

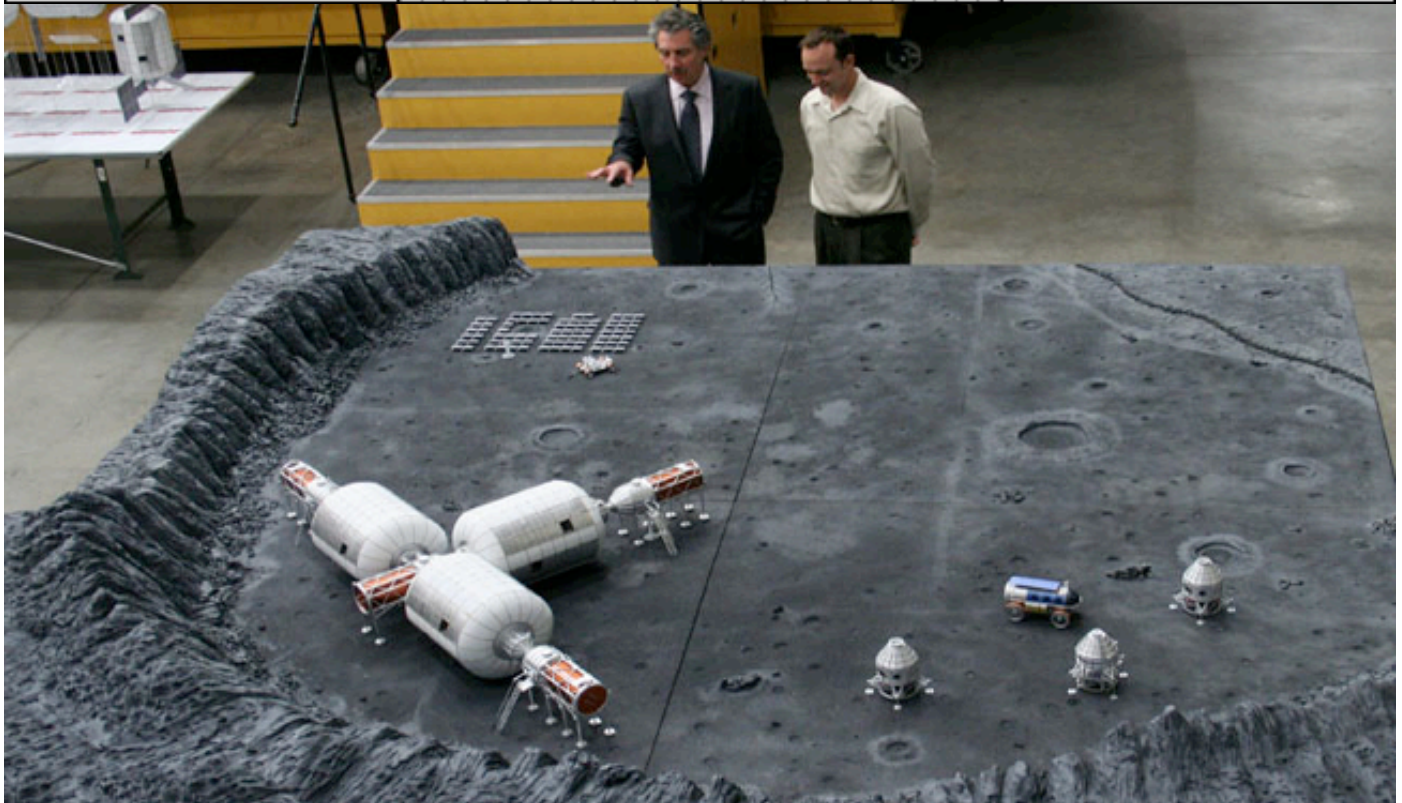
Moon Miners' Manifesto

& The Moon Society Journal

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#235

MAY 2010



Bigelow Moonbase: "significantly bigger, significantly less expensive, significantly sooner" (than any NASA plan)

Apollo 13 Commemorative Issue

**A Focused Advocacy for Human Space
Exploration** – 1st Prize Essay

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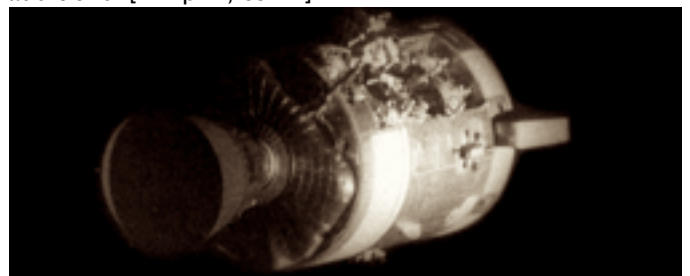
**More than one "Outpost" needed to Open
the Lunar Frontier Successfully**
Peter Kokh page 8

The Drama, Suspense, and Lessons of Apollo 13

Right: Apollo 13 Service Module: Photo taken after Crew
Module Separation, showing Damage from Explosion. As
with every reversal and setback that involves loss of life,
we hear the hue and cry of those who have lost the right
stuff of a frontier people and have become risk averse.
We owe it to those who will follow to stay the course.

IN FOCUS International Space Station Future is looking Brighter

Until President Obama gave some badly needed
re-targeting, it looked as if NASA was preparing to send
the venerable outpost to the same fate as it demanded
that Russia send MIR. The deorbiting and incineration of
ISS was to happen in 2016. Now ISS is not only safe until
2020, but possibly for well beyond that. More! In the
meantime, ISS may get some interesting and exciting new
additions. [=> 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 Glossary: new terms, old terms with new meanings:**
<http://www.moonsociety.org/publications/m3glossary.html>

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• **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 many 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 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.

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• **Submissions by email** to KokhMMM@aol.com - Email message body text or MS Word, Appleworks, pdf attachments ✓ Mac compatible CD / or typed hard copy must be mailed to: Moon Miners' Manifesto, c/o Peter Kokh, 1630 N. 32nd Street, Milwaukee WI 53208-2040

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⇒ In Focus Editorial continued from p. 1.

Obama mentioned inflatable additions such as the BA 330, which could double the stations volume for a fraction of the original cost: the 330 stands for 330 cubic meters of internal volume! And looking to salvage some elements of the Constellation program, the Orion capsule is to be completed and permanently docked as an ACRV – an Assured Crew Return Vehicle. Originally the X38 was being designed for this task, but the program was cancelled in a budget move. The Orion uses proven heat shield design and can carry 7–8 people whereas the present Soyuz is tight with just 3. That didn't matter when there were only 3 people aboard, but now there are regularly 6 or more.

There is also talk of bringing it to the ISS parking lot, if we can use that term, spare modules that had never been finished, plus engines, to assemble into *the first true space ship, destined not to reach space but to travel back and forth between space destinations.*

For those of us graying early space enthusiasts who conceived of the space station as an assembly and port facility, that it has become anything but has been a bitter pill to swallow. ISS is not in an ideal orbit for spaceward operations, but we can make it do in the interim. Meanwhile, with federal money going to help advance inflatable technology, whole new space stations in a more equatorial orbit are likely to grace the skies before 2020. The President is concerned that we learn to live and work more efficiently in orbit, so that then we can go anywhere, faster, cheaper, and in greater force.

