

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

Moon Miners’ Manifesto

& The Moon Society Journal

www.MMM–MoonMinersManifesto.com



[UNIVERSE ART UNIVERSE 51 PHOTO275 JPG] -

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About Moon Miners' Manifesto – *“The Moon - it's not Earth, but it's Earth's!”*

- **MMM's VISION:** “expanding the human economy through off-planet resources”; early heavy reliance on Lunar materials; early use of Mars system and asteroid resources; and permanent settlements supporting this economy.
 - **MMM's MISSION:** to encourage “spin-up” entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.
 - **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first twenty years plus have been re-edited, reillustrated, and republished in 23 PDF format volumes, for free downloading from this location: http://www.MoonSociety.org/publications/mmm_classics/
 - **MMM THEME Issues:** 14 collections of articles according to themes: [.../publications/mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)
 - **MMM Glossary:** new terms, old terms/new meanings: www.moonsociety.org/publications/m3glossary.html
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 - **Milwaukee Lunar Reclamation Society** is an independently incorporated nonprofit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. MLRS serves as the Milwaukee chapter of both **The National Space Society** and **The Moon Society**: – <http://www.moonsociety.org/chapters/milwaukee/>
 - **The National Space Society** is a grassroots pro-space member-ship organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.
National Space Society 1155 15th Street NW, Suite 500 Washington, DC 20005 (202) 429-1600 – www.NSS.org
 - **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon.” – Contact info p. 9.
 - **NSS chapters** and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.
 - **Publication Deadline:** Final draft is prepared ASAP after the 20th of each month. Articles needing to be keyed in or edited are due on the 15th, Sooner is better! – **No compensation is paid.**
 - **Submissions by email** to KokhMMM@aol.com – Email message body text or MS Word, 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
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In Focus Preserving Civilization through “Off-Spring Worlds”

By Peter Kokh

We humans have inherited a world teaming with life – vegetation and animal alike. To date, we have found no “worlds” within our own solar system that could support life on a similar scale and diversification. No, we have to create mini-“biospheres” on hitherto lifeless worlds like the Moon and Mars. But to make them work, we need to learn something totally new, how **to live downwind and downstream of ourselves.**

It is possible, and those who set out fully realizing and accepting this challenge will succeed.

The Moon and Mars both will oneday host human settlements that do just this. In the process, hopefully “people back home on Mother Earth” will come to realize that the only way they can preserve Earth as a comparative paradise will be to do likewise: **learn to live downwind and downstream of ourselves.**

If we fail to take up this challenge on the Moon and Mars, it is most likely that we will also fail to do what is necessary to pass on to our children the awesomely beautiful and life-rich world we have inherited from our own ancestors: parents and grandparents and greatgrandparents.

There are those who see civilization thriving off Earth but with civilization on Earth itself going downhill as we continue to abuse the wondrous environment we inherited from generations before us. **Our goal is clear. ##**

Mother Earth & Father Sky: the Moon and Beyond; Environmental Lessons

By Peter Kokh

Mother Earth is ailing

The list of must-accept challenges is clear. And if communities – towns, cities, and megacities – are slow to accept it, **individual homeowners can** accept it and **help pioneer and improve the technologies needed** to that the air they use and the water they drink and wash and garden with passed downstream as clean or cleaner than it was before they received it. Yes, it will cost money. How much do you love your children and grandchildren?

There is a relatively small percentage of homeowners who are attempting to do just that. But their effect is small on the wholesale misuse of air and water by people, industries, and community alike.

Those who refuse to admit that the world's climate is changing for the worse largely because of human activity – no matter how much they declare their love for their children and grandchildren – demonstratr that for them, the driving motive is to stay rich and get richer if possible, “to hell with their children and grandchildren. Let them fend for themselves.”

No generation has been given such a challenge, and so enormous a responsibility, as our current generations, be they grandparental, parental, or young people. We continue to be more absorbed in “enjoying the present to the full,” We continue to introduce new chemicals into the environment, chemicals “nature” is unable to process adequately. We look the other way, refusing to admit that Nature can't take care of it, because doing the right thing will cut into the money we make to spend on ourselves, again, “let our children take care of it.”

Father Sky gives us a way to turn this around

Both the Moon and Mars, while presently lifeless, have water (or ice) and the minerals needed to sustain “islands of life,” created local biospheres – if (and its a big “if”) we set out determined to “learn how to live downwind and downstream of ourselves.”

Both these new naked lifeless worlds have mineral resources that if not needed on Earth itself, could significantly increase **Greater Earth's economy** – resources needed to continue to expand that part of our current economy that is **anchored in facilities in GeoSynchronous orbit**. Already, economic activity in GEO is large enough to displace one or more current members of the “top 20 national economies.”

Solar Power Satellites and Power Relays are not the only possibilities.

By international agreement, there are only 180 slots available in GEO, 2 degrees apart (360 degrees in all) and GEO is getting crowded. But processed materials from the Moon could allow us to expand the number of satellites in GEO a hundredfold or more by **building large platforms each of which could host hundreds or more individual satellites**.

These platforms would provide power, repair services and more.

Without lunar resources, which can be downported to GEO at a significantly lower cost than similar items upported from Earth, **metals, glass/glass fiber composites, basalt/basalf fiber composites, and more**. Believe it or not, **even food items produced on the Moon** can be downported to manned facilities in GEO at a significant cost savings over similar items “upported” form Earth's surface.

We have to stop thinking about Earth as just our home planet. “Greater Earth” includes GEO and the Moon. It is Greater Earth that alone can snap out of the current environmental downplunge.

There ae some who do not want you to know this. But too many of our “grandparents” dismiss this vision of much more prosperous future because it might cut into their current self-indulgent life styles.

This is not a condemnation of one political party. No, these attitudes are unfortunately too common. Those of us who understand what is at stake, owe it to their children and grandchildren – and/or nephews and neices and grand nephews and nieces – **and to their own dreams** – to try to find ways to turn our civilizations “downplunge” into a much brighter future.

This is not the first service the Moon has to offer Earth

The Moon formed from the debris knocked off the Earth in a collision with an intruder destroyed in the process. This new body, our Moon, formed much closer to Earth's surface and its tidal effects on both the ocean and the land were enormous. These tides slowed down Earth's rotation form short days – 7 or 8 hours to the 24 hour days we have now. In other words, the Moon is responsible for making Earth livable.

Predicitng lunar eclipses also spurred the development of mathematics. In short, human civilization might not have developed were it not for the Moon. What developing the Moon, in a envrionmentally responsible way, can do for our civilization is the frosting on an already tasty cake.

Yes, Mars seems more Earthlike. But that is irrelevant. It is the Moon that is responsible for our civilization in the first place, and it is the Moon that alone can help mature our civilization and realize our potential. Then, and only then, will what we will have learned in settling the Moon with environmentally responsible communities that will allow us to do the same on Mars.

Our future looks brigh on both worlds – and beyond. But first things first – we wil be more successful on Mars if we “do the Moon” first. Not to forget: The Moon, not Earth, will be Mars' best market. ##

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Opening the Moon and Mars will bring a new Renaissance to Earth

By Peter Kokh

Imagine Europe today if the Americas had not been discovered and settled

Columbus' discoveries, and those of other European explorers who followed, had an enormous effect on Europe, especially on those nations involved: Spain, Portugal, France, England especially. The effects were not only economic – metals and food items and much more – but cultural. The limits of the “known world” exploded to include the whole planet as Magellan went beyond the Americas to rediscover Asia from the other direction.

Gold was the goal of choice of course, but beyond that new foods, and new technologies revived Europe and provided its citizens with new hope for a new life beyond the shackles of previous options. People throughout Europe, not just in the exploring Atlantic coastal nations, saw in the New World, open possibilities of a new life.

