

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

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In FOCUS: An end to the Lunar Dark Ages?

We didn't know it then, but the Lunar Dark Ages began when Apollo 17's *Challenger* lifted off the moon at 5:55 p.m. EST December 14, 1972. Three more missions had been planned to explore Schroter's Valley in the Aristarchus Plateau, Hyginus Rille, and the great crater Copernicus. Apollos 18, 19 and 20 had been canceled due to cuts in NASA's budget by Congress, and Nixon's indifference.

In the interim there *has been some activity*. The Soviets kept at it for another four years.

- Luna 21 (Lunakhod 2 rover, Le Monnier Crater) Jan 1973.
- Luna 22 (orbiter) June 1974
- Luna 23 (lander, Mare Crisium) October 1974
- Luna 24 (lunar sample return, Mare Crisium) August 76

Galileo took new, color-filtered photo's of the Moon as it flew by in December, 1992. In early 1994 Clementine, a mission by the Strategic Defense Initiative Organization tested instruments (meant to map the Earth), on the Moon

In 1998-9, Lunar Prospector, a mission developed outside NASA, was flown by NASA to look for evidence of hydrogen at the lunar poles. But in all this time, since Apollo 17, there has been no NASA-originated Moon Mission.

It has been difficult for many Moon-enthusiasts to "keep the faith" during these Dark Ages. Will this end?

Beware of the "wooden nickel" trap!

There has been much excitement since President Bush announced that NASA would abandon the Earth-science focus of its Manned Space Program, build new manned vehicles, return to the Moon, and go on to Mars. Those who state reservations about NASA's new lunar outpost plans, are urged to "quit rocking the boat." But unfortunately, as in almost all other cases when something seems to be too good to be true, the thankless role of the Devil's Advocate is essential.

An end to the Lunar Dark Ages? *What we all want* is a return to the Moon to stay. Unfortunately, a great many space supporters are naive enough, or with no or too short a memory, that they believe that because the stated intent is to put in place a "permanent" moonbase, that a new human presence on the Moon will continue to the end of time. Now we could point to past government assertions and eventual realities (NASA will abandon support of ISS six years after it's truncated final version is completed) but such an argument will carry no weight with those desperate to believe.

Instead, we appeal to reason. "Permanence" has to be earned, by *laying the foundations on which it can become self-maintaining*. Otherwise, *all assertions to the contrary*, the Lunar Dark Ages will not have ended. [⇒ p. 2, col. 2]

Bigelow Aerospace Tourist Moon Cruiser Concept

www.bigelow-aerospace.com/images/mooncruise01.jpg

The exciting thing about this concept is that all the parts except the inflatable Nautilus Module are off the shelf, and the Nautilus is under construction. Regular suborbital tourism is a near-term reality. Next, taking tourists to orbit. Looping around the Moon will soon follow. All it requires is refueling and provisions for 7 days.



Moon Miners' Manifesto

Moon Miners' MANIFESTO/ Moon Soc. Journal is published every month except in January and July.

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- **Moon Miners' Manifesto CLASSICS:** Beginning with 'July 2004, we have begun an effort to re-edit, reformat, re-illustrate and republish the timeless articles of MMM's first ten years, with the intention of publishing two issues, each covering one year, in PDF format only, for free downloading, each January and July.
- **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; earliest use of Mars system and asteroidal resources; and the establishment of the permanent settlements necessary to support such an 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.
- **MMM retains its editorial independence.** MMM serves several groups each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test. Any presumption that participating organizations can be labeled by indirect mutual association is unwarranted.
- For the current space news and near-term developments, read *Ad Astra*, the magazine of the **National Space Society**, in which we recommend and encourage membership.
- **The Lunar Reclamation Society** is an independently incorporated non-profit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. LRS serves as NSS' Milwaukee chapter
=> www.lunar-reclamation.org
- **The National Space Society** is a grassroots pro-space membership organization, with 10,000 members and 40 chapters, dedicated to the creation of a spacefaring civilization.
The National Space Society, 1620 I Street NW, Suite 615, Washington, DC 20006; Ph: (202) 429-1600 <= NEW HQ
FAX: (202) 463-8497; nss@nss.org => www.nss.org
- **MMM's desktop publication** has received computer hardware and software support from the **Space Frontier Foundation**, 16 First Ave., Nyack NY 10960; 800-78-SPACE - SFF seeks to open the space frontier to human settlement as rapidly as possible.
openfrontier@delphi.com => www.space-frontier.org
- **The Moon Society** is "dedicated to overcoming the business, financial, and technological challenges necessary to establish a permanent, self-sustaining human presence on the Moon." — See contact information on page 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.

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=> IN FOCUS Editorial continued from p. 1.

Readers who had even a brief course in Logic know what a syllogism is: a form of argument in which a conclusion follows inescapably from two premises. Here is how I see the situation with respect to NASA's return to the Moon.

Premise: No human presence on the Moon can be permanent unless it aggressively expands using local resources in order to be able to produce the bulk (by shipping weight) of its needs, and enough export products and services to earn what is necessary to purchase those of its needs it cannot (yet) provide for itself.

Premise: NASA, despite tentative, easily-cancelable plans to do token in-situ resource use demonstrations, has no plans to expand an initial lunar base or to use lunar resources for expansion, or even to bring civilians to the Moon. Any of that would depend on government (Administration and Congress) decisions.

Conclusion: The NASA/Government plan to return to the Moon "to stay" is self-neutering, just so many words.

So what do we do: Supporting NASA's efforts are fine and good, especially as it helps keep up public interest. But, that said, *we must remain aggressively vigilant* that:

1. NASA involves **private enterprise** (*not just* "contractors" who are not risking their own capital) as much as possible.
2. NASA does not discourage non-agency efforts to develop the Moon for **industry, settlement and/or tourism**.
3. In short, we must be vigilant to make sure that the NASA Game is **not the only game in Moontown**.

We cannot, dare not, must not take it for granted that private enterprise will follow NASA to the Moon, that NASA will pave the way, that NASA will be supportive. All the evidence of the past four decades should tell us otherwise. We have had a Socialized Space Program that we think is "as American as apple pie." Socialism only becomes capitalism after a revolution of sorts. When NASA says "private enterprise" there is a fundamental disconnect between what it understands by the term and what we understand by it. We have to remain aggressively vigilant.

"Rocking the boat?" Perhaps, but that is the only way we are going to free the boat from the sandbar on which it now rests. Yes, NASA's plans are exciting. But NASA, following the majority opinion of planetary scientists who are totally disinterested in the idea of lunar settlement and development of lunar resources, seems intent on selecting a lunar polar site, the worst possible location from the point of view of developing a lunar resource-using industrial civilization. [See the following essay.] And alarmingly, the apparent majority of space enthusiasts are mesmerized by this plan's stated advantages (i.e. not having to deal with the reality of the lunar environment). Please, let's not settle for "wooden nickels." **PK**

Perfect Spot Found for Moon Base?

<http://www.space.com/scienceastronomy/>

050413_moon_perfect.html

An Impassioned Rebuttal

by Peter Kokh

A north polar site has the great advantage of being less than half as far away from the nearside maria complex as the South pole. The North pole lies just 600 miles north of the North coast of Mare Frigoris, whereas the South pole is 1300 some miles south of the southern coasts of Mare Humorum, Nubium, and Nectaris.

Industrially, the highland/mare coasts have much to offer with the availability of both major suites of regolith; highland regolith enriched in aluminum and calcium, mare regolith enriched in iron and titanium.

The nearside mare complex embraces all the nearside maria except Crisium in one interlinked area of relatively easy to traverse terrain and represents 39% of nearside. Add to that highland areas handy to the coasts.

The problem with the polar sites is that they are ghettos. These places of "eternal sunlight" are surrounded by very inhospitable terrain. We will be on very uneven, even mountainous terrain with very confining and limited flat areas. The shadows will be extremely long and dark and the shadow pattern will be constantly changing, making visual cues as to one's whereabouts or heading all but meaningless.

The whole idea of going to the poles, is not to tap ice (that's just "frosting on the cake") but to *escape* two requirements of settling in anywhere else:

[1] Having to store up power during the two-week long dayspan in order to power equipment and systems during the two-week long nightspan

[2] Being able to avoid the problems inherent in incessant bimonthly cycling between extreme hot and extreme cold.

If we tackle those problems head on from the start, then we own the whole Moon. If we do not, then we only own tiny turflets at one or both poles while the rest of the Moon remains off limits.