India and China may well be invited to participate in the ISS activities and growth. Whether they will accept that invitation is uncertain. India has already said that it sees the Moon itself as the ultimate perch from which to study Earth, especially Earth's past to the extent that the Moon shared the cosmic events that forged our planet.

What about beyond 2020? Most of us would see decommissioning of the station as a crime. Yes, systems will wear out. So, replace them! Renew the station as needed but let's stop this obscene talk of scuttling it. We already committed that crime once too often. NASA needed Russia to focus on ISS. But Mir was already about to be sold or leased to a commercial firm. And if that deal fell through, it could have been boosted to a higher orbit to remain for centuries as Earth's first International Space Historic Site and Monument, a proposal MMM had suggested *before it was too late.* But NASA has this mindset that if they can't have it or use it, junk it. That was a moment that made many space enthusiasts begin to lower their esteem for NASA. Yes, we have become a throwaway society, but most of us realize that is not something to boast about.

Again, that is an obscene attitude of which no American should be proud. When the time comes when NASA doesn't want ISS, sell it to a country or to an international and/or commercial partnership that does.

The time will come, however, when newer. Larger, cheaper space stations (emphasis on the plural) will make ISS, in its present orbit, obsolete. So the long-term future of ISS remains a question. And that sets the stage for another article. Pradeep Mohandas, Dave Dietzler and I have some brash ideas. We'll have to leave you hanging until then!

PK

International Space Station Assembly Video

www.space-video.info/iss/assembly-animation.html

“Manned Space Exploration is Worth the Risk”

Our Apollo 13 40th Anniversary Essay Contest

[To insure judge neutrality, all the submitted essays bore only a **code name** and not the author's real name]



Above: the A13 Service Module Explosion captured in the imagination and art of Apollo 12 astronaut Alan Bean

A Focused Advocacy for Human Space Exploration

By Edward N Brown, Lakewood, California

Code name *Graystone_ebck*

Contest 1st Prize Winning Entry

It is generally agreed by most people that exploration and discovery are good and beneficial for future life and wellbeing. What are not in universal agreement are the approach that should be taken, the cost/ resources that should be allocated, and the Risk that should be allowed. As we acknowledge and appreciate this year the heroic efforts involved in the rescue of the Apollo-13 astronauts 40 years ago, many people are asking, "Is human space exploration worth the Risk?" If we are to answer 'Yes' to this question, we must be prepared to provide a convincing argument to support that position.

It is said that beauty is in the eye of the beholder. The same can be said about Risk. The degree of Risk involved in undertaking an activity can be estimated reasonably well by experts. Complexity, resource availability, and timeframe drive the estimate. But the degree of Risk that is tolerable by an organization or an individual is a much harder thing to ascertain. So when asked the question "Is it worth the Risk?", the answer is not straightforward. It depends upon the Risk tolerance of the evaluator. Four well-known factors drive the Risk tolerance*. Furthermore, the relevant tradeoffs are different for an individual considering undertaking an activity, an advocate proposing that someone else undertake an activity, a commercial establishment contemplating the prospect of starting an activity, and a governmental organization deciding whether to pursue an activity. Each has their own set of needs, desires, constraints, fears, and avoidances (henceforth abbreviated NDCFA) that influence their tradeoffs regarding Risk tolerance.

Let's look at the case of the advocate. To successfully advocate for something, you have to know your target. Then you have to "see-through-his-eyes"; to figure out what his NDCFA are, so you can try to persuade him to align his thinking with your own. Now

let's consider the question of whether manned space exploration is worth the Risk. As an advocate, we believe that it is, but who are we trying to convince, what are their NDCFA, and how should we proceed? It is important to note that we are talking about "exploration" and not travel, commerce, or pioneering. This will steer our approach.

"Exploration" can be defined as the search or investigation of the unknown, with the aim of making discoveries that will maximize the tradeoff of self or group NDCFA**. There are three relevant types of travel-based "exploration"***. The Experimental type may have instances where human-tended experiments have value, but in general, manned programs compete poorly with unmanned robotic programs because of the high cost and safety disparity. The Geophysical type may be applicable to small-scale proof-of-concept efforts, but these niche programs always have environmental and popular ramifications. However, the Experiential type is driven by the desire to affect the tradeoff of NDCFA by improving sensory awareness of the surrounding environment. At the group level, these programs are usually under the purview of government organizations, and this is where we should concentrate our advocacy. Space tourism, adventure, vocation, or settlement might be applicable at the individual level (which has a very different NDCFA set), but large-scale experiential-type exploration is applicable to the government realm because the NDCFA are nationalistic.

A good place to start to understand the US Government's NDCFA is to review the current US National Space Policy. Of the seven Goals stated, Goals 1, 3, and 5 are very relevant to human space****. Although it is hard to pinpoint, I'm betting that the Goals that contain the words "strengthen leadership" are the key needs and desires. These Goals also give insight into the fears and avoidances, which must also be considered. Thus the central argument around which we formulate an answer to the original question must involve the concept of retaining US world leadership in space*****.

The advocacy argument is this: The nation that leads the world in human space exploration will lead the world in the projection of its political, economic, value, and belief systems. It would be unthinkable to allow another nation with a different set of priorities to be the world's leader in the projection of those systems to the rest of the world. This was the driver behind President Kennedy's challenge to the nation in 1961 and it is still valid today. The most important sentence in his May 25 Message to Congress is "We go into space because whatever mankind must undertake, free men must fully share." That says it all. To insure that freedom, and not tyranny, will be the predominant social institution as mankind explores the space frontier, the US must be the world's leader. That is the overarching reason why human space exploration is worth the Risk. Loss of leadership could result in loss of freedom and diminution of our hard-earned values, beliefs, and economic well-being. Our foreign policy is based on that precept. It is the overriding need of the US Government.

There are a lot of catch phrases that can support the argument. "Oh, by-the-way, human space exploration will also ____". You can fill in the blank: "improve economic prosperity by creating jobs, enhance national security by providing in-situ observers, increase the future science/engineering workforce by inspiring youth,

improve civil operational efficiency through maintenance/repair of space assets (Hubble)", come immediately to mind. There are others, and they are all important.

Finally, it is sometimes tempting to wax eloquent about how human instincts (curiosity) or human destiny (species survival) compel human space exploration. While this may gather emotional support among the already-converted, it won't get you any political-sway in Congress or the Executive branch.

In conclusion, by following a focused approach to advocacy, we can maximize its efficacy. We can respond 'Yes' to the question "Is human space exploration worth the Risk?" with a specifically tailored answer that targets the key NDCFA (along with supporting arguments) of US Government leadership. Of course, a good advocacy would also have prepared counter-arguments to respond to critics, lobbyists, and anti-advocates. But that is the topic for another essay.

Footnotes:

* Risk tolerance is a complex function of 4 factors:

1. What you want at the end of the day
2. What it may cost you to get it (which may not be just monetary)
3. What it may cost you if you don't get it (which may include loss of human life)
4. The uncertainty (probability, likelihood) in the activity that is hoped to get you what you want, actually coming to fruition (the degree of Risk)

** The Needs and Desires are also known as Goals and Ambitions in the "literature" (reports, articles, books, magazines, etc.)