Beyond our Home Planet to our Home Solar System

Opening the Moon, then Mars, will have a similar effect on many individuals here on Earth. Yes, a pioneer life on the Moon or Mars will mean many sacrifices, giving up lives on Earth that are far more comfortable, for “open-ended futures” for themselves **and their off-spring**.

As people choosing to remain on Earth follow the adventures of pioneers on the Moon and Mars, they may try to copy some of the lessons learned. And, or they may be encouraged to follow suite, or to encourage their children to do so.

In short, opening up the Moon and Mars will slowly transform civilization on Earth. Hopefully, this transformation will be thorough enough to prevent civilization from imploding by a failure to learn and practice how to live downwind and downstream of themselves, as the pioneers on the new worlds must “do or die.”

That the list of spacefaring nations is now increasing is encouraging. The United States, Canada, Europe, and Russia have been joined by China, India, Korea, Japan, even Viet Nam. Hopefully other nations will follow suite. There is too much to gain by participating, and too much to lose by not doing so. Most disappointing is Brazil's failure to take the plunge.

Sputnik, Yuri Gagarin, Apollo 11's first Moon landing, the series of space stations, have been followed by a slowing of progress world wide for blind-sighted “budgetary” reasons. In the United States, possibilities-blinded representatives and senators prioritize short-sighted alternative goals while a public that traditionally remains future blind-sighted pushes more “immediate” ends.

When will we open the Moon?

It has been four decades since the last humans set foot on the Moon. Chinese “taikonauts” may be the next to do so. But it could be that private enterprise will take the next step. Elon Musk is working towards the opening of Mars. It will take less money, and realize more practical economic goals if outfits such as Golden Spike open the Moon, first to exploring tourists, and then to pioneers.

Golden Spike Moon Lander – www.space.com/18805-golden-spike-private-moon-landing-graphic.html

This is a plan to bring individual paying tourists to the Moon. There is no recent report on the company's plans. But even if this enterprise has collapsed for funding reasons, other enterprise efforts to bring people to the Moon are sure to follow. Russian plans to fly tourists to the Moon without landing are still alive. But high prices may doom this effort also.

When will we open Mars to humans?

Mars One is a totally impractical proposal. The architecture of the complex is inadequate, and the financial plan is absurd. No attention seems to have been given to where on Mars (and why there) the Mars One colony would be built.

On the other hand, **Elon Musk's plans** are much more realistic. But to date, he has given more thought to the ships that would bring human settlers to Mars, than to where on the Red Planet they would settle, and how they would provide for their needs: needed resources (water!), agriculture and industry. In fact, very few Mars enthusiasts (other than myself) have looked into where on Mars they will find a suite of resources that would allow the settlement to survive and then expand. These considerations cannot be dismissed as “details.” They are “do or die” considerations.

The effect on Earth of establishing settlements on the Moon and/or Mars

The effects of Columbus' discovering of a “new world” on the other side of the Atlantic were enormous and transformed European civilization and culture. We can expect that opening the Moon and Mars to pioneers will have a similar effect on those of us remaining on Earth – the vast majority of humankind.

Without the opening of these new frontiers, cultures on Earth will languish and leave younger generations with far less options. Yes, Earth is our home planet. But just as relevant, our Solar System is our home system. It is ours to explore and settle, and those ventures will bring new life to our cultures, new hopes for young people. New benefits for those who remain on Earth.

Yes, we are Terrans, people of Earth/Terra. **But we are also Solarians**, people of a system of the star Sol. The sooner we start thinking of ourselves as Solarians, not just Terrans, the better. ##

Will we one day find evidence of past visitors from another star system?

By Peter Kokh

The possibility of past visits from explorers of other civilizations on worlds around other stars has been a hot topic for a long time – since we first realized that the stars are each “suns” and possibly host to other “solar systems.” It is hard to look up at the stars and not wonder about this possibility, especially for those of us who realize that our universe is far far older than once believed or taught.

That the Sun, formed 4.6 billion years ago, as ancient as it would seem to us, did not form from a collapsing nebula until our host galaxy, the “Milky Way” was already about 8 billion years old, suggests that other civilizations on worlds around other suns, may have arisen far earlier.

It is likely then, that there are, or have been, other civilizations that have risen before ours, and which may or may not have survived into our times. Yet we must never forget that when we look at the stars we are seeing them as they existed years, even hundreds of years, even thousands of years, even millions of years in the past. If we were to “find” evidence of a civilization, we will have no ground to be sure that this civilization still subsists.

Undoubtedly, some civilizations will endure longer and reach higher levels than others. Our own civilization’s future is far from assured. We are in that juvenile stage where we are living for the present, and carelessly letting our biosphere deteriorate, putting our own comforts ahead of those of generations to come. **“interstellar conversation” is quite impossible.**

That it would take a message from another civilization years, if not centuries, even millenia, even millions, hundreds of millions of years to reach us, and just as long for our answer to reach them, it should be clear that “interstellar conversation” is quite impossible.

Calling Cards

But could an interstellar-faring civilization have left a calling card in our system in the hopes that the ecosystem on Earth would mature to the point of giving birth to an intelligent species and an inquisitive civilization such as ours? It is marginally possible.

Where would they have left a calling card, and what would it say.

We’ve written about this before. The visitors would have had to pick a place that could survive intact for millions, even hundreds of millions, even billions of years. No place on Earth fits that requirement.

What about the Moon? Yes, but a calling card left on the surface would erode over time. And if not, it could be found before we are “ready” to appreciate it.

The Moon’s lavatubes, those that have not collapsed into rille valleys, have been around for billions of years. Some of them have collapse holes caused by meterite impacts, inviting human explorers to explore. To date, we have found several such holes.

What might they have left behind for us to discover and appreciate?

Certainly not the secrets of interstellar travel! Maybe something about themselves.

But far more usefull and appreciated would be an exhibit of some kind showing us **what Earth looked like – in detail – at the time of their visit.** Could we think of a more useful gift? Views of Earth, showing the then placement of the continents, forests, deserts, etc. And maybe a comprehensive exhibit of the plants and animals that existed at that time. Such knowledge would fill in a lot of gaps in the picture we have of Earth’s past, not only filling in gaps, and perhaps correcting some assumptions..

The “Cheshire Cat” – leaving us their smile

They might also tell us something about their own home sun, at least the direction in which it lies, maybe the distance, about their own biology, and what their diverse animal and plant life are like, etc.

But it would be best if they did not tell us much about their culture and history. It would also be best if they left us no technological shortcuts to our own future, letting us to discover such things on our own.

Once we are able to broadcast to other civilizations around other stars, messages that may reach them far in our own future, let’s hope we take a similar “Cheshire Cat” approach.



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The Diaspora: Where besides the Moon and Mars might humans one day settle

By Peter Kokh

MERCURY: The north polar area has craters filled with ice, much as does the Moon. Just to the south is a basaltic mare area, like the maria "seas" on the Moon, almost certainly including lavatubes whose interior temperatures may be low enough to allow human outposts.

Besides exploration of the planet, crews could operate giant solar-powered lasers to slow incoming spacecraft and then use them to boost these ships into orbits to Mars and elsewhere in the solar system. Why, because indirect Earth to Mars by way of Mercury trips could be made more often than direct trips.

Read about it in this article: www.moonsociety.org/publications/mmm_themes/mmmt_solarsystem.pdf

VENUS: [Read "Rehabilitating" VENUS as a Human Destination 1992, 1998, 2000

www.moonsociety.org/publications/mmm_papers/venus_rehabpaper.htm

We think of Venus as a forbidding place forever "off limits" to humans. Our "twin planet" has a thick crushing atmosphere and an unsurvivable surface, abysmal lands were the temperatures and pressures far exceed all human capacity to adapt – even within technomiraculous protective cocoons.