On point [1] – “eternal sunlight”

I believe that the "eternal sunlight" is available not at one precise point, but at a string or chain of spots around a high point rim or massif at either pole. If that is the case, it *may* take a significantly greater mass of equipment shipped to the Moon's pole (either) in order to set up a power system that will have solar input most (but still not 100%) of the time, *than it would be to set up a system elsewhere that would store up excess dayspan solar input for nightspan draw.*

Further, we will *still* need such a power storage system at either pole, for those periods, however minimized, that the sun doesn't shine.

To me, the search for the eternal light brings with it the inherent drawbacks of:

- ❑ putting us in very small local areas surrounded by much more challenging polar terrain,
- ❑ putting us where we have no, or greatly reduced, access to iron and other industrially essential elements more abundant in mare regolith. Both poles are highland areas.
- ❑ putting us in a place from which it is hard to travel overland to anywhere else
- ❑ still needing to have a power storage system on top of a more massive system of solar arrays linked by cable around the polar mountain or rim crest
- ❑ having to set up shop in relatively non-flat areas. Laying out the extended solar power array system in mountain terrain, involves high risk to personnel and equipment.

This euphoric "eternal light bandwagon" gripping perhaps most lunar enthusiasts and supporters seems all very much like the momentary delight and anticipation of the moth that sees a bright porch light or street light, and is drawn instinctively, unsuspectingly, to its certain doom

Yes, we need water. But we need more iron and other materials. So is it better to ship X tons of water to sites away from the poles, or 10X (to grab a figure) tons of other materials to the poles? The answer to that question seems to me to be a "no-brainer".

But if you are someone who doesn't put much stock in the potential for lunar industrialization, and who is only attracted to the polar ice reserves because in addition to a supply of drinking water, they can be turned into rocket fuel to support exploration, *not of the Moon*, but of the rest of the solar system, then the polar sites offer just what you need. That you bring the Mountain (larger tonnage of mare/highland regolith needed) to Mohammed (ice) or bring Mohammed to the Mountain, is not a consideration. But consider: *did we build Los Angeles next to Prudhoe Bay?*

You don't feel trapped at the poles, because the whole idea is to establish a token presence on the Moon, maybe with a token telescope to boot, and to leverage that for fueling other solar system endeavors - You dismiss prospects of lunar industrialization and settlement.

Now David Schunk and his team have indeed developed a very ambitious scheme to use peak of eternal light sunshine to power a lunar railroad network which will eventually extend over much of the Moon. A lot of work has gone into that proposal in his Book: **The Moon : Resources, Future Development and Colonization**, and I deeply respect that, and highly recommend the book(*).

The poles *will* be part of the lunar future. I just think that they should play a supporting role, not the lead.

We need to get our feet wet on the Moon in a way that will allow us to roam free on the Moon, virtually everywhere, *not writing off* the 99.999% of the Moon which is not "eternally sunlit."

Maritime Luna

by Peter Kokh

Mar·i·time. *adj.* 1. connected with the sea in relation to navigation, shipping, etc. 2. of or pertaining to the sea: a *maritime* civilization. 3. bordering on the sea: *maritime* provinces. 4. living near or on the sea. [from Latin mare = sea + timus suffix]

Mar·e [pl. maria]: [pron. mahr·ay, mahr·i·a]
n. Astron. any of several large, dark plains on the Moon, thought by Galileo to be seas when first seen through a telescope in 1610.

The Moon's Earth-facing Near-side is very different from the side we can never see from Earth. Thirty-nine percent of the nearside is in the form of relatively low-lying basins that have been filled, some time after their formation, with lava floods. These areas are known as Maria. (Basins on the thicker-crust farside that were never filled by lava upwellings are known as thalassoids, from the Greek word for "sea.") Once these seas of liquid lava congealed, their surfaces became subject to "gardening" by the micrometeorite bombardment. Over the 3 and a half billion years since, this has produced a blanketing layer of pulverized rock and powder known as the regolith. The mare regolith is considerably darker than that in the highlands, and so it is the lunar seas or maria that give us the familiar "Man in the Moon" naked eye appearance of the Full Moon.

To ignore whatever advantages that special aspect of the Moon's Earth-facing hemisphere might offer us, would be foolish for three basic reasons:

1. Topographical advantages:

In comparison to the highlands, the mare areas are sparsely cratered as the maria were formed after the main era of asteroid bombardment by planetesimal debris leftover from the formation of the solar system had ended. The maria terrain is relatively flat.

But there are several features that break the monotony and will affect transport routes. In some of the shallower maria, we find ghost craters representing impact craters that formed in the basin before wholesale flooding. In this case just their rims, or portions of the rims protrude as "reefs" [Latin *saxa*, anyone?]

There are gentle "scarps," the edges of the various lava flows. And wrinkle ridges that formed as the lava fill settled. and There are rille valleys hundreds of meters across and deep that formed from collapsed lava tubes.

Some of these features may necessitate detours

until we are able to do major earth-moving and/or build bridges. But in general it should be relatively easy to travel from one mare location to another anywhere on nearside, excepting the highland locked Mare Crisium and several lesser mare units.

2. Shelter advantages:

There is no particular advantage to covering a habitat complex with highland regolith rather than with mare regolith. However lavatubes, some of them with appreciable intact subsurface volumes, will be found in the maria only. They are formed naturally by the way the runny lava flows that filled these basins advance.

Intact lavatubes will someday provide ready voluminous shelter in thermally stable environments for whole settlements and their associated industrial parks and warehouse complexes, and the ultimate in long enduring archival space for all of humanity's records, artifact collections, and more with a lifetime of billions of years.

*Lavatubes are the Moon's
"Hidden Valleys"*

And again, there are none of these well-coming refuges in the highlands. Lavatubes may exist in multiple layers as in some areas the basin-fill has built up in successive lava sheets, each of them forming tubes..

3. Resource access advantages:

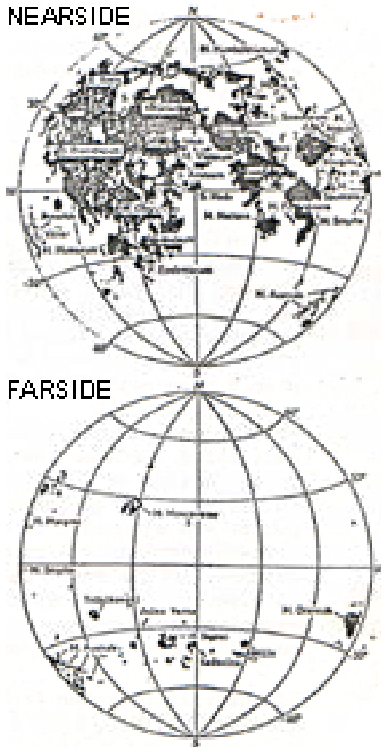
The basalt-filled maria are richer in iron and titanium whereas the highlands are richer in aluminum, magnesium, and calcium. Locations along the mare/highlands "coasts" have access to both suites of materials. This

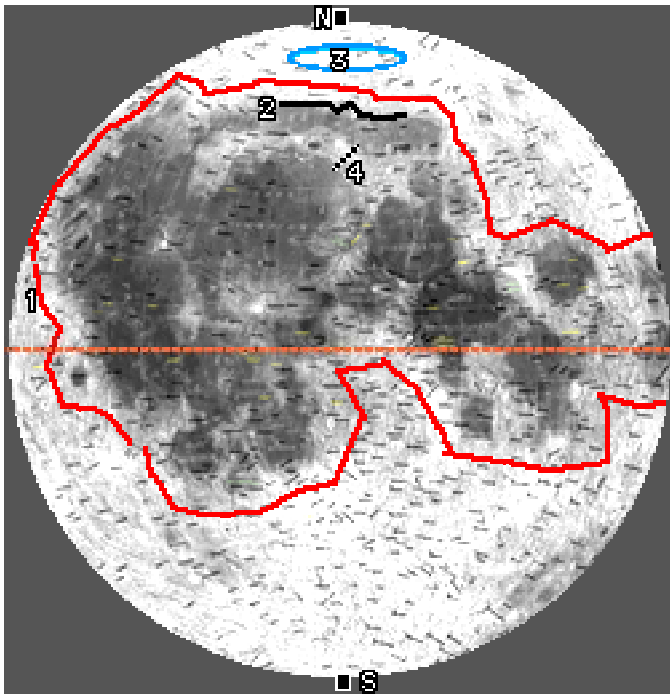
is necessary if we are truly interested in development of a diversified industrial lunar economy, able to provide the bulk of its own needs as well as producing a variety of products for export.

As to hydrogen, all lunar regolith topsoils contain hydrogen as solitary protons adhering to the fine particles in the soil, the gift of the solar wind, to the tune of one ton of hydrogen per then thousand tons of regolith. All that is needed to recovery this resource is heat. Further, the northern coast of Mare Frigoris, the long, narrow E-W mare north of Mare Imbrium and Mare Serenitatis, is only 200 miles from the southernmost north polar craters of 20 km or more in diameter that have appreciable areas of permanent shade, meaning likely ice deposits.

