

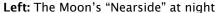
The Moon's Mysterious "Farside" – left actual color – right altitude colaor map:: red highest, blue lowest

1 Mare Moscoviensis 2 Tsiolkovsky 3 Mare Ingenii 4 SBA: South Pole Aitken Bazin

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Right: The Moon's "Farside" at night see, p. 7

About Moon Miners' Manifesto - "The Moon - it's not Earth, but it's <u>Earth's!</u>"

- 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/
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 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. P.O. Box 98106, Washington, DC 20090-8106 (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, 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 Ceres, the smallest "Planet"

By Peter Kokh '

The decsion to re-categorize Ceres as a dwarf planet was flawed.

"Clearing its orbital space" is not a valid criterion

- 1. Any well-cratered body has obviously done a lot of "clearing."
- 2. No "planet" has "entirely" cleared its "orbital place" Jupiter comes close
- 3. Ceres is large enough and massive enough to be shaped into a sphere (unlike Vesta, for example)
- 4. Like Mercury, Ceres is smaller than the two largest "moons" Ganymede, and Titan so that size cannot be a determant of status. (Compare their diameters below)

[Ganymede 3,270 miles (5282 km) & Titan 3, 2012 miles (5,121 km) vs. Mercury 3,032 miles (4,880 km)]

A better definition of "Planet:" -

"Any body in orbit around its star/sun that is massive enough to maintain a spherical shape."

By this definition, Ceres ia a Planet, and Pluto-Charon is a "Binary Planet" and size has nothing to do with it.

This definition is one the public at large can understand. There is no room in science for "attitudes!"

Flunking the test is Vesta. Nor do we know enough about Eris (larger than Pluto) to lean either way

Probing beyond Pluto-Charon - In hindsight, from a science viewpoint, it would be better for New Horizons to brake into Pluto-Charon orbit to learn more about the Pluto-Charon system instead of a flyby of a comparatively insignificant Kuiper Belt astrochunk, less than a hundred miles in diameter. ##

A "P.S." for the Dawn probe: Beyond Ceres: A swing by Pallas?

By Peter Kokh

Could the Dawn probe be redirected to the major asteroid Pallas?

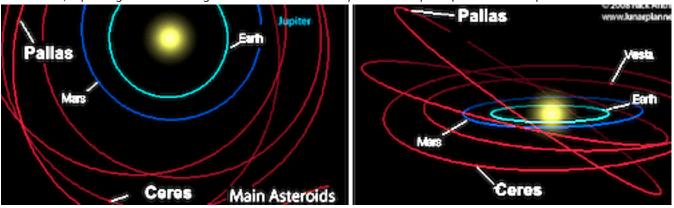
Is it possible? Or would it be better to start with a new probe launched from Earth?.

Pallas is not that far from Ceres (for the next several decades), but its orbit is highely inclined (34.8°) to the ecliptic: the plane of Earth's orbit around the Sun)

[Note that in the interest of accuracy, the "ecliptic" needs to redefined as "the plane of the orbit of Jupiter which has 3/4ths of the angular momentum of all the planets taken together – including the Sun!]

Would the attempt be worth it? Given its high orbital inclination, Pallas would be an ideal site for (a) tele-scope(s) that could look down on the Sun's poles, alternately the Sun's northern pole and its southern pole, allowing us to study areas of the Sun inaccesible from Earthl However we could probably do this lees expensively with a set of simple Sun orbiting telescope in high inclination orbits.

"Pallas, minor planet designation 2 Pallas, is the second asteroid to have been discovered (after Ceres), and it is one of the three largest asteroids in the Solar System. It is estimated to comprise 7% of the mass of the asteroid belt, and its diameter of 544 km (338 mi) is slightly larger than that o 4 Vesta. It is 10–30% less massive than Vesta, [7] placing it third among the asteroids. It is likely a remnant protoplanet." – Wkipedia



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PALLAS: The Basics

With an average diameter of 608 km (378 mi). It's surface area can be compares with

- Mare Imbrium + Serenitatis on the Moon
- The American states of Washington + Oregon + California + Nevada
- The Austrailian states New South Wales + Victoria + Tasmania



Pallas is classified as 'peculiar chondrite' and from its radar signature appears to be rather smooth.

Pallas' orbit is much more elliptically inclined, bringing it about 66 million km or 41 million miles closer to the Sun than Ceres and taking it the same distance urther out), its mean distance from the Sun is almost exactly the same as Ceres'. Pallas has a 10 hr day-night cycle. Pioneers would experience 12 of its days to every five of ours.

"Reimagineering" Public Images of Moon & Mars Bases & Outposts

By Peter Kokh

When it comers to public outreach, it is hard to think of something more important than changing common public conceptions of future human presence on the Moon and/or on Mars that comes from so many illustrations which ignore the need to shield our habitats on both worlds from the hazards of cosmic radiation, as well as from occasional meteorites large enough to puncture the walls of exposed pressurized structures.

Shielding also helps keep interiors at comfortable temperatures, particularly on the Moon where there is such a big temperature swing between two weeks of constant sunlight

In MMM #? (TTSIQ#?) recent article showing good and bad conceptions

Decades ago, NASA paid attention to shielding needs (example) but that was when in the Apollo years the plan was to stay on the Moon, and develop permanent outposts

Now NASA hopes someday it can put up a permanent shelter (from micrometeorites) but without shielding as they don't think these shelters will be continuously occupied, just visited now and then.

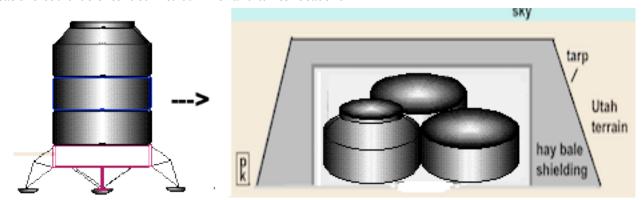
The scaling back of NASSA's visions of the future is rooted in lack of government support and funds. Meanwhile the public is mislead about the possibilities and the requirements necessary to make them real. It is time to reimaginer public conceptions about Moon and Mars "Outposts" and "Settlements," That is the mission we must sell to artists and modelers. Our publications should nix illustrations which ignore the need for ehielding.

The Mars Society's two "Habs" on Devon Island and in southern Utah

Robert Zubrin's conception of a minimal early Mars outpost was based on transport restraints: 2 or 3 "tuna-can" floors on top of one another for ease of transit. **But if** we want to shield them, it would be best to design the analog facilities as three one floor units, stacked on top of one another for transport, then set next o one another in a triangular one floor arrangement – for ease of piling" Mars" soil on top for **shielding from radiation** as well as for **minimizing external temperature swings**.