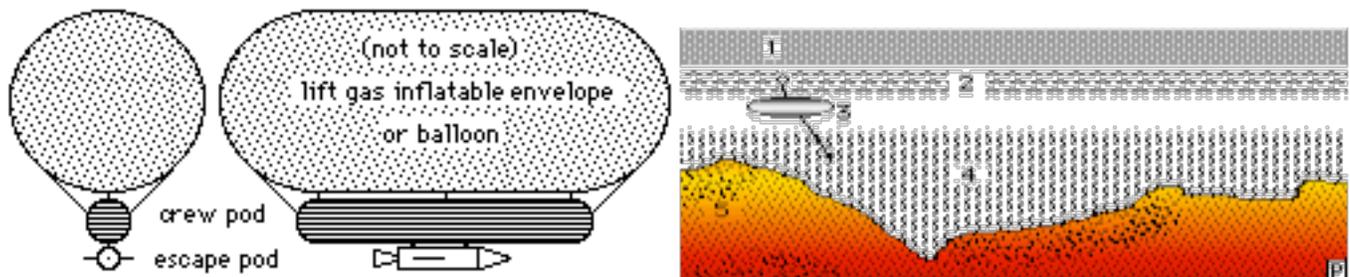
Yet there are thinner, higher, more temperate regions in the atmosphere of this "hell planet" where the conditions are relatively benign. Such a planet-girdling pseudo "ecosphere" lacks but one thing to make it an attractive site for human outposts or settlements – "terra firma", solid land at the seemingly benign levels.

But this lack is something we can, with determination, do something about. We only need to expand conservatively on the known concepts of lighter-than-air craft.

In the oxygen-rich atmosphere of Earth we would need to use helium gas for buoyancy, but as Venus' atmosphere has no significant amount of pure oxygen to cause combustion concerns, using the lighter and more buoyant hydrogen would work better. Of equal or even greater advantage is that the needed hydrogen could be mined from Venus' atmosphere locally.

Aerostats seem doable using the lightweight composite materials and fabrics now available or in the works, many of which could be fabricated in situ by mining the atmosphere itself. Venus' atmosphere has hydrogen, carbon, nitrogen, oxygen, sulfur, and possibly phosphorous and other elements present as methane, ammonia, ethane, propane, phosphine, hydrogen sulfide, carbon monoxide, acetylene, water vapor, and other compounds.

The feasibility of aerostat outposts over Venus can be tested by dropping into the upper atmosphere a pressurized crew compartment carrying an inflatable gas envelope, the lift gas with which to inflate it, and an underslung Pegasus-like shuttle by which the crew could escape to orbit.



Solar Power is not an option beneath the cloud decks of Venus. Nor are elements for fission or fusion reactors. Energy production on Venus will have to be more resourceful. Could lightning be harnessed? Circulating a working refrigerant liquid between hot lower atmospheric levels and cooler upper ones might work.

Thermal management should be a simple matter of **picking a float altitude with the right temperature.** If the outpost has excess heat to radiate, a colder and thinner altitude would provide the needed heat sink. However, radiators at the end of tethers flying above the outpost (i.e. supersats) might do the trick, especially if parking in a higher colder altitude meant being in the clouds, and losing visibility of the planet's surface.

Industry: If all that Veneran "cloud miners" have to work with are C, O, N, H, and S -- carbon, oxygen, nitrogen, hydrogen, and sulfur -- then in addition to agricultural products (importing phosphorus and other micro-nutrients) what serviceable synthetic materials could they produce? And what sorts of things could they make from them? Structural elements from which to expand? Mere low-performance furnishings and craft stuffs? Are exotic nitrogen-based ceramics and Kevlar among the possibilities?

The fewer basic needs that can be met by self-manufacture from ambient elements, the more must at first be imported at high cost. Raw materials for manufacturing might be tele-dredged from the torrid surface.

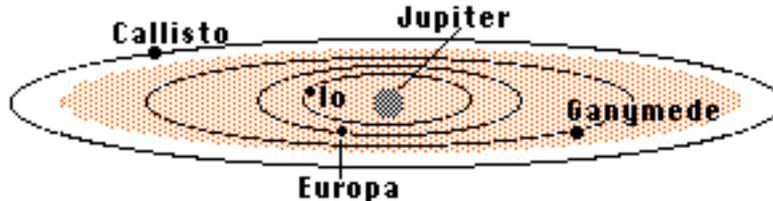
Such a facility would offer unequalled opportunities to conduct Venus science and exploration: An economic geography of the planet could be pieced together against a far future day when we might somehow be able to transform the pressure-cooker atmosphere into something humans could handle .

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A down-facing observatory would map the Veneran terrain below using multi-spectral remote sensing techniques. More ambitiously, rugged oven-hardened ceramic-hulled, diamond-wired teleoperated explorers, samplers, and eventually miner vehicles, etc. might be developed to serve as our stand ins on the surface, operated by crews in the aero-xity. These could be stationary surface stations or mobile ones. Prior to this, we could begin to get our feet "hot", probing ever lower and lower as the hardness of our equipment allows, by drone airborne craft teleoperated from "The Heights".

Read the whole paper for how we might transform Venus into a livable planet: Hint: **89% of the water needed to refill Venus ocean basins is already on location:** Oxygen to be extracted from the oppressive Carbon Dioxide atmosphere, saving the carbon for an unlimited list of uses. All we have to do is import Hydrogen. Where from? From the Solar Wind of course. And you thought we'd have to find water rich comets and bring them into the inner solar system! Nope. It will be much easier. But it will be a long duration project. We predict that this is what future generations of humans will do.

CALLISTO, GANYMEDE, EUROPA: The outer three of Jupiter's 4 larger Moons



Only Callisto orbits outside Jupiter's Radiation Belt

CALLISTO is the outermost of Jupiters major moons and happily it is outside Jupiter's radiation belt. As such, Callisto will be the major outpost in the Jovian System from which missions in to Ganymede and especially Europa will be staged. Incoming ships will be jacketed in ice from Callisto's surface for protection from radiation en route to Ganymede and Europa. (We have no prediction for what manned missions to Ganymede would do)

EUROPA's ice crusted ocean begs to be explored, especially if surface landers find organic materials in the reddish streaks formed when ocean water below made its way to the surface when the ice cover cracked. A manned complex on the surface could be jacketed with ice on location for radiation protection.

Read: www.moonsociety.org/publications/mmm_papers/europa_outpost_paper.htm



Left: an outpost on Eurp[a]'s ice crust could be shielded



Right: could there be "air" pockets under the ice? from radiation by a layer of ice blocks.

If we find organic materials in the reddish cracks on Europa's surface, we can expect to find life of some form in the global ocean below, possibly 60 miles / 100 km deep, holding more water than Earth's global oceans! If so, we could be exploring that ocean for a long long time.

Europa-like worlds do not need to be near a sun, and could exist in any and all solar systems, even around Brown Dwarf star-wannabes. This kind of life should be predominant throughout the universe. Humans would be on Europa for a long time, studying it. But the Europa outpost population need not be large.

TITAN and IAPETUS: Moons of Saturn

Titan is proving to be the most unique world in the solar system, other than Earth itself. We might have a "Space Settlement" in orbit above, controlling surface probes and even submaines with minimum time-delay, studying this unique world for a long long time.

IAPETUS: a moon of Saturn with half the diameter of the Moon (Earth's) is best placed for viewing Saturn's rings and as such could be the main human outpost in Saturn's system.