The maria themselves are not homogeneous. As successive magma upwellings poured out into these basins, its composition changed. Some lava flows are richer than others in various elements. You can see this online at:

www.lunar-reclamation.org/papers/mare_soilprovinces.gif





Above, a high contrast image of the Moon's nearside shows the extent of the nearside "mareplex" Encircling it is an outline [1] of the near-coastal highlands hinterland within easy reach. A dark line [2] marks the **north coast** of the long E-W stretching northern sea, **Mare Frigoris**. Within two hundred miles or so of this coastal area, lie craters larger than 20 km (13 mi.) in diameter, just north of the 75° line, [3] with appreciable expanses of permanently shaded floor area, presumed to hold comet-derived water and carbon oxide ices and other cometary volatiles. Linking Mare Frigoris with Mare Imbrium to the south is the **Alpine Valley** [4], a major transportation corridor. Image: P. Kokh

The shadings that create the "Man *in* the Moon" naked eye impression, represent the territory that is destined to become the principal home of "Man *on* the Moon."
Hmmm! "Man in the Moon" - the "MIM-plex" anyone?

On Earth, humans spread across the globe following the path of least resistance: across prairies and steppes and along coasts and rivers. Mountain passes were pinch points. Those tribes established in areas from which expansion was easy, spread and grew and became dominant. Equally capable tribes caught in isolated areas or cul de sacs stayed small.

On the Moon, the maria could function as both seas and plains in this respect. There is a lesson here for us, and if we think that with all our sophisticated technology, we will not also do better to follow more easily traversed pathways to expansion, we are setting our "lunar initiative" up to become a footnote in history. Many a culture has unwittingly chosen oblivion, following some intoxicating siren call.

All coasts are not created equal: There are well over ten thousand miles of highland/mare coast in the mareplex. *But:*

- ▣ Some coastal areas will be handy to passes or easy routes into highland areas, or even lead to coasts on nearby maria: example. sites at each end of the Alpine Valley.

- ▣ Others may be near clusters of intact, usable lavatubes.
- ▣ Not all mare regolith is the same. Color filter photos show clear "provinces" of regolith which are differently enriched or deprived of various elements. A coastal settlement astride a boundary between soil provinces will have an edge up over those not so placed. See the link at the bottom of the previous page. Some mare areas are titanium-rich (ilmenite) and others enriched in potassium, rare earth elements and phosphorous (KREEP).
- ▣ There may be coastal sites with both advantages: gateway to the highlands; astride a mare soil boundary.

The needs of orderly industrial diversification:

A lot will depend on the priorities set for the most efficient path to lunar industrial diversification. At first, it may be easier to produce steel than aluminum (for which the preferred alloy ingredients are rare on the Moon) or it might be easier to start with titanium. Access to both primary and secondary elements will be a factor. As diversification continues, and it becomes necessary to begin production of additional elements, new sites will become secondary towns. The needs of orderly industrial diversification, not scenic or scientific interest, will determine the routes along which our presence on the Moon spreads.

The spread of Lunar Highways

With few exceptions, coastal settlements will be more numerous, prosperous, and populous than sites either in mid-mare or that are highland-locked. So it seems natural that the original lunar highways will follow the coasts, enough "off-shore" to minimize unnecessary bends, etc. Where wrinkle ridges, impact debris fields, or rilles block the logical way, they will detour around, at least at first. These coastal roads will in time be joined by spurs into industrially significant highland areas. Trans Mare and Inter Maria express routes will be built eventually.

The first vehicles may be "toads." The crew cabins of ferries from LEO or LL1 may be underslung between the engines and below the cargo platform, so that they can winch down to the surface on the wheeled chassis provided and taxi to an outpost, then back to the ferry for take off. Some of these "amphibious frogs" will stay on the Moon becoming "toads," the first lunar motor coaches and Greyhounds. Double duty, use-reassignment is the game.

The first roads will be minimally improved, raked of boulders, that's about it. But dust control is important, and so, eventually, will be speed. Lunar roads will be graded, compacted, and sinter-fused into a pavement all in one process without much need to drag along paving materials, other than possibly fiberglass mats.

Junctions will be logical sites for automated self-service wayside facilities as well as flare-protection sheds. One could recharge batteries and fuel cells there, replenish water reserves, sign out tools, etc. In time these waysides

Visiting Hell & Living to Tell About it:

Mission Goals for Future Venus Probes

by Peter Kokh & David Dietzler

See "Rehabilitating Venus as a Human Destination"

www.lunar-reclamation.org/papers/venus_rehabpaper.htm

Synopsis: Manned aerostat outposts are possible on Venus, floating just below the cloud deck where temperatures and pressures are manageable and from where the Veneran surface is visible.. The atmosphere and clouds can be mined for carbon, oxygen, nitrogen, sulfur, hydrogen, and other elements to make building materials for outpost expansion or replication. Tourist hotels could be built in this way to serve tourists taking "window shortcuts" between Earth and Mars via Venus.

Goals of ESA's Upcoming Venus Express

Condensed for MMM from <http://sci.esa.int/science-e/www/area/index.cfm?fareaid=64>

In large part based on the successful Mars Express orbiter, weighing 1270 kg = 2794 lbs., Venus Express is set for launch Oct-2005 on a Soyuz-Fregat rocket and intended to operate for 500 days in a polar orbit around Venus.

The Venus Express payload comprises a combination of spectrometers, spectro-imagers and imagers covering a wavelength range from ultraviolet to thermal infrared, a plasma analyser and a magnetometer. The aim is to enhance our knowledge of the composition, circulation and evolution of Venus atmosphere. The surface properties and the interaction between the atmosphere and the surface will be examined and evidence of volcanic activity will be sought.

- **ASPERA-4** (Analyser of Space Plasmas and Energetic Atoms) will investigate the interaction between the solar wind and the atmosphere of Venus
- **MAG** The Magnetometer instrument will provide magnetic field data and study the interaction of the solar wind with the atmosphere of Venus.
- **PFS** (Planetary Fourier [infrared] Spectrometer) will perform vertical optical sounding of the atmosphere, to:
 - Perform global, long-term monitoring of the 3-D temperature field from cloud level up to 100 km
 - Measure concentration and distribution of known minor atmospheric constituents
 - Search for unknown atmospheric constituents
 - Determine the size, distribution and chemical composition of atmospheric aerosols
 - Study global circulation, mesoscale dynamics & waves
 - Analyse surface to atmosphere exchange processes
- **VeRa** (Venus Radio Science) is a radio sounding experiment to examine the ionosphere, atmosphere and surface of Venus by means of radio waves. The instrument will determine the dielectric characteristics, roughness and chemical composition of the planetary surface.

- **VIRTIS** (Visible and Infrared Thermal Imaging Spectrometer) in the near ultraviolet, visible and infra-red parts of the spectrum to analyze all layers of the atmosphere and clouds, make surface temperature measurements and the study of surface/atmosphere interaction phenomena.
- **VMC** (Venus Monitoring Camera) operates in the ultraviolet, visible and near infrared spectral ranges. VMC will map the surface brightness distribution and search for volcanic activity. VMC images and movies will make a significant contribution to the public outreach program.

Top Priorities Beyond Venus Express: – Kokh's List:

- **Temperature hardened and corrosion resistant components** for future Venus & Mercury landers with enhanced viability (months instead of minutes) and redesigning chemical / mineralogical sensing equipment, and heat-flow drill taps, etcl accordingly
- **A fleet of balloon probes** (100s) tin Venus' atmosphere at various levels to map circulation cells and patterns, wind speeds, and variations in atmospheric chemistry at different levels, for data to locate any "sweet spot" - a best tradeoff between lower temperatures & pressures (higher up) and better visibility of the surface (lower down). Ideal pressure (1 ATM) and the best temperature (50-70 F?) may not occur at the same leve..
- **A balloon borne processing unit** to demonstrate production of carbon, carbon composites and carbon-based compounds, sulfur and sulfur-based compounds, etc.
- **A subsatellite lowered from a tether** from a high-floating balloon for low-level high resolution surface photo atlas as well as high resolution geochemical mapping, from which to create a short list for priority sites to test future ground probes and rovers

Top Priorities Beyond Venus Exprss: – Dietzler's List:

- **Map light intensity and spectrum at various altitudes** in different locations longitudinally and latitudinally for future agricultural and solar power generation needs.
- **Determine risk from lightning and up/down drafts** to floating outposts.
- **Test a Veneran Atmosphere Thermal Energy Gradient Converter power system** on balloon borne probes.
- **Surface samplers** to locate, qualify and quantify mineable surface resources.
- **A spectrometer capable of locating industrially interesting reouces** not just geologically interesting ones.
- **Measure solar flare radiation influx at various altitudes** (Venus' weak magnetic field generates no Van Allen Belt shield, and we are relying on the atmosphere for radiation protection. Secondary particle generation when ions from solar flares hit the Venusian atmosphere could be pretty bad. Venus is also much closer to the Sun so solar storm particle fluxes are more intense there. We'd want to examine this in detail before we plan high-floating human science stations and outposts.