*** The 4 types of discovery-based "exploration" (2, 3, and 4 may be travel-based):

1. Conceptual/Philosophical – special religious, cultural, or personal focus – analytical orientation – result is intellectual gratification – driven by desire for insight into life and existence, or personal fulfillment
2. Experimental – scientific focus – research orientation – result is data and understanding of the data driven by desire for knowledge or understanding of natural physical phenomena throughout the universe
3. Geophysical: topographic focus, prospecting orientation: result is location of minerals or natural resources driven by desire for accumulation of raw materials useful in the manufacturing of products which can be profitably distributed to create wealth
4. Experiential – geographic focus – mission orientation – result is maps, organized observations/descriptions, territorial claims – driven by desire for sensory awareness of surrounding environment to fulfill organizational (e.g. sovereignty, prestige/power projection) or community/individual (e.g. survival, comfort/happiness) needs and desires

**** Goals of US National Space Policy (31 August 2006):

1. Strengthen the nation's space leadership and ensure that space capabilities are available in time to further U.S. national security, homeland security, and foreign policy objectives;
2. Enable unhindered U.S. operations in and through space to defend our interest there;
3. Implement and sustain and innovative human and robotic exploration program with the objective of extending human presence across the solar system;
4. Increase the benefits of civil exploration, scientific

discovery, and environmental activities;

5. Enable a dynamic, globally competitive domestic commercial space sector in order to promote innovation, strengthen U.S. leadership, and protect national, homeland, and economic security;
6. Enable a robust science and technology base supporting national security, homeland security, and civil space activities; and
7. Encourage international cooperation with foreign nations and/or consortia on space activities that are of mutual benefit and that further the peaceful exploration and use of space, as well as to advance national security, homeland security, and foreign policy objectives.

***** In May 2009, President Obama issued Presidential Study Directive PSD-3, calling for a broad review of the U.S. national space policy of former President Bush.

Manned Space Exploration is Worth the Risk

By Jared Treadway, Amelia, Ohio

Code name Emmacup

Contest 2nd Prize Winning Entry

Apollo 1, Soyuz 1, Soyuz 11, Challenger, Columbia:

To date, twenty-one brave space explorers have lost their lives while pushing back the frontier of humanity. When they died, not only did their families enter a black period of mourning, but entire nations grieved. In that grief we heard the rumblings of those who argued the futility of manned space exploration. They insisted that the deaths of these brave astronauts and cosmonauts were unnecessary, and that manned space exploration was not worth the risk of losing our sons and daughters, mothers and fathers, husbands, wives, and dear friends. Perhaps they have a point... perhaps.

Fear of loss is a powerful incentive to play it safe. Nature has provided us with a deeply-rooted instinct to protect those whom we love, and this feature has helped us to survive as a species in the face of countless dangers. Yet, fear isn't the only mechanism by which humanity has survived. Our mobility and vision have again and again drawn us to the horizon in search of greener pastures. Our will to survive led us out of Africa, across Asia, into Europe, and into the Americas. Our adaptability to a variety of environments laid the world at our feet. And even when the horizon had been conquered, the sheer challenge of diverse landscapes compelled brave women and men to scale Mt. Everest, race across Death Valley, swim the English Channel, or dogsled across Antarctica. Tackling a challenge brings out the best in humanity, plays to our strengths, strengthens our weaknesses, and strangely fulfills an oft-ignored void. Nature threw down the gauntlet, and humanity answered.

Yet, for restless humanity, another challenger now taunts; one that is akin to past challengers, yet dwarfs them by its vastness. The vacuum of space is monstrous, unforgiving, harsh, and takes no prisoners. Hitherto our challenges have taken place on our home turf, *terra firma*, where adaptability, though challenging, is possible. In space, however, humanity must rely solely on its ingenuity even to breathe. Like Sirens, other worlds call across unfathomable distances, beckoning to be explored. Humanity hears the call, feels the instinct to answer, but is intimidated by the danger. Having tamed nature, humanity has fallen prey to complacency and fear, and has excused itself from the call reverberating

from its own nature by appealing to the twin chimeras of expense and danger. But the call cannot be thus ignored.

The risk of *not* exploring space with a robust manned program is *greater* than the risk of losing our astronauts. Environmental concerns, energy production, the population explosion, and the risks posed by earth-crossing asteroids are all potential dangers to the human race *as a whole*, and are best answered through an aggressive program of manned exploration and settlement of the solar system. These problems simply cannot be solved through robotic exploration alone.

If current projections hold, the habitability of the Earth will be drastically different within the next fifty years. Some scientists estimate that our environmental pollution has snowballed to the point of no return, and that much of this damage to the environment is irreversible. Technological innovation enabling life to survive in hostile environments will undoubtedly progress as humanity settles on other worlds—a progress driven by necessity rather than sheer profit. Although Earth's environment is not expected to become as intolerable as other worlds, such technological advances will surely provide solutions to later Terran environmental problems.

Energy production in space, though costly, is a long-term investment in our future. Space Solar Power is being taken seriously by some politicians as a clean, credible option; and the ultimate benefits of such a program could be revolutionary. The late Gerard K. O'Neill had envisioned such space power stations as manned outposts where scientific research and station repairs and construction are carried out by ever-expanding manned crews. Such stations would someday become true colonies, essentially ensuring humanity's survival apart from the Earth.

As the population of Earth increases, problems concerning food production, sanitation, and clean water will also multiply. Such problems will have been dealt with in depth and from different angles by intrepid space pioneers, such as the first settlers of Mars or the moon. Fresh perspectives on such pressing issues will spawn equally fresh, innovative solutions.

Life on our planet has been molded by several planet-wide extinctions. The extinction of the dinosaurs was almost certainly caused by a rogue asteroid or comet that slammed into the earth 65 million years ago. The ability to maneuver and work in space is a necessity if we are effectively to deflect a potential planet-killer. In addition, if a giant asteroid or comet should catch us unawares, it would be wise to have humanity spread throughout the solar system in order to ensure our survival as a species.

Above all, however, stands one truth: when humanity ventures among the stars, we will pass a fundamental milestone in our existence as a species. We wandered out of Africa, emigrated east and west, crossed oceans, conquered the skies, and harnessed the power of the atom. Now humanity will have reached a new level of existence, that of a space-faring species. Space is our manifest destiny, and will be hampered only by a lack of will power and imagination. The call has gone out, the challenge made, and we can feel the very marrow of our bones urging us onward, upward, and outward. It is time for us to fulfill our destiny as a species. It is time for humanity to take the sage advice of Polonius: "This above all, to thine own self be true." ###

[The 3 3rd Prize Essays will appear in the June MMM Issue]

Aspects of a Moon Society Lunar Analog Facility and How We Might Design One

By Dave Dunlop – dunlop712@yahoo.com

Moon Society Director of Project Development

The Challenge of Lunar Analog Environments

The Moon Society has long been interested in the challenge of developing lunar analog programs. First, the challenge of doing so on Earth has value as a test bed for understanding the "systems issues" in terms of the sequence of development and the processes that can be used. It is less expensive and less risky to try things out in an analog of the lunar environment than on the Moon. We could not afford to do otherwise. It is also a challenge to our imaginations. The Moon is a harsh and hostile and unforgiving environment. It will demand the best efforts we can muster to really go there and learn to live and work in that environment.