And doing just that on Devon Island and in Utah, then shielding them, could extend crew-occupied "seasons" simply by moderating temperatures. That translates to more research per yeat.

That the Bureau of Land Management would not allow substantial soil movement at the Utah location would not stop using $\sqrt{\text{straw bales}}$ as shielding, covered with tarp to prevent rain-soaking, and then painting the tarp to mimic the ruddy soil. With that form of at least minimal insulation, the crew seasons at both locations could be extended into summer and winter seasons.



"Tri-stack" rearanged side-by-side . Thermal Insulation by hay bales, tarp and local soil.

Is it 14 years too late,? NO! Will it cost? YES!

This improvement project will re-enthuse followers to contribute needed funds and the needed manpower. Engineering Problems – The real problem, is that the original 2-floor units were not built to be "unstacked." Does this mean that it can't be done? No. It will require some thinking. There is nothing moe motivating to an engineer or architect than a real "can't do" challenge.

Well planned, It could be done in the off-season, one station at a time. Meanwhile, a third unit would allow for less cramping, and to the support of additional functions of a Moon/Mars base that have not been modeled in either of the Mars Society's two locations.

This project, if the Society is up to it, shuld attract new members to the Society, and possible support from the National Space Society as well, in exchange for one or two crew slots per season.

Creation of an FMARS/MDRS Crew "Alumni/Veterans" group would also revivify the project.

There does not seem to be anything to lose, and quite a bit to gain, public interest and enthusiam being the top prize. Showstoppers? Let us know and we'll vaporize them! PK

Ways to make Moon & Mars Settlement Easier & Less Expensive

By Peter Kokh

[NB: These listings are and always will be "Works in Progress" subject to further modification]

Moon & Mars Applicable

- Only use recovrerable boosters Space X (and any other company up to the challenge)
- Everything that gets to the Moon or Mars stays there with as many/much reusable or use reassignable parts as feasible: rocket parts, cargo holds, even walls and fittings etc. (they can be replaced back on Earth for less than the cost of boostinG them back to Earth from the Moon except minimal reusable shuttles.
- Everyone who goes to the Moon or Mars reups for another "tour" cutting costs of supplying manpower in half that requires a shielded outpost so people can work on the Moon "sunth around" (Moon's 28.5 day dayspan/ nightspan cycle) or for several years minimum on Mars
- Everything that can be **3D printed s**hould be "sent" to the Moon or Mars that way however that requires making 3D printer material from Lunar/Martian regolith if we can do that. (research needed for all major regolith types: highland/mare on the Moon; basaltic/non-basaltic on Mars.
- · A scenic site to attract more workers and to keep personnel happy and more likely to "reup"
- · Official "pioneer' status for enyone & everyone who reups for a 2nd or more tour of duty.
- On this score, "keeping people happy", read "Avoiding Cabin Fever" in MMM #276 June 2014. Reprinted in To The Stars International Quarterly #8, July 2014 pp. 114-119 [download from www.moonsociety.org/international/ttsig/ or www.mss.org/tothestars/}

The bullet points from the above are;

- · Selection of a scenically interesting site
- · Interesting accommodations
- · Bringing the views and the sunlight down inside the shielded quarters
- · Common spaces that support a variety of recreational and social activities
- · Options for expanding the community and its footprint as well as activities
- · Places to "escape" changes of scenery
- The right to try startup enterprises ~ cottage industries
- The right to "re-up" to stay for another tour of duty
- · The right to apply for open jobs
- Remember, everyone who "re-ups:" for another tour, saves the cost of taking him/her home and bringing a replacement to the Moon i.e. "megabucks."
- · Accept volunteers willing to pay their own way, in part or full, for the privilege of pioneering

Moon applicable only

- Finding ways/tasks to keep personnel busy around the 28.5 day plus "sunth" (= dayspan + nightspan)
- Telleoperating from Earth everything we can with 3 second time delay (impossible on Mars)
- Paying personnel (working tourists as on archeological or paleontological digs)
- · Finding things to make and/or do that attract more "working" tourists
- · Official "pioneer' status for enyone & everyone who reups for a 2nd or more tour of duty.
- · Create, produce products, momentos etc. that attract more paying tourist
- Program that helps tourists fashion their own or gift souvenirs within space and weight limits.

Mars applicable only

- Choosing **lightweight personnel** for all jobs not requiring "muscles" such as on location teleoperation of construction and other equipment **even dwarfs and pygmies** who **meet all other requirements (health, talents, experience, etc.** (less food, smaller personal quarters, more people per arrival at same fuel cost)
- Consider the Sydney, Australia example: life prisoners who apply and have needed talents recieve permanent free status to become working pioneers on Mars with no expectation of return to Earth.
- · People who have worked to develop aircraft (and other equipment) that will work on Mars
- People who have worked on the "Redhousing Project" to develop plants that can thrive on Mars Air at higher atmoshpheric pressure.
- If we are determined to establish a permanent population on Mars, one way to expand the population and the gener pool is for women to leave Earth pregnant by men not making the passage. The sooner we have native born Martians, the more likely the settlements will be permanent.

There are many ways to drastically cut the perceived cost of opening both Moon and Mars! PK

The Moon & Mars are so boringly "monochromatic" - Opticians to the Rescue

By Peter Kokh





Yes, rare "orange" moondust - No, unfortunately, these Mars rocks are not really blue.

Some optics manipulations with boringly monochromatic Marsscape hues results in shifting hues of rocks of various kinds so that they stand out aginst the background, all for the sake of easier scientific examination. https://www.theatlantic.com/technology/archive/2012/08/why-are-there-blue-rocks-in-the-latest-photos-from-mars/261149/

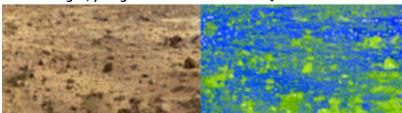
Of course it would be nice if these were the true colors. Then lamp bases, tablewear, and many other objects carved from such rocks or forged from powdered rock would become a mainstay of "traditional" Mars pioneer "early settlement" decor.

But that seems unlikely. So what can we do?

Here is a suggestion. Make eyewear, including contact lenses, that produces this same color shift for residents and tourists alike, both out on the surface and inside frontier homes. Humans like variety and the monochromatic appearance of both the lunar and Martian terrain is certain to very soon bore to death immigrants and visitors alike, with a negative effect on morale and life satisfaction.

["The light from the sun as filtered through the dusty Martian atmosphere makes everything look red to your eye." "When we take our images and have uncorrected images, there's a little less contrast in the ground. The shadows aren't dark. There is a lot of diffuse light in the air.

