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

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

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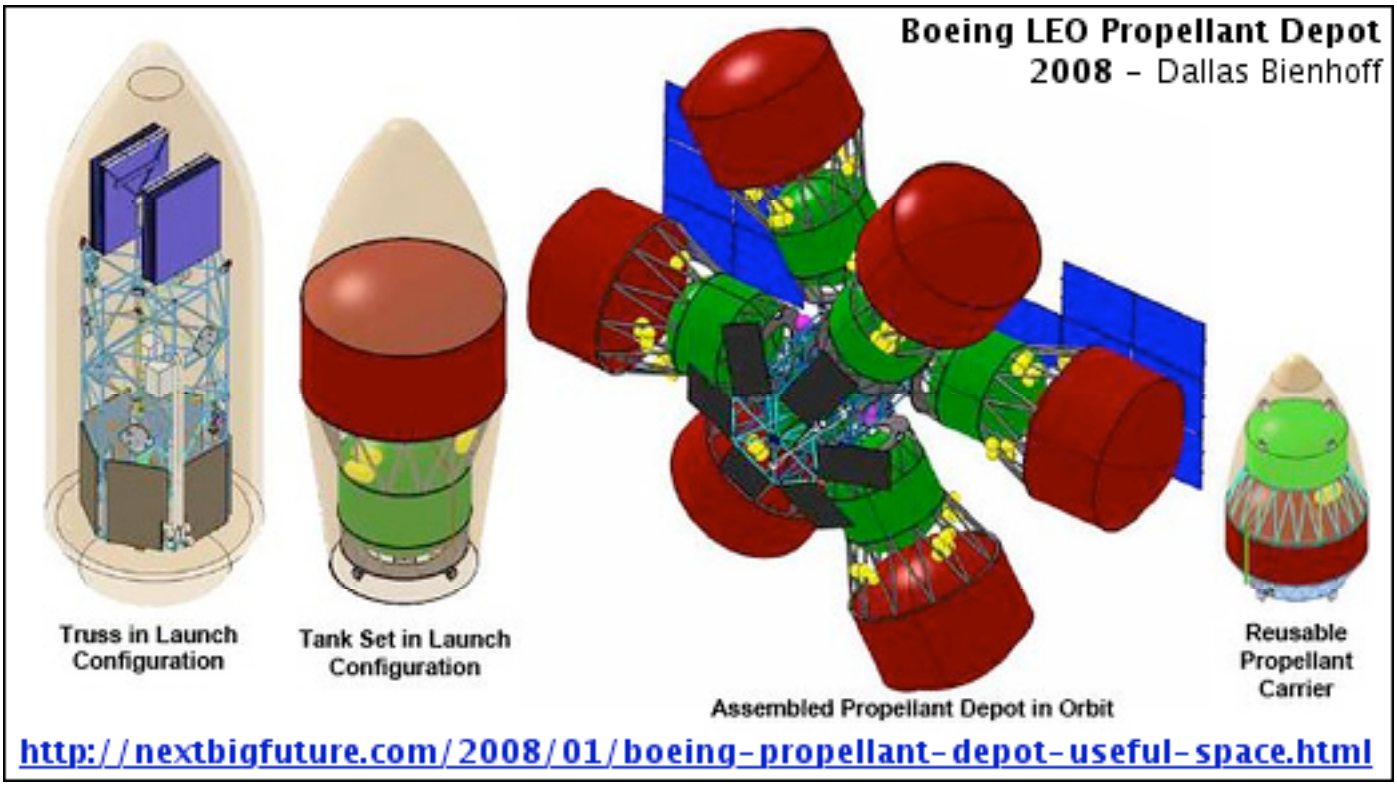


Feature Articles in This Issue

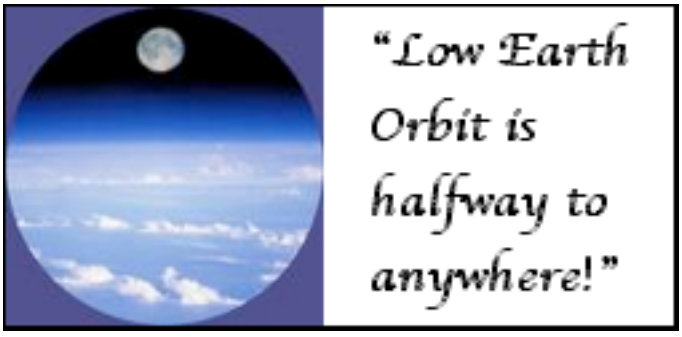
Administration wants Orbital Refueling Capacity

One of the *many positive highlights* of the newly announced space budget is money to create a refueling capacity in orbit. See the 2008 **Boeing** illustration *above.* "The system would allow for two to three times more payload for many missions" and/or lower costs for the same payloads = **win, win!** *At right:* "Low Earth Orbit is halfway to anywhere," said Heinlein. With such a depot, we can start playing that fact to our advantage! One tends to forget that NASA contractors are commercial companies whose advice sometimes falls on deaf ears. The new NASA budget has *a definite commercial bias.*

IN FOCUS ◎ "Flags & Footprints 2" is dead. A *real* Moon effort can emerge!

By Peter Kokh, *speaking personally*

On page 16 Column B, we have printed NSS' Press Release on NASA's new direction. Perhaps many people will agree with it. I do agree with the first part, but part company at that point. To many people, NASA is "as American as apple pie." NASA, however, is a *Socialized* Space Program. How can a "socialized" [=> p. 2, col. 2]



Moon Miners' Manifesto

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• **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first twenty years have been re-edited, reillustrated, and republished in 20 PDF format volumes, for free downloading from either of two locations:
www.Lunar-Reclamation.org/mmm_classics/
www.MoonSociety.org/publications/mmm_classics/

• **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; early use of Mars system and asteroidal resources; and establishment of 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.
• **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.
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• **The Lunar Reclamation Society** is an independently incorporated nonprofit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. 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 50 chapters, dedicated to the creation of a spacefaring civilization.
National Space Society, 1155 15th Street NW, Suite 500, Washington, DC 20005; Ph: (202) 429-1600 - www.NSS.org
• **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon." - Contact info p. 9.
• **NSS chapter**s and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.
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⇒ In Focus Editorial continued from p. 1.

anything be "as American as Apple Pie?" "NASA should *open* the door to space, not try to *be* "the door!" as Space Frontier Foundation founder Rick Tumlinson has long said. It would appear to me that the Obama Administration has gotten this message.

The overly expensive and technologically troubled Ares-1 is cancelled. But this is no loss, as we have at least four vehicles waiting in the wings, each of which can lift almost as much or even more than Ares-1, and can be man-rated for much less money: Falcon 9, Taurus 2, Delta-4, and Atlas-5. Old timers will recall that a much earlier Atlas carried the Mercury capsules to orbit! The Administration is putting money on the commercial market. It is likely that any or all of these vehicles could be ready to carry American crews to ISS before Ares-1 could be readied to do so. So no loss here!

As to heavier-lift vehicles, more powerful versions of both Delta-4 and Atlas-5 are in the planning stages. But they might not be necessary. The Administration wants to fund development of **orbital refueling depots.** That would make it possible for lighter craft to carry crews to the Moon, and even sooner than the already dead-on-arrival published NASA date of 2020.

NASA Administrator Charles Bolden believes that NASA should partner with other space agencies in an international Moonbase. NASA had already signaled to the Russians that it did not want to partner with Russia (read "ever again!") In fact, ISS' time in orbit is to be extended at least to 2020, and is to be expanded using inflatables and other new technologies. Keep in mind that unlike the Moon Mission, ISS is immune to Congressional or Administrative budget cuts (and/or cancellation) as it *is an international partnership,* which implies commitments that we feel obliged to continue. An international moon base effort would be much more likely to become real, much more likely to be robust, and to more quickly expand, and to sooner develop lunar resource utilization technologies, and to more quickly morph in the direction of a first lunar industrial settlement.

NASA had only committed itself to a re-visitable shelter, one that at first would not support "overnighting" and growth into something capable of more than allowing us to brag, as in World War II, "Kilroy was here."

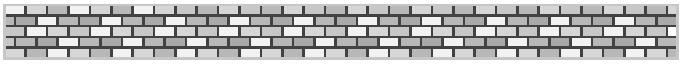
We think that the Obama Administration is administering to NASA a long overdue attitude-adjustment, and preparing us for the real and more robust commercially-supported opening of the Moon. To NSS, we say, this does not close "space beyond Earth orbit to human activity!" Quite the contrary, by getting NASA out of the way, and doing something more truly "as American as Apple Pie," the new policy would burst the door to manned activity beyond Earth orbit wide open.

At 72, I might not live to see 2020, but now when the time comes, I will pass much more confident that the Moon will become another human world, than I had been up to this point.

The Obama plan has been careful not to leave any NASA center dry, giving them new roles in the new space program, roles that are exciting, roles that are open-ended. We encourage everyone who has expressed disappointment and letdown to be encouraged. This is the day that many of us revolutionary space enthusiasts have been awaiting for more than two decades. We did not need *another* Flags & Footprints dead-end start!

PK

Lunar Base Preconstruction



A Basic Public Demonstration of Using Moondust to Make Building Materials

By Peter Kokh kokhmmm@aol.com

PK: I had been invited to sit in on a presentation of Jay Witner's *"Apollo Village Proposal"* during the 2009 International Space Development Conference in Orlando, FL over the Memorial Day Weekend.

To put it in a nutshell, Jay was proposing that we raise seed money approaching one million dollars to convince the government to fund a pre-construction mission on the Moon. *Teleoperated bulldozers and other equipment would be sent to a spot on the Moon that had been previously selected for a NASA Moonbase. At that location, the selected equipment would be delivered by a Delta launcher and begin to "make bricks."*

Jay would use solar concentrators to melt moon dust in molds. Actually, you can compact moon dust and use microwaves to sinter and stabilize the outer layers, and for many purposes that would be good enough.

"The public has never been shown that we can go to space and build structures out of local materials. Live video of buildings going up on the face of the Moon is an incredibly powerful means to ignite interest in and support of our space program."

We do not have the expertise to weigh the merits of Witner's proposed methods. Nor should this article be construed as an acceptance of their feasibility. But his proposal did get us to thinking:

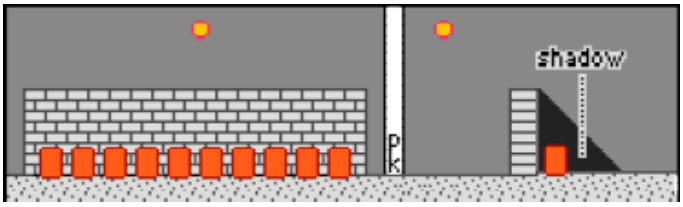
What could we do with bricks made by the sintering method?

The suggestion that we make buildings ready for astronauts to occupy seems to us to be rather impractical. It is *our own non-professional expectation* that *no structure made of bricks,* no matter how well made, *can hold pressure against the outside vacuum.*

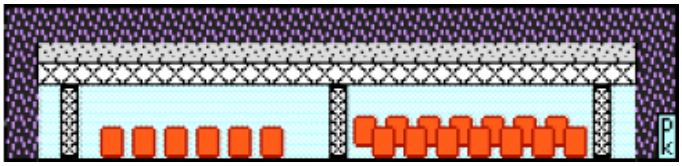
But fortunately that does not exhaust the possibilities. There are sevreral practical construction projects in which brick structures can play a supporting role in setting up a lunar outpost. Let's look at some of them.