URANUS: Supposedly, Uranus has by far the largest amount of Helium-3, the ideal fuel for Fusion Reactors. If Fusion becomes a main source of power, a "Space Settlement" in orbit above the planet to control the "mining" (for want of a better word) of that Helium-3 hoard. PK

Effect on Earth's people of different life styles of settlers on the Moon and Mars

By Peter Kokh

Tourists returning home from the Moon, and Mars

When Europeans came to North America, they discovered **Native American foods** and these soon made their way to Europe:

- **Cereals:** maize (corn) and barley; **Fruits:** tomatoes, chili peppers, avocados, cranberries, blueberries, h\passion fruit, pineapple, and strawberries. Squash'
- **Meat and Poultry:** turkey, buffalo, venison, ducks, guinea pigs. **Guinea Pigs!?** They are a common meat source in South America and may be the most efficient source of meat and other byproducts – more efficient than cows and goats (though for milk, goats are the more efficient choice. Soy milks will likely be more common, however.
- **Native American Fabrics:** wall hangings, rugs, throws, garments

All these things varied from tribe to tribe and in various areas of North and South America

What tourists will bring home from the Moon: Furniture and Furnishings

Lunar pioneers will have different materials out of which to make both daily necessities (dishes, planters, tubs, lamp bases, furniture, table tops, floor tiles etc. Among these will be glass/glass fiber composites ("Glax" in MMM) and cast and carved basalt and basalt fiber/basalt composites.

"Native Lunar Fabrics" will be will depend on which fabric fiber producing plants grow well on the Moon, and efficiently (percentage of the plant that is turned into consumer products.)

Tourists may treasure in their homes back on Earth small lighter weight items made on the Moon of "glax" or basalt or basalt composites: a place setting of dishes if not a whole set, lamp bases, planters, statues, etc.

Tourists may trade some of the clothes they wore to the Moon, for equivalent items made on the Moon.

In Turn, prospective tourists may be given a list of clothing items that Lunar pioneers would welcome, whether to use in "Theater Plays." They would return home in clothing made on the Moon. For tourists to keep in mind here is that clothing made on the Moon may have a limited set of relatively drab colors.

With relatively limited arts & crafts materials, colored ties, ribbons, even human hair in various shades might be welcome.

The biggest source of made on Earth items will be tourists from Earth taking along items hard to get on the Moon, to trade to Lunans for unique things made on the Moon, that would be much more expensive if brought back on Earth. We assume that tourists will have a weight allowance as to what they can bring to the Moon, and another weight allowance as to what things made on the Moon that they can bring back to Earth, whether to treasure for themselves, give away as gifts, or sell.

Sports paraphernalia:

Lunar pioneers will soon find out that some sports translate better in the Moon's light gravity than others. But there will be some adjustment. After all, balls, for example, will behave differently in the lower gravity, and, if the sport is played "out-vac" in the absence of air. Most Lunar versions of Earth sports may not work and vice versa. But tourists coming home to Earth may find a new passion for those sports that do.

Mini biospheres

On both Moon and Mars, worlds without global biospheres, homes and settlements must provide and maintain mini-biospheres. Hopefully, tourists will take some of these features home, pushing local governments to better treat waste water and waste air so that they too can live "downwind and downstream of themselves." Individual features such as "Living (Green) Walls" might become more common here on Earth.

Social problems

On the Moon, some settlers or their offspring may have a hard time "fitting in." But on the Moon, settlements can't afford to just remove such persons from Society. They will be put to work doing useful things from making roads, mining, or other things in which guard teams can do a good job. At the same time, this "forced productivity" may teach them how to better fit in, once they are "released."

Tourists returning from Mars

Because of the very long times spent in space en route to Mars and en route back to Earth, and the long time they must spend on Mars before a window opens back to Earth, will be far fewer in number. Nonetheless, they will want to return home with items made on Mars to showcase or give as very special gifts, as well as mementoes they want to keep for themselves as proud reminders of so special a trip.

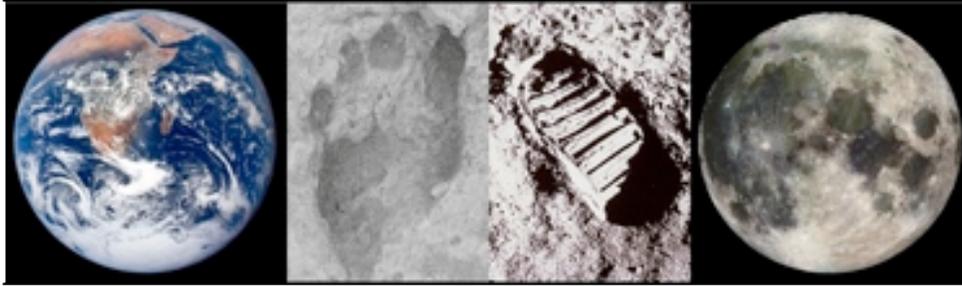
Effect on Earth's population and culture

As things made on the Moon, or Mars, become more commonplace on Earth, others on Earth will be more aware that they live in an era of a multi-planet civilization. Hopefully, the hardships and adjustments that lunar and Martian pioneers will go through will make them more responsible citizens back here on Earth.

The result will be a multi-world community of people trading their creations and adjustments. ##

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

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



Our Goal is
Communities
on the Moon
involving
large scale
industrializa-
tion and
private
enterprise.

The Moon Society Journal Section (pages 9–12)
About the Moon Society
Objectives of the Moon Society include, but are not limited to:

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

Our Vision says it all – “Who We Are and What We Do” – www.moonsociety.org/spreadtheword/whowhat.html

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

Moon Society Mission: to inspire and involve people everywhere, from all walks of life, to create an expanded Earth–Moon economy that contributes solutions to the major problems that challenge our home world.

Moon Society Strategy: We seek to address these goals through education, outreach to young people and to people in general, competitions & contests, workshops, ground level research and technology experiments, private entrepreneurial ventures, moonbase simulation exercises, tourist centers, and other means.

Interested in having input? Any member may ask to join the Leadership Committee and attend our Management Committee meetings held twice monthly. You may even express opinions. Decisions are often made by consensus, so this input has value. Write president@moonsociety.org

From Moon Society President  Ken Murphy

This is truly the scary season. Not just because of Halloween, but also the looming threat of so many broken things in the U.S. Our corporate culture is broken, our financial systems are broken, our educational systems are broken, even our political system is broken. Is it any wonder then that our space efforts seem also broken?

The scariest evidence of that is the inability of the U.S. to put a crewed vehicle into Low Earth Orbit. The Chinese have just reiterated their capability, and of course the Russians use the old reliable Soyuz for which we pay outrageous prices per seat to put our astronauts onto the International Space Station. We keep hearing whispers of "soon...soon...", but the real question is whether the U.S. will be able to generate the capability to send crews into orbit by the 50th anniversary of the Apollo 11 Moon landings in 1969. Private industry offers many promises, and the potential to actually achieve what they say seems to be there, but our broken financial industries are unable to steer risk capital into clearing the performance hurdles, and the companies seem to be happy to pace off of NASA's trickle of monies. Perhaps Putin has friends in Congress we don't know about, but that's for conspiracy theorists and

Past articles http://legacy.moonsociety.org/publications/mmm_classics/
Or arranged by themes: http://legacy.moonsociety.org/publications/mmm_themes/

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

government analysts to worry about. Nevertheless, NASA does seem to be providing more drag than lift to the space industry.

It could also be averred that the robotic side of things is in a bit of a doldrums as well. A real overhaul of the planetary science program would make much better use of the Inter-Planetary Superhighways (IPS, for which we have an on-ramp at the Earth-Moon L-1 point) to establish a network of probes around the Solar System to provide an ongoing stream of data from a number of key locations around the Solar System. Asteroid belt watchers could be established at Sun-Mars L-2 and Sun-Jove L-1. Communications relays could be established at the Venus Equilaterals. There are many locations that could be of use, and much useful data that could be collected to provide a much fuller picture of the dynamics of Sol's System. This would require a significant amount of overhaul of the program, but the investment would likely create a much stronger field of scientific endeavor in the long run.

The Google Lunar XPrize teams have been rather quiet of late, and are hopefully focused on bending metal. This again highlights the seeming inability of our capital markets to direct the necessary capital into nurturing space-related efforts. The problem is that there's not enough there yet to loot, and so little effort is made. A refocus of our capital markets on encouraging investment and growth seems unlikely at this point, but there is still hope.

