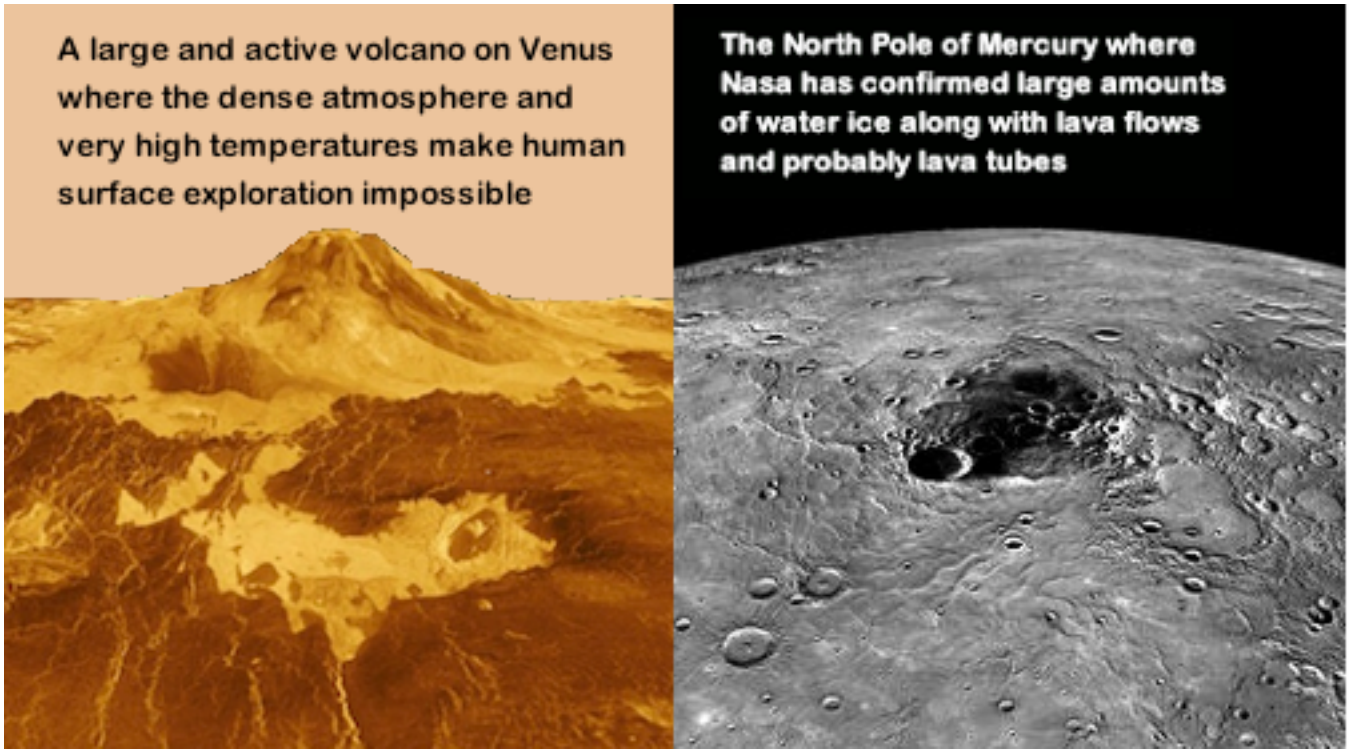
"Towards an Earth-Moon Economy – Developing Off-Planet Resources"

Moon Miners' Manifesto

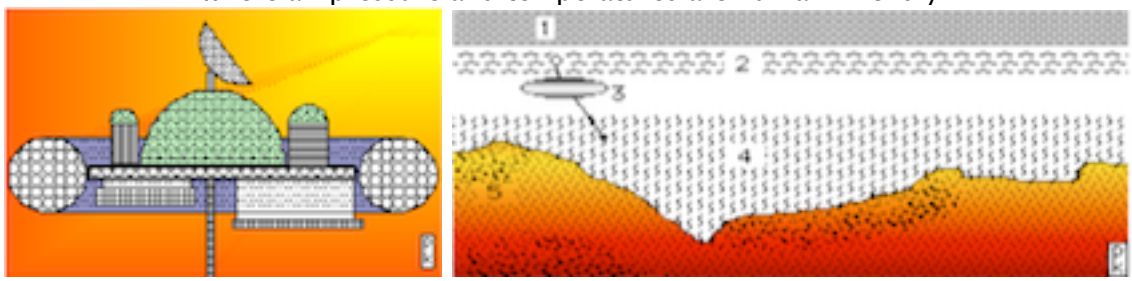
& The Moon Society Journal www.MMM-MoonMinersManifesto.com



Two worlds of the Inner Solar System that present enormous challenges for human visitors, explorers, and settlers

Feature Articles:

Below: Previous Articles about Venus have focused on "Aerostat stations" high above the surface, where air pressure and temperatures are human-friendly



Above left: a Venus aerostat station – **right:** at an altitude where temperatures and pressures are benign

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

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

- **MMM's VISION:** "expanding the human economy through off-planet resources"; early heavy reliance on Lunar materials; early use of Mars system and asteroid resources; and permanent settlements supporting this economy.
- **MMM's MISSION:** to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.
- **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first twenty years plus have been re-edited, reillustrated, and republished in 23 PDF format volumes, for free downloading from this location: **http://www.MoonSociety.org/publications/mmm_classics/**
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• **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.

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

In Focus Venus & Mercury: Must we Limit Human Frontiers to Moon & Mars?

By Peter Kokh

People born in the 1950s and later have always known that the next planet nearer to the Sun, **Venus**, was the closest thing to a physical version of hell that we might imagine. But those of us, born earlier, who grew up in the 1950s or earlier, expected Venus to be a doable challenge: **Venus was imagined as either a hot desert world, or a steamy tropical jungle**, according to which science fiction novel you liked best. The planet's impenetrable blanket of clouds kept us from telling which of these visions was right on.

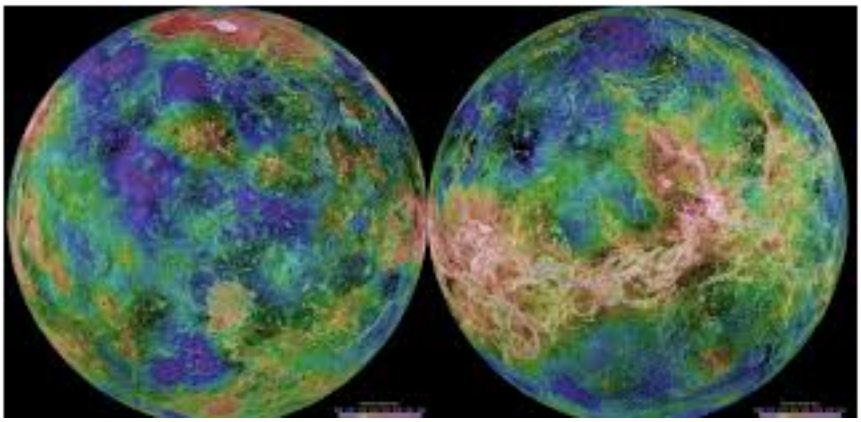
We expected it to be warmer than Earth, to be sure, but not the incarnation of hell that the Soviet Venera probes of the 1960s revealed it to be. With an atmosphere some 80 times as thick as Earth's and surface temperatures averaging 864 °F (462 °C), its surface is most unlikely to be ever trod by humans, even briefly. Indeed, no probe has lasted much longer than an hour before pressure and heat got the best of it.

As for **Mercury**, we've always expected it to be hot, sterile, and barren, an unlikely scene of human activity.