"When we correct for Earth sunlight, you get a lot more contrast."]

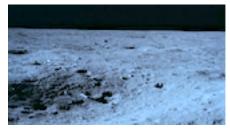


Above a Mars landscape in true colors left, and in exactly opposite colors, right
This raises the question. Can we play with optics eyewear so that some types of rocks look green and yellow?
Optians of the world, you can come to the rescue of the Martian pioneers! We hope!!

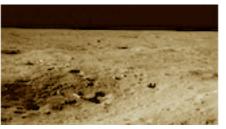
Applications to the Moon: eyewear that subtly "colorizes" the Moonscapes

Now how do we do the same on the Moon? Create eyeglasses to use out on the Moon's surface that take subtle, unnoticeable color hues and magnify them to "colorize the moonscapes?

I'm sure some people at NASA might have a clue. If not, we can surely produce results shown below.







Left to Right: Cool Blue hues

Natural hues

Warm Marslike hues

Simple tinted glasses could produce the above choices. But what about mulit-color renderings? PK

Living in the Moon's "Outback" - its "Farside"

By Peter Kokh

The "Farside Experience"

Living on the Moon's Farside will be a very different experience than settling on its Nearside, not so much during the dayspan when the Sun is over the horizon, as during the nightspan.

On the Nearside, during the 14+ days of Night (the "nightspan") Earth is always above the horizon and is far far brighter than the Moon is in our own skies. Not only does Earth present a face 13 times larger in area than the Moon presents to us (the difference in diameter squared) but 2ith its ice caps and clouds, it will be intrinsically much brighter. "walking in the Earthlight" will be quite a different experience than "walking in the moonlight." Even during a total eclipse of Earth by the Sun passing directly behind it, Earth's sunset–sunrise ring will light up the Moon's surface, making it look for a few minutes like Mars.

On the Farside, during its 14+ day-long nightspan, it will be darker than anyone has ever experienced here on Earth, the perfect setting for enjoying the splender of the stars and the Milky Way above – an experience no one has ever had (the Apollo astronauts circled the farside too briefly, and never totally during the local night).

This tremendous experience is bound to affect farside settlers. Indeed, the Moon's farside is **the only** place in the Solar System from which Earth is never visible.

The Moon's bulk not only blocks "earthlight" but also the ever increasing radio, television, and other noise from Earth, making it the ideal place in all the solar system to put up very very large arrays of radio telescopes. We will be able to search the Cosmos as never before for "intelligent noise."

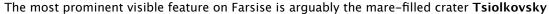
The Farside Surface

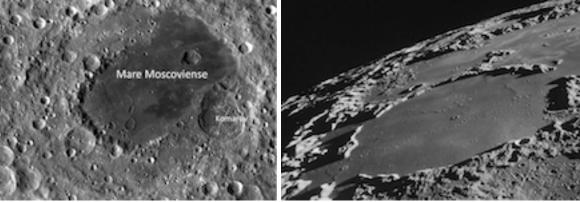
Except for there being far less "mare" areas, the flat basaltic plains that are the dark areas on the familiar face of the Moon we always see from Earth, the terrain will be much the same: craters, craters, craters. The lack of a mare complex will make travel a bit more difficult. The Moon's farside crust is considerably thicker than on the nearside. Major impacts did not penetrate the thicker crust to release lava flows from below.

Farside "Culture"

Earth: "out of sight, out of mind!" – maybe not entirely, but the culture of "Farsiders" is bound to be uniquely different from "Nearsiders." Some will visit the "peekaboos" a 15° strip between Neaside and Farside where Earth is sometimes above the horizon, sometimes not. Some may visit that area frequently. For others, once may be enough. But in general, Farsider culture will be notably different. Now something similar will be the case for other moons in the solar system, as they too have one face always turned toward their primary (Jupiter, etc.)

Tsiolkovsky Crater – easily the most visually outstanding feature of Farside





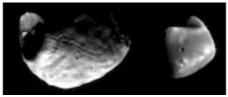
Farside's largest Mare, Mare Moscoviense (above left) and Mare Ingenii with many assets (above right)

Musings About Mars' Moonlets: Phobos and Deimos

By David Dietzler

It was once thought that Phobos and Deimos were captured asteroids. Their spectra, albedo and density resemble those of C or D-type asteroids. If this was true, then space industrialists would have access to two small bodies every 26 months (the Earth-Mars synodic period) that contain water and organic compounds. Our high hope was that the moonlets of Mars could supply Earth-Moon space with needed light elements in the form of liquid methane and ammonia transported in robotic tankers propelled by ion drives, light sails or magnetic sails. We envisioned a trade triangle between the Moon, Earth and Mars with Phobos and Deimos figuring in prominently. However, evidence obtained in recent years indicates that Phobos consists of phyllosilicates and is a rubble pile covered with 100 meters of regolith [1]. Not as much is known about Deimos. Hope still springs eternally for space colonists.

Phobos



Deimos

It is undoubtable that Deimos and Phobos consist of silicates like most rocky bodies in the solar system and that means oxygen is probably their most abundant component by mass. It is well known that rockets use much more LOX than LH2. Future space industrialists could ship some liquid ammonia or hydrazine to Mars' orbit and decompose it at a moonlet base to obtain hdyrogen and nitrogen then load up their landers and descend to the martian surface. Even with aerobraking and parachutes some rocket power is still needed to touch down softly.

Phyllosilicates are minerals composed of **oxygen, silicon, magnesium, aluminum, potassium, sodium** and **calcium** combined with **water or hydroxyl groups** [2]. If the moonlets consist of these then it should be possible to extract **water** and **hydrogen** by roasting their regolith. Extra oxygen could be extracted from the rocks and regolith. Rocket fuel for landers and spacecraft headed back to the Moon or Earth could be obtained. Calculations show that hydrogen supplies can be doubly extended by combining hydrogen with silicon to form **silane** to power rockets with a specific impulse of 340 seconds. While hydrogen might not be very plentiful, silicon is.

We must wonder about **rockets that burn silicon powder and oxygen**. Silicon powder is combustible and must be handled carefully. It burns with about as much energy as aluminum, 13,000 BTU per pound, but I know of no research on silicon/LOX burning rockets. If this could work there would be a never ending supply of rocket fuel in all sorts of places because Moon dust and space rock including the material Phobos and Deimos are composed of is mostly silicon dioxide. Human or robotic space explorers just have to decompose it and there are numerous candidate technologies for that like Dr. Schubert's supersonic dust roaster and all isotope separator, molten silicate electrolysis, etc. A rocket burning silicon and oxygen might not have a tremendous amount of power but not much rocket power is needed to land on Mars.