<PK/DD>

The Moon Society



JOURNAL

<http://www.moonsociety.org>

Please make NEWS submissions to KokhMMM@aol.com

The Moon Society was formed in July, 2000 as a broad-based membership organization with local chapters, to spearhead a drive for further exploration and utilization of the Moon in cooperation with other like-focused organizations and groups.

Artemis Society International was formed in August 1994 as a forum for supporters and participants in the **Artemis Project™** quest to establish a commercial Moon base as a first step to a permanent, self-supporting lunar community. **ASI** does not engage in any form of commercial business directly, but seeks to build a Project support business team. Registered trademarks of the **Artemis Project™** belong to **The Lunar Resources Company®**

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OUR LOGO above, shows the Moon in its natural beauty, empty and deceptively barren, waiting for human settlers to shelter and to mother as an adopted new human home world. We have work to do!

[In celebration of Astronomy Day, April 16, 2005]

Moon Society Cosponsors "Lunar Study & Observing Certificate" Program

By Peter Kokh, Moon Society President

We all are extremely familiar with the Moon's nears side face. But it is a safe bet that not all of us have looked at the Moon through a telescope. Yes, many of us can pick out at least a few of the Moon's maria, seas of congealed lava floods, and perhaps recognize by name a handful of craters: Copernicus, Tycho, Plato - well, let's not push it!

While "Mars only" advocates are free to wallow in their ignorance of the Moon's resources and geography, we owe it to ourselves to become more familiar with our very interesting satellite. It is more than a rubble pile, and when you have seen one crater, *you haven't* seen them all.

The American Lunar Society, with which I have been familiar since 1987, is a group of amateur astronomers focused on observing the Moon through their telescopes. They photograph and draw its features, look for subtle-ties that only appear in the long shadows of early dawn or imminent sunset. They look for sudden and fleeting changes - Transient Lunar Phenomena (TLP), and study the Moon during Lunar eclipses, again for subtleties not apparent during more common lighting conditions.

ALS newly elected President, its webmaster and Manager of Observing Programs, has created a program that is designed to familiarize participants with the many features of the Moon's nearside surface, learning the most prominent and interesting ones by name. The certificate program is modeled after the well-known Messier Certificate program in which amateur astronomers attempt to successfully find and observe all 101 Messier objects: a collection of galaxies, star clusters, and nebula. Earning that certificate is a benchmark of achievement for amateurs.

But Eric has taken the ALS program one step further by requiring participants to read a short introductory article on lunar geology, and then take an open book test to demonstrate that they did read the article. The purpose of this exercise is to make sure the observer understands the nature of the features looked at through the telescope. This has made the ALS program special.

Now, it is the American Lunar Society / Moon Society program, as per mutual agreement, both organizations will be co-sponsors. Moon Society members are encouraged to take advantage of this program. There is a small \$8 fee, due at the time of mailing in your test answers and observations log, for the framable certificate itself.

As an incentive to participate in this program, the Society will extend full credit for the \$8 fee that must be sent in to ALS along with the completed Observation Log and Test, applicable to the participant's next renewal, or initial joining Moon Society dues. Check it out:

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

[In celebration of Astronomy Day, April 16, 2005]

Telescopes on the Moon: How Soon?

by Peter Kokh

Many people have pointed out that the Moon is an ideal platform for conducting astronomy:

- The Moon's deep farside is the most radio-quiet location in the entire solar system for Radio Astronomy (including S.E.T.I. searches)
- No atmospheric turbulence to shake optical images
- The Moon is extremely quiet seismically speaking, with no tremors over 2 on the Richter scale
- The Moon's sky is black 24/7/365.256, i.e. all the time, except, of course, in the direction of Earth or the Sun.
- Telescopes can be trained on north or south circumpolar objects of extreme interest in dedicated fashion, continuously (as in forever) thanks to the Moon's low axis inclination of only a bit over one degree
- Telescopes can be trained on objects nearer the Moon's celestial equator for 14.5 days at a time, thanks to the Moon's slow rotation. Compare this with less than an hour for Hubble, circling Earth in a tight orbit.
- The intense cold of permanently shaded craters near the poles makes them ideal for infrared telescopes

Why are there no telescopes on the Moon yet?

Telescopes need occasional repair and tending. Only so much can be accomplished by teleoperation. We are all aware that Hubble's fate rests on this issue. To make sure that our telescopes on the Moon are good investments, we have to address the servicing issue. Can we build them with "attached replacement parts" so that shifting to a fresh part can be done remotely? Can we build them so that a robot landing mission can take care of the problem?

One idea might be to locate lunar telescopes in areas that we might want to visit in person anyway. Then a human servicing mission could kill two birds with one stone. Taking this a step further, for a major radio or optical telescope installation, landing of a "hostel" type habitat and tool shop at that location might in the long run pay off. Technicians could then have a place to stay, and tools and part-fabrication facilities already on site, and could travel "light" to and from the facility when needed. Read:

www.lunar-reclamation.org/papers/hostels_paper1.htm

One creative idea, which shouldn't be dismissed too lightly, is that early observatories could be serviced by paying, trained-for-the-occasion "tourists." This option would greatly reduce costs of observatory service missions, and might also make the "working lunar surface tourist excursion" enterprise more economically feasible as well.

There is one troublesome matter, however, that must be addressed: the lunar dust. At dawn and dusk, some

of the fine lunar dust appears to electrostatically "levitate" above the surface. We very much need to qualify and quantify this problem. An Observatory Scout mission would send a probe with an extensible arm to reach 30 meters or 100 feet above the surface to detect dust density at sunrise and sunset, over a number of cycles.

The lunar dust is angular as well as fine, and as Apollo landing mission experience amply showed, tends to insinuate itself into every joint and bearing. We may find that lunar telescopes have to be set on tall piers in order to be above commonplace electrostatic dust clouds. To protect our investment, without going overboard, we need to characterize this problem to a high degree of confidence.

Telescopes on the Moon are likely to be in full-time use. Nonetheless, they should be equipped with deployable shrouds to meet the threat of known meteor showers that occur when Earth, and the Moon with it, pass through bands of comet dust and debris on a regular annual schedule.

<http://comets.amsmeteors.org/meteors/calendar.html>

So it is clear that there are a number of design and engineering issues which must be addressed, and that for some of these issues, we do not yet have sufficient data. It is an action item of the Society to develop a well-rounded Position Paper on Lunar Telescopes and Observatories, based on which, we can adopt useful action items. We have already suggested the first: designing an *Observatory Scout* mission to characterize the levitating dust problem.

Telescopes on the Moon is one area in which terrestrial governments and space agencies must be involved. Yet, if they are willing only to pay, and not to deploy or operate, the design, deployment, and operation of lunar telescopes could be farmed out to private enterprise on a competitive basis with performance-based monetary bonuses and fines.

Lunar observatories, should some of them grow into clusters like those on Kitt Peak, Arizona or Mauna Kea, Hawaii, could give rise to nearby settlements, one of whose income sources would be observatory support. In the long run, it does make sense to co-plan observatory and settlement locations. They need not be side by side, only within easy reach, as with Mauna Kea / Hilo, Kitt Peak / Tucson.

But we also need to be advancing the state of human-robot synergies, not only for remote teleoperation, but for onsite teamwork to make human tending visits more manpower-efficient. Human-robot synergies and Lunar Observatories are two key areas of critical interest to the Moon Society, parts of the puzzle we need to put together in our effort to advance the day of a permanent and viable human presence on the Moon. We are in the early stages of brainstorming related initiatives. More on that when the time is ripe.

We're working on it!

<TMS/PK>

Have you Checked our Website Lately? Many New Features and Pages Added

Yes, at first glance our Website still looks the same as it did nine months ago - *unless you look carefully.*

- In the upper right hand corner, below the Current Moon Phase information, "**what to look for on the moon tonight**" entices you to get out a telescope.

Left Hand Destinations Menu

- ▣ You will see a brand new link: **"Earn a Lunar Observing Certificate"** (see page 9 above). *And do explore!*
- ▣ And click on the **"Reports"** link often, to keep up to date on what the Society is up to. We hope to link to the more significant of these reports in the Society News section at the middle of the page. That is in the web-formatting process as I write.