In the articles that follow, we say, "okay, these are two forbidding planets, but ....." The two factors both these visions fail to take into account, are "**frontier ingenuity and frontier determination**. "

We believe that mankind has a future at/or on both worlds, **not anytime soon, but eventually!** PK

Venus: The Sources of Radical Transformation are already "on Location"



The Magellan Probe's radar mapped Venus' surface hidden below the clouds
Basins are in green (shallow) and blue (deeper); highlands (continents) in tan and brown (higher)
At left, Ishtar Terra astride the north pole. To the right Aphrodite Terra astride the equator
By Peter Kokh

Some 89% of an ocean is already present in Venus Atmosphere in the form of Oxygen now bonded to carbon in CO2. We can "unbind it" by a vigorous Carbon=based industry in factories floating high enough above Venus' surface that both air pressure and temperature are bearable.

We need Hydrogen, not ice which is 89% Oxygen! (H2O).

The hydrogen is available from the solar wind.

So everything needed to transform Venus is "in situ" – "on location"

The carbon could be used to make immense mirrors/shades which would deflect sunlight away from the planet thus allowing Venus to cool slowly, and other mostly carbon products: Kevlar, Graphene, etc. Other options to be explored.

This is not a near-term project! It will be **a millennial project**, taking centuries**!**

"Venus Geomorphed" from "Hell" to Just "Steamy"

By Peter Kokh

[**Modification of an article** published in MMM #115 May 1998, p. 5]

The New Atmosphere

Venus' new atmosphere would be a carefully selected residual of its old one. How closely can we get it to resemble Earth's? Our familiar mix is:

- 76.084 % Nitrogen 0.934 % Argon
- 20.946 % Oxygen 0.031 % Carbon Dioxide
- "up to" 1.0 % Water Vapor

The game plan is to end up with a breathable mix of nitrogen, argon, and oxygen, with just enough carbon dioxide to make a biosphere work, no more.

Currently, Venus has about 3,000 times more carbon dioxide in its atmosphere than does Earth. This C02 is fair game. The tactic we've floated is to disassociate the gas into carbon and oxygen, O2, and use the carbon to produce Kevlar, graphite, graphene and other mostly carbon products and, in some fashion, to use the excess to create a giant parasol at the Venus-Sun Lagrange-1 position to intercept continued solar heating for as long as necessary. (The shield would radiate heat towards Venus from its "dark side," however, so this might not be a perfect solution. Other ideas are welcome. Furthermore, the pressure of solar radiation on the shield might tend to move it outward and out of position. Perhaps we can find a stable point, just inward of L1.

Now **many have suggested bombarding Venus with an endless stream of icy comets.** But 89% of water ice is Oxygen, and we sure don't need more of that on Venus! No, ice bombardment is not what we need. Just hydrogen which is flowing constantly outward from the Sun. How we get that hydrogen to react with oxygen is something I leave for others to clarify.

So ideally, the residual 60.5 ATMs of oxygen would be reacted with solar wind hydrogen to make water vapor which would eventually rain out as temperatures fell. A global ocean could fill much of Venus' global basin, but perhaps not to the average depth we have in Earth's global ocean. That would leave Ishtar Terra at the north pole and Aphrodite Terra astride the equator as Venus' two continents.

Just enough oxygen would be preserved to create a breathable mix with the Nitrogen and Argon in Venus' present atmosphere. How long it would take to do this, is beyond our power to calculate. But this will undoubtedly be a "millennial project" taking a long long time. That is perhaps 2 to 3 times as much N2 and Ar as we have. An elegant way of reducing these gasses has not occurred to us.

The upshot is an atmosphere noticeably heavier than what we are used to, and with a much greater capacity to absorb water vapor than has our own atmosphere. This water vapor will have a greenhouse effect, but one that probably cannot be avoided. Compensating, the planet should be just as overcast as it is presently, with water vapor clouds. A seasonal (see immediately below) pattern of winds, fogs, and thunderstorms should develop.

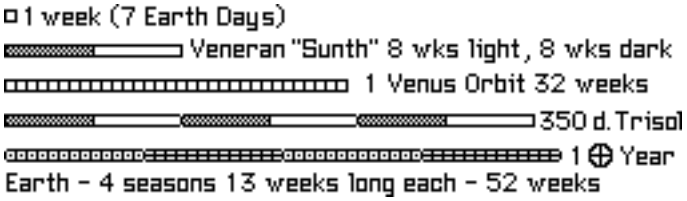
After the atmospheric makeover, **Venus might be livable in the mountain highlands of both continents:** Ishtar Terra at the north pole and Ishtar Aphrodite straddling the equator. Elsewhere it will be quite uncomfortable.

Would this drastic makeover of Venus be long lasting? Or would the sun's heat win the battle and undo this immense project? We don't pretend to know. It is not worth doing if we can't make it permanent.

II. Where Day and Night are Seasons

Venus' year is 224 days long, covering 1.6° of its orbit each day. It rotates on its axis once every 243 days, turning only 1.48° per day (compared to Earth's 360°.) If it rotated in the same counterclockwise direction as it orbits the Sun, as does Earth, its rotation would lag behind its revolution so slightly that it'd take 360/(1.60-1.48) = 2,960 days or 8.1 years for just one day-night cycle!! So its retrograde rotation should be seen as a blessing.

Fortunately, the direction of rotation is just the opposite so that the daily 1.60° and 1.48° increments are added instead of subtracted, the smaller from the greater. 360 / (1.60+1.48) = 116.78 days or **58.39 days (c. 2 months) of daylight, alternating with 58.39 days of darkness**. This "sunth" is not quite four times as long as the dayspan/nightspan "sunth" cycle on the Moon (29.53 Earth days long).



The Veneran Dayspan Nightspan schedule is not quite four times longer than that of the 29.54 day long cycle on the Moon The upshot is that there are two day/night cycles per Veneran Orbit Year.

Keep in mind that as Venus axial tilt to the plane of its orbit around the Sun is only about 2°, there is no "seasonal pattern" tied to the Veneran Versary or Orbital Year. It is the "Sunth" with its hotter 8 week long dayspans and cooler 8 week long nightspans that produces the true "Seasons" on Venus. We predict that Venerans will count their year-like periods as three sunth-sets ("trisols"?) of 3 x 116.78 = 350.35 Earth dates long. Their sunth would come out to an even 112 dates of 16 weeks if they marked dates as 25 hrs. 1.5 min. long. Or they could keep the Earth minute, hour, day, and week, but mark their own sunths and "trisols".

How can we use all Venus excess Carbon? Are there clues below?

- Diamond, of course
- http://en.wikipedia.org/wiki/**Graphene**
  http://www.roccarbon.com/content/carbon-**graphite**.html
- http://www.sciencedirect.com/science/journal/18725805
- http://news.stanford.edu/news/2012/october/carbon-solar-cell-103112.html
- http://web.stanford.edu/group/gcep/cgi-bin/gcep-research/all/design-and-fabrication-of-the-first-all-carbon-based-solar-cell/
- http://pubs.acs.org/doi/abs/10.1021/nn4016345
- http://www.scientificamerican.com/article/carbon-emerges-as-new-solar-power-material/
- http://www.sciencedaily.com/releases/2013/10/131009162732.htm
- http://www.journals.elsevier.com/new-carbon-materials/
- http://www.carbonfiberglass.com/Carbon-Fiber-Sheets-Composite-Panels-Fibre?gclid=CJOI_OHZmMACFYk7Mgodim4Aug
- 3D **Carbon Fiber** Vinyl - metrorestyling.com
- http://creativepultrusions.clickforward.com/
- http://en.wikipedia.org/wiki/**Carbon_(fiber**)

The purpose of this article is to get people thinking of how we can get Venus off the Forbidden Territory list and back on the pre-1960s list of human-colonizable places in the Solar System. This would be a project lasting many generations, perhaps centuries. But hopefully, if we don't scuttle Planet Earth for short term profits (the direction we are now taking) we'll be around to enjoy the results. PK

Read all the MMM Venus articles: www.moonsociety.org/publications/mmm_themes/solar_system.pdf

MMM #60 Aerostat Xities afloat in the Atmospheres of **Venus**, Jupiter, Saturn, Titan, Uranus, Neptune; **the Proper Adjective for "Venus"**