Plain old space rock has value just because it is already in space. It can supply oxygen for LSS and propellant for rockets, glass and glass-glass composites and the myriad of things that can be made with those, perhaps silicon fuel and of course silicon solar panels if you have the right dopants and some other materials including glass for anti-reflection coatings. Space rock and dust or regolith can be used for radiation and thermal shielding. Pure silica can be used for re-entry heat shields.

If the moonlets of Mars are solid enough it would be possible to dig in and build manned bases underground, however, they seem to be rubble piles covered with dust and almost no gravity holding them together. Anchoring equipment is the challenge. Perhaps a net consisting of an exotic material like carbon nanotubes or artificial spider silk could be wrapped around a moonlet. Machines would hold on to the cables. It might even be possible to make habitat out of fused regolith with a large 3D printer designed for operation in weightlessness.

Aerobraking into Mars orbit seems less risky than going all the way for a landing. Once in orbit space-craft can maneuver over to one of the moonlets, get fitted with a silica heat shield, fuel up and land. A system of reusable Mars lander and ascent vehicles—Mars Shuttles, could be devised. Establishing a population of millions on Mars will involve a lot of immigration and that will require substantial infrastructure development. The moonlets are positioned nicely in place while us poor Earthlings have to wrestle with bringing a NEO into high Earth orbit and launching material from the Moon with mass drivers.

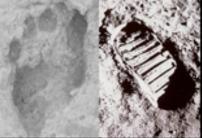
Even if the moonlets of Mars turn out to be devoid of water and hydroxyls they will still provide valuable resources. Mars Direct and Mars One are fine by me, but if we are ever going to plant heavy industry on Mars and bootstrap up a large industrial civilization it seems we'd be wise to take advantage of the resources offered by the moonlets. Not to forget, both moonlets are on the shoulders of Mars' Gravity well, which means lower cost shipping to the Moon and Earth orbits than from Mars' surface. Phobos and Deimos are bound to be the key to Mars' economic development. They might not be big, but that doesn't matter. ~ DDz

- 1] http://en.wikipedia.org/wiki/Phobos (moon)
- 2] http://en.wikipedia.org/wiki/Silicate_minerals#Phyllosilicates

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

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







Our Goal is Communities on the Moon involving large scale industrialization and private enterprise.

The Moon Society Journal Section (pages 9-12)

About the Moon Society

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

- Creation of a spacefaring civilization, which will establish communities on the Moon involving large-scale industrialization and private enterprise.
- Promotion of interest in the exploration, research, development, and habitation of the Moon, through the media of conferences, the press, library and museum exhibits, and other literary and educational means
- Support by funding or otherwise, of scholarships, libraries, museums and other means of encouraging the study of the Moon and related technologies
- Stimulation of the advancement and development of applications of space and related technologies and encouragement their entrepreneurial development
- Bringing together persons from government, industry, educational institutions, the press, and other walks of life for the exchange of information about the Moon
- Promoting collaboration between various societies and groups interested in developing and utilizing the Moon.
- Informing the public on matters related to the Moon
- Provision of suitable recognition and honor to individuals and organizations that have contributed to the advancement of the exploration, research, development, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says it all - "Who We Are and What We Do" - www.moonsociety.org/spreadtheword/whowhat.html

We envision a future in which the free enterprise human economy has expanded to include settlements on the Moon and elsewhere, contributing products and services that will foster a better life for all humanity on Earth and beyond, inspiring our youth, and fostering hope in an open-ended positive future for humankind.

Moon Society Mission: 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



Society Elections

All members are reminded to get your votes in for this year's election. Ballots were in the May MMM. You can emall your ballots to elections@moonsociety.org or mail them to

Art Contest

All members are also reminded that our art contest is underway, and the deadline is the end of June. Please spread the word!

Projects

On the web front, we hope to have our project pages up and running shortly. One of the more interesting projects is an update of our power-beaming demo which illustrates the principles of solar power satellites. The challenge is to make it into the kind of project that a high school team could put together. Or a bright science fair student. If you've got an electrical engineering background, please let us know!

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

Talking up the Moon to Young People

I recently had the opportunity to give a Moon presentation to an all-age audience. Interestingly, the best questions came from the kids, and they had a real interest in the topic. Something that highlights a change we're starting to see in the space dialogue.

For folks of a certain age, space exploration is all about the promises of their youth – space station, Moon, Mars. The bucket list remains incomplete, and that is driving our formal space efforts, led by a generation imbued with the Apollo mythos. Until there is a change in leadership, we should expect that Mars will remain the focus of formal efforts. It will also tend to be very personality driven.

But these things don't work with the younger generations. They need a new message, one that doesn't rely on the 'government doing great things' philosophy. Rather they need one that makes sense to them, and the challenges they see in their future. This is why The Moon Society has been popularizing the idea of cislunar space and the cislunar economy. These are things that have near-future possibilities. Things that the youngsters may have a hand in making happen.

Access to resources, access to energy, mitigating the environmental depredations of our planet, advancing our technologies. The Moon is our proving ground for all of these things as we advance out into the Solar System. Folks just need to know about it. And that's where The Moon Society can really make a difference – in spreading the word about the opportunities that our Moon offers, and educating people so that they know more about the Moon than its phases.

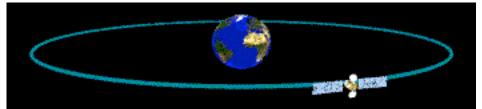
While presentations are helpful, there are other ways to help. Writing a letter to the editor of your local paper, preparing background materials for local teachers, paying a visit to your representative. All of these are ways you can make a difference. Join a panel at a local sci-fi con, or distribute literature at the event. The method is not important; what is important is that you share your knowledge of the Moon.

We have the opportunity to shape a new generation of space advocates. A generation not burdened with the expectations of the past, and which can look to the future with new perspectives. The message of near-Earth space being where we figure out how to take on the rest of the Solar System is a solid one. As is the message that we can help our planet with clean space-delivered solar energy, sourcing some resources from off-Earth so we can stop tearing up our own planet to get them, and over the long term even move the most polluting industries off-planet.

"Cislunar Space" ["this side" of the Moon]

It all starts in cislunar space, a term being used far more often now than in the past. It's where our space assets are, and it's a volume of space that we need to be capable of and comfortable with moving around in. The Earth-Moon L-1 point offers numerous benefits, including an on-ramp to the InterPlanetary Superhighways and a way to revolutionize our study of the Solar System.