It is also a challenge to our learning and skills development. It is one thing to write about or design something whether on paper or in virtual space; but it is quite another thing to carry out the process in the "real" world. Both stages of design are essential. We learn by trying things out. We learn by making mistakes, finding out what went wrong, and coming up with alternative solutions. We also derive pleasure from this process as physicist Richard Feynman wrote in *The Pleasure of Finding things Out*.

Now we can develop and explore ideas in the virtual world and modify and learn at less expense and effort than if we had to physically build everything. We want to see how what has evolved in a virtual design environment will actually work in real world operating conditions. Rapid prototyping allows us to join these two aspects together so that new things can be quickly designed and produced. Testing them allows us to evaluate whether we have been successful and to what extent. This technology is used to develop fairly small object such as metal or plastic parts. On the other end of the scale Contour Crafting of liquid materials such as concrete is now proposed for large-scale structure and buildings.

The computer aided design and manufacturing process will be the critical core for the effective colonization of the Moon. It is exciting and transforming that the whole scale of lunar base development and operations is being opened and advanced by virtual efforts. A chapter of the National Space Society, the Oregon L5 Society has been exploring the use of Second Life soft-ware to create a lunar base environment, this effort led by Bryce Walden.

Society member Manny Pimenta is developing another exciting software project called Lunar Explorer. This software will open up the challenge of lunar design to the wider world. He is working with Google and NASA to provide a software program that will permit people all over the world to participate in designing lunar cities and developing design ideas and solutions to complex challenges. This will permit large number of students and adults all over the world to "take on the Moon" as they develop their science and engineering skills. The Moon Society welcomes this advance as a way of letting the world participate and anticipate the development of an Earth Moon economy benefiting enriching, and protecting the Earth by opening the resources of space.

It is no doubt as important to engage multitudes of people in the challenges of designing because of the impact on them and on Earth's society, as it is to solve the design challenges themselves. The process of engagement, the ideas, the educational benefits, the entrepreneurs and business that result from the process are the major benefits of undertaking on this challenge. Perhaps the best way to open the frontier of the Moon is to bring that frontier within the grasp of every student and everyone connected to the Web.

The Current International Interest in Moon/Mars Analog Research Programs

Analog programs seem to generate a great deal of interest, and attract many persons who would like to participate in them. Moon Society members and affiliated National Space Society chapters have many ideas and ambitions regarding analog programs. In Canada on Devon Island, the Canadian Space Agency with NASA as a cosponsor has a Moon/Mars analog program (The Haughton-Mars Project). This facility is situated just a kilometer from the Mars Society's Flashline Mars Arctic Research Station. These are probably the largest, best known and best-funded efforts.

The Calgary Space Workers in Alberta, under the leadership of Michael Bakk, is working on a portable modular approach to lunar base design. In Sweden MS member Niklas Jarvstrat is developing an underground lunar analog project using a former iron mine. In Mexico Jesus Raygosa has been advocating for a Mexican analog initiative, MexLunaHab, and has formed a new organization COMEXEBA to move forward this project and other efforts that can be a part of the New Mexican Space Agency AXEA initiative. In Chile there is also interest in developing a Moon/Mars analog program in the Atacama Desert region. The Moon Society has been requested to assist in the design of this program in collaboration with Maria Catalina of The Astronaut Teacher Association (TATA), a California based educational program. Shaun Moss from Australia has also initiated a new interactive website www.moon-mars.com.

In the US the largest private effort to develop a space analog was the Biosphere II program in Oracle, Arizona during the 1990's. NASA developed its own Bioplex effort at Johnson Space Center in the late 1990's but ended those for budgetary reasons as it did the complementary NSCORT program at Purdue and other institutions conducting controlled environment agriculture and CELSS systems. While NASA has left a research vacuum in the US for this type of work, its shortsighted program reduction leaves a vacuum, which provides an opportunity for other nations. The Moon Society supports forward thinking and research that will advance the agenda of settling the Moon and saving the Earth, no matter where in the world this research occurs, because nothing less is acceptable.

The Mars Societies' Desert Research Station near Hanksville, Utah was leased for two weeks for a Moon Society Crew (MDRS Crew #45) in February-March 2006, after a prior 2-week stint by Moon Society President Peter Kokh on Mars Society Crew #34 the year before. The Moon Society does not yet have the resources to develop its own lunar effort in the US, but has given some consideration to potential sites, and has developed a multi-phase plan for an analog station of modular design.

The Urgency of Earth Applications of Lunar Analog Research

Now there is also another dimension to the issue of lunar base analogs that addresses the most urgent problems on Earth, the use of scarce resources and the management of the environment. A Moon base is a small village on the surface of the Moon. It must, because of transportation expenses, use the least amount of resources possible to meet the needs of its crew in safety and comfort, while recycling wastes, atmosphere, and water, and growing its own food and becoming as self sustaining as possible while also enabling a diverse ranges of research and commercial activity.

The disciplines and designs which will allow us to live and work on the surface of another planet will enable us to lift standard of living and preserve the environments of some of the poorest people on Earth. This is the payoff for a country such as India with some 600,000 villages whose productivity can be increased and whose people can aspire to a "Moon Standard" of living. Of course, India is not alone in this respect, as there are many people living in small village in rural poverty in countries across the world. But India deserves special mention because, from the very beginning of its space program, it has justified what they did in developing satellites and launch systems, which address the human problems of the country in agriculture, environmental remote sensing, meteorology, communications, and education. The ISRO could initiate a lunar analog program for the very same reasons and in the best of its scientific and educational heritage.

Design Elements of a Lunar Analog Base/Research Park

- A. The potential locations of a lunar analog are many. We have already discussed virtual space as the first step. But many will not be satisfied to limit their efforts to the virtual world. There is also a case for proving and demonstrating in the real world and to have a real world simulator. As we have already discussed there have been a variety of efforts in a wide-ranging number of environments. Some might be selected because the natural terrain has a lunar look-alike quality. Where testing in a physical environment is important locations such as Devon and Island and Antarctica may provide some aspects of the extreme natural environment of the Moon. Others might be constructed entirely with the confines of a building in the middle of a city in order to reduce expenses in transport of people and supplies and to build a simulator environment that is also physically accessible to large number of people. The Bioplex effort at Johnson Space Center in Houston, Texas followed this strategy. Because there are many aspects to analog considerations there is value in encouraging a range of approaches and efforts. The following elements of design should be part of a comprehensive analog effort.
- B. At the University of Arizona in Tucson, at the Controlled Environment Agricultural Center (CEAC) a prototype expandable Lunar Greenhouse is already in operation. CEAC is looking for more funding; the credibility of their systems could attract capital to a larger Analog Program which would have something no one else has: a working biological CELSS system growing food.