Right hand Destinations Menu

- ▣ The **"Lunar Directory"** link should be updated by the time you read this. We have added three more organizations.
- ▣ The **"Conferences"** link is being regular updated.
- ▣ The self-dating link **"Missions @04-2004"** has been replaced with a timeless link, **"Moon Missions,"** to a page that is being updated regularly.
- ▣ The old **"Moon Info"** link has been replaced with a new one, **"Moon Info & Things Lunar"** which takes you to a new master page for all sorts of interesting Moon information. The original Moon Info page is there, along with a second one of **"Moon Links"** but also much more. Exploring all these goodies will take you a while. And we hope to add much more over time. The idea is both to provide our members with more information and to give the casual visitor something to reward them for their visit, and hopefully to get them to return, and eventually to join.
- ▣ Further down on the right hand column, there is a new image link to a great documentary, **Gaia Selene**, about the role of the Moon in solving stubborn Earth Problems.
- ▣ For Chapters and Outposts we have added a new section on **Outreach Aids** with a link from the Chapters page and from the **"Spread the Word"** link in the left hand menu

"Under Construction"

Our website, and our Society, will always be "Under Construction!" That's what we are all about. Once we stop building and adding and undertaking, choosing to "rust" on our laurels, it will be time for someone to write our obituary.

Fixing the top center image to change regularly is priority #1 at the moment. But *let us here from you. What would you like added to the Moon Society Website? What content, information, programs, projects, links, etc. Let us know. Make this page "your home page."* **<PK>**

Coming Up: Moon Society Elections 2005

Yup, it's time for our annual ritual, picking dynamic and energetic people to continue the work of building the Society and striving effectively towards an earliest, and effective, "Return to the Moon to Stay."

This year three directors positions and two officer positions go up for election. Those presently holding those positions may choose to run for re-election. But members who are interested, are encouraged to nominate themselves or others for these positions.

The directors whose terms are expiring are Randall Severy, Dana Carson, and John Schrock. The two officers whose terms are expiring are Vice-President David Wetnight and Treasurer R. Scotty Gammenthaller.

Scotty has served us so well since the founding of the Society in July, 2000. He is now finding the demands of his day job leave him in a position where he can only do the bare minimum. Finding a suitable replacement for Scotty as Treasurer is our top priority in this year's electoral process.

In general we need dedicated people, with some minimum of free time. The Leadership Council meets for two hours twice a month on the ASI-MOO, 9-11pm Eastern on the first and third Wednesdays. If you cannot make that commitment, or are not online, you should not run. But additionally, we need working leaders who able to accept and perform various action items: things that need to be done to advance the work of the Board and Leadership Council. So nominees should ideally have more time to give than just those four hours a month. The Moon Society does everything it does through volunteers. We have no paid staff.

Eligibility: Membership for two continuous years prior to Aug. 1, '05, i.e. with a membership number of 1280 or lower.

Retired persons often have more free time at their disposal. We encourage our retired members to consider service to the Society. The characteristics most useful are enthusiasm, dedication, ability to work with others to reach consensus, and willingness to accept bite-sized action items.

We have been blessed to date, to have had fine people in leadership positions. We trust that this good fortune will continue. But, to no small part, that is up to you., the members of the Moon Society.

Timeline: As the deadline for ballots is August 1st, and we have to publish the ballot no later than early July, we request that all nominations and candidate statements be submitted by email to elections@moonociety.org by June 15th, or by mail to the Society's PO Box by June 1st. Please keep candidate statements short. The recommended maximum length is 250 words.

The Chairman of the Elections Committee this year is our Secretary, Gary Gray <elections@moonsociety.org> - please address any questions to him.

Moon Society to Cosponsor the Annual "Great Moonbuggy Race"

by Peter Kokh, Moon Society President

Perhaps you have heard of the "Great Moonbuggy Race" and even seen something about it on TV. This is an annual event hosted by NASA's Marshall Space Flight Center outside Huntsville, Alabama. This year's race is set for April 8th and 9th, history by the time you read this.

High School and College student teams are required "to design a vehicle that addresses a series of engineering problems that are similar to problems faced by the original Moonbuggy team.

"Each Moonbuggy will be human powered and carry two students, one female and one male, over a half-mile simulated lunar terrain course including 'craters,' rocks, 'lava' ridges, inclines and 'lunar' soil."

You can read all about the competition, its rules, the race course, registration, etc. at:

<http://moonbuggy.msfc.nasa.gov/>

In response to an inquiry, the Moon Society has been invited to join an already impressive list of sponsors, that includes AIAA, SAIC, ATK-Thiokol, United Space Alliance, and other organizations. This came too late for this year's event, but planning for next year's race is already underway, and we will be part of promoting it.

Unfortunately, as we are neither a high school nor a college, the idea of a Moon Society entry is out of the question. But for us, there is the possibility that some of our local chapters and outposts may wish to encourage and support entries by local high school and college teams.

We (Society, Chapters, Outposts) could also help find additional co-sponsors. Hmm? How about Harley-Davidson in my own home town - Milwaukee?

The Moon Society is on the alert for more Moon-focused contests and competitions, both existing ones to cosponsor, and those we may initiate ourselves.

Which brings us to ...

We very much need the services of a volunteer to design and manage school contests and competitions of all kinds: essay, poetry, fiction, art, design, modeling, music, even fashion (why not?). The Moon Society has no paid positions - that's "no" as in "NO." Our activities and efforts are 100% volunteer-run and managed. We cannot hire someone to fill a need, no matter how important. The need may in time require a team effort. If you think you have the experience and/or the connections to head or to support activities of this type, please contact us:

volunteers@moonsociety.org

president@moonsociety.org

<TMS/PK>

Chapters & Outposts

Society President Offers to Visit any Outpost Earning Chapter Status

From Peter Kokh

Any outpost achieving chapter status (*three people picking temporary officers and applying for a chapter certificate*) and then planning a public outreach event, can look forward to a visit, *with ample notice*, for that event, of the Society President. The precedent for this was set last fall, when I bussed down to St. Louis, at my expense, to join Moon Society St. Louis at their local Science Fiction Convention, *Archon*, where I helped man the chapter display and information table and joined them in a presentation on the Moon. One chapter member put me up for two nights, and they all treated me to dinner after the event was over.

Health, finances, and personal commitments can all interfere to delay my making good on this offer made with the best of intentions. I'll need a free place to stay. And, oh yes, the fine print:

This offer is not good outside the U.S. and Canada!

(without round trip airfare)

<PK>

Bay Area Moon Society at Yuri's Night

San Francisco - San Jose Metro Area

Meeting the 4th Tuesday of Every Month

Contact: Jonathan Andrew Goff - Chapter Leader

<http://www.moonsociety.org/chapters/bams/>

From: Bill Clawson <billclawson@yahoo.com>

Subject: [BAMS] Fun at Yuri's Night

"I represented BAMS at the Chabot Space Center in Oakland last Friday at the Yuri's Night event. Yuri's night celebrates the first human sent into space (Yuri Gagarin -- April 12th, 1961). Many bay area space advocates were in attendance as well as a fair amount of party revelers. (For what it's worth, I fell into the space advocate/geek squad, as one might imagine.) I showed off some lunar regolith simulant, mars regolith simulant. I let people play with a small sample (a few grams) of the lunar simulant (I still have a bit less than 5 kg of MLS-1a at home).

"People seemed interested, and I handed out a few Moon Society membership flyers. I have no idea if we'll get any bites, but I had to try. I also talked to members of the Mars Society at length. It was a lot of fun."

Next meeting April 28 at Bill Clawson's House, 7-9 PM PT.

Agenda items for consideration:

1. Food on the Moon 2. Lofty Goals

3. Continue revitalizing the Bay Area Moon Society

Contacts: Jonathan Andrew Goff - Chapter Leader - Bill Clawson, Steve Durst, Tim Cadell, Rhoda Bryant

GREAT BROWSING !

En route to Mars, the Moon

Why colonize the Moon before going to Mars? NASA scientists give their reasons

"Testing all this technology on the Moon, which is only 2 or 3 days away from Earth, is going to be much easier than testing it on Mars, 6 months away"

http://science.nasa.gov/headlines/y2005/18mar_moonfirst.htm?list886224

How to Start Building Cities & Factories Throughout the Solar System, for What We Are Now Spending on Space

<http://www.ari.net/moon/forum/mp/mp-4/bootstrap.html>

Space Movies Cinema

<http://www1.jsc.nasa.gov/er/seh/movies.html>

Saving the Enterprise (TV Show)

<http://www.trekunited.com/>

Detecting ExtraSolar Planets Directly

<http://www.spitzer.caltech.edu/Media/releases/ssc2005-09/release.shtml>

CSI Lunar ExpressSM System Enables a 100% Private Return to the Moon in 2-3 Yr

<http://www.constellationservices.com/lunarexpresssmsystem.html>

The Great Moonbuggy Race

<http://moonbuggy.msfc.nasa.gov/>

One Cool Droid - Meet "Omnitread"

www.engin.umich.edu/research/mrl/00MoRob_6.html

Segway-based Robotics Mobility Platform

www.engin.umich.edu/research/mrl/00MoRob_7.html

Races, beauty contests, franchises, and build-out requirements for lunar property "Auctions may be a better method."