The Moon itself is slowly revealing the diversity of resources it has on hand, and we're starting to figure out more ways to make them useful. We still have to come to terms with the fact that resource extraction on the Moon is going to be more sifting and sorting than mining rich ores, but that's part of the challenge, figuring out how to make the most use of stockpiles of various elements in varying proportions. One hint is that combining ultra-pure elemental feedstocks with advanced 3-D printing technology puts you well on the path to replicator technology.



https://www.thetech.org/exhibits/online/satellite/images/animations/geoanim.gif

Geosynchronous orbit in partticular, where satellites (and future space stations, hotels. Etc.) orbit in synch with the Earth's rotation, remaining forever above a set spot on the equator, is where the opportunities are highest for use of lunar resources such as building materials etc. The economic value of current satellites in "GEO" is already approaching \$400 billion a year, enough to make GEO, if it were a nation, one of the top twenty.

Make your voice heard

You're going to be hearing more about the Moon through the end of the decade, especially as we approach the 50th anniversary of Apollo 11 in 2019. You can be a valuable part of the dialogue. Make your voice as a member of The Moon Society heard, by being active in your community, and being active in the organization. We always need help running projects and getting the word out. Tell us how you want to help by e-mailing me at president@moonsociety.org KM

The Moon Society – Lunar Frontier Settlement – <u>www.moonsociety.org</u> p. 3

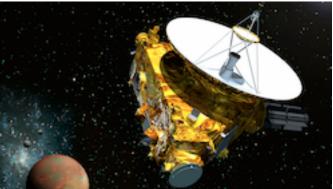
Outreach Opportunity Coming Up - New Horizons at Pluto-Charon

By Peter Kokh

Every day, the New Horizons probe gets closer and closer to the Pluto-Charon "Binary Planet" system.

Some of the folks involved in the annual Yuri's Night celebration, marking Yuri Gagarin's first orbit of the Earth, have proposed a new celebration: "Pluto Palooza"





It started as a touring event produced by Geoffrey Haines-Stiles, who was a senior producer on the original Cosmos television series featuring astronomer Carl Sagan. The hour-long "palooza" features members of NASA's New Horizons science team presenting a dynamic and richly-illustrated overview of the mission and the men and women who make it possible, telling the story of the spacecraft from launch in 2006 to its closest approach to Pluto this summer. The mission's flyby of distant ice worlds promises to reveal an incredible amount about these mysterious bodies, and about the origins and evolution of our solar system.

PLUTO-PALOOZA is supported by NASA and the APL Education and Public Outreach Department.

But now there is a movement to do a series of parties this summer, following the pattern Of Yuri's Night. At first, the Milwaukee NSS/Moon Society chapter registered a party, but after talking it over, we decided that we should wait at least until New Horizons reached Pluto, and possibly after most of the data came in.

But the party idea seems to be a good one. It is another chance to get new people involved in our chapters. It is also an opportunity to call attention to the astronomers all too-quick, all too superficial demoting of Pluto from Planet status to Dwarf Planet Status. Nor is "dwarf" or "member of the "Planet Club" the only issue.

Note that two stars that orbit together around a common center of gravity between them are called a "Binary Star system." Earth and the Moon revolve around a common center of gravity but that point is a thousand some miles below Earth's crust. Pluto and Charon BOTH revolve around a common center of gravity BETWEEN them, and both of them, not just Charon are locked in their rotation facing each other.

We need to make a lot of ruckus to get publicity for a change of mind of the astronomers "elite club" to campaign for a change of status from "Pluto, dwarf planet" to "Pluto-Charon binary planet system."

When is the best time? A good time? Certainly after the encounter has passed. But there is the issue of convenience which differs from chapter to chapter. And I don't think it matters. Pluto Palooza seems unlikely to become an annual event. Each chapter can make its own decision, a) whether or not it wants to hold a publicized local event and b) if so, when to hold it.

The Milwaukee chapter does not meet in July of August, so we are planning to make our regular September 12th meeting, a Pluto Palooza event. That gives us time to plan the party, and to advertize it, plus by then a lot more data will be available.

Lead time is important. It gives a chapter time to advertize widely, to try to get VIP guests, etc.

Whether this becomes an annual event or not is another question. As for myself, this is a good opportuity to put the "experts" on the defensive, for mis-categorizing Pluto altogether, first as a "dwarf" planet, then as a planet by itself. Charon and Pluto revolve together as a binary. That means that Charon is more than a moon, and that has been known for some time.

The pros just goofed all the way around, and this is especially embarrasing because the "binary" nature of the Pluto-Charon system has been known for quite some time.

Meanwhile, we continue to learn more and more about our amazing solar system, and this ever increasing knowledge gives us more reason to appreciate our situation. PK

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



ORGANIZING "OUTPOSTS"

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:

May 9th Meeting Report: We discussed several options for summer activities: including watching amateur rocket launching at Bong Recreational Area. Summer activities will be posted on http://www.space-Mlwaukee.com Next Meetings: JUN 13, [JUL AUG] SEP 12, OCT 10, NOV 14, DEC 12

Peter attended ISDC 2015 in Toronto and gave a presentation on how pioneers in outposts on the Moon would have to learn to live "downwind and downstream from themselves" with valuable lessons for people on Earth.

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 - 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. JUN 27 - JUL 25 - AUG 22 - SEP 26 - OCT 24 - Good News: it looks like St. Louis will be given the privilege of hosting NSS' 2017 International Space Development Conference.

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.

Upcoming meetings: JUN 20, JUL 18, AUG 15, SEP 19

The Space Access Conference, run by Henry Vanderbilt, was this past weekend in Phoenix (May 1–2). It was well attended with over 200 people registered. I got a box of Ad Astra magazines a few days prior, and handed out most of them. Assuming there were 50 in the box, I saved ten for other purposes, so you can assume we distributed 40. I also put out flyers for our local chapter with meeting, website, and contact info. I did not make any presentations.

May 6th, a local science café featured Rebeca Rodriguez, who spoke about her two week experience this past winter at the Mars Desert Research Station in Utah. I am not sure if she is yet an NSS member, but she helped at SpaceUp Phoenix. She will be giving this same presentation at our June meeting. There were about seven people at the science café, and I gave out more magazines and chapter info.

Mike Mackowski NSS Phoenix Chapter President

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 Al Anzaldua participated at ISDC 2015 in Toronto as a member of the NSS BOD.