Depending on the north/south latitude of your chosen location on the Moon, brick walls could provide shade for things stored out on the surface that must be kept cool, or at least, must not be allowed to get too hot; Tanks of fuel and/or various gasses, for example. Tanks storing blackwater (toilet) wastes are another example. Eventually, such wastes will prove most valuable as a source of agricultural nutrients, but we may not be ready for such operations right off the bat.

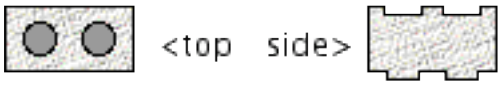
How high a shade wall would have to be will depend on the latitude. At the equator, it would throw no shadow and be useless. So such walls will be more helpful at middle to polar latitudes, north or south.



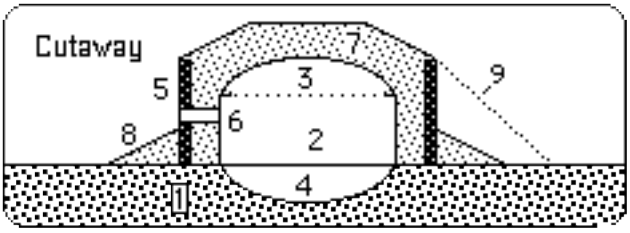
Bricks can also be assembled into columns sturdy enough to support space-frame canopies for unpressurized lee-vacuum storage areas protected from the cosmic elements of radiation, solar flares, micrometeorites and the extremes of dayspan heat.



As we are talking about mortarless applications, a better brick/block design would take a cue from the familiar interlocking "Lego" toy plastic blocks.

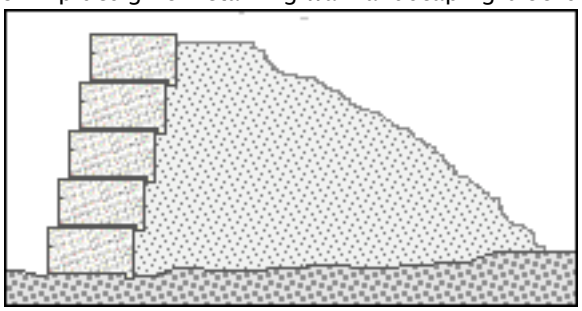


Another use for simple bricks would be to create retaining walls for moodust used as shielding.



In the illustration above, (9) represents the slope of the moondust shielding mound if a retaining wall were not used. Now in 1/6th gravity, the weight of the retained moondust might not exert enough pressure to topple a well-built brick wall. Experience will tell, however.

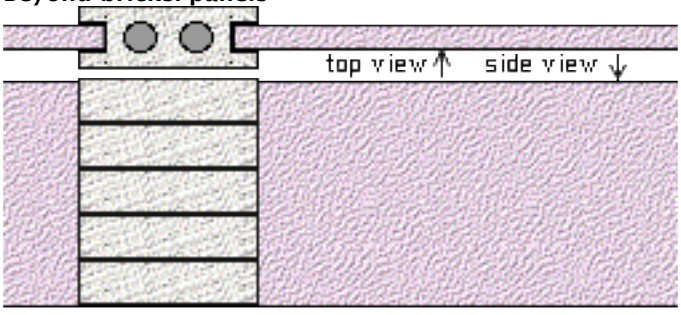
A better option would be to use the now-common bottom lip design of retaining wall landscaping blocks



Beyond bricks: pavers

Closely related to bricks are "pavers" which can be brick like in size and thickness up to much bigger slabs. These would have a use as well, for example serving as pavement for rocket landing/launch pads to cut down on the spray of sandblasting moondust driven by rocket exhaust. Such pads would be bermed as well to present a horizontal barrier; and these berms could well be confined between retaining walls.

Beyond bricks: panels

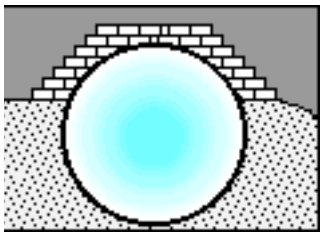


Panels, whether of concrete or made in the same moondust sintering fashion as bricks and blocks, could be held in place by Lego type blocks with forked ends.

Such panel walls could be used to shade stored items that need to be kept within specific temperature ranges, as mentioned above. They can also be used as visual barriers along roads and paths, blocking the view of warehousing and recycling sites, for example.

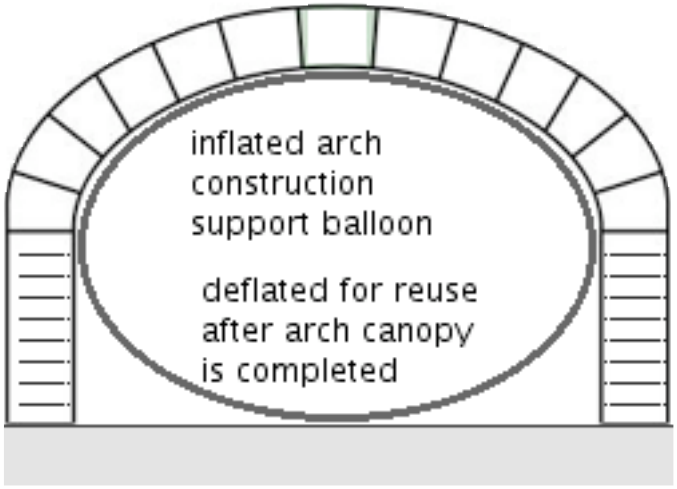
From Romance to the Prosaic

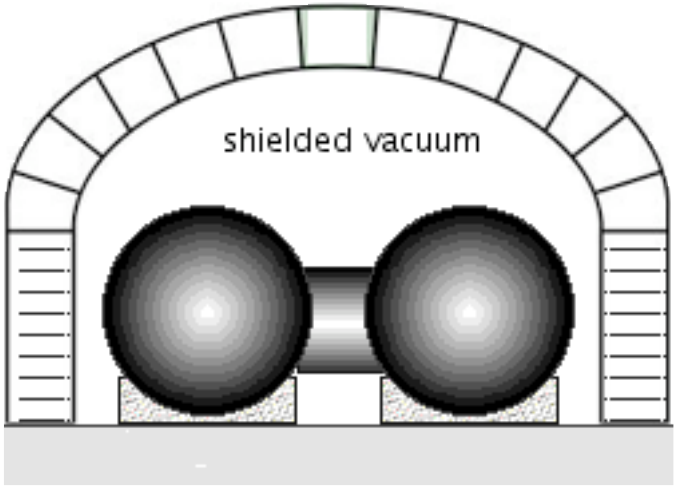
We must be brutally honest and say that we see no construction role for bricks in creating lunar shelter other than as retaining walls for moondust shielding



or brick/block shielding which like sandbags could serve as removable and temporary shielding. Removability would allow repair, maintenance, and modification access to the module's exterior. However, this form of shielding can only be constructed *after the habitat module is in place.*

However, there is one way to create a brick/block shelter before any pressurized modules arrive from Earth. That would be to use blocks designed for arches. You could build interlocking rows of arches *over a temporary supporting inflatable structure.*





Should the Apollo Village proposal of presenting NASA with ready-made shelters is unrealistic, *we can help to prepare a site for NASA* by creating a supply of bricks/blocks which could come in handy in many ways.

What about sandbags?

As implied, we could also create piles of ready-to-use sandbags. It would boost the viability of this option, however, if we could make the "bag" from local material: glass or basalt fiber mesh. But a lot of prior experimentation will be needed to demonstrate that this can be done early on, on the Moon.

What about pressurized buildings?

Except for the unpressurized arched canopy option, even if we can't put up brick buildings, ready for NASA or anyone other agency to use, it is clear that we can provide brick, block, paver, and panel structures that will go a long way to making the job of setting up shop on the Moon that much easier. And this would go a long way towards serving the same purposes as The *Apollo Village Proposal* has been designed to do.

Who gets to teleoperate the brick making, and deployment controls?

Such a project, coordinated with NASA or any other contracting tenant, would be an early indication that a base was about to become real. Indeed, we think that we can make this proposal even more interesting by expanding on the teleoperation angle. *Finding ways to select individuals from the public at large by lottery of other means and give them a turn behind the brick/block manufacture and deployment teleoperation controls,* would give this project significant public attention.

We'd have to train lottery winners, and they would only get a chance to do actual work on the Moon *remotely,* if they demonstrated a required level of expertise. But to win and then be approved for this privilege would and then actually get to do some of the work *on the Moon* would be a lifetime feat hard to surpass, surely something to tell the grandchildren about.

While waiting for NASA, we can do more!

The *Apollo Village Proposal* suggests that space enthusiasts raise a million dollars or so for a publicity campaign that would get NASA to put in the budget the money needed to deliver the required equipment to the Moon. I think that misses major opportunities.

Why wait for NASA to do the brick and block design, to develop the equipment needed and which is to be teleoperated? Can't we help do that? NASA now has college and university groups help ferret our design options by such means as Rover competitions, regolith-moving competitions, and so on. It would seem that the next step, is not to raise money for a publicity campaign, but to get NASA to sponsor a new set of Engineering Challenges. This would involve many young people across the country in brainstorming how, indeed, we could do something like this: manufacture bricks, blocks, pavers, panels etc. on the Moon, ready for NASA or whomever to use. The moondust handling equipment as well as the manufacturing equipment needs to be pre-engineered and tested.

This would include tests using regolith moon dust simulant to see what process would work best and require the least weight of equipment and the least energy to produce the bricks and blocks. The proposal suggests using solar concentrators to melt moondust in molds. But sintering moondust compacted in molds by using microwaves could work if the product performance is sufficient.

While we could expect college and university teams to be eager to get involved, NSS chapters and chapters of other space organizations should be allowed to try their talents. What more captivating an activity could one imagine for chapter public outreach? Of course, most chapters would be hard pressed to put together a team with sufficient talents, and to purchase necessary supplies and equipment. But let's give them the chance!

A dedicated website for this project would showcase:

- √ Product design and service purpose options
- √ Equipment design and performance
- √ Progress along related lines such as design of sandbags, which could be made on site of lunar materials, and automated/teleoperated sandbagging equipment
- √ Illustrations and artwork
- √ Photo gallery
- √ List of college/university teams involved
- √ List of other teams (chapter-based, etc.)
- √ Information about related NASA Challenge events
- √ Updates on Moonbase plans of various agencies

The Moon Society could host such a site, but the National Space Society could do so also. Meanwhile, progress could be showcased at the annual International Space Development Conferences, and any demonstrations would be sure to attract a crowd. This activity could be a welcome added draw for the ISDC.

Can we push this idea further?

We do not now know where the first moon base will be located, or at least a few of us *not on the bandwagon* do not know. The South Pole location is very hilly and rugged and a builder's challenge. *A site on or near a mare/highland coast would allow us to similarly pre-manufacture cast and/or hewn basalt products (from tiles to blocks) as well.* A site which had flat areas for an initial base to morph into an industrial settlement, *as well as nearby high ground for overlooks* as well as scenic relief, would be visually more interesting.