Although the political theatre of the last two years that will (temporarily) culminate in the upcoming elections doesn't seem to offer much hope. The platform statements of the two dominant political parties contain the usual pabulum and platitudes, and there's little there to encourage much change in the status quo. That will have to come with generational change, and the Baby Boomers still wield political and social control over the society. That's unlikely to change until sometime in the 2020s when the demographic numbers make it inevitable. We're seeing the early effects on the fringes, but the change is still too small. As a result I expect there to be an ongoing gross misallocation of national resources, coupled with (seeming) ineffectual political leadership that's colossally abnegating its actual duties and responsibilities in the name of drama and theatre. And as a consequence our space efforts will continue to limp along with small victories here and there, but nothing like the vibrancy that the industry could actually engage.

So things may seem pretty spooky and scary right now. But one thing is unchanging, and that is change. Dark nights precede luminous dawns, even if those dark nights seem to go on and on. Just as the Moon wanes even disappearing for a while, yet again will it wax large in the public imagination. My personal belief is that the 50th anniversary of the Apollo 11 landings will provide a unique cultural touchstone moment that can really sway things towards a vibrant cislunar focus. But again, the key question is will we have crewed access event to LEO as we celebrate our once and future access to the Moon?

I've got my fingers crossed... Ken Murphy

Dave Dietzler's Article on Lunar Tourism published in Ad Astra

Moon Society member Dave Dietzler, who has been a frequent contributor to Moon Miners' Manifesto over the years, has his major article "**Space Infrastructure for Lunar Tourism**" published in the **Fall 2016 issue of Ad Astra**, the quarterly magazine of the National Space Society.

The article covers "Dreams and Nuclear Rockets", "Propellant from Space," Advanced Propulsion Systems, and "Future Visions."

As Dave is also a key member of the St. Louis Space Frontier Society, a joint NSS/TMS chapter, which is hosting the upcoming 2017 International Space Development Conference – ISDV – over the Memorial Day weekend May 26–29, 2017 in St. Louis, you will have an opportunity to meet him and get into some far out discussions.

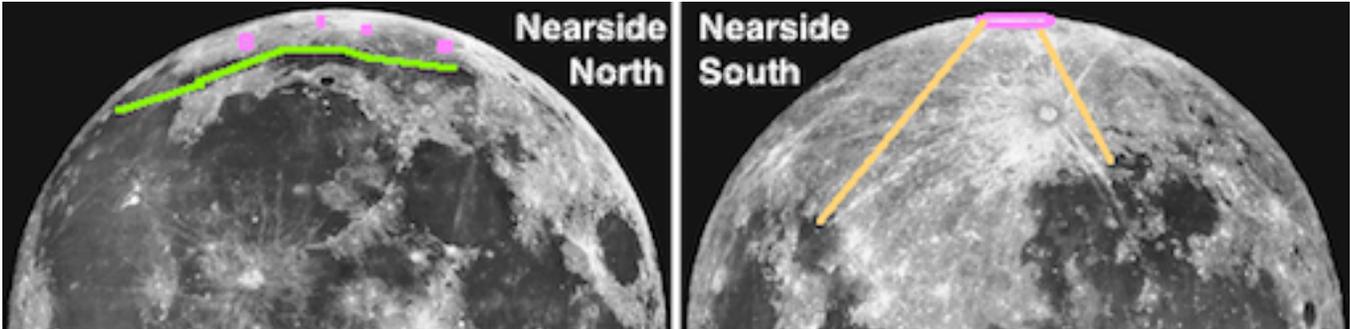
We expect that Dave will also contribute to MMM's successor publication, Outbound: The Moon, Mars, and Beyond from time to time – P. Kokh.

Our (3) Planned Exhibits at the St Louis ISDC., May 25–29, 2017

By Peter Kokh

(I haven't been to an ISDC since 2009 Orlando and 2010 Chicago. Given my age 79.5, this could be my last)

1. Where to set up shop on the Moon, and why – two options



(pink: ice-filled craters at the poles but also as far as 30° from the poles – easier to mine!)

Mare Frigoris/Sinus Roris North Hemisphere Gambit vs. Short-sighted In vogue South Polar Gambit

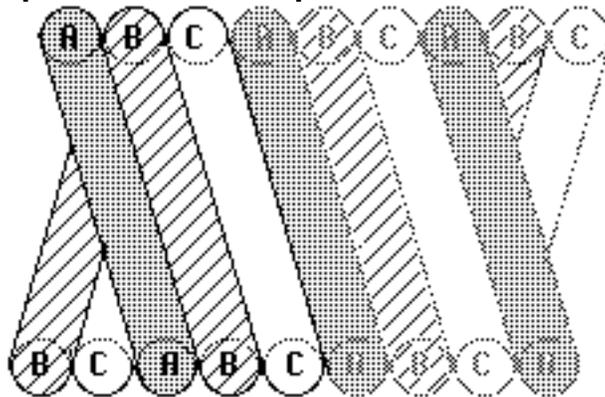
- **South Pole Option:** Choice of “Experts” – Sunlight 95% of the time but very far from mare deposits (yellow lines) and thus a poor start for industrialization
- **North (Mare Frigoris & Sinus Roris)** 150° expanse of basalt-rich maria with iced craters just above 60°N, Easier to mine, with **power-sharing-cable-end-to-end** so cable-interlinked ice-mining outposts just above 60° N can enjoy power 85+% of the time, with access to both basalt rich mare soils and highland soils – for maximum industrialization.

2. Moon outpost exhibit made with (free) recycled components

An Exhibit example for proposed design competition for Middle School young people level, (before students loose all interests except “social” ones). A real opportunity to be inventive.

Tin cans, plastic bottles and jars, bottle caps, toilet paper cores, etc. Etc. Plus creative ingenuity!

3. Expandable Helix Space Settlement Design



<http://moonsociety.org/changing-images/showimage.php?image=105>

Building on a cue form DNA, Expandable Helix design take-off from the Stanford Torus family of Space Settlements, with each of 3 continuous strands having day-night cycles 8 hours apart to keep industries running 24/7 but everyone working during “their day shift” This open-ended design can support growing populatons and industries.

November


 Chapters & Outposts

2016

ORGANIZED CHAPTERS

Milwaukee Lunar Reclamation Society – <http://www.moonsociety.org/chapters/milwaukee/>

<http://www.meetup.com/Milwaukee-Space-Exploration-Meetup/> – <http://www.space-Milwaukee.com>

Contact: Peter Kokh – kokhmmm@aol.com – MEETINGS, 2nd Sat 1–4 pm monthly except July, August,

Meetings: Mayfair Mall lower level room G150 for all meetings except December, in G110: **2016** DEC 10 – **2017** JAN 14 – FEB 11 – MAR 11 – APR 8 – MAY 13 – JUN 10 – SEP 9 – OCT 14 – NOV 11 – DEC 9

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

<http://www.meetup.com/Saint-Louis-Space-Frontier-Meetup/>

St. Louis Space Frontier has been invited to do a series of Space Talks at County Libraries. We are scheduling three talks, to be repeated at two libraries with talks for middle school, high school, and adults
Our goals include: • educate the general public about the Space Program • excite everyone about Space Exploration so that they will want to learn more • inform people (no hard sales) of ISDC 2017.

Contact: Robert Perry surfer_bob@charter.net – Meetings 4th Sat. room 162 of McDonnell Hall of Washington U.
2017 Jan 28, Feb 25, Mar 25, Apr 22, May 27, Jun 24, Jul 29, Aug 26, Sep 27, Oct 28, Nov 25, Dec 23

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 **2016 Schedule** S Dec 17 **2017 Schedule** Jan 21, Feb 18, Mar 18, Apr 15, May 20, Jun 17 –

Chapter News: We sponsored a display table and a presentation at “LibraryCon”, a one-day free sci fi event Sat. Oct. 15, at the Southeast Regional Library branch in Gilbert, AZ. This is the 2nd year we have participated in this outreach opportunity that had over 600 visitors. Families and enthusiasts checked out cosplayers authors, gaming demos, and workshops on various sci fi and fantasy topics.