MMM #61 **Altitude, Pressure, Temperature for Venus**, Titan, Jupiter, and Saturn

MMM #114 **Venus: a Fresh Look at a Forgotten World; Subnubilar Industries over Venus; Geomorphing Venus**

MMM #115 **A Rose by any other name; Visits to Venus en route to Mars; High Sky Aircraft for Venus; Venus Geomorphed; The Friday File: The Veneran Reclamation Project; Starter list of R&D Priorities**

MMM #134 **Touring Venus from above: Balloons and Aerobots;**

MMM #184 **Venus: Visiting Hell and Living to Tell about it; Goals for future Venus Probes**

Sun-scorched Mercury: The Discovery of Livable Sweet Spots and more

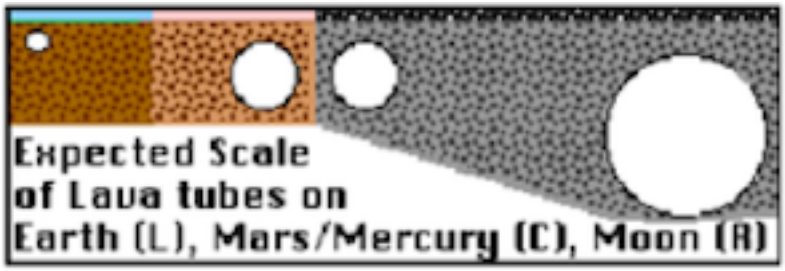
By Peter Kokh

Mercury's "Shangri-la" – livable hidden "valleys"

Mercury: the naked rocky world bathed in intermittent solar flares and forbiddingly hot. That's this world's long-standing common reputation. And for the most part, that's true. But in recent years we have been surprised to find permanent ice deposits in polar craters. Mercury's axis has neglibigle tilt so that should not be surprising.

And then NASA found that the area around the north pole was heavily basaltic, covered by deep lava flows.

Bingo! That means that the north polar area must have a maze of lavatubes offering shelter from t: he Sun;s heat and radioactive outbursts: **Plus pure water for agriculture and enough livable volume for a substantial population, should there be a rationale for that.**



Above: as the Gravity levels on Mars and Mercury are similar, we can expect lavatubes on both worlds to be comparable in cross-section.

Lavatubes are also ideal pre-shielded space for area-intensive operations such as factories, agriculture, warehousing, etc. The technologies needed will already have been developed for lavatube settlements on the Moon and Mars.

For more on Lava Tubes (featuring those on the Moon and Mars) check this online paper: http://www.moonsociety.org/publications/mmm_poapers/**lavatubes_ccc.htm**

The upshot: Mercury has a resource-laden hideaway ready for human occupancy! That had not been expected. But why would humans want to go there? For scientific exploration, of course. But after we are satisfied we have learned enough, or all we need? What further use would a permanent settlement on Mercury offer?

Mercury trivia:

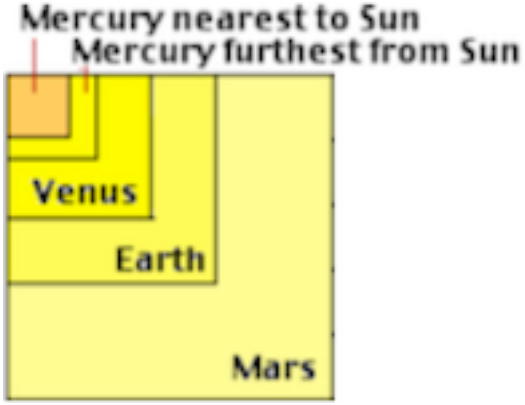
- **Mercury's day, noon to noon**, is 176 Earth days long (yes, twice as long as its year! One need travel only 3.75 kph (2.33 mph) to keep up with the advancing sunrise or sunset, at the equator, and at an even slower pace at higher northern or southern latitudes. It would be easy for an exploratory party to circle the planet in "early morning, soon after dawn" conditions when temperatures are low enough to not be a problem, but after shadows (in the direction the crew is going) are not too long to be a problem.

- **Mercury is the densest planet in the Solar System**, probably because an early impact sheared off much of the lighter material. As a result, **Mercury's surface gravity is the same as that of larger Mars: 38% (or 3/8th) Earth normal.**

Mercury Gateway: Grand Central Station of the Solar System
Rationale for a Mercury Sweet Spot Settlement

By Peter Kokh

Being closest to the Sun, Mercury has **access to enormous amounts of Solar Power**, enabling activities and services unlikely to be supported elsewhere. Below is a comparison of the size of a solar array producing any set amount of power, for Mercury closest to the Su, furthest from the Sun, for Venus, Earth, Mars, and Ceres.



Above: relative sizes of solar arrays to give the same amount of power for Mercury, Venus, Earth, and Mars. The advantages for solar power at Mercury's distance from the Sun are enormous.

Mercury is already a sweet spot: the closest planet to the Sun, **it circles the sun in less than three months and that too is an enormous advantage.** Not only can Laser Arrays in orbit about Mercury generate far more power size for size, but Mercury offers substantially **more frequent windows to and from all the other planets than any other departure or transfer point, including Earth**.

That makes the speedy planet **the logical Grand Central Station of the Solar System**, when fuel cost is not an issue. Why wait 25 and a half months for the next launch window from Earth to Mars when you could swing by Mercury and **arrive at Mars in much less time, and at more frequent intervals**? More bang for the buck!

Faster and More Often

How would this worK? We need powerful laser arrays in orbit around Mercury **probably in the Mercury-Sun L1 Lagrange spot** "to **catch** the incoming vehicle and **thrust it back out** in the right direction." And Mercury is close enough to the Sun to be able to offer just that advantage.

Anyone who studies this list should quickly get the idea, that, Delta V and fuel cost aside (after all "time is money!) **the quickest way to get from anywhere to anywhere else in the Solar System (Earth<>Moon aside) is "the Mercury.Detour"** or should we say "**Mercury Gate**?"

What about departure planet to destination planet alignments and windows?

So what if you get to Mercury and have just missed a window to Jupiter. Another will open up in just 3 months, an insignificant delay parked in the Mercury-Sun L1 Lagrange point behind a "sun shade". Transportation to Mercury's surface would allow you to get a free tour of the planet's lavatube settlements! offering distractions galore!).

Ah, but Delta V and fuel cost do matter, you say! My point is that much of the extra Delta V needed to do the detour by way of Mercury can be managed by free deceleration into orbit around Mercury, and free acceleration into a trans destination trajectory — free courtesy of those giant solar lasers in orbit about Mercury.

What about alignments?

So what if you get to Mercury and have just missed a window to Jupiter. Another will open up in just 3 months, an insignificant delay parked in Mercury orbit (you get a free tour of Mercury's lavatube settlements! offering distractions galore!). Ah, but Delta V and fuel cost do matter, you say! My point is that much of the extra Delta V needed to do the detour by way of Mercury can be managed by free deceleration into orbit around Mercury, and free acceleration into a trans destination trajectory — free courtesy of giant solar lasers in orbit about Mercury.

In going to Mars or Ceres this presents a problem. The Mercury-boosted ship will arrive with a great deal of excess momentum. This will require a lot of fuel to shed. But ships going out to any of the moons around any of the Outer System gas giants, can shed that excess momentum free in an aerobrake maneuver through the upper atmosphere of the gas giant (Jupiter, Saturn, Uranus, Neptune). In fact, the only Delta V that need be provided for by fuel carried on board is that for the boost in toward Mercury, and the landing fuel at the destination moon that would be the same in either case. The benefits would be astounding

Some Trip Window Frequencies (bidirectional) and average Hohmann travel times (both in 30 day months)

between		*window frequency*	*travel time*
Earth/Moon	**Mercury**	**3.45**	**3.51**
Earth/Moon	Mars	25.87	8.63
Mercury	**Mars**	**3.36**	**5.68**
Earth/Moon	Ceres	15.55	15.75
Mars	Ceres	38.67	19.13
Mercury	**Ceres**	**3.09**	**12.01**
Earth/Moon	Jupiter	13.30	33.27
Mars	Jupiter	27.21	37.56
Ceres	Jupiter	91.81	48.43
Mercury	**Jupiter**	**2.99**	**28.36**
Earth/Moon	Saturn	12.60	73.65
Mars	Saturn	24.46	79.20
Ceres	Saturn	66.56	92.96
Jupiter	Saturn	241.9	121.8
Mercury	**Saturn**	**2.96**	**67.33**
Earth/Moon	Uranus	12.33	195.2
Mars	Uranus	23.42	202.8
Ceres	Uranus	59.47	221.4
Jupiter	Uranus	168.1	259.2
Saturn	Uranus	550.5	331.6
Mercury	**Uranus**	**2.94**	**186.3**

LEAVE ALMOST ANYTIME and GET THERE MUCH MUCH SOONER .

