Also: Michelle and I recommend visiting the Intrepid if you are in New York. There is an exhibit on the 25th anniversary of the Hubble Space Telescope till September. Great images and you get to see the Enterprise and a great historical vessel as well.

Submitted by Earl Bennett, President, NSSPASA, KD2CYA.

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