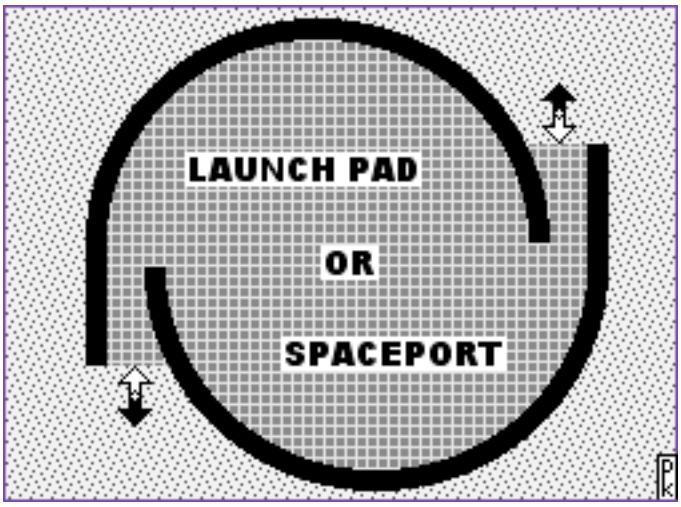
Imagine that we find such a place, and prior to first base module landing, prepare the site not just by grading it and building a launch pad, but by tele-manufacturing bricks, blocks, pavers, panels, etc. for multiple helpful uses. Then, while waiting for the base components themselves to arrive, we tele-construct a "nature trail" to and up on any *overlooking* high ground. Our bricks, blocks, pavers, and panels could be used to make steps, restraining walls too near any precipices, benches to rest on along the way, and a paved, walled overlook on top with the panorama of the ever growing base-into-settlement below.

If such a trail were tele-constructed before the first crews arrived, it would be a welcome after-work and free time diversion to check on the progress from an overlook like this. What could we do to make the first crews feel more welcome than to have such a "Jay Witner" trail ready for them?

In summary, even if the *Apollo Village Proposal* should prove to go too far, we think that that the general idea of providing pre-construction building materials out of moon dust by teleoperation has great potential, both to speed up construction of an operational Moonbase and to excite the public beforehand.

And we thank Jay Witner for that! **PK**

Supporting illustrations and photos



A Launchpad with paver floor and moondust berms between retaining walls

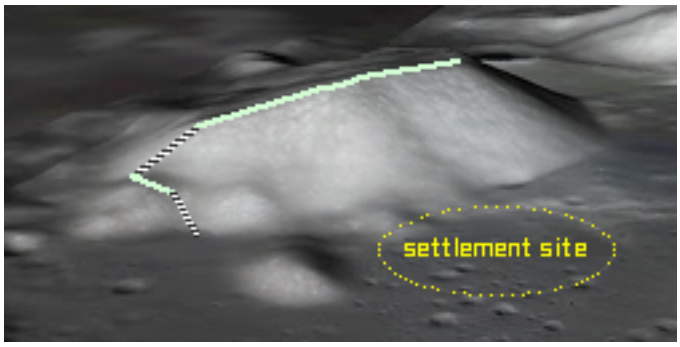
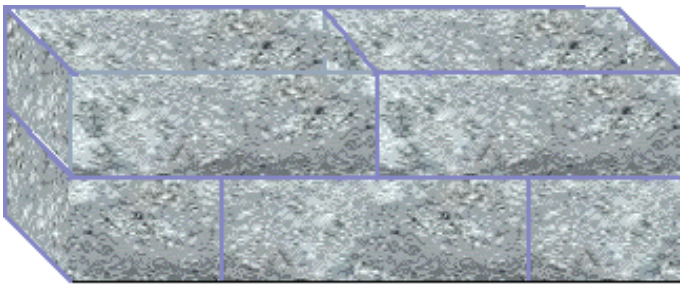
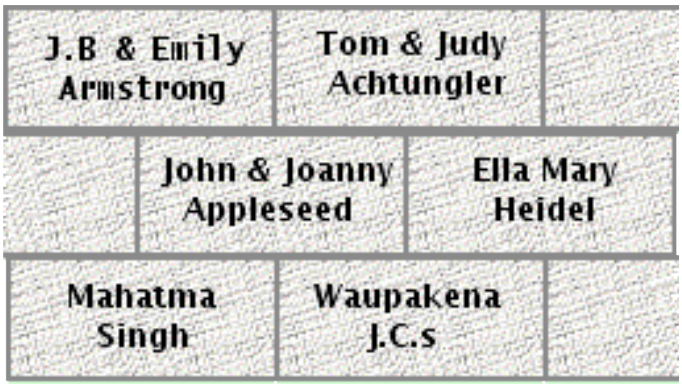


Illustration of an overlook trail and settlement site below, superimposed on photo of Taurus-Littrow Valley (A-17)

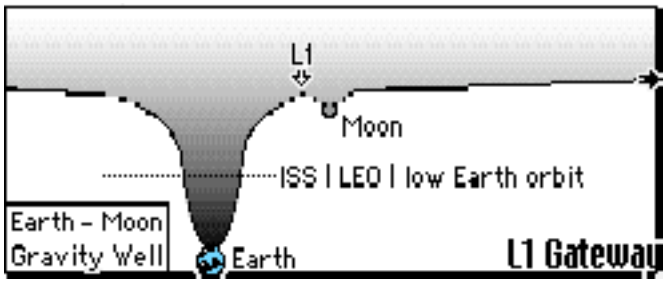


Bench rest stop along the Overlook Trail

On the road from the launch pad to the Settlement Site, paid for through a "Buy-a Brick" campaign, detail below.



An L1 Space Station: Gateway to the Moon



by David Dietzler pioneer137@yahoo.com

Introduction

A space station at the Earth-Moon L1 point could greatly facilitate the build up of a manned lunar base. Humans could travel to the L1 station with chemically propelled rockets that dash through the Van Allen Belts to minimize radiation exposure time and descend to the lunar surface in chemically fueled Moon Shuttles. They could land anywhere on the nearside within hours to a day. Propellant for the Moon Shuttles would be delivered to L1 economically with electrically propelled robotic tankers that spiral slowly from LEO to L1. Cargos for the lunar base could be sent to L1 with electrically driven robotic freighters and then landed on the Moon with chemically propelled rocket landers. The best form of electric propulsion might be solar powered VASIMR with argon propellant.

The L1 station would allow humans to inspect, refurbish and even repair spacecraft for descent to the Moon or return to Earth. Back-up Moon Shuttles could be docked at the L1 station just in case Moon Shuttles on the lunar surface malfunction so that teams on the Moon don't find themselves stranded. This would improve safety and mission success rates. A small crew could remain on the station to monitor and if necessary repair tracking and communication equipment vital to the safety of explorers on the Moon. They could also maintain space telescopes on the station.

In the early days of lunar base buildup, crews on the L1 station could teleoperate robots on the lunar surface with only a fraction of a second delay time. Since there is a three second delay when teleoperating robots from Earth, robots must move slowly and can only do crude tasks. From L1, finer telerobotic tasks could be done necessary for readying a base for human inhabitation without incurring the cost of landing humans.

Although L1 is outside of the Earth's magnetic field, workers there would only endure radiation exposures similar to those expected for travelers to Mars and this will be tolerable if a solar flare shelter is included on the station.

Manned Transportation

Since it takes less delta V to reach L1 than to retro rocket into LLO with a fully fueled lunar descent/ascent vehicle and then rocket back to Earth, Apollo style, a much smaller Earth launch rocket is needed. Instead of the Ares V monster rocket being developed at taxpayer expense, I suggest using a SpaceX Falcon 9 Heavy with a new cryogenic upper stage. This rocket could put 65,280 lbs. in LEO. Rocket engines burning LH2 and LOX could have a specific impulse of 460 seconds and an exhaust velocity of 4.5 km/sec. This is found by multiplying the specific impulse by 0.0098. Then we use the rocket equation, e^(dV/c), to find the mass ratio. The mass ratio is the mass of the rocket and payload loaded with propellant divided by the mass of the payload and rocket empty after burning all propellant. The term e is the natural log, 2.718. This number is raised to the power of the quotient of the delta velocity, dV, that is the change in the rocket's velocity, divided by c, the exhaust velocity. Since the dV to L1 is about 3.15 km/s, we can use the rocket equation to determine:

- e^(3.15/4.5)=2.01375 65,280/2.01375 = 32,417
- 65,280-32417= 32,863 propellant mass
- tankage and motors 15% of 32,863 = 4929 lbs.
- 32,417 - 4929 = 27,488 lbs or 13.7 English tons for the crewed module. This would include about a ton of propellant for maneuvering into and out of L1

A 13.7 ton spacecraft is very respectable. The Apollo Command module amassed 12,800 lbs, the Soyuz 14,350 lbs. and the Orion CM 19,000 lbs. The crewed module to L1 does not need a large service module with rockets capable of braking into LLO and accelerating to lunar escape velocity.

Landers, or Moon Shuttles, would be sent to L1 with electric drives and fueled at L1. I envision reusable single staged vehicles powered by LH2 and LOX. To prevent problems with cryo-propellant boil off during lunar surface missions, reliquefaction devices tended by robots would be landed ahead of time.

Robotic Transportation

Electric propulsion will definitely lower the cost of cargo transport to the Moon because it uses far less propellant and allows much more cargo from LEO to reach the Moon, so the price per pound is less. However, electric propulsion is slow so we must use space storable propellants like MMH (mono-methyl-hydrazine) and NTO (nitrogen tetroxide) for lunar landers. Non-toxic and inexpensive kerosene and nitrous oxide are also possibilities. These propellants are not as powerful as LH2 and LOX so they will land less cargo.

What if we shipped space storable water to low lunar orbit and cracked it to hydrogen and oxygen at a LLO station, liquefied them and pumped them into empty landers with cargos on board arriving from LEO via electrically propelled vehicles? We could land larger cargos. The only problem is that a station in LLO is not going to stay in orbit because of the Moon's "lumpy" gravitational field caused by masscons. What if we shipped water to a L1 station and converted it to LH2 and LOX there?

MMH and NTO 316 sec. Isp or 3.097 km/s exhaust V. Since the delta velocity from LLO to the lunar surface is about 1.6 km/sec. we find:

- e^(1.6/3.097) = 1.67
- LH2 and LOX 460 sec. Isp or 4.5 km/s.

Since the dV from L1 to the lunar surface is about 2.4 km/s. we find:

- e^(2.4/4.5) = 1.7

So even though the delta V from L1 to the lunar surface is higher, LH2 and LOX have so much higher performance than MMH and NTO that the mass ratio therefore payload is about the same. In addition, less electric drive propel-lant would be needed to reach L1 because the dV to L1 is less than to LLO and just as important, less time would be required, and time is money. So there is an advantage to sending cargo to the Moon via an L1 way station.

Moreover, landers designed to run on LH2 and LOX could eventually be fueled on the Moon with propellants derived from lunar ices, if we can get them.

R&D Projects to LEO

- Falcon 9 Heavy, 65,280 pounds payload

R&D Projects to o L1

- Solar electric drive systems for propelling a medium sized space station with inflatable habitat modules and fuel storage tanks assembled in LEO, or even a renovated ISS?
- Propellant tankers using SEP (Solar Electric Propulsion) to deliver water to L1
- In space water storage, electrolysis, cryogenic liquefaction and propellant storage and transfer systems
- A cryogenic upper stage using LH2 and LOX for propulsion of a crewed module capable of re-entry at near Vesc that amasses about 27,000 lbs. to L1
- Reusable SEP cargo vehicle for moving landers and other payloads from LEO to L1

To the Lunar Surface

- Reusable single staged manned landers that use LH2 and LOX.
- Initial propellant for first descent sent to L1 with SEP in the form of H2O that is processed to LH2 and LOX at the L1 station.

These vehicles will load up with enough LH2 and LOX to descend to the lunar surface and return to L1. Cooling equipment to keep the cryogenic propellants cold during a prolonged stay on the Moon will be landed ahead of time. Using hydrogen mined on the Moon to fuel these vehicles is undesirable because lunar hydrogen resources are so scarce. Since oxygen is abundant in regolith it would be possible to land these vehicles with only enough LH2 for return ascent to L1 and tank up on LOX on the lunar surface. Eventually, other fuels like aluminum will be produced on the Moon.