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

Contact: Eric Bowen <u>eric@streamlinerschedules.com</u> – **Meeting 7 pm 3**rd **Mondays of even # months** in the conference room of the Bay Area Community Center at Clear Lake Park: JUN 15 – AUG 17

MAY 2015 SPACE NEWS BROWSING LINKS

SPACE STATIONS + ROCKETS + COMMERCIAL SPACE

www.space.com/29308-nasa-hyperspace-em-drive.html

www.planetary.org/blogs/jason-davis/2015/20150413-united-launch-alliance-vulcan-rocket.html

www.space.com/29131-reusable-rocket-technology-spacex-ula.html

www.nasa.gov/press-release/spacex-demonstrates-astronaut-escape-system-for-crew-dragon-spacecraft-0

www.space.com/29496-spacex-rocket-military-launches-approval.html

www.spacedaily.com/reports/New_Space_Trash_Laser_May_Tidy_Up_Earths_Orbit_999.html

www.space.com/29271-space-station-laser-cannon-orbital-debris.html

EARTH + DEAR SPACE

www.space.com/29403-cloudiest-places-on-earth-nasa-image.htm

moon

www.space-travel.com/reports/Moon_formed_when_young_Earth_and_little_sister_collided_999.html

www.space.com/29285-moon-base-european-space-agency.html

www.space.com/29466-nasa-Iro-spacecraft-closest-moon-orbit.html

www.space-travel.com/reports/Russia_Invites_China_to_Join_in_Creating_Lunar_Station_999.html

MARS

www.space.com/29324-mars-life-flowing-water-recent-past.html

www.space.com/29475-mars-rover-curiosity-slippery-slopes.html

www.marsdaily.com/reports/UAE_says_on_track_to_send_probe_to_Mars_in_2021_999.html

www.space.com/29345-nasa-journey-to-mars-challenge.html

www.marsdaily.com/reports/Could_Green_Rust_Be_A_Catalyst_For_Martian_Life_999.html

www.space.com/29323-nasa-manned-mars-exploration-plans.html

www.space.com/29349-manned-mars-missions-phobos-moon.html

www.space.com/29433-mars-microprobes-parawing-lander.html

www.space.com/29503-nasa-insight-mars-lander-begins-testing.html

www.space.com/29512-mars-mission-radiation-nasa-challenge.html

www.marsdaily.com/reports/New_Project_Aims_to_Establish_a_Human_Colony_on_Mars__999.html

ASTEROIDS + COMETS

www.marsdaily.com/reports/New_Project_Aims_to_Establish_a_Human_Colony_on_Mars__999.html www.space.com/29514-nasa-dawn-ceres-craters-photo.html

OTHER PLANETS + MOONS

www.space.com/29340-mercury-ancient-magnetic-field.html

www.space.com/29392-jupiter-moon-europa-salty-dark-streaks.html

 $\underline{www.nasa.gov/press-release/\textbf{nasa-selects-advanced-space-technology-concepts-for-further-study}$

www.esa.int/spaceinimages/Images/2015/04/Saturn s sponge-like moon Hyperion

www.space.com/29334-enceladus-ocean-energy-source-life.html

www.space.com/29330-saturn-moon-enceladus-gevsers-curtains.html

www.space.com/29439-pluto-spacecraft-message-to-aliens.html

www.space.com/29468-what-would-it-take-to-send-people-to-pluto.html

ASTRONOMY + ASTROBIOTICS

www.space.com/29286-nearby-super-earth-alien-planets.html

www.space.com/29303-super-earth-volcanoes-planet-55-cancri-e.html

www.space.com/29336-polluted-white-dwarf-asteroids-water-earth.html

www.space.com/29337-habitable-alien-planets-venus-zone.html

www.space.com/29342-dwarf-stars-could-make-atmospheres-hospitable.html

www.space.com/29020-living-on-alien-planet-kepler-186f.html

www.space.com/29389-alien-life-hydrocarbon-exoplanets-ether-dna.html

www.space.com/29439-pluto-spacecraft-message-to-aliens.html

www.space.com/29270-milky-way-size-larger-than-thought.html



Simon Sidekick (cont. Part 5) 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 <u>could</u> 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 ves"

"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."

Carl thought about it. Simon had never lied to him. At least he wasn't aware of it if he had. And everything else Simon talked about made sense.

Two days later Carl found himself in front of an airlock, wearing a white pressure suit and carrying a rugged, compact direction finder. He trembled, unable to calm his body.

Cynthia Holmes was talking. She was a stocky girl, two years older than he was. Her hands and red curls bounced excitedly as she talked, even though she had been starting kids out on this same trip for almost a year.

"All right, Carl," she said. "You'd better start."

There was time for one last glance around the bay. A large crowd of curious kids had gathered and they were talking idly. Carl caught sight of Peter. He wasn't smiling.

Carl had rejected another of his offers of advice.

Cynthia motioned him toward the airlock. His helmet clicked into place, the autocheck light winked on, and cool air started flowing past his face. He plugged the locator into the suit equipment interface connector. A few deep breaths somewhat calmed his shaking, and he shuffled into the airlock.

The door behind him sealed itself, and he punched the exit button.

"Simon, can you hear me?" he asked, his voice scratchy.

"Yes. How are you doing?"

"I'm OK. I " He froze as the outer door slid open and unveiled the highcontrast landscape. It was light out; it would be for several more shifts. The immediate surface was welltrampled, flattened by countless footprints. Perhaps a halfkilometer distant, the inside of a shallow crater wall formed the horizon.

Carl couldn't move. He stood there for the moment, petrified.

"Are you sure you are all right?" Simon's voice intruded on his fear, linking him back to the real world. "Nothing is going to happen to you."

He forced down the memories that had surged forth, and swallowed hard. "Yeah. I'm OK." And he did feel better. His trembling died down and he felt in control once more.

He stepped out of the airlock, the breathing sounds louder now. The locator direction marker lit up a normally unused portion of the status panel near his forehead. It pointed toward a spot on the horizon just opposite the sun. The sun would move less than three or four degrees even if he was out for several hours, so it was an easy reference.

The first few steps were the hardest, but a feeling of normalcy slowly returned.

"I am glad you are feeling more comfortable now," Simon said after Carl had traveled perhaps fifty meters.

"How do you know?"

"Routine things. Heart rate, pupil dilation, digestion rate, and a few others."

Carl fell silent again, settling into an easy rhythm, feeling the dirt below his feet crunch as he walked. Periodically, he rechecked the locator, also noting the signal strength. It was slowly rising.

He made his way through a carved path up the crater wall and soon he had traveled far enough that he began to worry about being able to find the way back. He wasn't sure the direction finder could pick up the beamed communications from Jane Doe Station. In an emergency, he could always use the suit radio or Simon, and have someone talk him back in, but he didn't want to have to do that. He could have probably traveled in the direction of the densest footprints, but that method sounded borderline.

"Simon, you could find the way back, couldn't you? I mean, tell me which way to go?"

"Certainly."

Despite Simon's assurance, Carl felt a need to be able to do it on his own, so periodically he looked back the way he had come, to see what the features looked like from this perspective. It was during one of those times that he spotted sunlight twinkling off what looked like a shiny helmet several hundred meters back.