I (Mackowski) gave my talk on the prospects for human missions to Mars, with coverage of the latest announcements from SpaceX. We had our astronaut cut out for photo-ops (which did not get used much and some info posters and gravity jugs. We also gave away a lot of As Astra magazines. Thanks to members Phyllis Bush, Greg Rucker, and Gary Henderson for helping out and working the crowd. ##

Tucson L5 Space Society – Now serving Moon Society Members www.tucsonspacesociety.org/ (not updated)

Contact: Al Anzaldúa – Meets monthly, every 2nd Sat, 6:30 PM – **2016** DEC 10 , **2017** JAN 14. FEB 11, MAR 11, APR 8, MAY 13, JUN 10, SEP 9, OCT 14, NOV 11, DEC 9

Clear Lake NSS/Moon Society Chapter (Houston) – <http://nss-houston-moon.org>

<https://www.meetup.com/Clear-Lake-Area-National-Space-Society-and-Moon-Society/> (new site)

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:

Update from the October 17th meeting: The current slate of officers was re-elected unanimously. In addition, the chapter board members were authorized to draft an amendment of the chapter bylaws which would relax our current requirement of dual Moon Society and NSS membership for chapter directors provided that the Moon Society and NSS give consent. This amendment will take effect after approval by the chapter at a future scheduled meeting. Moon Society member Larry Friesen was provisionally elected to fill the second director's seat; he will officially take office upon approval of the amendment. We also reviewed material and videos received from the Sacramento L5 Society on a proposal for "Powering a Moon Base Through the Lunar Night"; these items are now posted on our chapter web site at <http://nss-houston-moon.org/chapter-resources/> for review and viewing. The video links will expire on December 17th.

NEWS: NSS Board Members met in Houston on Saturday, October 22 for their Fall meeting.

On **November 14th** we will be hosting a **Movie Night at Anita's house**. I will be bringing the popcorn machine, Anita has her usual spread of soft and adult beverages, and I'm sure that the rest of you will contribute leftover Halloween candy! We'll decide the actual movie the night of the event; besides Apollo 13.

Upcoming Meetings: **2016** Dec 19 – **2017** Feb 20, Apr 17, Jun 19, Aug 21, Oct 16, Dec 18

NOVEMBER 2016 SPACE NEWS BROWSING LINKS

SPACE STATIONS + ROCKETS + COMMERCIAL SPACE

www.spacedaily.com/reports/NASA_develops_satellite_concept_to_exploit_rideshare_opportunities_999.html
www.space.com/34388-more-radioisotope-power-nasa-wants-nuclear-batteries-to-last-longer-video.html
www.space.com/34388-more-radioisotope-power-nasa-wants-nuclear-batteries-to-last-longer-video.html
www.space.com/34516-astronauts-back-pain-has-surprising-cause.html
www.space.com/34542-made-in-space-optical-fiber-in-orbit.html
www.space.com/34377-private-space-stations-may-take-flight-in-2020.html
<http://phys.org/news/2016-10-china-mission-experimental-space-station.html>
www.space.com/34477-laser-communications-could-be-10-to-100x-faster-new-nasa-mission-video.html
www.space.com/34310-blue-origin-orbital-flights-for-space-tourists.html

EARTH + NEAR SPACE

<http://phys.org/news/2016-10-effect-rare-solar-earth-belts.html>
www.spacedaily.com/reports/Antarctica_is_practically_defined_by_ice_What_happens_when_it_melts_999.html
www.space.com/34520-satellites-image-whole-earth-every-day.html

MOON

<http://arstechnica.com/science/2016/10/japans-space-agency-just-released-a-trove-of-jaw-dropping-moon-photos/>
<http://phys.org/news/2016-10-reveals-lunar-surface-features-younger.html>
www.space-travel.com/reports/Russia_plans_to_revive_lunar_rover_moon_exploration_program_999.html
www.space.com/34233-launch-contract-deadline-looms-for-lunar-lander-teams.html
www.space-travel.com/reports/Research_helps_explain_formation_of_ringed_Lunar_crater_999.html

MARS

www.marsdaily.com/reports/Unusual_Martian_region_leaves_clues_to_planets_past_999.html
<http://phys.org/news/2016-10-microscope-biological-samples-red-planet.html>
<http://phys.org/news/2016-10-global-storm-mars.html>
<http://phys.org/news/2016-10-glaciers-mars.html>
www.space.com/34094-microscope-seeks-biological-samples-on-mars.html
www.marsdaily.com/reports/US_relies_on_industry_help_to_make_giant_leap_to_Mars_999.html
<http://phys.org/news/2016-10-europe-mars-life.html>
www.space.com/34536-exomars-lander-impact-site-revealed-in-higher-resolution-video.html
<http://phys.org/news/2016-10-nasa-maven-mission-unprecedented-ultraviolet.html>
<http://phys.org/news/2016-10-maven-mission-ups-downs-mars.html>
<http://phys.org/news/2016-10-citizen-scientists-south-pole-spiders.html>
www.space.com/34523-mars-life-could-resemble-earth-bacteria.htm
www.space.com/34519-mars-space-weather-forecasting-critical-for-astronauts.html
<http://www.space.com/34461-how-robots-move-on-mars.html>
www.bloomberg.com/news/articles/2016-10-04/boeing-ceo-vows-to-beat-musk-to-mars-as-new-space-race-beckons
www.space.com/34319-nasa-spacex-mars-mission-medicine-astronauts-health-spaceflight.html
www.space.com/34361-cosmic-radiation-may-damage-brains.html
www.space.com/34411-nasa-human-mars-mission-living-off-land.htm
www.space.com/34528-nasa-lasers-superfast-spacecraft-communications.html