- One-way LH2 and LOX fueled cargo landers that will be "cannibalized" on the Moon

Conclusion

An L1 space station and Falcon 9 Heavy. rockets in addition to more new hardware like VASIMR drives would make for a cheaper, more reliable system for the Industrialization and settlement of the Moon. The Apollo system might have been the quickest way to defeat the Russians during the Space Race, but it is not the most efficient way to reach the Moon and the present Return to the Moon project is misguided. Instead of a taxpayer funded Ares V monster rocket that is too large for any commerical or defense payloads, a system based on privately financed Falcon rockets and an L1 way station should be developed. Electric drive systems and a reusable tug for transporting unmanned cargos from LEO to L1 where the tug docks with the L1 station and leaves its cargo module then returns to LEO to pick up another cargo module containing machines or water are also essential parts of this system. **DD**

On "L1" from Past Issues of MMM

MMM #159 "Expanding the Manned Space Envelope: The Earth-Moon L1 Gateway"
and #160 Constructing an L1 Gateway on a "Just-in-Time" Schedule (as Business & Industry would do it)

Both preserved in MMM Classic #16 pages 45-47 and 51-53 respectively. Download from www.moonsociety.org/publications/mmm_classics/

NOTE: "L1" and "L5" are esoteric terms for many!

Dave Dietzler and Peter Kokh have been tossing about some more *people-friendly* names:

"The Pass" and "The Lagrange Gap"

i.e. *through the "mountain ridge"* between the Earth's deep gravity well and the Moon's shallower well.

See the illustration just below the title of this article.

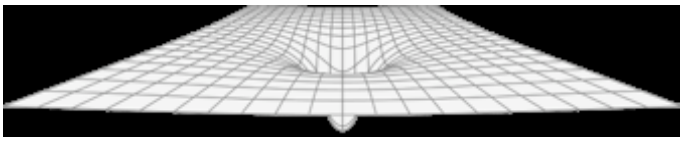
Too many people have grown up with the proverbial dictum about there being no "up" and no "down" in space. For all practical reasons, in travel between gravity well destinations, this is a misleading sophism.

It is commonplace to show Earth-Moon and Earth-Mars trajectories in a flat plane, when it would be more helpful to show them against a gravity well map. Yes that is harder to do, like most things worth doing!

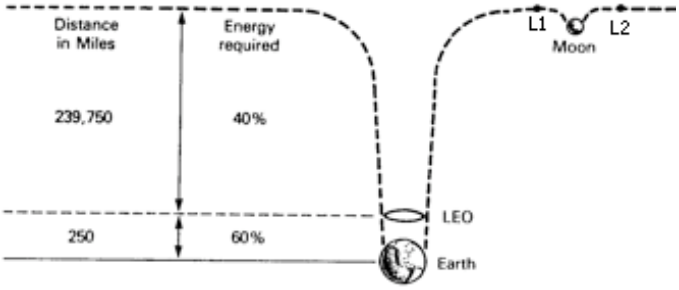
Gravity Wells Comment:

Perhaps this is *something we need to promote!*

This should be part of our strategy of getting across to people the need to place infrastructure waystations to enable less expensive, more heavily trafficked personnel and cargo travel between Earth and Moon: LEO, GEO, and L1 were all bypassed by NASA because, for a low traffic operation like Apollo, it made no sense to invest in such infrastructure, and we all now understand that this "low traffic" assumption was/is a "self-fulfilling prophecy."



Above, how space is warped by a heavy mass "at the bottom of a gravity well." Applies to all bodies of size: the Sun, Earth, Moon, Mars, Jupiter, etc.



Robert A. Heinlein first noted,
"once you are in Earth orbit, you are *halfway to anywhere!*

Gravity Wells: an animated illustration
http://www.opencourse.info/astronomy/introduction/06.motion_gravity_laws/gravity_well.gif

An illustration by our own Ken Murphy
http://www.outofthecradle.net/WordPress/wp-content/uploads/spacefarerseml1.jpg

A great YouTube Explanation
http://www.youtube.com/watch?v=VBQHtF3WhMw&feature=player_embedded

"If Earth's gravity well is 22 steps deep, the Moon's gravity 'dimple' is only 1 step deep in comparison."

The general "terrain" of the Solar System is like a great *plateau, seemingly flat,* but like the Great Plains States, gradually *sloped uphill* from the Sun outwards as this area is on *the shoulders* of the Sun's giant gravity well.

Pete's Shielding Blog

By Peter Kokh kokhmmmm@aol.com

Well, first, I don't like being called "Pete" unless you are about to give me money or treat me to dinner. And second, a blog is an online page airing personal opinions on a regular, if not daily basis. That said, "shielding" has been a favorite topic of mine since MMM #1 in December 1986, commenting on a May '85 visit to a unique "Earth-sheltered" (read "shielded") home some 25 miles north of my home in Milwaukee, Wisconsin.

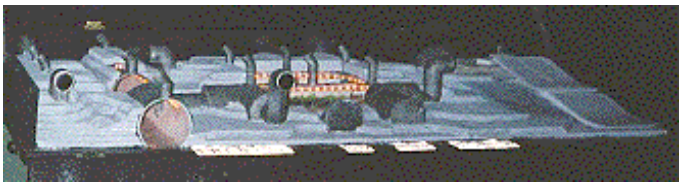
I have a friend who refuses to talk to me about space because his teacher told him that it was not possible for humans to live on the Moon, and as he respected her, I had to be "talking nonsense." Of course, his teacher was right, literally speaking. No one can live "on" the Moon, not for long, given the thermal extremes, the total exposure to cosmic rays, solar flares, full industrial strength solar ultraviolet, and the micro-meteorite rain. Indeed, we can live "on" Earth's surface only because our thick atmosphere sufficiently insulates us from these aspects of the Cosmic Weather.

Our atmosphere serves as a blanket. There would seem to be no such *air* blanket protecting the Moon's surface. But take another look! The bombardment of the Moon's surface by big objects (most of that stopped over 3 billion years ago) and smaller micrometeorites (still ongoing) has pulverized the upper layer of the Moon's surface, gardening it to a depth of 2-10 meters (~yards), thinner in the maria which are only 3 plus billion years old and formed after most of the early bombardment ran low on material, and thicker in the older highlands. We've all seen film and photos from the Apollo missions and are familiar with what the surface moondust looks like. We call this layer the "regolith" - Greek for "rock powder."

The point is that tucking ourselves under this *blanket* would provide *the same degree of protection* that our atmosphere blanket gives us. Consider that if it got cold enough (very, very) to freeze out our atmosphere, it would settle out on the Earth's surface (and ice-covered ocean) as a layer of Oxygen and Nitrogen "snow" 15 ft or 5 meters deep - *in the same ballpark, thickness wise!*

Over the years we have written many articles about shielding and methods of providing it. Getting ready for ISDC 1998 here in Milwaukee, I made a model of a modular lunar homestead on a 36"x80" hollow core door base to exhibit at ISDC. It teaches many things:

- How to build shelters on the Moon by using building materials made from moon dust (metal alloy, glass composites, concrete, etc.) to make modules (on the illustrated pattern of PVC plumbing components - I used 4" sewer schedule and smaller PVC/CPVC parts) - to make homes of any size, with many design options.
- Covering our constructed shelters with 2-4 meters (~yards) of moondust (I used sculpted layers of 3/4" Styrofoam)
- Each home has access to sunlight, and visual access to the moonscapes outside
- Each module has a wastewater system that treats toilet wastes while providing clean water, lots of vegetation and color, and sweet fresh air - "modular biospherics!"
- All homes are connected to a pressurized street system so that one can go anywhere in town without a spacesuit
- Bringing tools and factories, seeds and resourceful people from Earth; making most everything else locally



We are now in the process of making minor changes to this exhibit that we hope to bring to ISDC 2010 in Chicago next Memorial Day Weekend, so that it is more self-explanatory. I love explaining it to people whose eyes light up as they begin to understand how living "on" the Moon might be possible *and quite comfortable* - just by tucking ourselves under a moon dust blanket. Perhaps many space enthusiasts, who try to explain how we can set up shop on the Moon, neglect to put full emphasis due on "shielding." That is perhaps the major root of the skepticism they encounter.

Meanwhile, back here on Earth, those of us who have seen or visited "Earth-sheltered" homes have had a preview. Now most such homes have an exposed south-facing window wall to tap passive solar heat, and that is something we can't do *that way* on the Moon. The home I had visited back in 1985 did not have that feature and did break new ground on the methods of solar and visual access. See the article "MMM" is for "Mole" in MMM #1, now online at: www.lunar-reclamation.org/mmm_1.htm

Two images of Earthside precursors

Terra Lux, the home I had visited. Note exposed windows - upper portions of a unique periscopic system.

Necessarily exposed entrance to an "Earthbag" home http://earthbagplans.wordpress.com/introduction/

Also do Google Image searches for "Earthbag homes" - "Earth-sheltered homes" or "underground homes"

It is a mistake to neglect the shielding option and to tell people we will build in lavatubes. Yes, we will, and the possibilities are enormous, *but not near-term,* as lava tube construction will have its own challenges to address. Talk "shielding!" *and you will convince more!* **PK**

The Moon Society www.moonsociety.org

An international nonprofit 501(c)3 educational and scientific organization formed to further the creation of communities on the Moon involving large scale industrialization and private enterprise

Objectives of the Moon Society

include, but are not limited to:

- Creation of a spacefaring civilization which will establish communities on the Moon
- Promotion of large-scale industrialization and private enterprise on the Moon
- 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 & utilizing the Moon.
- Informing the public on matters related to the Moon
- Provision of suitable recognition and honor to indivi-duals and organizations which have contributed to the advancement of the exploration, research, develop-ment, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says Who We Are

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

Our Mission is to inspire and involve people everywhere, and from all walks of life, in the effort to create an expanded Earth-Moon economy that will contribute solutions to the major problems that continue to challenge our home world.

Moon Society Strategy

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

Our Full Moon Logo above:

The Moon in its natural beauty, empty and deceptively barren, waiting for human settlers to shelter and to mother as their adopted second human home world. We have work to do!

Masthead Design: Charles F. Radley, Society Vice-president\

Monthly Moon Society Progress Reports: visit our Homepage http://www.moonsociety.org and scroll down the center of the page to the prominent yellow **Frontlines** link. This report has been issued monthly since April 2008.

Society Celebrates 40th Anniversary of Dramatic Rescue of Apollo 13 Crew With Essay Contest

"Manned Space Exploration is Worth the Risk"

By Peter Kokh, President

Apollo 13 was the one Moon Landing Mission that, on the surface, failed. The crew launched April 11, 1970. Two days later, en route to the Moon, there was an explosion in the unmanned Service Module. "Houston, we have a problem." The Moon Landing was now out of the question. Worse, at first it looked as if there was no way to get the crew back home safely, and that this was a tragedy in the making, something that they could only watch happen, helpless to do anything about it.

But through determination, resourcefulness, ingenuity, and a stubborn refusal of NASA personnel to accept this fate, in a 5 day drama played on television screens world wide, we found a way to give the crew "a slim chance." They splashed down safely on April 17, 1970. Around the world, there was not a dry eye! If ever there was a defining tribute to the human "never say die" spirit, this was it.

Apollo 13's 40th Anniversary is April 11-17th, 2010.

While this mission did not involve a successful landing, it was an iconic example of courage and ingen-uity in the face of almost certain disaster and tragedy.

We cannot speak for nationals of other countries, but it is a sad truth that many Americans have lost the frontier spirit and have become risk-averse. This was evident in public reaction to the Challenger and Columbia mishaps. The only disaster in either event was this minority segment of public opinion. None of us would be here if our ancestors had not willingly taken risks.