Yes, laser-assisted orbital switching by way of Mercury is not a near term option.

Our point is that Mercury will have a significant role in human settlement of the solar system.

It won't be just "Moon and Mars" OR "Moon, Mars, and the asteroids" anymore! ##

Read all the MMM Mercury articles: www.moonsociety.org/publications/mmm_themes/solar_system.pdf

MMM #78 **Mercury**: The Other Terrestrial Planet; Mercury Gateway to the Outer Solar System
MMM #111 Drumroll for **Mercury:** snail-pace rover;
MMM #204 Three Myths of Planet **Mercury;** More on **Mercury** as a Human Frontier
MMM #205 **Mercury** Frontier Speculations for the fun of it
MMM #244 **Mercury** – A Coming Attraction ##

Moon Base Costs

By Dave Dietzler

What will it cost to build a bootstrapping industrial settlement on the Moon? First of all, there will be the cost of research and development for processes and technology needed to extract lunar materials and turn them into useful products. This will involve extensive planning and experimentation on Earth in large vacuum chambers that simulate lunar temperature variations and at analog Moon bases. Then there will be the cost of transporting equipment to the Moon. This means there must be rockets to LEO and electric tugs to L1 as well as an L1 station where water is stored and converted to LH2 and LOX for landers as needed. There are already companies like SpaceX and Orbital Sciences working on rockets to LEO and companies like Boeing and Lockheed are still in the game.

If NASA constructs the space refueling infrastructure needed to establish a permanent base at Shackleton crater then private enterprises might purchase refueling services from NASA. Once the transportation problem is solved we need to extract lunar materials and turn them into useful products like furnaces, mining machines and habitat modules.

Besides the costs of R&D, equipment manufacturing and transportation there will be costs of operation on the Moon. We will need to build and maintain teleoperation stations on the Earth. This means costs of construction as well as costs to heat, light, cool and supply water to the stations as well as pay janitors and administrators and teleoperators who control robots on the Moon. There will probably be at least three teleoperation stations on Earth with crews working in time zones eight hours apart. The Earthside stations would be connected to each other via the internet.

Teleoperated robots will be landed on the Moon and they will deploy solar panels for energy. The robots will use microwaves to sinter a landing pad and they will bulldoze a berm around the landing pad. This will help control dust that could be a problem with landers retrorocketing and taking off again on the Moon. The robots will set up an aluminized plastic tent to store equipment without exposing it to intense solar heat. Chances are that some of the robots will break down and extra robots will be needed to get everything done. Robots might repair other robots. The cost of maintaining the teleoperations stations on Earth and paying the humans who work at those stations will be incurred, not to mention the cost of the robots and other equipment like solar panels on the Moon when they were manufactured on Earth as well as transport costs.

Humans will probably be needed besides robots. While robots might set up the landing pad and storage tent as well as some materials production systems, for instance volatiles mining and meteoric iron fines mining as well as 3D printers that work with iron fines, basalt and anorthositic highland regolith, humans will be needed to operate robots without the roughly three second delay Earthside opertors must deal with and to do fine tasks as well as work in machine shops and assembly shops. It will cost quite a bit to train and transport humans to the Moon as well as pay them while they are working there. We will also incurr the cost of shipping habitat, dried food and other things to the Moon for the support of humans.

MIning solar wind implanted volatiles will involve setting up solar power plants to power the mining machines as well as landing mining machines that will be controlled from Earth. Polar crater ice mining might be more productive when it comes to hydrogen, water and carbon. We shall see. It will take a long time to mine up significant quanities of meteoric iron. These tasks should be done by robots before humans are landed. Oxygen and rocket fuel should be produced and stored up before humans land. Inflatable habitat should be deployed and buried under several feet of regolith before humans land.

With meteoric iron fines seived and sized we can use 3D printers to make molds for casting basalt. Teleoperated robots can shovel up mare regolith and melt it in solar or electric furnaces and pour it into iron molds to make various products. Mare regolith might by packed into iron molds and sintered with microwaves too. Centrifugal casting machines could be used to make pipes from basalt. Bricks, tiles, slabs, pipes and blocks could be used to make all sorts of things from walls to planting boxes to toilets. Furnaces that roast anorthositic regolith at 2000 C., which means they must consist of very high temperature refractories and/or use active cooling, can make calcium aluminate cement for slapping bricks and blocks together and joining pipes. Of course, this work would be done indoors as out-vac hydraulic cement will just lose its water to the vacuum and fail to bond. Besides bricks, tiles, slabs and pipes basalt can be used to make all sorts of everyday things like cups, mugs, dishes, countertops and grills (from slabs), ovens, teapots, art works from carvings, sinks, wash tubs, planting boxes, lamp stands, etc. Basalt will be like the plastic of the Moon. It will be the cheap multipurpose material that can be cast, sintered, and injection molded to make all sorts of low stress items. Just look around at all the junk made of plastic in your home and imagine it made of basalt instead.

Basalt will melt at 1150 to 1350 C while anorthosite will melt at 1500 C like iron. We might cast anorthositic highland regolith in iron molds with active cooling to make items that are more heat resistant. If we can make a furnace with melted glassy anorthostic material that melts and 1500 C. and provide active cooling we could handle much higher temperatures. If we can mine mare deposits of ilmenite and purify it by electrostatic separation then reduce this with hot hydrogen gas we can get titanium dioxide and this stuff melts at 1900 C. so we would make some high temperature equipment with sintered titanium dioxide. We'd have to land forms made of carbon-carbon or silicon carbide to sinter the TiO2.

Whenever we have to import something from Earth we incur costs. We will need lithium chloride to extract aluminum and calcium chloride to extract titanium. The question then is how much do we pay for these imports and how much do we pay in terms of manpower to produce these materials on the Moon?

Only a very detailed analysis will tell us ahead of time what costs will be for various materials on the Moon. Intuitively we can tell that basalt will be cheapest. Other processes will yield iron, glass and other metals. Pure iron could find many uses. Besides the time and energy required to produce various materials we must also consider the time and energy required to convert them to useful products. So the details of bootstrapping a lunar industrial settlement remain to be filled in. DDz

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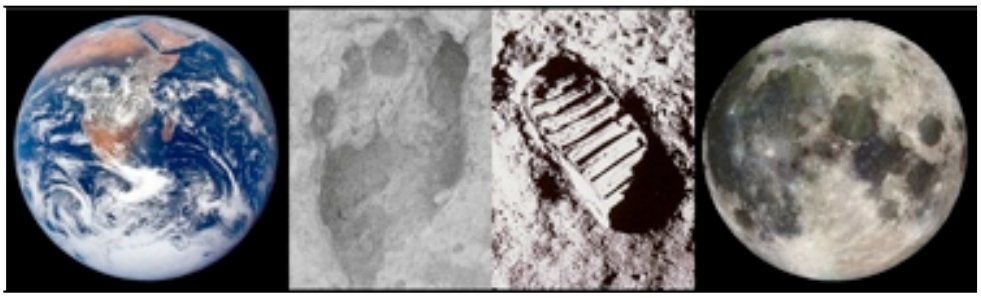
From Africa to the Moon, the Human Epic, told in footprints, Continues to the Stars!