- C. The CEAC system could be further improved by the inclusion of robotic or teleoperable capabilities. That would take another level of funding and engineering expertise focus on the operational of a Controlled Environment Greenhouse
- D. What is also missing is an educational vision that could involve lots of students. CEAC has a good start on this. Synergies with the Lunar Explorer program might be explored. The proposed Moon Society Analog facility would attempt to involve students in many areas and in several ways, including teleoperation.
- E. Another valuable contribution would be developing a working surface infrastructure system that shows how things will be landed, moved around, and protected from surface extremes by various methods of shielding, which would have the added advantage of managing thermal extremes.
- F. We must demonstrate how tank farms can be assembled from empty landing vehicle tanks to enable ISRU demonstrations at first and then full industrial production.
- G. We must demonstrate how curation-receiving facilities would operate collecting and dividing samples for shipping to Earth from those maintained and protected on the Moon.
- H. We should demonstrate an architecture for extended surface exploration, which shows a progressive build up, and reutilization of what has here to fore been expendable equipment.
- I. We should demonstrate the utilization of solar energy systems and not only PVC arrays but solar thermal turbine systems, and the utilization of "solar wadi" which use the latent heat stored in processed iron enriched materials derived from the lunar soils.
- J. We should demonstrate the telerobotic operation of mining vehicles, which can process the surface regolith. The miner concept developed at the Fusion Research Institute at the University of Wisconsin was focused on the capture of solar wind implanted volatiles. Other materials process issues could also be coupled to these mining machines so that a cascade of materials processing events and process can be understood, designed, and prototyped. (See Q)
- K. We should demonstrate the operation of solar power laser transmission systems to power lunar surface vehicles.

- L. We should demonstrate a complete end-to-end system from the harvesting of food crops to their preparation and storage using robotic and tele-robotic capabilities.
- M. We should have modular habitation and lab systems perhaps using Bigelow inflatable modules or creating our own Moon Bagel Torus designs.
- N. We should develop working models of the autonomous lander and deployment systems expanding Greenhouse systems tele-robotically proposed by CEAC.
- O. We should partner with NASA to operate their exploration and surface mobility systems to see how they hold up in extended use and how well they can be maintained in a lunar simulation environment with missions "tasked" from an operating base.
- P. We should explore the use of contour crafting construction technology in construction of lunar base structures and explore how this type of machinery could be designed, shipped, deployed, and tele-operated in the context of a lunar base operation.
- Q. The development of feedstock for lunar concrete utilized by the contour crafting system is another aspect of in situ resource utilization studies, This aspect is also a significant systems development challenge based on the variability of lunar surface materials.

Now this list is not intended to be exhaustive but to merely illustrate the rich possibilities for research and engineering in a lunar analog context. We did not discuss the energy and resource systems management research alluded to in regards to the Earth-side applications. The limitation of page space leave much for discussion in future issues.

Links:

Haughton Mars Project
<http://www.marsonearth.org/>
 Flashline Mars Arctic Research Station
<http://www.fmars2009.org/>
 Mars Desert Research Station
<http://desert.marssociety.org/>
 Moon-Mine (Sweden)
<http://www.moon-mine.com>
 Moon Society simulation at MDRS
www.moonsociety.org/moonbasesim/moonbasesim.html
<http://marssociety.com/MDRS/fs05/>
 [scroll down to crew 45]
 Moon Society modular analog station presentation
<http://www.moonsociety.org/moonbasesim/proposals/AnalogMoonbaseProposal.pdf>
 Mex Lunar Hab proposal
http://www.moonsociety.org/sem/mlh_Raygoza.pdf
 Moon/Mars Atacama Research Station proposal
<http://groups.google.com/group/moonmars>
 U-AZ/CEAC Lunar Greenhouse
http://www.moonsociety.org/moonbasesim/moonbase_analogs_net.html#sadler
 Pisces Project on Hawaii Island
<http://pisces.uhh.hawaii.edu/documents/LPSCAbstractFinal.pdf>
 Calgary Space Workers Project
<http://www.calgaryspaceworkers.com/thehabitat.html>
 Aquarius Undersea Research Station
<http://uncw.edu/aquarius/>

Successful Opening of a Lunar Frontier Will Require More Than One Settlement

By Peter Kokh

An overwhelming percentage of lunar advocates, both professional and enthusiast supporters, assume that “the” lunar outpost will be at one of the Moon’s poles, with the South Pole the current favorite. We have many times stated our objections to this location on these grounds:

- The **available sunlight** is *not* fulltime, and so we must learn to store power for use when sunlight is not available. So why not learn to do this for as long as two weeks, which would enable us to go anywhere
- **Water is essential** and would be costly to upport and at the poles water ice is available. In fact what is there is at cryogenic temperatures and not a resource that we can expect to tap near term
- The **temperatures at the pole** (excepting permanently shadowed crater bottoms) are moderate. But we have already endured “mid-morning” temperatures on the Moon during the Apollo days. Being “afraid” (let’s call a spade a spade) of nightspan cold and dayspan heat is not a trait that bodes well for us as pioneers. We must learn to live in conditions that apply globally on the Moon, or just forget about it.

But from the vantage point of the Moon Society’s declared vision statement,

“formed to further the creation of communities on the Moon involving large-scale Industrialization and private enterprise”

the choice of “a” site is by itself “out of order.” Why? Because the list of resources that will be needed for such an ambitious goal, are not to be found in any one location on the Moon: not at the poles, not at any other single location.

We owe it to our own stated commitment to start at a place from which we can easily expand. The South Pole is more highland-locked than is the North Pole, where twice as much water ice seems to be available. But we will want to tap resources that are more abundant in the maria as well as those more plentiful in the rugged highlands. But not all maria areas are equally endowed.

Some maria and mare-fringe areas are rich in KREEP deposits, that is, in Potassium (K), various rare earth elements (REE) and Phosphorus (P). Other areas are rich in ilmenite, an iron-titanium-oxygen mineral. Others are richer in uranium and thorium, which could support a lunar nuclear fuels industry. Then there are special places like the Marius Hills, which may contain volcanic volatiles, which could be exceedingly important Indus-trially and biospherically.

Helium-3, if ever fusion based on this isotope becomes a near-term reality, is to be found virtually everywhere, but seems to be especially concentrated in ilmenite rich mare areas.

It seems that for a really successful industrialization, one as self-reliant as possible (some imports will be needed), we will have to set up shop in several locations, and, yes, that includes at least one of the poles, the north pole being the most promising on at least three counts: twice as much hydrogen (implying) water as at the south pole, more water-ice as opposed to frozen regolith with a low water content, and less than half the distance to the

nearest mare coast, the north coast of Mare Frigoris. There is reason to start outposts on the farside as well, both industrial reasons, and scientific ones.

We should factor in locations that will be highly attractive to tourists. At first, any place that is “on the Moon” will do. But as tourism grows, the demand will grow for especially scenic areas, and they abound. Some tourists will be content to land, look around, and leave. But more and more the demand for overland excursions will grow strong. New tourist targets will at first be handy to new industry-focused settlements. But in time, we will see them sprout up in non-settled areas. Different locations will offer different recreational opportunities as well as changes of scenery.

Now precisely because sites with special mineral resources will produce different products, they may also give rise to different arts and crafts, not just for frontier settlement enrichment, but to spur trade between settlements as well as to become more attractive to tourists, both those from Earth, and those from other lunar settlements – pioneers who need a vacation and change of scenery!

On Earth, trade was essential both for the development of local economies, and for slowly bringing all parts of the world into mutual contact. If we look back in history, trade has been absolutely essential, and probably the greatest single stimulus to the development and evolution of material cultures. Trade created incentives to build new highways, to improve transportation vehicles, to open new areas. Below is a map I found online of trade routes through Asia that have been key to the development of civilization.