ASTEROIDS + COMETS

www.space.com/34473-looting-asteroids-water-will-make-launches-cheaper.html

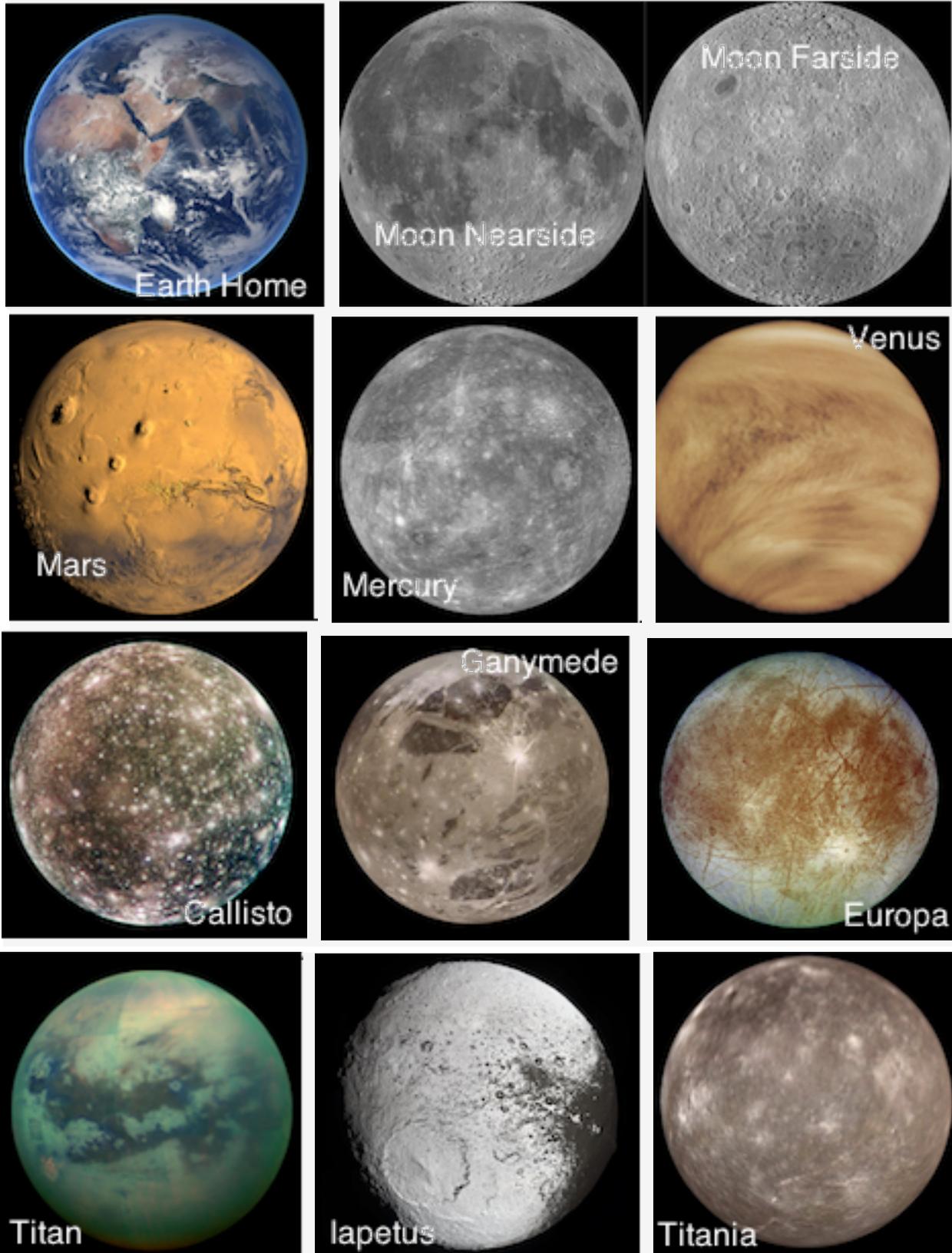
OTHER PLANETS + MOONS

www.space.com/34420-venus-volcanos-erupted-recently-hotspot-study-suggests.html
www.space.com/34457-jupiter-stripes-go-deep-juno-probe-reveals.html
<http://phys.org/news/2016-10-results-long-term-hi-res-tracking-eruptions.html>
<http://phys.org/news/2016-10-cassini-seasonal-titan.html>
<http://phys.org/news/2016-10-uranus-undiscovered-moons.html>
www.space.com/34443-landslides-on-pluto-moon-charon.html

ASTRONOMY + ASTROBIOLOGICS

<http://phys.org/news/2016-10-pluto-discovery-binary-binary-solar-formation.html>

WORLDS OF THE FUTURE HUMAN DIASPORA



From the Editor: I am profoundly grateful to those who have sent funds to cover the extortion fees That I had to spend to recover my stolen computer, which fortunately, still held all my files intact.

Past articles http://legacy.moonsociety.org/publications/mmm_classics/
Or arranged by themes: http://legacy.moonsociety.org/publications/mmm_themes/

ISDC 2017 - A Conference Like No Other

- √ People from everywhere share the latest breakthroughs in space exploration and development.
- √ the perfect meeting place for space leaders, astronauts, enthusiasts and the next generation of experts
- √ Men and women of all ages; bringing unique skills and backgrounds such as: aerospace industry leaders and startups, space exploration pioneers, academic thought leaders, and space supporters – all united by a common goal; to discuss the latest discoveries and projects on space development.



Whatever your interest(s) we'll be talking about it at ISDC 2017
St. Louis, MO May 26–29 [Memorial Day Weekend]– Union Station Hotel

Online Registration Form

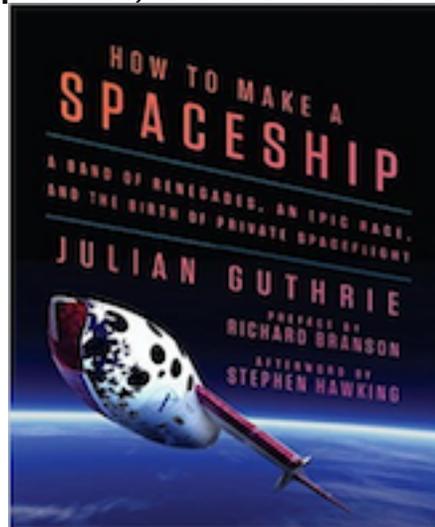
[https://www.nss.org/cgi-bin/register/tdregister?\\$Origin=ISDC17](https://www.nss.org/cgi-bin/register/tdregister?$Origin=ISDC17)

Past articles http://legacy.moonsociety.org/publications/mmm_classics/
Or arranged by themes: http://legacy.moonsociety.org/publications/mmm_themes/



How to Make a Spaceship:

A Band of Renegades, an Epic Race, and the Birth of Private Spaceflight Hardcover



September 20, 2016 by **Julian Guthrie** (Author), **Richard Branson** (Preface), & 1 more
The historic race that reawakened the promise of manned spaceflight

“Alone in a Spartan black cockpit, test pilot Mike Melvill rocketed toward space. He had eighty seconds to exceed the speed of sound and begin the climb to a target no civilian pilot had ever reached. He might not make it back alive. If he.....?”

www.amazon.com/How-Make-Spaceship-Renegades-Spaceflight/dp/1594206724/ref=zg_bsnr_13439_9

Kindle \$14.99 --- Hardcopy #17.99

Selections
from the



GLOSSARY

"MMM Speak"- New Words & Old Words with New Meanings

<http://www.moonsociety.org/publications/m3glossary.html>

Biodynamic Design – Using architectural plans from nature – An example is the design of a triple helix toroidal space settlement, the inspiration being the double helix design of DNA fame and the basis of all life as we know it.

Building Materials from Moondust – From the elements most common in moondust, we should be able to make metal alloys, concrete, glass, fiberglass, glass-glass-composites, and ceramics [add basalt and basalt fiber/basalt composites] out of which to make modular lunar habitats, furniture, vehicles and much of what else we will need both to defray importing those items from Earth and to make a profit for the settlement from "downporting" those items to LEO and GEO for the construction and outfitting of space stations, orbiting laboratories and factories, even orbital hotels and tourist complexes.

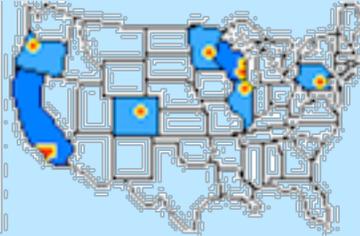
Central Peaks – Some large craters, probably those formed by impacts at a high angle, have central mountain massifs. These are thought to be composed of upthrust mantle material formed in the rebound. If that proves to be the case, the minerals, and the elements they are composed of, will form a 4th category after Highland regolith, Mare regolith, and KREEP. Sample prospecting may or may not show these peaks to be an enriched source of some elements in high demand.

From another point of view, some of these central peaks may attract climbers, even the erection of chair lifts to enjoy the view from above. Some very notable craters with prominent central peaks are: on the nearside, Copernicus and Theophilus; and on the farside, Tsiolkovsky. But there are many more. ##

From the Editot: I am profoundly grateful to those who have sent funds to cover the extortion fees I had to spend to recover my stolen computer, that fortunately still held all my files intact. **Peter Kokh**

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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!

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)

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

2016 Schedule DEC 10 – **2017 Schedule** JAN 14 – FEB 11 – MAR 11 – APR 8 – MAY 13 – JUN 10

Our holidays 30th anniversary party, Saturday, Dec 10 – Catered luncheon & Movie: “The Martian”

Desert Contributions welcome.