"Peter," he said. "That must be him, trying to spoil my search."

"Maybe."

Carl turned back quickly so the other wouldn't know he'd been spotted. Ahead, almost on the same heading as the transmitter, was a large rock outcropping. It would provide concealment.

"Let's find out," he said, continuing to move at his original pace. Soon he reached the rock. The surface fell off slightly past that point, so he continued until he was probably below the follower's horizon, and then doubled back, hunched slightly, moving sideways for the rock cover. The shadow was just tall enough to conceal him if he crouched. Perfect.

"What do you hope to accomplish?" Simon asked.

"I don't know. I at least want to find out who it is."

"But then what?"

"I'll figure that out afterward." He shifted his weight.

The wait took less than three minutes. The figure came over the rise slowly, maybe wondering why there was no sign of Carl farther on. That's when he came out of the shadow and enabled his suit radio.

"Who are you?" Carl asked.

There was a slight delay. "Peter," he said at last.

"Why can't you leave me alone? Why are you out here trying to ruin my search?"

"You can't do it alone. You're--"

"Don't you get tired of this? I can manage fine on my own. I'm not a little child. I've come this far. Go back to base." With that, Carl turned off his suit radio and started on his way again.

"He seemed to want to help," Simon said after a long silence.

Carl looked back and saw Peter standing in the same spot. "I don't know. Maybe he was--maybe he's got another motive. I'm tense out here, Simon. Maybe I'm not making the best decisions."

"Maybe you are tense inside the complex too."

"Meaning what?"

"Meaning people might be friendlier to you if you were friendly to them."

Carl looked back again. This time there was no sign of Peter. "He gave up awfully easy."

"You can not have it both ways, Carl."

The silence lasted much longer than before. Carl watched the signal strength continue increasing as he kept walking. Ten minutes later, he stopped. A crater lay directly in his path. On a hunch, he moved fifty meters around the rim, and the direction changed on his instrument.

"It must be in the crater," he said, looking for the easiest way up the outside. "But it may be pretty steep."

"We must be almost there," he said. He moved perpendicular to the direction indicated and the direction finder tracked the same point on the surface. "That must be it."

A large box lay behind a large mound of dust and rocks. He was there. He reached forward to read the lettering on the surface. Maybe it would tell him to take the transmitter back to Jane Doe Station. At last.But that wasn't what it said. As Carl read the words, his stomach tightened, and he started breathing too heavily.

"No, Simon. It can't be. Can't I do anything right?"

Simon's only response was a quiet, "I'm sorry."

Carl sat down on the pile and reread the inscription. It said:

THE SEARCH REQUIRES TWO PEOPLE, WORKING TOGETHER. WHEN YOU BOTH ARE READY TO PROCEED, PUSH THE SWITCH LABELED 'A'. THAT WILL ACTIVATE A SECOND TRANSMITTER SOMEWHERE IN THIS CRATER. ONE OF YOU MUST GO TO THE SECOND TRANSMITTER.

FOUR MINUTES WILL BE ALLOWED FOR YOU TO REACH YOUR POSITIONS. THEN PRESS THE SWITCH MARKED 'B'. THAT WILL ACTIVATE TWO MORE TRANSMITTERS FOR FIFTEEN SECONDS. THE PERSON WHO STAYS HERE HAS TO NOTE THE DIRECTION OF THE FIRST TRANSMITTER. THE OTHER PERSON MUST NOTE THE DIRECTION OF THE SECOND TRANSMITTER. THESE TRANSMITTERS CAN BE TURNED ON ONLY ONCE IN TWENTYFOUR HOURS. AT THE INTERSECTION OF THE LINES, YOU WILL FIND A PLASTIC DISK, THIRTY CENTIMETERS IN DIAMETER, COVERED BY A THIN LAYER OF DUST. YOU MUST BRING THE DISK BACK WITH YOU.

THERE ARE LOTS OF FOOTPRINTS IN THIS CRATER. DON'T RELY ON THEM. WE'VE HAD THE TRANS-MITTER IN MANY DIFFERENT LOCATIONS.

Carl still couldn't believe it. To come all this way. To have to go back emptyhanded. And why had he shut off all those possible conversations about the search?

"Simon, I don't understand. I'm tired, frustrated, angry with myself, but the thing that seems to bother me most is having to go back to that group without the disk. But I can get along without them fine. I have been."

"I do not think you should worry about that reaction. You may look back on it someday and be quite happy about it. There is nothing wrong with needing people, even if they might not last forever."

Carl was back on his feet, wandering aimlessly in the shadow cast by the crater's rim, visualizing the reception he'd get back at Jane Doe Station.

"It's a long way." He looked at the far side of the crater, imagining how difficult it might be to take only one direction sighting, and then search all the area along that path. He should live so long. It was no use. Simon couldn't help on this one, and he couldn't do it alone. He would go home without the disk, and have to face the jeering and the laughing. But why should that bother him so much if he didn't need anyone?

To be continued

NSS Chapters that share Moon Miners' Manifesto





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

WISCONSIN



MLRS - Milwaukee Lunar Reclamation Society

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

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

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

APR 11, 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: APR 16 - JUN 18 - AUG 20 - OCT 15 - DEC 12 (2nd SAT in Milwaukee)

CALIFORNIA



OASIS: Organization for the Advancement of Space Industrialization & Settlement Greater Los Angeles Chapter of the National Space Society PO Box 1231, Redondo Beach, CA 902

Events Hotline/Answering Machine: 310-364-2290 - Odyssey Ed: Kat Tanaka <u>odyssey_editor@yahoo.com</u> <u>oasis@oasis-nss.org</u> - Odyssey Newsletter <u>www.oasis-nss.org</u>/articles.html

Regular Meeting 3 pm 3rd SAT monthly - 2015 SCHEDULE; APR 19, MAY 16, JUN 20

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 <u>eric@boethin.com</u> – Monthly Meetings every 3rd Thursdays, 7 pm Englewood Public Library, Englewood, CO 80110 – 1000 Englewood Parkway, First Floor Civic Center 2015 MEETINGS: 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

PENNSYLVANIA



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

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

NSSPASA Report for May 2015

Meeting Time and Location: We will at the Liberty One food court on June 6th. July or later dates not set.