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

Attention Members!

The Moon Society is looking for literate members to serve as **the editorial team for Moon Miners' Manifesto**. As members well know, Peter Kokh has been publishing MMM for almost three decades. To help him focus on some books he has in mind (and ample material for!) we need some folks to take over MMM editing duties so that we can continue publishing this amazing resource. Peter will continue to contribute articles. Please contact me at president@moonsociety.org to find out more

The fall season is nigh, and with that comes a variety of holidays that members can use to help build public awareness of the importance of the Moon to humanity's future, and to convey the ideas The Moon Society supports:

International Observe the Moon Night (**InOMN**) – organized by LPI and SSERVI, InOMN is held each year about the time of the first quarter Moon in September. (NB: At the first quarter (& third) the Moon is crossing Earth's orbit around the Sun, and so is where the Earth was (or will be) in space only four hours prior) This year the event will occur on **September 6th**. You can check for a local event, or create your own, at: http://observethemoonnight.org/

World Space Week (WSW) – organized globally under the auspices of the UN, WSW is held each year from October 4–10 to celebrate the anniversary of Sputnik and humanity's first step into the cosmos. Each year a different theme is celebrated; for 2014 the theme is 'Space: Guiding Your Way', and highlights the benefits of global positioning

satellite constellations like GLONASS, GPS and Galileo to bettering the human condition. More details at: http://www.worldspaceweek.org/

Eclipses! – There will be a total Lunar Eclipse on Wednesday, October 8th at 09:41 UT. This occurs over the middle of the Pacific, so is best seen by those on the Pacific Rim. There will also be a partial Solar Eclipse half a month later on Thursday, October 23rd at 21:44 UT visible to most of North and Central America. Who doesn't enjoy an eclipse party?

Winter Solstice – while not Moon-specific, the Winter Solstice offers a nice scientific basis for having a STEM-oriented party during the end-of-year holiday season. This year the solstice will occur on Sunday, at 23:03 UTC, after which point the days will start getting longer. Believe it or not there are many people out there that don't know that it takes a year for the Earth to orbit the Sun. So take the opportunity to educate your community as to the Earth's place in the Solar System.

Conferences:

- Oct 22-24: **Lunar Exploration & Analysis Group** (LEAG) annual conference in Laurel, MD is themed this year on the topic of Destination Moon to highlight the value of exploring the Moon. Details at: http://www.hou.usra.edu/meetings/leag2014/
- Nov 8-9: The **Gateway to Space NSS Regional Space Development Conference** in **St. Louis** which will focus on the Moon. Peter Kokh and Dave Dunlop will be presenting
- Nov 9: **Scientific Opportunities in Cislunar Space** (SOCS) conference in Tucson is themed on the topic of Lunar Science Illuminating the Universe, and seems to be premised on the idea that cislunar space can be a proving ground for scientific instruments destined for farther destinations, an idea that The Moon Society heartily endorses. Details at: http://www.socsworkshops.com/
- Nov 9-13: **Next Giant Leap**: Leveraging Lunar Assets for Sustainable Pathways to Space conference in Hawaii. The Moon Society is proud to be collaborating with the organizers on program content, and encourages members that can do so to attend the conference and represent. Details at: http://2014giantleap.aerospacehawaii.info/

So it looks like the Moon is going to close out 2014 on a strong note, and the ideas of commercial development and scientific exploration of cislunar space are gaining traction amongst more audiences. I encourage all of our members to use this opportunity to let folks know about not just the Moon, but also The Moon Society. Stand up and be recognized! – KM

An Affordable Moonbase by Michael Abramson

http://www.spacesociety-sv.org/files/93539948.pdf

An NSS Silicon Valley Chapter PDF Presentation (slides)

Below are some of the slides. For more, including illustrations and charts, see link above

Enablers of affordable technologies: unification and standardization

- Mass production
- Reliance on existing and commercially available technologies
- Open competition, in the spirit of Commercial Orbital Transportation Services (COTS) program
- Early adoption of In-Situ Resource Utilization (ISRU

Development Architectures (Phase 1, 2)

- Transitional in nature
- Main flow of resources from Earth to Moon
- Focus on minimizing transportation costs

Operations Architectures (Phase 2, 3)

- Evolving, adaptive, and expanding
- Main flows of resources are in cis-lunar space
- Focus on sustainability

Dimensions / Components

- Transportation
- Habitats (**Bigelow 330** inflatable units)
- Energy production, distribution, and storage
- Communication
- Human health and fitness
- Oxygen and water production and recycling
- Food production
- Mining and manufacturing
- Organization and management ##

Voyager 2's unforgettable Neptune-Triton Encounter 8/25/1989, and a long lasting friendship and collaboration that ensued

By Peter Kokh

This August 25th was the 25th anniversary of this event. If you did not see the live NASA feed at a nearby observatory or other participating location, a live feed directly from Voyager 2, You not only missed an unforgetable experience, You will not be able to grasp what you missed. Here is a greatly speeded up Video of the 45 minute knock-your-sox-off experience. It is just a teaser compared to the live experience on a big screen about 4 am for all of us who stayed up all night to see it.

http://www.wallstreetotc.com/nasa-releases-**incredible-footage-of-voyager-2s-encounter-with-triton-video**/27948/

http://www.space.com/26906-voyager-2-s-hair-raising-fly-by-of-triton-animated.html

Triton's surface was scanned in amazing detail 4-5 am, The surface reminded me of that of a cantaloupe in its knobby texture: awesome, awesome, awesome!

For me, the experience was doubly significant: a most memorable start of a 25 year long continually productive collaboration and friendship.

I had driven north a hundred miles from Milwaukee to a small observatory in Menasha, Wisconsin, immediately south of Appleton – the Barlow Planetarium at the University of Wisconsin Fox Valley. I had came alone. Driving south 30 some miles from Green Bay, WI was someone I had never met before, **David A. Dunlop.** I had brought some displays along-to advertise our 3 year old chapter of the National Space Society, Milwaukee Lunar Reclamation Society, These displays caught Dave's eyes, and we have been a prolific duo ever since.

Dave joined the Milwaukee chapter and travelled south 120 miles every month to participate in our meetings and other activities. That we both happened to be there changed our lives forever.

Over the years, we have gotten together behind quite a number of ambitious projects. One of them was the **Lunar Agricultural eXperiment project. LUNAX** was an effort to define lunar agricultural experiments that could be undertaken by teacher-supervised high school students in experiments that would help pin down the minimum number of days during each lunar 14.5 day long "Nightspan" we had to provide plants with lighting to ensure that they would go on to harvest. – http://www.moonsociety.org/chapters/milwaukee/**lunax**/index2.htm



Peter and Dave

More recently, Dave has served on the Board of the National Space Society, and also as Chair of the NSS International Committee. It was at a meeting of the later in suburban Chicago in 2012 that "**To The Stars International Quarterly**" was launched. Dave and I had previously produced **Moon Miners' Manifesto India Quarterly** for a number of years. TTSIQ now replaces MMMIQ.

www.moonsociety.org/india/mmm_india/ – MMM India Quarterly issues in pdf format
www.moonsociety.org/international/ttsiq – To The Stars International Quarterly pdf files
www.nss.org/tothestars/ – To The Stars International Quarterly pdf files

Through the years, Dave has contributed articles to 30-some issues of Moon Miners' Manifesto as well as to every issue of the two quarterlies

This coming November, we will both be presenting at the Regional Space Development Conference in St. Louis – see the conference ad below

The above account is very very truncated list of our collaborative efforts, and it all began when Voyager 2 skimmed over Neptune's largest moon, Triton, "live" – I remember being so awestruck that we were virtually there, and seeing so much detail, live!. For me, this experience rivaled watching Neil Armstrong and Buzz Aldrin set foot on the Moon, live, on July 20, 1969, just over twenty years earlier.