SubmissionOur message is: "Manned Space Exploration is Worth the Risk" and the Moon Society is running an Essay Contest on this theme. The contest is open to members, former members, visitors, and in short to anyone who hears about it, anywhere in the world.

Prizes are modest: new/renewed Society memberships.

- 1st Prize: 3 year renewal, or 3 year new Moon Society membership - a $105 value
- 2nd Prize: 1 year renewal or 1 year new Moon Society membership - a $35 value
- 3rd Prize: offered by the Lunar Reclamation Society, publishers of Moon Miners' Manifesto: a hardcopy subscription to MMM* - a $12 value

*Conditions. This 3rd prize is available to only to those who are not members of the Moon Society. If the 3rd contest winner, as picked by our panel of judges is a member, he/she must assign this subscription as a gift to a non-member or to a Library of his/her choosing.

(Submission rules and further incentives on next page)

Essay Contest Continued from page 9

"Manned Space Exploration is Worth the Risk"

All three prize winning entries will be published

- in Moon Miners' Manifesto
- on the Moon Society website
- in a special edition of our science-fiction (pdf file) magazine, Moonbeams, with pictures and illustrations. This issue will be a keepsake for winners!

Contest requirements and conditions:

- **Submission deadline: April 1, 2010**
- **Word limit: 1,000 words**
- **Submission form: electronic only** (.doc, .rtf plain text, .html web page, .pdf file --if your mail program allows, you may also copy the unformatted text of your entry into the body of the email message.) Double-spacing is not necessary.
- **Submission address:** secretary@moonsociety.org
- **Include a "code name":** please pick a code name and put that name with no other contact information in your entry. Put your name and full contact information in the accompanying email. The Secretary will compile a list matching code names to real names, which will not be distributed to anyone. This ensures judge neutrality in the event that a judge might recognize the name of an entrant and be influenced favorably or unfavorably by that. Given the code names on entries picked by the judges, the Secretary will notify the winners, the Moon Society webmanster and MMM editor by email.

Judges:

- **Marianne Dyson:** Noted author and Editor http://www.mariannedyson.com/ Marrianne will coordinate the judging effort
- **Ian Randal Strock**; editor of Artemis Magazine (in late 1990s). Science Fiction / Science Fact http://www.asi.org/bios/strock.ian.html
- **Chuck Lesher**: Editor of Moonbeams http://www.moonsociety.org/publications/ficiton http://charleslesher.com/index.php/about-joomla

Announcements

Awards will be announced on April 17, 2010, the 40th anniversary of the safe touchdown of the A13 crew. Notice will be on our website, as well as emailed to the individual entrants. Please spread the word to anyone whom you think might be interested.

Address any questions about the Contest or its details to president@moonssociety.org

You wil find all of the above online at:

http://www.moonsociety.org/reports/A13_contest_announce.html

Progress for Moon Society India

http://www.moonsociety.org/india/

The latest issue of Moon Miners' Manifesto - India Quarterly (M3IQ #5) was published January 8th and featured several great articles by Indian contributors Pradeep Mohandas Secretary of the new Moon Society India, and by Srivinas Laxman, well known Indian space writer, both currently in Mumbai. A third co-editor of Indian origin but living and working in California is Madhu Thangavelu.

The game plan is to continue publication through this second year with the above C0-editors having more of a say in each successive issue. The goal is for MSI to take over the publication entirely next year, at which time its name may well change. Current circulation of M3IQ may well exceed that of MMM itself. M3IQ is presently published and distri-buted only as an electronic pdf file.

Anyone may freely access these issues at:

http://www.moonsociety.org/india/mmm-india

These developments are very rewarding to current head editor Peter Kokh and to David Dunlop also a co-editor. The new organization is moving quickly to make itself known, and will aim primarily at the younger generation who will become the future leaders of India.

Together, we will again cosponsor the SEDS India Conference this February. MSI and SEDS (Students for the Exploration & Development of Space) are working together towards these ends. Meanwhile more and more findings by India's Chandrayaan-1 lunar orbiter are being published. Public excitement continues as Chandraraan-2, a lander with two rovers, advances in design and con-truction phases, and as the selection process begins for the first 4 Vyomanauts as India's astronauts will be called (vyoma is a Sanskrit word for "space" though almost certainly not in the sense we use the word today.)

More MMM "Theme Collections" Published

www.moonsociety.org/publications/mmm_themes/

In the MMM Classics, we endeavored to collect all the non-time sensitive articles from MMM's first twenty years in pdf file volumes, one per publication year. In the MMM Themes, we are regrouping this material according to key topics or themes. These theme issues are freely accessed from the above linke directory by anyone without a member username and password.

The first to be published were two volumes on **Mars**, then two more on "**Eden on Luna**" about the environmental aspects of the lunar frontier. Now we have added an issue on **Asteroids** (and comets), on **Tourism**, and on **Research**. Currently next in cue will be an issue on Lunar Frontier Economics or "**Exo-economics**."

The MMM Themes publication effort has two purposes: first, newer members and visitors can look up that past material of greatest interest to them without reading through everything. Second, it is another step in the reorganization of all this past material for what has been code-named as "MMM, the Book," but which will probably be titled "**A Pioneer's Guide to the Lunar Frontier**." There is no target date for such a publication.

The editor has had to hire yet another clone to tackle this project!

New Special "Vector" pages:

Members and visitors may wonder what the Moon Society stance may be on interrelated and seemingly "competitive" space issues: e.g. Mars, the Asteroids, and so on.

The following pages are now online:

- http://www.moonsociety.org/mars/
- http://www.moonsociety.org/asteroids/
- http://www.moonsociety.org/tourism/
- http://www.moonsociety.org/research/

In each of the above, there is a short section on how the topic in question fits in with the Moon Society Vision and Mission, and a link to an **MMM Theme collection** of topic-relevant articles from the first 20 years of Moon Miners' Manifesto

- http://www.moonsociety.org/art/

The idea behind this Art page is to help members and visitors visualize the possibilities!

Next in cue is "**Exo-economics**" – the economics of the Earth-Frontier Moon economy or "econosphere." Plus one on "Astronomy from the Moon." There may be a few more.

Currently the only link is via "*more...*" which follows our Description statement top front center of our homepage.

We hope to make these pages accessible by direct link from our homepage. The current idea is to add a "Vectors Menu" just below the "Destinations Menu" in the right hand column of our homepage.

You can now renew for 3 years for the price of 2!

We understand that for many people, these are hard economic times and that it may be necessary to make hard choices when it comes to discretionary spending, for memberships and subscriptions, as an example.

All organizations are feeling a pinch these days with more individuals making the hard choice not to renew than the number of new people joining. While given our costs, we cannot realistically reduce our membership rates, by offering 3-year renewals for the price of 2 years, to those already in our database system, whether current or expired, our membership processing costs are lowered.

If your membership rate is $35, you can send $70 and get three years membership, a $105 value.
If you are a student or senior and get our newsletter as an electronic pdf file only, your rate is $20. If you send $40, your membership will be good for three years, a $60 value. For those outside North America who have chosen to get the hardcopy edition of our newsletter, your rate is $60. Send us $120 and you will get three years, a $180 value.

This 3-for-the-price-of-2 has worked well for the Mars Society, and we believe it will work well for us as well. And as mentioned, former members, whose data is still in our database, can take advantage of this offer to rejoin us.

It took some recoding of our registration page to make this work, but we are now go!

Moving? Changing your email address?

Perhaps the leading reason for member failure to renew membership in the Society, is a feeling that the Society is dropping the ball: either not sending out notices that the next newsletter is available for download, or not sending promised hard copy newsletters by postal mail, etc.

The Society *does,* however, send out such email notices automatically every month (except January and July when MMM is not published), and *does* send out hardcopies faithfully to those who have ordered them.

The root of the problem is *member failure to alert the Society* when he/she changes his/her email address, and/or moves to a new postal location. There is no way that we can find out this information on our own, or take the time to investigate.

Please do yourself a favor, and the Moon Society also, by letting us know that you have made a contact information change.

But in fact, if you know your **username** and **password**, you can go onto this page:
http://www.moonsociety.org/mymoon/
and change this information in our database directly.

If you do not know or remember your username and password, write president@moonsociety.org and we will get you fixed up.

NOTE: If you have selected to get the newsletter in electronic form only, you absolutely must use your username and password to download it, as *we do not email out the file as an attachment.*

So if you joined, selected the electronic version, and then paid no attention to your username and password, or forgotten it, and not contacted us for help, *essentially you have cut yourself off from all membership benefits.* Of course, come renewal time, you will be unlikely to renew.

So membership in the Society is a two-sided venture. We count on you doing your part.

All you have to remember is one simple email address: **president@moonsociety.org**

Or send snail mail mail to either of the addresses listed on our website (Plano, TX and Milwaukee, WI)

Society's Spanish Translation Effort Languishing on a "Wish List"

From Peter Kokh

The Moon Society had decided that the time had come to clone a Spanish version of key portions of our website and of our outreach publications. Two bilingual persons had offered to help, but both are now engrossed in other activities that have to come first. As of now, we just have a placeholder web address:

http://www.moonsociety.org/es/

An upcoming conference in San Juan, Puerto Rico October 23-26, 2010, hosted by the new NSS PR chapter, sponsored by NSS and cosponsored by the Moon Society, would be an ideal place to recruit a translation team. VP Charles F. Radley is conference chair, but as of now, it is not clear if any other MS officers will be able to attend. The MS does not pick up conference attendance costs.

The Moon Society Chapters & Outposts Frontier Report

Moon Society St. Louis Chapter

http://www.moonsociety.org/chapters/stlouis/
Contact: Keith Wetzel <kawetzel@swbell.net>
Next meetings – Feb 17th, Mar 17th, Apr 21st
Meetings **3rd Wed** monthly at Buder Branch Library
4401 S. Hampton, in the basement conference room

Wednesday, Jan 20th Meeting: We had a fair turnout: Bob Perry, Jim Merriman, Dabne Tolson, Rufus Anderson, Tom Kullman, Burt Sharpe, Mark Rode, Karl Strassman. We watched a DVD documentary from 1987, a tour of the Planets hosted by Isaac Asimov and set to the music of Holst's "The Planets". Rufus brought his laptop and projector and screen and Bob a set of powered speakers. The computer graphics were good, considering that it was produced about ten years after the Voyager missions, c. three years before Hubble was operational.

The majority of our discussions were triggered by the documentary. One topic was why the inner planets are rocky and the outer planets are mostly hydrogen with considerable amounts of ice.

Dabne volunteered to do a presentation next month on an ion drive to keep the International Space Station in orbit rather than letting it fall to Earth when it is decommissioned in 2016 – which is unlikely but that's as far as the current funding and treaties go. Some of us adjourned to Uncle Bill's Pancake House. – *Bob Perry*

January 29th, Moon Madness Night – This annual event had been postponed from January 8th. It was held at the Center for Creative Learning In Ellisville 7-9 pm. Our speakers were Gregg Maryniak (St. Louis Science Center and X-Prize), Brad Joliff (Earth & Planetary Science, Washington. U.), Ray Tucker (retired McDonald Douglas Gemini program), John Newcomer (St. Louis Astronomical Society), and Earl Mullins (The Space Museum). We provided our "gravity bricks" and other materials.
www.moonsociety.org/chapters/stlouis/Activities.htm

Moon Society Phoenix Chapter

http://www.msphx.org
http://www.moonsocphx.blogspot.com/
Contacts: Craig Porter portercd@msn.com
Chuck Lesher: chuckmiester999@yahoo.com
Meeting the **3rd Saturday of the month**
Moon Society Phoenix' next meetings are on
Saturdays **Feb 20th, March 20th, April 17th**

Elections: We held elections at our December meeting. Craig is again President of the Chapter as Don had declined to run again. The rest of the officers were returned for the coming year.