What has all this to do with where we are now? A lot! The Bush-NASA plan was to open an outpost. Yes, NASA has always been aware of the potential for more, but it has not been tasked by the government to explore and develop those options. Thus the NASA plan was designed for a “low flight rate” transportation system in which cost was not an object, virtually guaranteeing that a first lunar outpost would remain the sole one, and that it might not even become truly permanent.

Personally, I have been greatly encouraged by the change in direction. While the government-focus may no longer be on the Moon, the technologies now to get attention will lead to better, cheaper, more efficient transportation systems, with considerable commercial participation, and even leadership. Now this is what we need to truly open a frontier. “A” lunar “outpost” has never been the goal of The Moon Society, nor of the National Space Society for that matter.

Yet there are many enthusiasts, who (a) would settle for a token outpost, and/or (b) are not confident of the abilities of the commercial and private sector to open the lunar frontiers. Face it. NASA cannot and will not open the Moon. Now we have a real chance that this will happen, and maybe even sooner.

PK



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 individuals and organizations which have contributed to the advancement of the exploration, research, development, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says 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.

Moon Society Elections 2010 Ballot

By James Rogers, Director and Elections Secretary

Dear Moon Society member,

We are now conducting the annual election of officers and directors of the Moon Society. This election is being conducted by both email and paper mail ballots. You may vote either way. Your ballot must be received (email) or postmarked by August 1, 2010.

Two directors will be elected this year. The second year of an unfinished term or a director who has resigned is also open, but we have no candidate. Officers whose terms expire this year are President and Secretary. At this time, we also have no candidate for Secretary.

All posts are two-year terms, except as noted.

An electoral statement for each candidate is included at the end of the ballot [page 10]. Please consult these statements for guidance in voting.

We have sent an email ballot out to all current members with valid email addresses on file. If you did not receive them, it may mean that we do not have your current address or it was blocked by your spam filter.

If voting by email, please include your membership number, if you know it, and email your completed ballot to this email address:

<mailto:elections@moonsociety.org>

If you vote by mail, send the paper Ballot to:

Moon Society, PO Box 940825 Plano, TX 75094-0825

Postmarked by August 1, 2010. Do not forget to *sign* the ballot and, if you can, enclose your *membership number*.

OFFICERS VOTE

President (Vote for one)

☐ Peter Kokh #239

☐ write in candidate _____

BOARD OF DIRECTORS VOTE (in order of seniority)

☐ Benoit Nault # 1365

☐ Fred L. Hills # 1379

☐ David Dunlop # 1348 (one year term)

☐ write in candidate _____

Voter's Signature _____

Membership # (if known) _____

President's Comment:

All of the above candidates have been very productive during the past year. While we have no contests this time, we are fortunate to have an outstanding slate, and I urge all members to vote *as an indication of confidence and support*.

Members who wish to have non-voting input on Management Committee deliberations, are welcome to email me with a request for Meeting Room access:

<mailto:kokhmmm@aol.com>

Candidate Statements

For President, 2 yr term: Peter Kokh #239

A member of the Artemis Society and the Moon Society since 1995, I started Moon Miners' Manifesto in 1986 and continue to produce it monthly. I was elected to the Moon Society Board in 2002, and to the office of President in 2004, and reelected in 2006 and 2008.

Chapters: I have continued to serve as Chapters Coordinator from 2002 through the present, endeavoring to create resources local members can use in public outreach. I have been a chapter person for 21 years. It is now easier for chapters to organize and work effectively.

Collaboration: A life member of the National Space Society from 1973, and an active leader from 1986, I negotiated an affiliation agreement with NSS at ISDC 2005. NSS subsequently cosponsored our Moonbase simulation exercise at the Mars Desert Research Station in Utah, in early 2006. We continue to work with NSS in the area of promoting Space Based Solar Power.

Our affiliation with the American Lunar Society remains active. We are also engaged in projects with the Mars Drive Consortium and with LunarWire.com. We are working with the Space Nursing Society on ways to promote the mental & physical health of lunar pioneers.

Projects: We continue to look for doable projects that will (a) help advance the goals of the Society, (b) publicize our existence and thus attract new members, and (c) provide more ways for members to be involved. We built a Solar Power Beaming Demo unit for ISDC 2008 and last year published an online kit for others to copy.

Since our Moonbase Simulation Project at MDRS two years ago, we continue to develop plans for our own analog research program and have recently had offers of assistance. There is so much to be done in this area.

Recruitment: we need to keep growing our numbers. Our members are essential as "keepers of the vision." But we need to attract many more of them. We also seek persons with a wide range of talents, to be able to undertake projects that leverage and combine these abilities, and produce valuable results. We seek not just a return to the Moon to set up a first human beachhead, but establishment of a viable community of pioneers from all walks of life: chemical engineers, systems managers, agriculture & biosphere specialists, product development experts, marketing experts – the list goes on and on. Rocket scientists and other "gray" engineers may get us back to the Moon. But we need the "green sciences" engineers and others to keep us there.

Enterprise: We layman can also do more. We can work in teams to identify technologies needed on the Moon then brainstorm each of them for any promising terrestrial applications. Our goal? to predevelop turnkey business plans entrepreneurs can follow for profits now. Any success would put new technologies "on the shelf."

As one who lived through the glories and frustrations of our first "flags & footprints" manned Moon missions, the last thing I personally want to help happen, is a rerun of that dead end. But that was the path that NASA has been on, and which the new administration is endeavoring to correct. This creates major challenges and opportunities for us, as "the little engine that could."

I am fortunate to be retired, and able to spend most of my time trying to grow the Society and make progress towards our goals. I appreciate your support.

For Director, 2 yr term: Benoit Nault #1365

I have been fascinated by the Moon ever since I first looked at it with my small telescope as a 7-year old. A short few years later, men orbited the Moon and then walked on it. I remember skipping school to watch the moonwalks. A new frontier was opening and I wanted to be part of the adventure.

Many of us share that same experience. The adventure has turned out to be a long, mostly fruitless, walk in the wilderness. But the goals of creating a space-faring civilization and of settling the Moon make as much sense today as they did all those decades ago. In fact, they probably make even more sense today than 40 years ago. Science tells us that the Moon probably holds key answers to the creation of the solar system and of Earth itself. Advances in technology make lunar resources available to us to help mankind move out into the solar system and quite possibly make life on Earth better in many ways. It is time to go back to the Moon to stay and the Moon Society intends to be part of the adventure.

I have been a "space activist" for more than 27 years. More recently (since 1991), I have been involved in National Space Society chapter activities. I have had the privilege of holding various positions in the Tucson L5 Space Society including four consecutive terms as chapter president (my last term ended in November 2007). I was also webmaster (and web developer) for the ISDC2000 website which included the very first online registration and payment form for an ISDC.

Professionally, I am a consultant in e-business and e-commerce technologies for medium sized companies. In that capacity, I manage fairly large projects with substantial budgets and work with teams that can range up to 20 people.

As the United States revamps NASA's priorities, the Moon Society is uniquely poised to continue to build on the interest in the Moon that remains. But we must plan our initiatives carefully.