Our efforts and key interests differ but complement each other. We hope to continue our "dynamic duo" efforts for years to come. ##

September Chapters & Outposts 2014

OUTPOSTS (2 or more local members in search of more)

Bay Area Moon Society, CA Outpost – **South San Francisco Bay** – http://www.moonsociety.org/chapters/bams/
Contact: Henry Cates hcate2@pacbell.net Meeting the 1st Tuesday of the Month at Henry's home

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

ORGANIZED CHAPTERS – JOINT TMS/NSS CHAPTERS

Milwaukee Lunar Reclamation Society – **www.MilwaukeeLunarReclamation.org**
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 May-fair Mall lower level room G110 – **MEETINGs – SEP 13 – OCT 11 – NOV 8 See page 17 for MLRS news**

Moon Society St./NSS Louis Chapter - http://www.moonsociety.org/chapters/stlouis/
http://www.meetup.com/Saint-Louis-Space-Frontier-Meetup/
Contact: Robert Perry surfer_bob@charter.net – Meetings 2nd Wed monthly at Buder Branch Library, 4401 S. Hampton, in the basement conference room

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.

On Saturday, August 16, the Phoenix chapters of the National Space Society and Moon Society had a pot-luck barbecue at the home of Chuck and Peggy Lesher. We had about a dozen members and guests in attendance, including some new people that came via MeetUp.com. It was a nice opportunity for discussing topics in space development and just plain old socializing.

Our next meeting will be on **Sat. Sept. 20** and will feature Tracey Dodrill, a JPL Educator Ambassador for the Mars MAVEN mission. We will do a heavy publicity campaign for this event.

Tucson L5 Space Society – http://www.tucsonspacesociety.org/
http://www.meetup.com/NSSPhoenix/events/161939572/ Now serving Moon Society Members
Contact: Al Anzaldua – Meets monthly, **every 2nd Saturday, 6:30 PM SEP 13 – OCT 11 – NOV 8 – DEC 13**
On Saturday, August 9, the Tucson L5 Space Society, local chapter of NSS and the Moon Society, held a meeting and potluck to plan for our upcoming exhibitions, including an Earth Science Day exhibition (October 15) at a local junior college, the Arizona Science and Astronomy Expo (November 1 – 2), and Sci-Fi Convention TusCon 41 (Oct 31 – Nov 2). To enrich our exhibitions, members on the spot pitched in to buy a virtual-reality headset Oculus Rift, which we intend to program with space related scenarios. We also discussed carrying out more political action outreach to local senators and congressional representatives. Since we had already recently done so, however, the issue was left unresolved until next meeting.

Clear Lake NSS/Moon Society Chapter (Houston) –http://www.moonsociety.org/chapters/houston/
Contact: Eric Bowen eric@streamlinerschedules.com – **Meeting 7 pm** in the conference room of the Bay Area Community Center at Clear Lake Park – Mondays in even # months: **OCT 20 – DEC 15**

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

Interested in Starting an Outpost or Chapter in your area?
There are many helpful tips on the Space Chapters Hub website
http://nsschapters.org/hub/hub_main.htm
Contact Peter Kokh**,** Moon Society Chapters-coordinator
chapters-coordinator@moonsociety.org

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

AUGUST 2014 NEWS BROWSING LINKS

SPACE STATIONS + COMMERCIAL SPACE

www.space.com/26921-spacex-reusable-rocket-explodes-over-texas-video.html
http://www.space.com/26675-**nasa-robot-satellite-gas-station**.html
http://blogs.wsj.com/digits/2014/08/27/**satellite-lost-in-space-well-tow-it-says-israeli-startup/**

ASTRONAUTS + ANALOG ACTIVITIES

http://www.esa.int/Our_Activities/Human_Spaceflight/**Caves/Dry_runs_preparing_for_underground_astronauts**
http://www.space.com/26829-astronauts-space-station-sleep-deprivation.html

EARTH

http://news.sciencemag.org/climate/2014/08/**earths-missing-heat-may-be-hiding-deep-atlantic**
http://www.nasa.gov/press/2014/july/**nasa-selects-instruments-to-track-climate-impact-on-vegetation/**
www.asianscientist.com/tech-pharma/**microsatellites-send-pictures-space**-2014/
www.space.com/26822-digitalglobe-launches-worldview3-earth-satellite.html
www.nasa.gov/press/2014/august/nasa-to-investigate-climate-impacts-of-arctic-sea-ice-loss
http://www.space.com/26884-microbes-antarctica-lake-alien-life.html

SPACE TOURISM

http://www.space.com/26978-**commercial-spaceflight-requires-safety-of-new-space-suits**.html

MOON

http://www.space-travel.com/reports/China_to_test_recoverable_moon_orbiter_999.html
http://www.space-travel.com/reports/**Manned_Moon_Mission_to_Cost_Russia_2_8_Bln_**999.html

MARS

http://www.space.com/26955-**mars-rover-curiosity-driving-mount-sharp**.html
http://www.space.com/26705-nasa-2020-rover-mars-colony-tech.html
http://www.space.com/26820-**nasa-mars-insight-mission-planet-history.html**
http://www.space.com/26690-**mars-comet-flyby-spacecraft-preparation**.html
http://www.spacedaily.com/reports/**Colliding_Atmospheres_Mars_vs_Comet_Siding_Spring_**999.html
http://www.marsdaily.com/reports/**Russia_to_Construct_Landing_Pad_for_Russian_European_ExoMars_2018_Space_Mission_**999.html
http://www.marsdaily.com/reports/**Robotic_Rock_Climbers_Could_Uncover_Clues_to_Mars_Past_**999.html
http://www.space.com/26383-**nasa-flying-saucer-test**-ldsd.html
http://exploremars.org/**exolance/the-mission/** – https://www.**indiegogo**.com/projects/**exolance**
www.marsdaily.com/reports/**Life_on_Mars_Implications_of_a_newly_discovered_mineral_rich_structure_**999.html
http://www.space.com/26705-**nasa-2020-rover-mars-colony-tech**.html

ASTEROIDS + COMETS

http://www.space.com/26773-**nasa-advanced-space-technology-concepts.html**
http://www.space.com/26716-**rosetta-spacecraft-comet-orbit-arrival-explained**.html
http://www.space.com/26740-**rosetta-spacecraft-comet-arrival**.html
http://www.bbc.com/news/science-environment-28659783
http://www.space.com/26433-rosetta-probe-snaps-**spinning-comet-nucleus-video**.html
http://www.space.com/26834-**rosetta-probe-comet-3d-photos**.html
http://www.esa.int/Our_Activities/Space_Science/**Rosetta/**
http://www.space.com/26843-**rosetta-spacecraft-takes-comet-temperature**.html
http://www.esa.int/Our_Activities/Space_Science/Rosetta/**Rosetta_Landing_site_search_narrows**

OTHER PLANETS + MOONS

http://www.space.com/26935-**nasa-robot-swarmies-army-space-exploration**.html
http://www.space.com/26905-**jupiter-moon-europa-alien-life**.html
http://www.spacedaily.com/reports/**A_Hellacious_Two_Weeks_on_Jupiters_Moon_Io_**999.html
http://www.space.com/26814-**saturn-moon-titan-clouds-cassini.**html

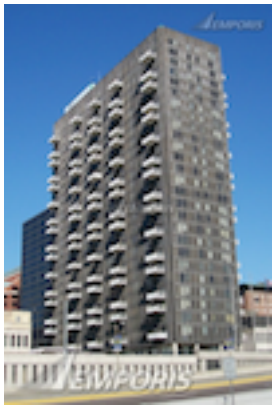
VIDEOS

http://www.space.com/24949-**robotic-satellite-refueling-tech-works-nasa-proves-video**.html
www.space.com/26961-**two-thirds-of-arctic-sea-ice-lost-since-1980**-s-nasa-explains-video.html
http://www.space.com/26983-**nasa-arise-mission-arctic-ice-video**.html
http://www.space.com/26831-**comet-cherry-gerry-snapped-from-64-miles-above-video**.html