<http://www.thespacereview.com/article/224/1>

Solar Panels from Moondust

http://space.com/business/technology/technovel_solarcell_050325.html

March 14 SMART-1 Lunar Orbiter Update

<http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=36801>

ILC '03 Proceedings Available

International Lunar Conference 2003 - ILEWG 5

Held November 16-22, 2003,

Waikoloa Beach Marriott Hotel, Hawaii Island, USA.

Eds.: Steve M. Durst, Charles T. Bohannon, Christopher G. Thomason, Michael R. Cerney & Leilehua Yuen

Publication: Univelt, 2004, 576p.,

Publisher: Univelt. Volume 108 of the American Astronomical Society Science and Technology series, 576 p.

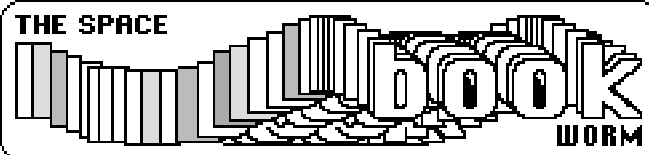
Includes CD-ROM containing digital versions of entire book including introduction, foreword, Hawaii Moon Declaration, all 72 papers, plus full-color graphics.

Papers are divided into sections on lunar activities and programs of the International Space Agencies; science of, from and on the Moon (astronomy and astrophysics, geology and geophysics, and life sciences and habitation); Pacific space access; advanced space access technologies; lunar commerce, enterprise and technology; space, lunar policy and property rights; global education and culture in the space age; China presentations; and special presentations on topics such as lunar tourism.

Hard Cover plus CD ROM \$110 (ISBN 0-87703-513-X)

Soft Cover plus CD ROM \$85 (ISBN 0-97703-514-8)

25% off = \$82.50 hard, \$63.75 soft cover, for current members of NSS or the Mars Society



"From Footprints to Blueprints : Development of the Moon and Private Enterprise"

Publisher : AuthorHouse, at Bloomington, Indiana

Bloomington, Indiana

Author : Michael Ross, SM.AIAA

The target audience is the business community, general readership, and in the younger people who may have an interest to pursue a career in the Space Program. The book proposes, in light of the recent flight of 'civilian' SpaceShipOne, that private industry can consider taking on Space projects that once, and perhaps still are, believed to be exclusively the domain of National Governments.

Book outlines the steps, resources and planning that are involved in a private enterprise mission to the Moon. All this, based on author business experience background in engineering and construction management in very large multi-million Earth projects that are comparable. (not much of a stretch from those projects to the Moon.

Michael Ross, M.R.Services (Space Studies)

703-40 Delisle Ave., Toronto, Ontario, Canada M4V 1S6

WORLD WATCH

AFD News Service

CHICAGO, IL: Big news in the music world is the emergence of an unlikely combination, enthusiasm for opening the space frontier and rap. "Rocket Rap" has been developing fast, and acquiring an equally improbable following, in large part because of a different sort of "bi-coastal" rivalry, *Windy Skies* from Chicago on the Great Lakes coast, and *Star Beach* from Panama City Beach on Florida's Gulf coast.

Windy Skies specializes in near future themes: space tourism in orbit and the Moon, outposts on the Moon and Mars

Star Beach speaks of going to the stars and scattering human seed across the galaxy.

Father Sky Records has both groups under contract. That keeps it friendly. There is talk of a joint album or two, resulting from planned "space-duel" concerts.

Downloads of numbers from both groups have been running at an accelerating clip as their obvious enthusiasm and passion along with an upbeat frontier theme is catching on.

Hit numbers by *Windy Skies* include:

"Starting Over, Starting Fresh," "Somewhere Out There"

"Earth in my Rear View Mirror," "Mother Earth & Father Sky"

Hits by *Star Beach* include:

"Stardust thou art, to the Stars thou shalt Return"

"Hey, out there! Can we talk, Bro' to Bro'?"

"Pilgrimage Home to the Stars," "Cosmic Destiny"

The music seems to be a hit not just in areas long associated with NASA and aerospace industries, but also in economically depressed areas. One explanation is that the rappers appeal to those facing unpromising futures where they live, making very appealing the prospect of starting over on new frontiers where the possibilities are wide open.

Rocket Rap is a fresh spin-off of a little known genre of "folk" music known as "filk," science-fiction and fantasy folk songs. Indeed, the word "filk" owes its origin's to a typo by the staff of a hotel hosting a science fiction convention. The typo stuck. But until now, filk did not take root outside of science fiction fandom and space enthusiast groups.

ALMATY (Alma Ata), KAZAKHSTAN and DENVER, CO: The Mars Society Kazakhstan chapter, based at Kazakh State University is designing "burstcom" meteorburst communications equipment it hopes it can fly on the next pair of NASA MERs (or on a planned RSA Mars rover duo) to serve as a backup to NASA/ESA orbiter relays to/from Earth. Signals are bounced off the plasma trails that persist briefly after passage of small meteors through the upper atmosphere, reaching receivers over the horizon. Kazakh truckers have much experience using meteorburst communications in this largest (after Russia) of the former Soviet Republics. Kazakhstan is home to Baikonur making the Kazakhs essential partners in the Russian space program.

DES JARDINS, NJ: The Garden State Horticultural Association has come up with a sexy new project to call attention to its new line of bioengineered "Beanstalk Flowers®" available this spring from their annual flower bulb and seed catalog. A joint venture with the College of Tropical Agricultural & Human Resources at the University of Hawaii at Manoa (Honolulu), aims at developing a self-contained arboretum capsule to land on Moon and bring a selection of flower seeds and bulbs to term. The purpose is to test Arthur C. Clarke's suggestion that flowers would grow tall enough in the Moon's low gravity to make Floral Forests possible. If the idea proves out, a lunar arboretum could become a must see attraction for tourists on the Moon, and the perfect location for romantic weddings and for "honeyMOONers" from Earth.

BALTIMORE, MARYLAND - Astronomer Jack Otis of the University of Maine, reports that a series of observations with the Hubble Space Telescope have resulted in confirmation of yet another asteroid moonlet, the 27th found to date. "Not too long ago," Otis reminds us, "we found the first, tiny Dactyl, orbiting Ida. We found that one by examining Galileo photographs taken during its flyby encounter with Ida."

The newest moonlet is circling Vesta, the 3rd largest asteroid, after Ceres and Pallas. This time the Hubble Space Telescope captured the evidence in a series of photographs from which the orbit of the object could be determined with a high degree of confidence. "This object is only a couple of kilometers across, at best," Otis points out, "but the truly remarkable thing about it is that it seems to be in a Vesta-synchronous orbit." Vesta is not quite spherical but something like a 'flattened watermelon' 350 x 330 mi. in diameter along its equator, as against only 290 mi. from pole to pole. Its "moon" seems to be hovering a few hundred miles above one of the equatorial bulges. This bulge must represent a major concentration of mass, or masscon.

Vesta rotates in a mere 5 hrs 20.5 min and this moon shares that period. "Given Vesta's low mass and gravity, and the rather short distance of the moonlet from Vesta's surface, I'd be willing to bet that we'll see the solar system's first space elevator built right there, and that prospect has got to move Vesta to the top of the list of important asteroids from a real estate point of view."

Of course, Otis admits, humans won't be journeying out that way any time soon, not until much faster and more affordable space transportation is available. "We really need nuclear propulsion if we are going to do anything interesting, not just beyond Mars, but on Mars itself."

"It's my privilege to name this moonlet," Otis beamed, "and I think I'd like to call it 'sidekick' or 'beanstalk,' but I'll be a good boy and look for an appropriate name from mythology -- maybe," he winked mischievously.

MMM's 19th Annual Happy April Fools Day News

By Dareth Murray & Bob McGown



After hearing stories of the clear, dark skies of West Texas, we decided to experience first hand the famous McDonald Observatory on the summit of Mt. Locke, at 6,800 feet. With a lucky search on the Internet, we found the last two spots in the private winter observing group on the 82" Otto Struve classical Cassegrain telescope. This was the second largest telescope in the world when it was built. The high performance 27 foot focal length, 45 ton telescope was completed in 1939.