We had six present and five absent so we had a Quorum. Mike was there, and had emailed a Treasurer's report to be include in the minutes,

Projects in progress include:

1) Don's Habitat Project and
2) Craig's Display wall for our posters and pictures.
3) Craig is working on more "eye candy" for the kids.

CopperCon30: Craig volunteered for the three disaster panels, and talked Don about helping on one of them. Patti agreed to email the Cons that she has contacted about having outreach tables. Don has agreed to send me a rough engineering drawing of his habitat.

Next Meeting is the third January 23rd, 3:PM at the Denny's at US60 and Rural Road.

Moon Society Houston Chapter

http://www.moonsociety.org/chapters/houston/
Contact: Eric Bowen eric@streamlinerschedules.com

January 18th Meeting: – Eric

Moon Society Houston is entering into a collaboration arrangement with NSS Houston. In a deal worked out between Eric and Marianne Dyson, the two chapters would share assets. The NSS chapter had lost its web-master and website and has not been meeting but has a mailing list of 150 or so plus money in the bank as well as a 501c3 tax exempt status. The Moon Society chapter has a website, meets every other month. Both chapters will support each others events, hold combined meetings, and send out announcements on evite to both lists. This arrangement has Moon Society blessing.

Chapters & Outposts Map (North America)
www.moonsociety.org/chapters/chapter_outpost_map.html

Chapters & Outposts Events Page
www.moonsociety.org/chapters/chapter_events.html

===== Moon Society Outposts =====

College of Menominee Nation-Green Bay Outpost
Contacts: Dan D. Hawk hawkd_0212@menominee.edu
David A. Dunlop dunlop712@yahoo.com

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

Bay Area Moon Society, CA **Outpost** – South Frisco Bay
http://www.moonsociety.org/chapters/bams/
Contact: Henry Cates hcate2@pacbell.net
Informal meeting at Henry Cate's home in San Jose
The 4th Thursday every month

Moon Society San Diego, CA
Contact David Schrunk DOCscilaw@aol.com

Moon Society Longview, TX **Outpost**
Contact: James A. Rogers jarogers2001@aim.com

Moon Society DC Metro, DC-MD-VA **Outpost**
Contact: Fred Hills Fredhills7@aol.com

Milwaukee, WI **Outpost** (MSMO)
www.moonsociety.org/chapters/milwaukee/msmo_output.htm
Contact: Peter Kokh kokhmmm@aol.com

NSS Partner Chapter News – pp. 17-19

Oregon L5 (Portland), **Lunar Reclamation Society** (Milwaukee), **Minnesota Space Frontier Society** (Minneapolis-St. Paul), **San Diego Space Society**

Moon Society DUES with ***Moon Miners' Manifesto***
Electronic MMM (pdf) **$35** Students/Seniors: **$20**
Hardcopy MMM: U.S/Canada **$35** Elsewhere: **$60**
Join/Renew Online - www.MoonSociety.org/register/

Moon Society Mail Box Destinations:

Checks, Money Orders, Membership Questions
Moon Society Membership Services:
PO Box 940825, Plano, TX 75094-0825, USA

Projects, Chapters, Volunteers, and Information
Moon Society Program Services,
PO Box 080395, Milwaukee, WI 53208

< End Moon Society Journal Section >

GREAT BROWSING

NASA, DARPA hold conference on Space Debris
http://www.space.com/news/091208-space-junk-cleanup-meeting.html

A new market for suborbital spaceflight
http://www.thespacereview.com/article/1525/1

Significant Amount' of Water Found on Moon
http://www.space.com/scienceastronomy/091113-lcross-moon-crash-water-discovery.html

Water Discovery Fuels Hope to Colonize the Moon
http://www.space.com/scienceastronomy/091113-moon-water-colony.html

Singularity University @ NASA Ames
http://singularityu.org/about/overview/

Wikipedia list of private spaceflight companies
http://en.wikipedia.org/wiki/List_of_private_spaceflight_companies

Space Tourism Essential to Future of Spaceflight
http://www.thespacereview.com/article/1514/1

Why more lakes at Titan's north pole than south?
http://www.physorg.com/news178724806.html

To Deflect an Asteroid, Try a Lasso, Not a Nuke
http://www.wired.com/wiredscience/2009/12/asteroid-deflection-tether/

Space Station 2010 Calendar: Decade of Research
http://www.nasa.gov/pdf/402659main_2010%20ISScalendar.pdf

Sandtrapped Rover Makes A Big Discovery
http://www.marsdaily.com/reports/Sandtrapped_Rover_Makes_A_Big_Discovery_999.html

NASA's latest manned Mars mission plan available
http://www.flightglobal.com/blogs/hyperbola/2009/12/nasas-latest-manned-mars-missi.html

AIAA Bibliography of Space Architecture Papers
http://www.spacearchitect.org/pubs/pub-biblio.htm

SpaceShipTwo and the modern imagination
http://www.thespacereview.com/article/1529/1

Review: Krafft Ehricke's Extraterrestrial Imperative
http://www.thespacereview.com/article/1526/1

CAMSAT (China Amateur Radio Satellite) is up
http://www.camsat.cn/index.php?option=com_content&view=article&id=56&Itemid

Glint of sunlight confirms liquid lakes on Titan
http://story.malaysiasun.com/index.php/ct/9/cid/89d96798a39564bd/id/578898/cs/1/

Manifest Schedule of Upcoming ISS missions
http://www.nasa.gov/mission_pages/station/structure/iss_manifest.html

Detecting past comet strikes on Earth
http://www.innovations-report.com/html/reports/physics_astronomy/kansas_scientists_probe_mysterious_comet_strikes_145574.htm

Low mass planets common around nearby stars
http://www.innovations-report.com/html/reports/physics_astronomy/planet_discoveries_suggest_low_mass_planets_common_145591.html

85 Entries in Contest for "final" Shuttle Mission Patch
http://www.collectspace.com/news/news-122209a.html

Britain's Space Organization to shake off the cobwebs
http://www.bnsc.gov.uk/assets/pdf/PRSciMin2.pdf

Too many commercial spaceports?
http://www.thespacereview.com/article/1544/1

GREAT SPACE VIDEOS

MOON COLONY VIDEOS – The Moon Society
30 plus thought-provoking videos, produced for the Moon Society by Chip Proser (Celestial Mechanics, Inc.) can be found at.
http://www.moonsociety.org/video/
or at:
http://www.mooncolony.tv/
http://www.stickymedia.com/

ASSORTED SPACE VIDEOS

When the Good Sun Goes Bad: Solar Tsuamai
http://www.space.com/common/media/video/player.php?videoRef=SP_091125_soalr-tsunami

Mystery of 2-faced Iapetus solved
http://ciclops.org/view_event/122/Dichotomies_on_Iapetus

Star Trek's Wrp Drive – Are we there yet?
http://www.space.com/common/media/video/player.php?videoRef=SP_090505_mark_millis

Plotting an Escape for Mars Rover Spirit
http://www.space.com/common/media/video/player.php?videoRef=SP_091113_spirit-escape

India's Moon Mission
http://www.space.com/common/media/video/player.php?videoRef=SP_081015_chandrayaan

Are you a fan of Space Settlements?
Read Clarke's Rendezous with Rama?
http://www.youtube.com/watch?v=zBIQCm54dfY&feature=related

The Expanding Danger of Space Junk
http://www.space.com/common/media/video/player.php?videoRef=SP_090218_space_debris

Video – When Satellites Collide
http://www.space.com/common/media/video/player.php?videoRef=SP_090212_IridiumCosmos

Top 10 Worst Space Debris Moments
http://www.space.com/missionlaunches/080225-top10-debris.html

How Virgin Galactic could rule the Galaxy
http://www.space.com/common/media/video/player.php?videoRef=SP_091209_virgin-galactic

How Black Holes Build the Universe
http://www.livescience.com/common/media/show/player.php?show_id=50&ep

Where did all Mars' water go?
http://www.livescience.com/common/media/video/player.php?videoRef=SP_090915_mars-show2

This Week in Space with Miles O'Brien

"The place for space fans to get their weekly fix"

http://www.vimeo.com/8310662

Powered by http://spaceflightnow.com

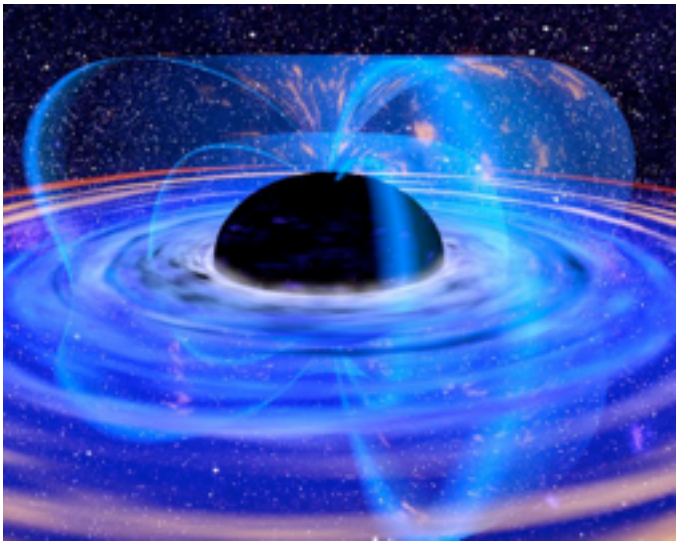
First weekly show debuted Dec. 21, 2009

"Welcome to the premier of "**This Week In Space With Miles O'Brien**," a new show dedicated to keeping space lovers up to speed on the stories and issues making news off the planet."

Miles, a long-time strong supporter of both manned and unmanned space exploration, picks up were Jules Bergman left off, too many years go.

We think you will enjoy this "weekly fix" as much as I have. **PK**

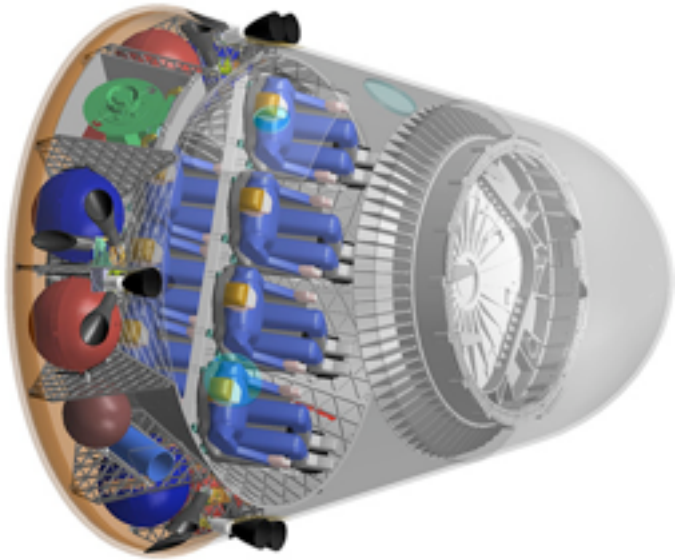
MMM PHOTO GALLERY

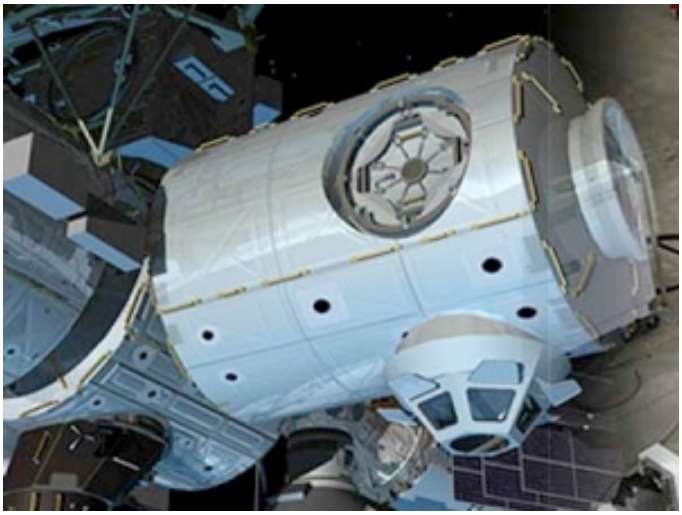


Artist depiction of **the black hole V404 Cygni** now determined to lie just 7,800 light years from Earth.