I do not think I have the answers to all challenges facing us. And the challenges are substantial. All space activist groups face a declining and graying membership. I believe that attracting and retaining new and younger members is our number one challenge. Societal change is accelerated by technologies that are changing the world around us at a rate unseen in many generations, perhaps in human history. New ways of thinking and of doing things are appearing quicker than they can be inventoried. The Moon Society must find way to keep up and communicate in modern, relevant, ways.

In real world terms, the Moon Society must continue to work on a strategic plan to favor growth and a higher public profile. We should also put in place tools and instruments to help individual members and chapters with their projects and outreach efforts. I wish I had easy answers but I do not. But I would like to contribute to the debate. Your support is much appreciated.

For Director, 2 yr term: Fred L. Hills #1379

My interest in space goes back to an article Werner Von Braun published in Collier's Magazine describing space ships to reach Earth orbit and to go on to the moon. I was so impressed I built a model of the former.

Later I built a spaceport model and placed it in the county fair. I was disappointed at not winning a Blue

The Moon Society Journal - Free Enterprise on the Moon

Ribbon. Dad said the judges just didn't understand the model. So a year later I built one that they would understand... and got the Blue ribbon. There is a lesson here; our society needs to press ahead while keeping in touch with our readers.

My career has not included as much space activity as I would like, but it has included contracts for building the XM Satellite Radio service and Orbital Science's Orbview III Satellite.

For Director, David Dunlop #1348, 1 year term (2nd year of 2-year term of Shaun Moss, elected in 2009, who has resigned because of time conflicts)

I met Peter Kokh at the August 25, 1989 Neptune-Triton encounter (the Voyager 2 flyby) event at a planetarium in Neenah, Wisconsin. Peter had brought along some exhibits from his Milwaukee Lunar Reclamation Society NSS chapter, and I was hooked. Living two hours north of Milwaukee, in Green Bay, I became an at large member of the chapter. We worked together to start the Wisconsin Space Business Roundtable, and he helped me launch the LUNAR National Agricultural experiment Corporation - LUNAX - to get college level agriculture and ag-business students interested in doing ground level experiments. The purpose of these experiments was to help pin down what minimum lighting pattern during a simulated two week long lunar nightspan, would allow plants to survive and go on to harvest. We have now restarted this effort with new experiment lines as a Moon Society Project.

In the mid-1990s, I developed the Rockets for Schools program that has involved students in rocket launch and other space activities annually in Sheboygan, Wisconsin. I then developed a similar program for Muskegon, MI on the opposite shore of Lake Michigan.

For the past four years, I have been assisting Kokh, who had since been elected Society President, as Director of Project Development, an unpaid staff position. My first task in that regard has been primarily to help develop the "University of Luna Project." I have also been talking to people in other organizations about finding ways to salvage the work of Google Lunar X-Prize "also ran" teams to carry needed instruments to the Moon.

I have also been serving as co-editor of MMM-India Quarterly through the first six issues, and am helping nourish the new Moon Society India. Currently, on the Society's behalf, I am putting together the ISDC 2010 Moon Track, as I did for ISDCs 2008 and 2009. These efforts have taken me around the country, meeting Moon-focused movers and shakers. Establishing new areas of collaboration is a vital thrust of the Society.

Meanwhile, I have accepted an invitation to run for election as a National Space Society regional director for region 6 (WI, IL, IN, MI). We have been affiliated with NSS since ISDC 2006 and this relationship has been most helpful to the Moon Society. In this capacity, I hope to find even more ways for us to collaborate and cooperate with NSS on areas and projects of mutual interest. This affiliation extends our reach and offers new options to NSS members as well.

I will continue as DOPD if elected to the Board to finish the second year of a currently empty seat.

End, Candidate Statements

Our Apollo 13 40th Anniversary Celebration is Over! What's next?

By Peter Kokh

Our original idea was to put together a team of cosponsors and a list of great prizes, for our Essay Contest. But that did not happen. We decided to proceed on our own, nonetheless, and have been very pleased with the results. We did have a good number of entries, and given the differences in the judges' rankings, we decided to award three 3rd prizes, so that everyone whose essay ranked in the top three for one judge, but not for all judges, was recognized. As the 3rd prize was a one-year hard copy subscription to Moon Miners' Manifesto from the publisher, the Lunar Reclamation Society, and as LRS agreed to this arrangement, we proceeded.

1st Prize: Three-year renewal of current Moon Society Membership: **Edward N Brown**, Lakewood, CA

2nd Prize: One-year renewal of current Moon Society Membership: **Jared Treadway**, Amelia, OH

3rd Prize: One year hadcopy subscription to Moon Miners' Manifesto: *Three-way tie, listed in alphabetical order of last name:* **Tom Burkhalter**, Hickory, NC; **Dorothy Diehl**, Mt. Angel, OR (Oregon L5 Society); **Valentin Peretroukhin**, Toronto, ONT, Canada (affiliation unknown)

We thank our panel of three judges: Marianne Dyson, Ian Randal Strock, and Chuck Leshner.

The 1st and 2nd prize entries are published above. The three 3rd prize entries will be published in the next issue. These five and six more have been published in our electronic science-fiction magazine, *Moonbeams*, which you can download freely from this directory:

<http://www.moonsociety.org/publications/fiction/>

The Society also wishes to thank these winners, but also all the other contestants for their submissions.

Our Next 40th Anniversary Observance: Apollo 15



You will have noticed that we skipped Apollo 12. We cannot observe them all, and making a selection is fortuitously somewhat easy. For some reason, all the even # missions were *relatively* boring, all the odd # ones much more interesting. **A11** was the first; **A13** a near tragedy that grabbed worldwide attention; **A15** the first mission with a moon rover, longer EVA sorties, and the first really scenic setting: Hadley Rille and background mountains. So we choose to celebrate Apollo 15 next, **July 26-August 7, 2011**. This gives us the lead-time to plan something even better: *rover-related* and *scenery-related* - and time to field a better package of prizes.

The Moon Society Chapters & Outposts Frontier Report

Chapters & Outposts

Moon Society St. Louis Chapter

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

Contact: Keith Wetzel <kawetzel@swbell.net>

Next meetings – Oct 21st, Nov 18th, Dec 16th

Meetings 3rd Wed monthly at Buder Branch Library
4401 S. Hampton, in the basement conference room

Our April meeting was held on Thursday the 22nd as another group had reserved our usual time slot. Several of us are getting ready to attend ISDC 2010 in Chicago at which Dave Heck will give a presentation in the Business Track on the International Lunar Research Park concept.

Moon Society Phoenix Chapter

<http://www.msphx.org>

<http://www.moonsocphx.blogspot.com/>

Contacts: Craig Porter portercd@msn.com

Chuck Leshner: chuckmiester999@yahoo.com

Meeting the 3rd Saturday of the month

Moon Society Phoenix' next meetings are on

Saturdays May 16th, June 19th, July 17th

Our April 17th meeting had four members attending. Notes from meeting included a decision to ask Chuck to add a form to the web site for those who want to pay their dues for this year. Included on the form will be an address to sent the dues to. One furnished by our Treasurer or to me for deposit to the Chapter account.

We have a table for the LephreCon36 on the third Saturday's weekend. All volunteers to man the Table will be appreciated. We also have a Table for CopperCon30, labor Day weekend. Volunteers needed to man the Table.