**McDonald
Observatory
Amphitheater**

McDonald Observatory has an outstanding visitor center with a huge amphi-

theatre for outdoor summer presentations. The road to the observatory is not like most observatory roads. This one was Texas speed limit all the way!

Picking up our car in the morning after coming into El Paso the night before, we stopped by Hueco Tanks State Park to view the petroglyph masks rock art and the unusual hollows (huecos) in the rocks that fill with water and stay wet year round. We climbed the chain trail to the summit and bouldered around the picturesque rocks. It was a beautiful desert oasis, lush and green in the Texas winter. After an hour we headed down to McDonald Observatory, about 2 hours south. We checked into the Astronomer's Lodge, located directly below the Harlan J. Smith 107" scope. We spent an hour in the amazing gift shop before being called for dinner.

The observing session price included a tour of the observatories and grounds, a fine catered dinner and 3 hours of observing time on the 82". Over the course of the evening Public Affairs Specialist Frank Cianciolo and celestial mechanic David Doss shared the technical complexity of this marvelous equipment along with their expertise on deep sky navigation.



Sketch of NGC 4440, a planetary nebula

The evening's list of sketched observations on the 82" included

- 
- M 79
 - IC 418 Spriograph Nebula
 - M42 Orion Nebula
 - NGC 4440 planetary nebula
 - NGC 2158 - open cluster in Gemini
 - NGC 2392 - Eskimo Nebula
 - NGC 2903 - 8a-8b galaxy edge on
 - Saturn at 1,300 power
 - and many more



Bob, observing on the 82"



The objects were stunning at 890 to 1320 power under sub-arc-second seeing. The light from the entire 2.1 meters was focused through the 22 mm Takahashi eyepieces. The telescope floor was built to be raised up in two sections to accommodate viewing and instrumentation. The telescope was able to slew rapidly from object to object as the the telescope floor was separate from the obser-vor's floor and could be raised independently. We were warned to be careful as the two floors could crush an unwary toe! The heated control room had an underfloor raceway and the unused mainframe casing. Now visiting astronomers use their personal laptops so the old computers have been dismantled.

Wide angle HET New Technology Telescope

During the course of our two days at the Observatory, we were especially interested in the new 11-meter segmented mirror Hobby-Eberly Telescope (HET). The HET was dedicated October 8, 1995 and is operated by a consortium of universities, including University of Texas Penn State, Stanford, and two German universities.



A similar design has been proposed for the south pole of the Moon.

The HET is tilted at 55 degrees and uses a movable secondary mirror that allows it to scan 70% of the sky. The frame of the telescope was built by a bridge maker, the dome was built by a radar dome manufacturer and the segmented mirror is zerodur low expansion glass. This unique design is so successful that it allows for a relatively low cost large telescope with scaled up versions to 35-100 meters in diameter which has been proposed for a sister facility in South Africa..

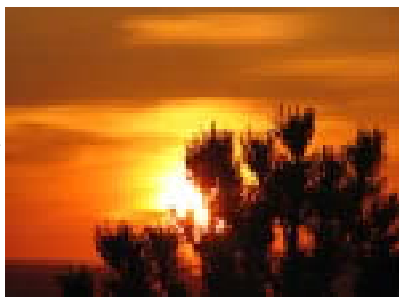
An unusual mushroom tower next to the telescope dome houses lasers and equipment to align the 91 mirror segments. Among some of the other research in progress at McDonald Observatory is the McDonald Laser Ranging Station (MLRS.) Astronomers bounce the lasers off the Moon to study relativistic effects between the Earth-Moon system and a dozen orbiting satellites.

Among some of the other research projects that the HET is involved in include:

- Measurement of stellar distances and velocities
- Chemical composition and evolution of galaxies, stars, gas and nebulae
- Searches for planets around stars, dark matter and black holes

When we got up early the next morning to continue our journey to seek the Odessa Meteor Crater and Carlsbad Caverns, we got a prime Texas sunrise.

Yes, West Texas can be "mighty purdy!"..



XM Satellite Radio Premieres Planetary Radio

by Mat Kaplan, Host and Producer Planetary Radio

Planetary Radio, the Planetary Society's weekly radio program, reached a major milestone on March 26. That's when XM Satellite Radio's more than three million subscribers were able to tune us in for the first time.

Listeners can hear the service from anywhere in North America. All you need to do is tune to Channel 133, XM Public Radio. Planetary Radio will air every Saturday at 10pm Eastern, 9pm Central, 8pm Mountain, and 7pm Pacific. XM Radio Online will extend our reach even farther.

The show got off to a great start on the 26th, with a special appearance by Dr. Neil deGrasse Tyson, Director of the Hayden Planetarium in New York City, and our Board Chairman of the Planetary Society Board of Directors.

Fans of the show who hear us on their local public radio station on the web need not worry. The Planetary Society is working to add even more ways for people to catch Planetary Radio, our travel show that takes you out of this world. Learn more about Planetary Radio at:

<http://planetary.org/audio/planetaryradio.html>

~~Amateurs Built the Ark.~~
 Professionals Built the
 Titanic

ISDC 2005 - MAY 19-22, 2005

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<http://isdc.nss.org/2005/>
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DOZENS OF SESSIONS on space science, technology, policy, commerce, exploration, and more, all focused on bringing ever closer the vision of spacefaring civilization.

Confirmed Speakers include: Craig Steidle, Burt Rutan, Steve Squyres, Peter Diamandis. Gala dinner at Smithsonian Udvar-Hazy Center for NSS 30th anniversary.

Schedule: Full days of conference tracks on Thursday through Saturday (May 19-21), and a half-day Sunday AM (May 22). Opening reception Wednesday PM (May 18).

Tracks and Sessions (what follows is the barest outline:

For the full Call For Papers listing go to:

<http://isdc.nss.org/2005/cfp.html>

1) Government sector track - Education - History - Law & policy - Moon, Mars & Beyond

2) Private sector track - Commerce & Space businesses - Finance - Lobbying - Media & entertainment - Suborbital & FAA/AST - Spaceports - Space tourism & experiences - Vehicles & hotels

3) Science track - Astrobiology/Exobiology - Earth science - Lunar science - Mars science - Near Earth Objects & planetary defense - Saturn science - Space medicine & physiology. - (Interstellar) Space science.

4) Settlement track - Developments in Lunar settlement concepts. - Developments in Mars settlement concepts - L5 & other. Developments in other space settlement concepts

5) Technology track: Agriculture & Life support - Computers, communications & software - Open source software - Power & propulsion - Resource utilization - Space elevator - Nanotechnology

6) Teen programs - Space arts competition. Present your music, poems, short stories, paintings, films, public service announcements.

Presenter Deadlines: March 1 Abstract deadline has passed: Title: text, up to 12 words. Abstract: text, 300-500 words. **Manuscript deadline:** Friday, April 22, 2005)

Hotel: The Sheraton National Hotel is located just across the Potomac River from downtown Washington DC in Arlington, Virginia. The hotel has a **free shuttle to and from Reagan National Airport** as well as the **Metro subway system**, making it an ideal place to stay not just for the conference but for any additional sightseeing in the Washington area. Visit the conference hotel web site for more information about the hotel and to book a room at the special conference rate of **\$109/night**.

<https://starwoodmeeting.com/Book/nss>

Conference Registration: it's always the most economical option to register for one ISDC at the one prior. These rates are for those who haven't done so. **Before/after April 30:** **NSS Member rates:** Adults \$150/175 - Senior/ Student \$125/150 - **Non-member rates:** Adults \$200/250 - Seniors/ Students \$150/175



**Lunar Reclamation
Society, Inc.**

**P.O. Box 2102
Milwaukee
WI 53201**

www.lunar-reclamation.org

Ad Astra per Ardua Nostra

To the Stars through our own hard work!

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(* Board Members, & Ken Paul < kenpaul@cape-mac.org >

LRS News

• **Striking Out with Meet-up:** We had recently registered a new group, Milwaukee Space Exploration Meet-up, with meetup.com. The idea was to meet other people in the area interested in space exploration, the first Tuesday of each month, and interest them in our local chapters: LRS, Moon Society Milwaukee Outpost, and Wisconsin Mars Society.

Ken Paul and Peter met at Mayfair on April 5th, but with no newcomers. But now Meetup wants us to pay a monthly fee for our efforts, so we are ending the effort.

• **Rockets for Schools in Sheboygan** is the same weekend as our May meeting so we cannot attend. Meanwhile the annual **Aviation Career Days** event at Mitchell Field failed to materialize for the 3rd straight year. The previous two years the event was announced, then canceled because of the outbreak of war in Iraq 2003, and construction, 2004.