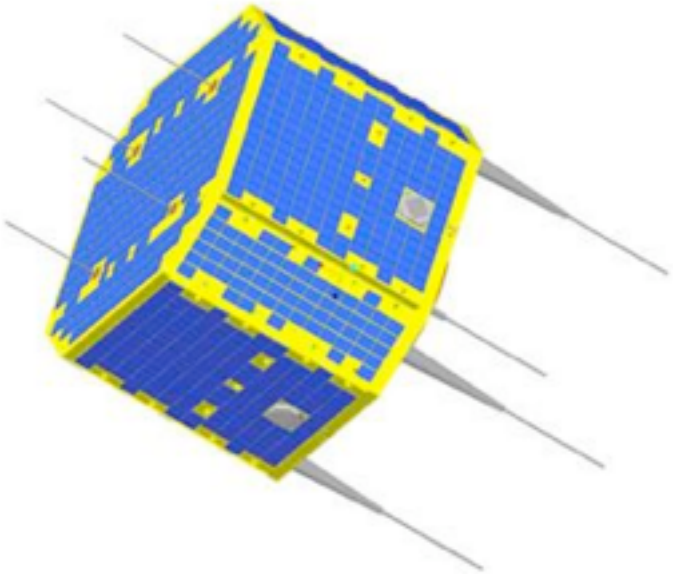
Space-X Dragon Cargo ship expected to make 1st ISS visit sometime between May and November this year. A 7-person manned version (below) is Space-X' next goal, with parachute braking, ocean landing.

So why build Orion when Dragon is better, cheaper?





Tranquility module, the final US module to be delivered to ISS, will arrive on Endeavor STS-130, target date Feb. 7, 2010. Its gym equipment is named the **C**ombined **O**perational **L**oad **B**earing **E**xternal **R**esistance **T**readmill, COLBERT, in a concession to the popular choice for the Module's name in a widely publicized poll.



CAMSAT – China's first Amateur Radio (micro) Sat is up.

XCOR Aerospace's Lynx – a Mark2 two-seater version will begin personal flights to the edge of space direct from and back to an airport in South Korea in 2011. No "mother ship" will be needed.

The parachute was invented more than a century before the airplane!

THE book WORM

Toward Human Emergence

A Human Resource Philosopy For the future

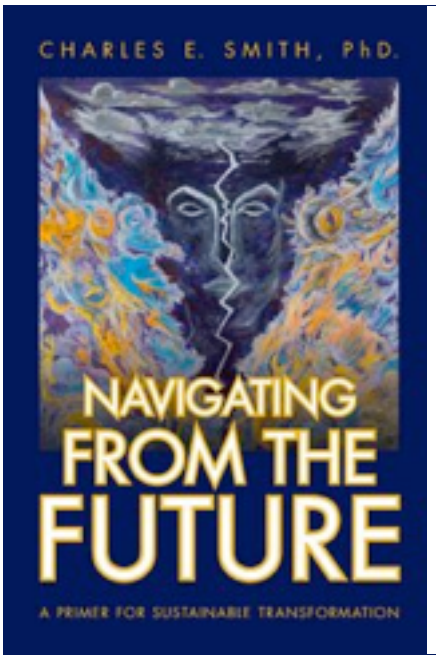
Philip R. Harris Ph.D.

$59.95
452 pages
Paperback

CONTENTS:

From the Jacket Blurb: "*Toward Human Emergence* is a helpful and positive analysis from a behavioral science viewpoint of various stages in our long journey from hunter-gathers and agriculturalists, to industrialists and knowledge workers. It examines the why, what, and how for perfecting human endeavor within a global society" undergoing "accelerating changes and pressures that challenge us: climate change, population explosion, increasing urbanization, technological advances, knowledge expansion, and economic turmoil. This mind-stimulating volume offers a hopeful vision of humanity."

The book "will motivate those who seek to be world shapers, rather than mere squatters. … "it offers … thoughtful insights on how to capitalize on human assets, while curbing our tendencies toward destruction, violence, and self-abuse. The major themes are coping with accelerating change, making knowledgeable choices and decisions, and influencing the future through self-knowledge and self-control. The last chapter discusses convergence of these key concepts of culture, change, choice, and control. The prologue considers humanity's prospects for emergence; the epilogue projects the offworld possibilities for our further emergence as a species."



Available from Amazon.com
$16.99
From the blurb
"This is a self-help book that tells the truth about leadership in the face of today's challenges. Its essence is that while good ideas, good products, and strong intentions are important, they are not enough. Rather, Smith suggests that organizations and projects with the most available energy in focus will prevail.

While many will say they want Transformation--at work, in government, at home and in the world -- few will summon the necessary courage and attention required to become transformational leaders. This book is about what it really takes. Dr. Smith illustrates how to manage the issues of starting up an organization or project, and how to build alliances in mergers and acquisitions. He provides tools and approaches that are useful in managing complex change, challenges of innovation …"

For more information:
http://www.NavigatingFromTheFuture.com/

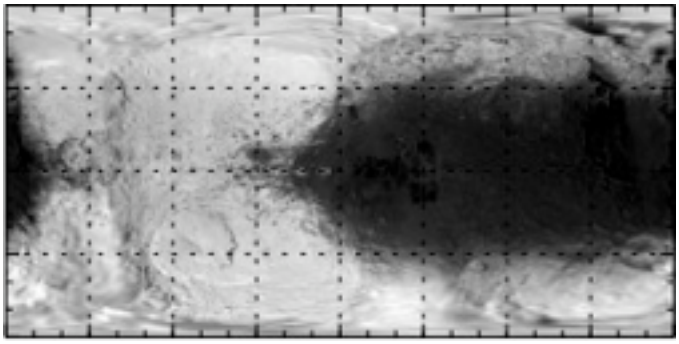
How the door to Russia's long hidden space program was opened during the era of Soviet perestroika, the political struggle on the signing of the first contract between the Russians and NASA, the push to change space station Freedom into a cooperative venture, the willingness of the Russians to use free markets against the wishes of NASA and how the Russian space station Mir became a commercial platform, are all told in a relaxed and engaging style by the author, who is the only American ever to work within the Russian space program.

Apogee Books – $28.95 plus shipping
ISBN 978-1-926592-08-4
www.cgpublishing.com/Books/9781926592084.html

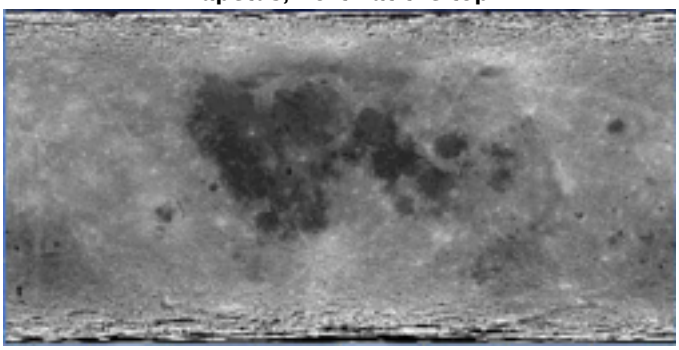
The Other Two-Faced Moon: Iapetus

http://ciclops.org/view_event/122/Dichotomies_on_Iapetus

As on the Moon, this dichotomy may have implications as to where future outposts would be most advantaged. In both cases, Saturn's moon Iapetus (next out from Titan) and The Moon, these pronounced albedo differences betray different abundances of key elements. In both cases border areas will have the edge.



Iapetus, north at the top



The Moon; nearside maria complex in the middle

Moon & Mars 360° animated Panoramas

http://www.moonpans.com/vr/
Apollo Mission landing site panoramas: A11, 12, 14 (1 each); **A15** (4), **16** (3), **17** (4); 14 in all.

http://marspans.com/vr/
Four panoramas taken by **Spirit**

You need Quicktime™ Player to see the image. Then "click your mouse on the image and drag it around whilst keeping the button pressed" You can go in either direction, fast or slow, reverse directions, halt, etc. You can control how much of the sky you see, or point down to see only the surface. Your finger on the cursor retains control.

You can purchase prints of all 18 of these Moon and Mars panoramas in 6 sizes from 40"x8" ($59) up to 90"x18" ($299). There is computer wallpaper available for each Apollo mission (and Mars rover) as well.

Vision without action is just a dream.
Action without vision is just activity.

Vision and Action together
can change the world!

National Space Society Welcomes Sci-Tech, Private Spending in 2011 Budget, Calls for Continued Human Spaceflight Beyond Earth Orbit

WASHINGTON, D.C. -- February 6, 2010

The National Space Society commends NASA and the Executive Branch for proposing to increase spending for science, technology, and sustainable economic development in space; however, we believe the President's 2011 budget request would leave the job only partly done. NSS calls for the President and Congress to restore funding for human spaceflight beyond low-Earth orbit. NASA's goal should be to make it possible to incorporate energy and resources from space into our economy and to extend human presence throughout the solar system.

Gary Barnhard, Chairman of the NSS Executive Committee, states, "Investment in technology development needs to be focused on the requirements to enable real missions. We need to make the best use of the International Space Station and other key resources both on the ground and in space to improve our ability to use space for the betterment of humanity, and to hasten the day that those new missions can be flown. Supporting private sector space capabilities is a good and necessary step toward further space development. It makes sense to fund commercial providers for cargo resupply and return, as well as for crew transportation once their services have been demonstrated to be safe. Our space endeavors, government and commercial, provide strategic capabilities that define us as a nation and help maintain our leadership in the peaceful exploration and development of space. However, a truly ambitious space program always focuses on what's next."

NSS supports returning people to the Moon for the benefits it can bring to our home planet and as a starting point for people learning how to work and live elsewhere in the solar system. In keeping with the President's original campaign suggestion to delay returning to the Moon by five years, NSS calls for a human return to the Moon by 2025. Such a mission should emphasize self-sufficiency and permanent human habitation by developing technologies that will enable humans to "live off the land." According to Gordon Woodcock, the last President of the L5 Society (parent organization of NSS) and previous NSS Policy Committee chair, "Economic growth and humanity's expansion into space require that we learn how to go somewhere and live there. That learning can only come through frequent access, and the Moon is the closest destination. Learning how to develop fuels on the Moon would be worth the price of the trip."

"Technology development is good but requires focus to be meaningful," asserts Greg Allison, NSS Exec. VP and NSS Policy Committee chair. "If we are to perform research for a heavy-lift launch vehicle, we should plan to develop one that matches our destinations and sustainability goals. We should build and fly prototypes along the way. We need to have missions in mind to make this work."

All of this requires a sustained, generational commitment to NASA's long-term mission. NSS is aware of the financial constraints under which the U.S. government will be operating in the next few years. Tax dollars should be spent wisely. We believe a larger budget for ALL of NASA's efforts is needed to adequately engage the private sector and is in the long-term best interests of the country. **NSS**

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!