St. Louis NSS/TMS Chapter hosts Regional Space Development Conf. Nov 7-9

"explore, discover, settle...creating a spacefaring civilization" - **GatewayToSpace.org**

Crown Plaza Hotel Downtown: Room Rates $119 - register soon as St Louis hotels will be busy.
200 N. Fourth Street St. Louis, Missouri 63102 Reservations 1-314-621-8200



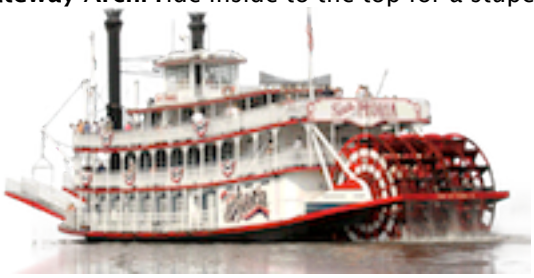
http://www.ihg.com/crowneplaza/hotels/us/en/st.-louis/stlrf/hoteldetail

Calling all space enthusiasts, aerospace professionals, planetary investigators, rocket scientists, science fiction buffs, educators, dreamers makers... Are you interested in exploring the cosmos? Do you dream of living and working beyond Earth? Do you have an eye on asteroids for mining or deflection? Do you want to learn about and **participate** in space science? If so, join us! **TMS members AND MMM readers get 10% discount - code MOON**

While you are in "the Gateway City" visit some of St Louis' Legendary Tourist Attractions

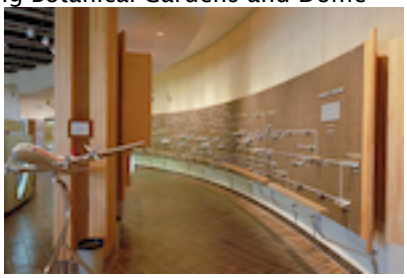
Gateway Arch: ride inside to the top for a stupendous view

The sprawling Botanical Gardens and Dome



Mississippi paddlewheel tourist boats

St. Louis Science Center



Boeing-St Louis Prologue Room

(and Busch Stadium (Cardinals), the Zoo, Washington University, a vibrant night life & much much more)

E**Online registration** is planned to launch September 2, after Labor Day. **$100 for the weekend**. If you are only able to attend for just one day, registration fees are **$75 for Saturday** and **$35 for Sunday**. Saturday registration includes a boxed networking luncheon and Cosmic Celebration. Sunday's registration includes brunch.

Among the Featured Saturday Speakers:

Peter Kokh: "What individuals and teams can do to prepare for true Lunar Settlement that are not on NASA's agenda or horizons for Outposts with rotating crews".

David Dunlop: "How relatively inexpensive CubeSats can help explore the Moon in greater depth."

Expected Displays: Lunar Homestead Model; Earth, Moon, Mars Gravity Bricks; Frontier Painting Experiments

NSS Board of Directors Fall Meeting on Saturday morning.

Editor: This conference is being put on **to show the National Space Society that the joint NSS/Moon Society chapter in St.Louis has what it takes to put on a near future International Space Development Conference.** Your support of this conference, by going to the conference, will be a great help and much appreciated!

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

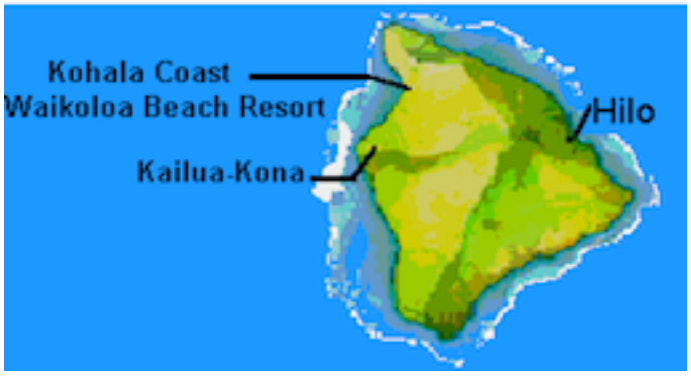
The Next Giant Leap

"Leveraging Lunar Assets for Sustainable Pathways to Space"

Cosponsored by the Moon Society

Sunday–Thursday, November 9–13, 2014

Waikoloa Beach Marriott Resort & Spa Waikoloa, Hawai'i Island



http://2014giantleap.aerospacehawaii.info

The **State of Hawaii**, in collaboration with the Pacific International Space Center for Exploration Systems (**PISCES**) and the **Aerospace States Association** (ASA), will be hosting a multinational conference on the Big Island of Hawaii this fall to explore options for developing sustainable pathways to space, with **an emphasis on leveraging our Moon's strategic assets** (e.g., **near-Earth location, diverse regolith, orbital periodicity, gravitational field**) in ways that can minimize the risks of space exploration/development/utilization while maximizing returns on investment.

The primary goal will be **to characterize and detail cost-effective strategies that can accelerate the maturation of revolutionary technologies** to both extend humanity's reach through the solar system (to asteroids, Mars and its moons, and beyond) and enhance the qualities of life on our home planet.

The conference will support three discussion tracks focusing on:

- **Benefits/opportunities for leveraging lunar assets**, including but not limited to **extending Earth's economic sphere beyond GEO**; expanding/diversifying space research, education and commerce; advancing public-private space enterprise; and preparing for/supporting deep space missions.
- **Cost-effective scenarios for near-term development**, involving both cis-lunar space (e.g., **robotic platforms, human stations, and fueling depots** at L1/L2 Lagrange Points) and lunar surface activities (e.g., ISRU; 3-D manufacturing; deep space astronomy; interplanetary launch operations).
- **Innovative mechanisms, building on multinational/public-private partnerships**, that can link the visions and goals for sustainable pathways to space with the technical, scientific, human, and financial resources and capabilities that can enable them.

Conference deliverables will include:

(1) **Detailed strategies for leveraging lunar resources** for sustainable space ventures (including plausible pathways with milestones/timelines), as well as innovative methodologies for mobilizing government/university/industry resources to support their development;

(2) **Recommendations for "next steps"** that public and private agencies/institutions (working in collaboration with PISCES and the State of Hawaii) could undertake to implement these strategies; and

(3) **The formation of multinational/multi-sectoral teams** that will continue to collaborate beyond the conference to help build the strategic alliances that ultimately will be essential for long-term program implementation.

Conference Tracks

- **Opportunities/Goals for Leveraging Lunar Assets**
- **Cost-Effective Scenarios for Near-Term Pathways**
- **Enabling Mechanisms for Program Development**

Dave Heck, of Boeing St. Louis, a member of the Moon Society's St Louis Chapter will be a key participant, and will be reporting on Conference achievements

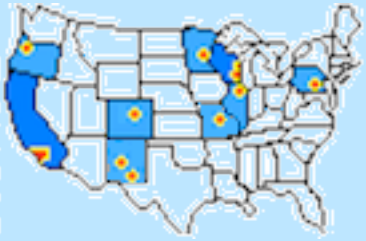
Hawaii Island has become the premiere location for Lunar Analog Exercises.

2015 International Space Development Conference
May 20th – 25th, 2015 in midtown **Toronto**, Ontario, Canada
At the **Hyatt Regency Hotel,** 370 King Street West
Save the dates!
Hosted by the **Canadian Space Commerce Association** & the **National Space Society**
http://isdc2015.nss.org/wordpress/ – Sign up now for low advance rates
(The MMM Editor has signed up – 1st ISDC since 2010 Chicago)

Hyatt Regency Toronto

Can't go because you don't have (or can't afford) a passport?
IF you are driving by car or entering by ship, (that is, not by airplane!)
there are two other less expensive options:
(1) a **US Passcard** with microchip, available anywhere,
(2) an **EDL - Enhanced Drivers License** available now in
Washington State, Vermont, New York, and Michigan
(and "soon" in Arizona, Texas, and California)
http://www.dmv.org/driving-abroad/passport-license.php
See you in Toronto!