LRS MAY & JUNE Events

 **Saturday, MAY. 14 th, 1-4 pm**

LRS Meeting, Mayfair Mall, Garden Suites Room G1 10

AGENDA: www. lunar-reclamation.org/page4.htm

- **Space Updates:** Cassini's exploration of Saturn's moons and the Huyghens probe's discoveries on Titan; NASA's plans for next Shuttle flight; The Space Station: Private Enterprise projects in the works

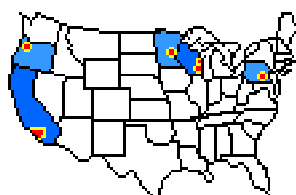
- **Plans for renting MDRS; The 2005 space Calendar**

 **Saturday, June 14 th, 1-4 pm**

LRS Meeting, Mayfair Mall, Garden Suites Room G1 10

AGENDA: www. lunar-reclamation.org/page4.htm

U.S. CHAPTERS



**NSS
Chapter Events
MMM
6 Chapters Strong**

Space Chapters HUB Website:

[<http://nsschapters.org/hub/>]

MINNESOTA



**Minnesota Space
Frontier Society**

**c/o Dave Buth 433 South 7th St. #1808
Minneapolis, MN 55415**

Tom Greenwalt (w) 763-784-6244 (h) 763-442-6015

David Buth (w) (612) 333-1872, (h) (763) 536-1237

Email: tomg@mnsfs.org [www.mnsfs.org/]

MN SFS News & Pictures

- **March 4-6 MarsCon Pix:**

<http://marvin.freemars.org/mnfan/marscon/2005/>

- **Marscon pictures** taken by Baron Dave Romm are now up!

Two pages, comprising 126 photos

<http://www.romm.org/gallery15a.html>

<http://www.romm.org/gallery15b.html>

- **2005 MN Yuri's Night Pics:**

<http://www.freemars.org/mnfan/mnsfs/2005Yuris-Night/>

MN Astro Day pics:

<http://www.freemars.org/mnfan/mas/2005-AstroDay/>

OREGON

**Oregon L5
Society**



P.O. Box 86, Oregon City, OR 97045

voice mail / (503) 655-6189 -- FAX (503)-251-9901

[<http://www.OregonL5.org/>]

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Bryce Walden <moonbase@comcast.net>

(LBRT - Oregon Moonbase) moonbase@comcast.net



Meetings 3rd Sat. each month at 2 p.m.

Bourne Plaza, 1441 SE 122nd, Portland, downstairs

May 21st

June 18th

MAY 19th: UW-Sheboygan, Room 6101, Sheboygan

We have two events that are major to our members in our area at the same time: The International Space Development Conference will be held in Washington D.C. from May nineteenth to the twenty second. We may have half of our members and former members attending this event. I am not going due to both a previous commitment and financial considerations. However: if you are considering it, go. It's a great event and, if you haven't committed to our other event, you could do worse than spend your money for this event.

Our other major activity is **Super Science Weekend**, Twenty Fifth Anniversary. This event is normally held in January but for this special event it has been moved into Spring. Specifically on May twenty first and twenty second. At this point I need to round up our display scientific material and informational hand outs. I have two volunteers for part or all of this: Mitch Gordon and Jim E. Karcher who will help answer questions and keep order at this crowded and exciting event. We will be in an outside space under a flying awning of about twenty foot depth. We will have two tables and I plan to set up literature on the flanks with the center for most display science equipment with the exception of "Landing Without Rockets" and something else I am coming up with possibly about building on Mars inspired by Gary Fishers' new group: Mars Homestead (.org). It ain't all rocket science and exotic materials folks!

The other event happening near this time is **Balticon**, a major science fiction / science fact event on the next, Memorial Day, weekend. This event, just outside of Baltimore, is the reason for our early May meeting.

Due to my tardiness in getting the report together I've had a few distractions, I will post our meeting report later to members of our mailing list. However, I should mention that I will be taking over as our groups treasurer, unless another long term member volunteers?, so that Jay can be relieved of this. He has quite enough on his plate now.

For the events: See our website, the various organizations websites: N.S.S. for the I.S.D.C., The New Jersey State Museum for S.S.W., and Balticon's. The Carver Science Fair is at www.temple.edu/carversciencefair but you may wish to check with Mr. Anderson at 215-204-4673 through Temple.

All mistakes and omissions are mine, Earl Bennett.

ISDC 07 May be in Dallas, Texas

April, 4, 2005 - Ken Murphy, President of NSS-North Texas, serving the Dallas - Fort Worth metroplex, writes that "the NSS-NT proposal to host the 2007 ISDC here in the metroplex was submitted by mid-March."

OASIS

**OASIS: Organization for the Advancement
of Space Industrialization and Settlement
Greater Los Angeles Chapter of NSS**
P.O. 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/>]

oasis@oasis-nss.org

Odyssey Newsletter Online

<http://www.oasis-nss.org/articles.html>



 Regular Meeting 3 pm 3rd Sat. each month

Microcosm, 401 Coral Circle, El Segundo.

Information: OASIS Hotline, 310/364-2290; website.

 **Regular Meeting 3 pm 3rd Sat. each month**

Microcosm, 401 Coral Circle, El Segundo.

Information: OASIS Hotline, 310/364-2290; website.

- **May 21st, 3 pm** -- OASIS Monthly Business Meeting at Microcosm, 401 Coral Circle, El Segundo.
- **May 19-22, 2005** -- International Space Development Conference (ISDC), Washington, DC. For more information, see <http://isdc.nss.org/2005/>. Registration rates climb steeply after January 1st
- **June 18th, 3:00 p.m.** -- OASIS Monthly Business Meeting at Microcosm, 401 Coral Circle, El Segundo.

Recurring Events

- **Fridays** -- Mike Hodel's Hour 25 webcast. The world of science fact and fiction with interviews, news, radio dramas, artists, writers, stories, reviews, and much more. Information: <http://www.hour25online.com/>.

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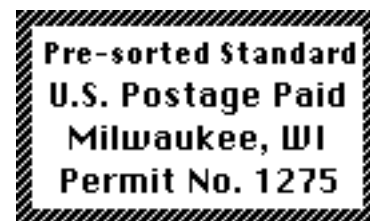
NAME _____ STREET _____ CITY/ST/ZIP _____ PHONE #S _____ ☐ \$45 National Space Society dues includes Ad Astra ☐ \$20 NSS dues if under 22 / over 64. <i>State age</i> ____ 600 Pennsylvania Ave SE #201, Washington DC 20003 Moon Society dues include Moon Miners' Manifesto • Electronic (pdf) MMM \$35 Students/Seniors: \$20 • Hardcopy MMM: U.S. & Canada \$35 Elsewhere: \$60 P.O. Box 940825, Plano, TX 75094-0825, USA  INDEX to # 184 APRIL  p 1. In Focus: An end to the Lunar Dark Ages? Beware of the "wooden nickel" trap! Editorial, P. Kokh p 3. Perfect Spot Found for a Moon Base? An Impassioned Rebuttal, P. Kokh p 5. "Maritime Luna", P. Kokh p 8. Visiting Hell & Living to Tell About it: Mission goals for future Venus Probes, D. Dietzler & P. Kokh p 9. Moon Soc. Journal: Observing Certificate Program p 10. Telescopes on the Moon: How soon? p 11 Website Improvements; Society Elections 2005 p 12. Great Moonbuggy Race; Chapters/Outposts Report p 13. Browsing Links; ILC '03 Proceedings: Book Review p 14. A.F.D. World Space News Report p 15. Big Telescope - Big Universe, D Murray, B. McGown	Member Dues -- MMM/MMR Subscriptions: Send proper dues to address in chapter news section => for those outside participating chapter areas <= ☐ \$15 Individual Subscriptions to MMM/MMR: Outside North America ☐ \$50 Surface Mail -- Payable to "LRS", PO Box 2102, Milwaukee WI 53201 CHICAGO SPACE FRONTIER L5 ☐ \$15 annual dues LUNAR RECLAMATION SOC. (NSS-Milwaukee) ☐ \$15 reg. ☐ \$20 family ☐ \$12 student/senior MINNESOTA SPACE FRONTIER SOCIETY ☐ \$25 Regular Dues OREGON L5 SOCIETY ☐ \$25 for all members O.A.S.I.S. L5 (Los Angeles) ☐ \$25 regular dues with MMM PHILADELPHIA AREA SPACE ALLIANCE ☐ Annual dues for all with MMM \$20, due in March or \$5 times each quarter before the next March SHEBOYGAN SPACE SOCIETY (WI) ☐ \$15 regular, ☐ \$10 student, ☐ \$1/extra family member "SSS" c/o B. P. Knier, 22608 County Line Rd, Elkhart Lake WI 53020
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Moon Miners' MANIFESTO

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