2009 LRS OFFICERS | BOARD* | Contact Information

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VICE-PRES. Doug Armstrong **NSS** 414-273-1126
SECRETARY – *James Schroeter **NSS**
James_Schroeter@excite.com 414-333-3679
TREAS./ Database – *Robert Bialecki
bobriverwest@yahoo.com 414-372-9613

LRS News

• **Our February meeting was lightly attended**: At first, there was Charlotte and Gene and Peter. But then to our great surprise, Terry Nielsen from Neenah entered. Terry was our founding Vice President back in the fall of 1986. The last time he visited us was for our 20th Anniversary meeting in December 2006, two years ago. We had a number of very interesting discussions.

• **A working model of a "Living Wall"** is being put together by **James Schroeter** for exhibit at the upcoming ISDC in Chicago at the end of May. What is a Living Wall?

http://en.wikipedia.org/wiki/Green_wall

• **Rockets for Schools: May 16th, Sheboygan:** We have not planned anything yet, but this is the first time in some years that this event did not coincide with our monthly meeting. As we have not done any outreach events since September 2007, we are overdue for this! Peter would be coordinating with Charlotte if we do.

The event includes exhibits, talks, and amateur rocket launching as well as many serious networking opportunities. We could bring the Moon Society's new tabletop Solar Power Beaming demonstration unit. We could operate it if we find someone on hand with a HAM radio license. That would be awesome. The unit has attracted a lot of attention wherever it has been shown.

• **ISDC 2009:** In Orlando, Florida this year, May 28-31, the weekend *after* the usual Memorial Day Weekend schedule. Peter Kokh and Dave Dunlop will be attending.

LRS Upcoming Events

Saturdays: 1-4 pm

October 10th – November 14th – December 12th

LRS Meeting, Mayfair Mall, Garden Suites Room G110

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

Unfortunately, our website has been off the Internet for two months in some weird dispute over who is the site administrator.

News & Events of NSS "MMM" Chapters

Space Chapter HUB Website:
http://nsschapters.org/hub/

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/]

Allen G. Taylor allen.taylor@ieee.org
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
Feb 20th, Mar 20th, Apr 17th

MINNESOTA

Minnesota Space Frontier Society
c/o Dave Buth 433 South 7th St. #1808
Minneapolis, MN 55415

David Buth (w) (612) 333-1872, (h) (763) 536-1237
Email: info@mnsfs.org – **www.mnsfs.org/**

Proud hosts of the MDRS Web Cams
http://freemars.org/mdrscam/

The counter has now passed 1,000,000!

Ben's All Ships Party
http://freemars.org/mnfan/AllShip/2009-12-Holiday-Party/
MNSFS's 2009 Year in Review
http://freemars.org/mnfan/MNSFS/2009-12-Review/
Twin Cities Regional Science Fair Feb 27-28
http://www.freemars.org/mnfan/TCRSF/2009/
Science Room at Mars Con Invasion
MN SFS Meeting March 10th
March 16 – STS 119 Display

ILLINOIS

Chicago Space Frontier L5
610 West 47th Place, Chicago, IL 60609

Larry Ahearn: 773/373-0349 LDAhearn@aol.com

Host of ISDC 2010 – May 27-31, 2010
http://isdc.nss.org/2010/

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WISCONSIN

Sheboygan Space Society
728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376 (h) astrowill@tcei.com
SSS Sec. Harald Schenk hschenk@charter.net

>>> **DUES:** "SSS" c/o B. P. Knier
22608 County Line Rd, Elkhart Lake WI 53020

[http://www.tcei.com/sss/]

● We meet the 3rd Thurs even # months 7-9pm
At The Stoelting House in Kiel, WI
Feb 11th, Apr 15th, Jun 17th, Aug 19th, Oct 21st, Dec 16th

COLORADO

Denver Space Society
(FKA The Front Range L5 Society)

1 Cherry Hills Farm Drive
Englewood, CO 80113
http://www.angelfire.com/space/frl5/

Eric Boethin 303-781-0800 eric@boethin.com
Monthly Meetings, every 2nd Monday, 7 PM
Next: March 8th, April 12th, May 10th
Englewood Public Library, Englewood, CO 80110
1000 Englewood Parkway, First Floor Civic Center

PENNSYLVANIA

Philadelphia Area Space Alliance
928 Clinton Street, Philadelphia, PA 19107

c/o Earl Bennett, Earlisat@verizon.net
215/633-0878 (H), 610/640-2345(W)

[http://pasa01.tripod.com/]
http://phillypasa.blogspot.com

● PASA regular business luncheon/formal meeting 1-3 pm, the **3rd Saturday of every month** at the **Liberty One food court** on the second level, **16th and S. Market.** Go toward the windows on the 17th street side and go *left*. Look for table sign. Parking at Liberty One on 17th St. Call Earl/Mitch 215-625-0670 to verify all meetings.
Next Meetings: Feb 20th, Mar 6th, Apr 3rd Note the shift to the ***first Saturday of the month.***

Meeting notes: We had an abbreviated meeting due to weather and the absence of Hank Smith for his Sci Fi report. We did have interesting material however, and the appearance of an occasional visitor to our group: Michael Stewart. He has done "sidewalk Astronomy" for school children for some time and recently received a Masters in Education. He is working part time with The Philadelphia board of Education and plans to help the Carver Science Fair personnel.

Mitch Gordon brought a Space Chess Set from Big League Promotions (.com) to show us, and he brought a report from The Futurist Magazine on the existence of extra terrestrial life could be confirmed or denied per Dimitar Sasselov director of the Origins of Life Initiative at Harvard. Nov./ Dec. 09 issue. In addition he brought a new news letter by C.D. Carson called "Luna!" website lunarcc.org. This should be of interest to Moon Society members if they haven't seen it yet.

Dorothy Kurtz brought material on programs at the Hyden Planetarium: "A field Trip to the Moon" and The New York Hall of Sciences activity: Physics Principles Golf Course out among the rockets on the grounds.

Earl brought material from the AMSAT Journal that included the second part of the Cubesat simulator (a device to teach how a real satellite works and that many of us can help make). There where a number of good articles in this and Sky and Telescope for February that included details on the discovery of lunar water and "Kaguya's High Def Highlights" by Motomaro Shirao, who help select the imaged areas. They are beautiful pictures and include the picture "A Cavern on the Moon" and more on lava tubes and how we have talked of using them. This on page 26 and is by Alan MacRobert. The pictures were taken by Mr. Motomaro and a team from NHK HDTV with Rie Honda. www.selene.jaxa.jp/en/link/index.htm

For January we again had limited attendance but had another visitor, Wallace Kemp. He added to the banter about the past year and our hopes for 2010, not all of them concerning space. We talked of the attention

to the national health care debate and the resulting media focus almost exclusively on that.

Mitch gave us our Treasurers report and our account balance so we can make financial plans. We will decide about using part of this for George Washington Carver Fair gift reimbursement. Most of this cost is members' contributions and minimally affects the treasury. He brought quite a bit of other information including reprising the NSS vision statement about "People Living and working in thriving communities". We are still hoping the announced cancellation of the Constellation program will not brake the momentum towards this goal (more on this later).

On something else we discussed: Mitch brought a document called The Declaration of Interdependence, that we have heard of here, which includes statements that restricts, in members opinions, ownership of, and rights to claim, extra terrestrial resources and bodies. As some of us understand this: we would have to share the results of our work with people and nations that had not put in anything but could write a law that a world court would say allowed this to happen. This discussion also included the recent ***Ad Astra*** talk on "The Law of the Sea Treaty" and how this might apply to ownership of off Earth resources and, indeed, bodies. Most of us don't like the idea of a space "wild west" but "for the good of the people" is also viewed with a jaundiced eye as well. Mitch has started to contact University City officials to get us a venue to do outreach to students this spring. He hopes the early start will result in success this year.

Dorothy told us of new, permanent additions to the Space Command exhibit at The Franklin Institute! Yeah! The Institute does not add to unpopular exhibits. The public must have asked for this. There will also be a series of lectures, starting in February, and a new Fels Planetarium exhibit. She also brought a huge amount of other material including a book review from New Jersey Magazine of "Your Flying Car Awaits" and a long subtitle. The book is by Paul Milo and he talks on all the great stuff that hasn't, and sometimes should not have, come to pass. The book should be read for fun, and our failure to do all of its dreams taken with this in mind: we are still working on stuff.

Earl brought in a book on robots called "Flesh and Machines" that included the trail of developments that led to the little robot that could: sojourner. The gem of the idea started with an early NASA plan to send a 12 Billion (!) dollar rover to Mars based on the old model of how an intelligent machine should work. As the reader would surmise, this is not how it was done! A really good book with this being only a great side light. As an added note: the March issue of Sky and Telescope has an article that talks of Transitory Lunar Phenomena. Moon Society and others interested in seeing what is really in front of them should pick up this issue. Analysis software is mentioned that has allowed several of the previously unexplained "events" to be resolved, via analysis of high res images, as the result of light falling on certain areas and not, as we would like, from outgassing events. Not all are explained away however.

Comment: We will have to see what the cancellation of the Constellation really will do to our efforts. As I write this, the Science Friday guests on Feb. 5 where not sounding as though this is an unmitigated disaster. Congress will weigh in and we will see where the funding is going. Earl Bennett

CALIFORNIA

SDSPACE.org

San Diego Space Society

http://sandiegospace.org/

info@sandiegospace.org

Meeting the 2nd Sunday monthly
Next Meeting: Nov 8th, Dec 13th 2:30 to 4:30 pm
Serra Mesa Branch Library 9005 Aero Dr, San Diego
Quarterly Newsletter: ***The Bussard Scoop***

CALIFORNIA

OASIS

OASIS: Organization for the **A**dvancement of **S**pace **I**ndustrialization and **S**ettlement
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/wordpress/

oasis@oasis-nss.org
Odyssey Newsletter Online
http://www.oasis-nss.org/articles.html

Regular Meeting 3 pm 3rd Sat. each month

Next Meetings: Feb 20th, Mar 20th, Apr 17th

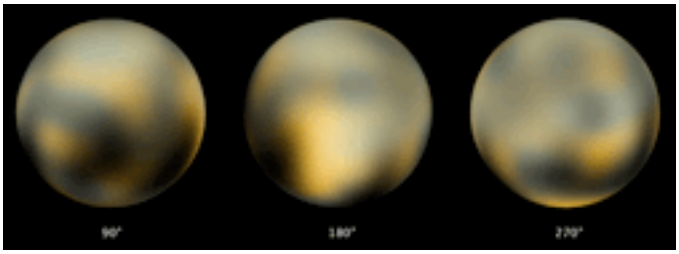
Information: OASIS Hotline, 310/364-2290; website.

- **Sat. February 20, 3:00 PM OASIS Board Meeting**, Home of Greg Slaughter, 5023 Lorelei Ave., Lakewood, CA 90712-2736

- **Fri-Sun, Feb. 26-28 Gallifrey One's Blackjack 21:** North America's 21st Annual Doctor Who Convention, Science lectures presented by OASIS speakers http://www.gallifreyone.com/gallifrey-schedule.php The Los Angeles Airport Marriot Hotel, 5855 West Century Boulevard, http://www.gallifreyone.com/gallifrey.phpl

- **Sat. March 20, 3:00 PM OASIS Board Meeting** Home of Steve Bartlett & Tina Beychok, 7108 East Peabody Street, Long Beach, CA 90808

Hubble takes most detailed portraits yet of Pluto



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