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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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)

NEWS: We now have 15 members in our Meet-up**. Peter Kokh** and **Dave Dunlop** will not be at the November 8th meeting as they are featured speakers in the St Louis Regional Space Development Conference. that weekend.
Upcoming Meeting Dates: SEPT 18 – OCT 11 – NOV 8 NO DECEMBER MEETING SCHEDULED AS YET
Meeting place Mayfair Mall Garden Suites East G110 **Note: this room** will NOT be unavailable for our annual anniversary banquet meeting December 13th – We are looking for a substitute location and/or date.

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
NEXT MEETINGS: OCT 17 – (Holiday Meeting in Milwaukee date and location not yet set)

CALIFORNIA

OASIS: Organization for the Advancement of Space Industrialization & Settlement
Greater Los Angeles Chapter of the National Space Society
PO Box 1231, Redondo Beach, CA 90278

Events Hotline/Answering Machine: 310-364-2290 – **Odyssey** Ed: Kat Tanaka odyssey_editor@yahoo.com
http://www.oasis-nss.org/wordpress/ - oasis@oasis-nss.org – **Odyssey** Newsletter www.oasis-nss.org/articles.html
Regular Meeting 3 pm 3rd SAT monthly – – SEP 20 – OCT 18 – NOV 15 – DEC 20
No information on upcoming meetings available at press time from either web address above

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

COLORADO

DSS: Denver Space Society fka Front Range L5
1 Cherry Hills Farm Drive, Englewood, CO 80133

Eric Boethin 303-781-0800 eric@boethin.com – Monthly Meetings **6:00 PM on 3rd Thursdays**, 7 pm
Englewood Public Library, **Englewood, CO 80110 –** 1000 Englewood Parkway, First Floor Civic Center
NEXT MEETINGS: SEP 18 – OCT 16 – NOV 20 – DEC 18

ILLINOIS

CSFL5: Chicago Space Frontier L5 – 610 West 47th Place, Chicago, IL 60609
Contact Larry Ahearn 773-373-0349

MINNESOTA

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

OREGON

ORL5 – 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
Shari's in Oregon City on 99E (sharis.com) 1926 SE McLoughlin Blvd Oregon City, OR
The Third Saturday of the Month at 2:00 PM – **SEP 20 – OCT 18 – NOV 15 – DEC 20**

PENNSYLVANIA

NSS-PASA: NSS Philadelphia Area Space Alliance – 928 Clinton Street, Philadelphia, PA, 19107
c/o Earl Bennett, Earlisat@verizon.net – 856/261-8032 (h), 215/698-2600 (w)
http://pasa01.tripod.com/ – http://phillypasa.blogspot.com

Earl Bennett, who gathers the information and puts together NSS-PASA's interesting montlhly reports is in the midst of moving to the other side of the Delaware River.

So instead of another monthly installment of his example-setting reports this month, MMM would like to give you an insight into how he does it, and that means first of all, revealing how the vary composition of this chapter's membership, sets PASA up to be so productive.

The chapter's very name gives the essential clue to the first Big Secret: "Philadelphia **Area Space Alliance**" – PASA is home for anyone in the Southeast Pennsylvania and West-central part of New Jersey across the river who is interested in anything space related: rockets, space stations, the Moon, Mars, Asteroids, the Stars Beyond, various relevant technologies. Its members may also belong to the National Space Society, the Mars Society, the Moon Society, astronomy clubs, asteroid groups, technology groups – any group whose goals are interrelated or inter-relevant. The result is a chapter with a strong membership.

The next Big Secret is the structure of their meetings. Individuals whose interests lie in one or more of the above cross-relevant domains, give reports on what is happening of interest or significance in their favorite topic area. Then Earl gives reports on magazine articles he has read. This makes for an interesting reading, and the interesting monthly reports we hope members from other MMM-sharing chapters read faithfully.

We encourage other chapters (including my own MLRS) to expand and grow in a similar fashion. Peter Kokh

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

www.MMM-MoonMinersManifesto.com

"**MMM**" is a monthly newsletter, published ten times a year (monthly except January and July) continuously since December 1986, by the **Milwaukee Lunar Reclamation Society** (MLRS). The November 2014 issue, #280, will completes the first 28 years of uninterrupted publication.

Terra Lux, the unique underground home that was the Inspiration behind Moon Miners' Manifesto
http://www.moonsociety.org/chapters/milwaukee/mmm/**mmm_1.html**

M.LRS has been the publisher of Moon Miners Manifesto since issue #1 in December 1986 through current. MLRS serves as the SE Wisconsin Chapter of the National Space Society and as the Moon Society Milwaukee Outpost – **www.moonsociety.org/chapters/milwaukee/**
As of October 16, 2013, **MLRS is now a Joint Chapter serving members of both Societies.**

MMM has served as the newsletter of the **Moon Society** and of its predecessor, **Artemis Society International,** since November 1995, beginning with issue #90.

MMM began serving other **chapters of the National Space Society in mid 1987 (Seattle L5) and now serves several NSS chapters** (7 currently), as well as the members of the **Moon Society**, and individual subscribers, and is also available to the members of the **American Lunar Society**, per a mutual affiliation agreement with the Moon Society signed in 2005.

National Space Society chapters who would like to offer MMM (hardcopy version) to all their members, or as an option, should contact the the MLRS Treasurer, Bob Bialecki, at **bobriverwest@yahoo.com** or leave a message at 414-372-9613. A series of 3 sample copies per member is possible to familiarize the chapter's members with the publication before signing up.

MMM Topics: Most issues of MMM contain speculative articles that deal with the opening of the Lunar frontier, suggesting how pioneers can make best use of local resources. Some of the points made will relate specifically to pioneer life in the lunar environment. But many points will hold for frontier living on Mars as well. MMM has occasional articles on the Asteroids, Venus, Mercury, the moons of other planets, and what lies beyond the solar system.

Pdf color file Archive of Current & Past Issues of MMM – www.moonsociety.org/members/mmm/

Beginning with MMM #145 through current – Prior to #145, we did not prepare pdf versions. The major articles of issues #1-144, however, are preserved in the MMM Classics #s 1-15

To access /**members/mmm/** you will need to use your **Moon Society username and password**.
If you do not have a username and password, you can request one at the following location:
http://www.moonsociety.org/mymoon/
For username and password assistance, contact **mmm@moonsociety.org**

The MMM Classics – **free access** – in pdf format only -- were created to preserve the non-time sesitive articles of previous MMM issues, in chronological collections, one per calendar year, with a 2-3 year lag behind the current issue**. – www.moonsociety.org/publications/mmm_classics/**

The MMM Themes – **free access** – This same material is now available in collections organized by **Major Theme**s and Threads. currently 17 – **www.moonsociety.org/publications/mmm_themes/**

MMM-Derived Papers – **free access** – **www.moonsociety.org/publications/mmm_papers/**

The MMM Glossary – **free access** – **"Old words with new meanings, and new words coined when no existing word will fit"** This Glossary was created to acquaint new members and visitors with special terms used in MMM for new concepts and ideas Additional entries will be added to as need be.

The Cue Images Library – **free access – Exploring concepts from Back Issues through key images**
To acquaint new members and visitors with important concepts from back issues of Moon Miners" Manifesto, **a "Changing Image" feature** hasd been developed. This feature of the homepage did not survived the website revision of 2013 http://**www.moonsociety.org/publications/cue_images.html**

The **Cue Images Library**, using these same images and their links, is preserved as a companion to the **MMM Glossary,** as fun ways to familiarize new members and visitors with ideas and concepts and topics featured in the past 27 years of MMM publication. ##

Moon Miners' MANIFESTO
Milwaukee Lunar Reclamation Society, Inc.
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PHILADELPHIA AREA SPACE ALLIANCE

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

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Individual Subscriptions outside participating chapter areas: • $15 USA • $25 Canada;

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

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