Special Events report: We had several events in May, starting on the 2nd, and on the 9th. Our first outreach event was at The Science Carnival in Philadelphia on the Parkway. We were invited by the organizers to be part of the event thanks to Mitch Gordon's efforts. We had a great spot, right near the Franklin Institutes and radio station WXPN's outreach stands. It was a great day with moderate temperature and sunshine. And people turned out in droves. On our side of the event we had most of our regular meeting attendees and Frank O'Brien came too. Dotty and Larry, Mitch Gordon, Janice, Rich Bowers, Wallace (Kemp), Hank Smith, and Earl all talked to the public and enjoyed the event. Of special note was Frank O'Brien being invited onto the WXPN show, with Derrick Pitts (the Chief Astronomer of the Franklin Institute and a friend to us over the years), and the show moderator, Kathy O'Connell, (from "The Kids Corner" show) who interviewed Frank with Derrick. Frank is the curator of an Apollo flight computer (yes; it was in space on an Apollo mission) and does great presentations on this and space exploration. You may find the interview on the stations website. Also; see Franks book: "The Apollo Guidance Computer: Architecture and Operation" (.com). Wonderful start to the morning! When Frank came back to the stand he was host to a steady stream of visitors, and, Derrick came by to thank us for being part of the Carnival.

We had a number of other exhibits that are used to explain why we should explore and inhabit space and how that could involve them. Mitch brought his outreach books (he created) and several other elements that emphasized our past, present, and future activities toward the goal of a thriving civilization living and working on, and in, the bodies, both natural and man created, that make up our Solar System. Mars was very popular and Mitch

showed the "Red, Green, and, Blue Mars" possibilities and the idea of changing the Moon to a place where our descendents could live on the surface without space suits. Thanks to the inclusive nature of our group we had people who wanted to talk about many things they were interested in and engaged people on the hard science through Science fiction and fantasy and the U.F.O. subject that some people want to ask about and other topics (like how did you get interested in this activity and how are the job prospects in relation to space exploration and future employment in space related fields).

For my, Earl's, part I discussed the Lunar Lava Tube display (small version) and why we might want to be sub lunan (and sub Aresian), the imminent launch of the Planetary Societies Light Sail (the particular sail they have created) and the work NASA is doing on the **Lunar Flash Bulb** (lunar Lava tube locator – Tom Billings) and N.E.A. sails to be launched from the Orion craft on its' test flight around the Moon in 2018. Note that all three sail are packed into Cubesat family packages. Water and energy were also hot topics and the mix of ages and backgrounds gave us all a chance to work on crafting our presentation for people on the fly. Great fun!

Speaking of all ages: on May 9 we were part of the Super Science event at The New Jersey State Museum where the age of the visitors tended to be younger with couples with babies and young children making up more of the audience. Unlike the crowds of exhibitors at the Science Carnival, which included a number of University and museum groups, the New Jersey State Museum had primarily educational and advocacy groups such as ours. There where several commercially related groups, such as the Johnsville Centrifuge and Science Museum and one of the 3 D printer displays (with a home brew printer no less!). But to the event: for this one I brought the larger Lava Tube Habitat (~7 feet tall) and again discussed this sub Lunan form of living. The presence of the tiny ("N gauge") people in the display fascinated the youngsters, some of whom thought they could pick them up, and the concept of such a construction being possible impressed the adults of various ages. Our display also included information on Cubsats and the solar sails being deployed in May and in the next few years.

And Mitch brought his talking points books, the Mars globe, and the "Space Bricks" that are beloved by children and parents who liked the distraction (and educational value of the display) while they talked about the future of them and the children they brought to the event. Mars was very popular with children as well as adults at this event and we will try for more material for the next events. The crowd was great even though we had some rain initially, and, a few opportunities existed to visit other presenters. Rich Bowers and his wife Jenette both appeared as did Michelle with Sam, a grand child, during the busy day. Both Jenette and Michelle took pictures of our displays and us to publish. Rich and his wife stayed till the end of the event with Rich doing outreach and giving Mitch and I a chance to rest and get snacks to keep us going. This backup is very important: if you do a public event you will need to keep your energy up and having sufficient staff to allow this should be arranged. For Super Science we started at 9 and continued our outreach till 4 p.m.. The Carnival also ran most of its day.

In lieu of the normal reports I will just mention a few points and articles: From a September issue of Moon Miners is a chart of the relative size of lava tubes. If I had not missed this I would have included it as part of our displays. As it shows the relatively large lunar tubes, and, the modestly larger (than Earths) so this would have worked for both places to have "ready made" habitat sites. And from Ad Astra: Dave Dietzler has "Astroid Mining for Space Travel" which describes the uses of material from the Moon and N.E.Os. (Near Earth Asteroids) as fuel for different kinds of propulsion systems. Why? Because there will be tourist groups going out in various periods and the ship/habitats will use the available materials that are economic at those times.

This same issue has a report on what is called "The SMALLSAT Revolution" by Mark Williamson. It has some nice pictures of Cubesats and some large craft that are considered small. According to the featured spokesman on the subject, Professor Sir Martin Sweeting, the real revolution in these small "birds" is the ability to design and build satellites that are pretty robust and capable in there ability to perform science and business operations with mostly commercial off the shelf ("C.O.Ts") parts. Your cell phone has useful components for satellites! (o.k., if it's a "smart phone" of recent vintage). More interesting pictures.

And, still not exhausting this issue, is "Beyond Mars: Travels in the Outer Solar System" by Michael Carroll who also illustrated the piece. There are a number of artists concept images of where we could go (including a space ship at the rings of Saturn) as well as the very real V.A.S.M.I.R. engine undergoing tests in a vacuum chamber. The use of this engine as a prime mover is discussed, with comments by Chang Diaz who is advocating this system, and the need for a high energy source to make it possible. The nice thing about this and other articles is that they talk about what is known to work and what conservatively can work: solar panels, bulky and large, work and are proven. Nuclear power plants generating electricity (indirectly) work, but, are viewed as undesirable at present. Pick up the Summer, 2015 issue of Ad Astra. Speaking of the publication and N.S.S.: thanks to the policy of supporting chapter public outreach NSSPASA had a good supply of this issue (and other material) which was delivered in a timely manner. Thank you, N.S.S. and Jill who coordinated the shipment. There was material from The Amsat Journal on the changes that are happening at the organization with the changes in regulations that affect cooperation with foreign collaborators on various projects, and the advancement of satellite data gathering (tracking has been around for a little while now) using tablets connected to Fun Cube Dongles and other Software Defined Radio devices (some are in the \$10 to\$20 range). There is also an article on attitude determination and how it can be observed via telemetry either indirectly, or, with the right instrumentation, direct measurement. And, as always, much more. Some of that will be in the August Moon Miners! Earl Bennett, President, NSSPASA, KD2CYA

Moon Miners' MANIFESTO Milwaukee Lunar Reclamation Society, Inc. PO Box 2102, Milwaukee, WI 53201-2102





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