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.com

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

Meetings **3rd Thur even # months:** **2016 MEETINGS:** Dec 15 **2017 MEETINGS:** Feb 16, Apr 20, Jun 15

Call for location (920) 894-1344

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CALIFORNIA

OASIS

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 **2016 Schedule** Dec 17

2017 S Jan 21, Feb 18, Mar 18, Apr 15, May 20, Jun 17, Jul 15, Aug 19, Sep 16, Oct 21, Nov 18, Dec 16

Past articles http://legacy.moonsociety.org/publications/mmm_classics/

Or arranged by themes: http://legacy.moonsociety.org/publications/mmm_themes/

COLORADO



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

James W. Barnard 303-781-0800 trailrdr@central.com – Monthly Meetings every **3rd Thursdays, 7 pm**
Englewood Public Library, Englewood, CO 80110 – 1000 Englewood Parkway, 1st Flr Civic Center
2016: Dec 15 – **2017** = Jan 29, Feb 16, Mar 16, Apr 20, May 18, Jun 15, Jul 20, Aug 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 about two hours. Each meeting features Board member introductions, general announcements,

2016 Schedule Dec 1 – **2017 Schedule** Jan 5, Feb 2, Mar 2, Apr 6, May 4, Jun 1, Jul 6, Aug 3

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

Meetings 3rd Sat Monthly 2 PM – **2016** Dec 17

2017 Jan 21, Feb 18, Mar 18, Apr 15, May 20, Jun 17, Jul 15, Aug 19, Sep 16, Oct 21, Nov 18, Dec 16

PENNSYLVANIA



NSS-PASA: NSS Philadelphia Area Space Alliance

928 Clinton Street, Philadelphia, PA, 19107 <http://pasa01.tripod.com/> - <http://phillypasa.blogspot.com>
c/o Earl Bennett, Earlisat@verizon.net – 856/261-8032 (h), 215/698-26

Meetings 3rd Thursday monthly **2016;** Dec. 15

2017: Jan 19, Feb 16, Mar 16, Apr 20, May 18, Jun 15, Jul 20, Aug 17, Sept 21, Oct 19, Nov 16, Dec 19

The NSSPASA Report for October 2016: Meeting times and locations: for November we will meet at the Crown Plaza Cherry Hill in New Jersey on the 19th at about 6 p.m. . The time is approximate due to panel and speaker presentations. In December we are back at Liberty One Food Court at 16th and Market (second floor: go towards west end). December 10, snow date the 17th, January 21st, snow date the 28th.

Meeting notes: Dorothy talked at several points during the meeting on: Capclave where she stayed for some of the talks but also went to the Con Suite to talk to participants, and she noted that the new editor of Analog Science Fiction and Fact is an English major and not from the science and engineering community like previous editors. She brought a lot of material especially on the Franklin Institute. There is a new exhibit called Robot Revolution with lots of publicity on this special exhibit and the movie about robots (called Robots”, but not the Disney of the same name) and lots of youngster oriented events. Go to the Institutes website, fi.edu, for more on these events, the

Past articles http://legacy.moonsociety.org/publications/mmm_classics/

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space oriented shows and films, and the costs of these. The Robots exhibit is there through April 2017. She brought the current films listing for the American Museum of Natural History including the Dark Universe space show. Check the amnh.org website for more on this great New York museum. And: she will be doing a Sunday service at the Philcon event in the format of a Quaker Meeting (no central authority at the podium etc) this will be Sunday her Facebook page for more on her travels and thoughts (like in “Dottys’ Dimensions” that she creates).

Larry gave us the latest web hits and cumulative statistics up through October. As the data shows, we tend to get more visitors during the New Year to Spring period with another peak during the June through August period. He has also begun showing us, in a set of documents he brings, how he creates elements of our web presence and the JAVA language that he uses. And on the language: he has linked us to the javacafe (see our website for this link). Go Larry!

Hank Smith brought us new Philcon bookmarks and discussed his work at Philcon with the subject of attendance coming up. He thought that Capclave was good, but, attendance was down. The problem of fall-off of audience and participation is a concern for Philcon and a number of events. He reports that Philcon will be at the Crown Plaza in 2017. He is not planning for any other Cons this year, but, next year will go to Lunacon, which has moved to Tarrytown New York.

Mitch gave us more on the most recent Ad Astra, but, a lot of our talk was on a model that Mitch found through The Space Studies Institute: it is a larger model of the O’Neill Cylinder Habitat that we had previously bought several years ago. This one is about 10” long and includes an agriculture/ manufacturing ring. This gives a better idea of what it could eventually look like (although the scale is still very large: about 7,000 to one ?). Mitch has come up with an outreach event at The Penn Book Center at 34th and Walnut Street in the near future. He subsequently bought a small table (he had collapsible chairs) and will bring the new model for this event. It should go over well at Philcon as well. He noted that the North Texas group was the NSS Chapter of the year for 2016.

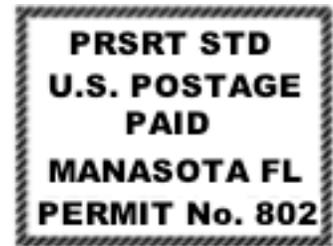
Dennis came and brought the new Chapters Assembly Charter that we ratified. This makes it easier to have a chapter with less than three members of the National Space Society among other things. This doesn’t mean they will not have to file the group tax papers! More work for somebody! In a subsequent meeting of The Chapters Assembly, which Mitch and I attended, the possibility of getting more samples of some of the models of the great habitats that have been planned came up. It is possible that more will be found both on the web and at local, better, hobby stores. We have several stores in the area around Philadelphia into new Jersey, but, quite a few specialize in motor vehicle and aircraft areas. Race cars predominate. We discussed the possibility of printing some elements of such displays at the telecom but nothing was decided yet.

Rich Bowers commented that the future that we are in now is nothing like that envisioned when he was young. I thing that most of us baby boom cohort members can absolutely share the sentiment!

Earl brought material on a number of things including the fun of the Maker Faire at the Queens Hall of Science in New York City. This annual event includes a NASA display with people showing some of the technology used by NASA, including a functional Virtual Reality display (huge lines), and a sample of a CubeSat that is part of the CubeSat Challenge program NASA is supporting. The particular example is the Team Miles satellite which has been selected to go out to the Moon, and after completing that part of the mission, will go on to Asteroid 2016 HO3. This will happen in 2018. As always, funding is necessary and they could use some help now. The competition they are part of is for \$5.5 million. The Team Miles has won a ride up on SLS-EM1. See more on their efforts : contact: Wesley. Team Miles. info@miles-space.com. This is for information on sponsoring or partnering on the groups’ activities. They had a good looking mock up and a knowledgeable (on the details of the craft and mission) representative at the table. Speaking of flights: there is an article, by Richard Lovett on the Dawn spacecrafts flight and explorations at Vesta and Ceres: one of the things found at Vesta was a connection between a particular group of meteorites and the asteroid. One of the most common types: the HED meteorites have a reflected spectra that matched Vesta from Earth. The close up data confirmed this. The appearance of Vesta tells why the commonality: it was almost shattered by collisions early in the life of the solar system, producing the materials we find here. And Ceres has that unusual white area: the speculation is that Ceres may have a large fraction of water in its interior! And some other valuable volatiles locked below the surface. A Cerologic (?) process that could cause some of this to come to the surface, thus creating the white spots, could be why it exists. November Analog Science Fiction and Fact. There is much more, as usual, but I will finish with several rocket related notes and an added note on the Team Miles craft: investigation is ongoing in the case of the disaster that wrecked a Space X launch several months ago, but, Elon Musk is moving forward and has announced plans for exploratory trips to Mars to begin in this decade. And more private space: NSS sends chapter leaders postings on events and two where congratulations on the Blue Origins success in launching and landing of its Sheppard craft and a non destructive separation of the rescue system from the main space craft (the flight tests are up to the edge of space now, not just off the pad and back). And the Cygnus capsule is a supply mission, from Orbital ATK on its’ Antares rocket, that should be done by the time this is in print (the launch happened in mid October). Private launchers all. And the Team Miles craft: it will be using an advanced form of ion engine to move the craft out to the Asteroid (it should be noted that the group started in the Tampa, Florida, Hackerspace (<http://tampahackerspace.com>)). – Submitted by Earl Bennett, President, NSSPASA, KD2CYA.

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