We are trying to add a program to the Panels for both Cons on Commercial Space Flight. The presenter will be Don. I have requested a Brief Syllabus for the presentation so that we, The Moon Society Phoenix, can sponsor the presentation. Patti is supposed to send me contact information for the LephreCon36 Programming and I will submit it to Niki at CopperCon30 for inclusion in the Program listing.

Don found several websites (urls below) that have Model Rockets that can be printed out and made. We decided to print out a bunch of them and assemble some to give to visitors to the Table along with unassembled ones for them to assemble at home. We will evaluate the response to the models at the June Meeting.

<http://www.ninfinger.org/models/papermodels.html>

http://www.jleslie48.com/gallery_models.html

<http://solarsystem.nasa.gov/kids/papermodels.cfm>

This report is courtesy of Donald Jacques

Don's other projects include the remote RC Car operation by television link which has run into a problem with interference. One suggestion for a fix was use coding flags to ensure no frequency overlap. Other suggestions are welcomed.

Also the Habitat project is proceeding and Don is currently working on the Water Purification Module.

My (Craig Porter's) display wall is coming along in its redesign and construction. There were also some comments about the inventions of Nikola Tesla including "Free Energy" generators and other items.

Finally, because we will be at LephreCon36 the Chapter meeting for May has been Canceled, Meetings will resume in June on the third Saturday, at 3:PM, at Denny's on the South East corner of US60 and Rural Road.

Moon Society Houston Chapter

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

Contact: Eric Bowen eric@streamlinerschedules.com

The Houston Moon Society and National Space Society now meet together, sharing strengths and filling weak spots. This is a paradigm other chapters may want to consider. [Note: Milwaukee has done this from the outset and the Moon Society and NSS Phoenix chapters are considering adopting a similar arrangement]

The Houston Chapter's next regular meetings are scheduled for Monday, May 17th and July 19th

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 =====

www.moonsociety.org/chapters/chapter_outpost_map.html

Moon Society Nashville Outpost – Central Tennessee

Contact: Chuck Schlemm cshlemm@comcast.net

Bay Area Moon Society, CA Outpost – South Frisco Bay

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

Contact: Henry Cates hcate2@pacbell.net

Meeting at Henry Cate's in San Jose, 4th Thursdays

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)

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

Contact: Peter Kokh kokhmmm@aol.com

The monthly Lunar Reclamation Society meeting on the 2nd Saturday afternoon every month serves MSMO also. Some LRS web pages are now hosted on the MSMO site.

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

Who will control the Moon's water?

<http://www.thespacereview.com/article/1590/1>

Bigger NASA Centennial Challenge Prizes to come?

<http://www.newspacejournal.com/2010/02/23/bigger-prizes-to-come/>

An X-Prize for Biospheres?

<http://www.colonyworlds.com/2007/02/should-there-be-an-x-prize-for-biospheres.html>

Ganymede potential for human outposts

<http://www.colonyworlds.com/2009/09/scientists-mapquest-ganymede.html>

Space-X Dragon to Challenge Russia's Soyuz?

<http://www.colonyworlds.com/2010/03/spacex-to-challenge-russia-for-us-rocket-transport.html>

Mars & Back 520 day simulation exercise

www.esa.int/esaCP/SEM4VFFKZ6G_index_0.html

Mapping Venus: Extreme makeover or plate tectonics?

<http://www.physorg.com/news188466638.html>

Mars Opportunity Rover getting smarter

<http://story.malaysiasun.com/index.php/ct/9/cid/d805653303cbbba8/id/615502/cs/1/>

Britain finally gets its own Space Agency

<http://science.slashdot.org/article.pl?sid=10/03/24/0226225>

The "One Flag in Space" Project

<http://www.oneflaginspace.org/>

Hands-on CELSS Research by dedicated Greens

<http://groups.yahoo.com/group/andorprojex/>

Mars Express sends Hi-Res Photos of Phobos

http://www.dlr.de/en/desktopdefault.aspx/tabid-11/129_read-23079/

Mars Express closes in on origin of Phobos

http://www.dlr.de/en/desktopdefault.aspx/tabid-1/86_read-13776/

Lockheed Martin, Alliant Techsystems to reenter commercial small payload market

<http://www.space.com/news/athena-rockets-resurrected-sn-100325.html>

Orion saved as ISS Emergency Return Vehicle

http://www.msnbc.msn.com/id/36484353/ns/technology_and_science-space/

Britain builds new Space Center on the Thames

<http://www.businessmag.co.uk/News/Technology/Thames-Valley--Region-becomes--space-station-.aspx>

Space-X Dragon communications software on ISS

www.earthtimes.org/articles/show/spacex-activates-new-communication-system,1223935.shtml

WISE IR telescope finds unknown "dark asteroids"

http://www.spacedaily.com/reports/Dark_Asteroids_That_Can_Go_Whack_999.html

Prospects & Concerns for Export Control Reform

<http://www.thespacereview.com/article/1595/1>

New UK Space Agency & US-UK Cooperation

<http://www.thespacereview.com/article/1593/1>

Can Commercial Space win over Congress?

<http://www.thespacereview.com/article/1592/1>

Opportunity Mars Rover gets new "smarts"

http://www.marsdaily.com/reports/First_Image_From_A_Mars_Rover_Choosing_A_Target_999.html

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.) This month's selection below:

Saving the Earth by Colonizing the Moon

<http://gaiaselene.com/Saving%20Earth/SavingEarth.html>

Lunar Greenhouse – 5 parts

<http://gaiaselene.com/LunarGreenhouse/LunarGreenhouse.html>

ASSORTED SPACE VIDEOS

VASIMIR Rockets: The best, safest way to Mars

<http://spaceports.blogspot.com/2010/02/propulsion-technology-spotlights-vsimir.html>

Project M: Robonaut to the Moon

http://www.youtube.com/watch?v=kFPNcWN7QnM&feature=player_embedded#

NASA Robonaut Humanoid Space Robot

<http://www.youtube.com/watch?v=jOnp2M5qibs&feature=related>

Airless Tires ("tweels") for Moon and Mars

<http://www.colonyworlds.com/2008/11/video-off-road-tweeling-for-the-moon-and-mars.html>

OpenLuna Foundation Presentation

<http://www.vimeo.com/9513615>

James Webb Space Telescope "Trailer"

<http://www.universetoday.com/2010/03/24/sexy-new-james-webb-space-telescope-trailer/>

Videos by Gregg Maryniak (X-Prize Foundation)

- **Earth & Moon Gravity Well Comparison**

www.youtube.com/watch?v=VBQhtF3WhMw&NR=1

- **Scale of the Earth-Moon System**

www.youtube.com/watch?v=tcNYJkPgAwg&NR=1

- **Earth's Offshore Island (1)**

www.youtube.com/watch?v=LPW5zS_K_dc&NR=1

- **Earth's Offshore Island (2) (Constellation>Moon)**

<http://www.youtube.com/watch?v=hW8SRyrdqAU>

Videos by Peter Diamandis

- **Origin of the Google Lunar X-PRIZE**

<http://www.youtube.com/watch?v=G-zGwqO5BwY&feature=channel>

- **1st ten Google Lunar X-Prize Teams**

www.youtube.com/watch?v=7B9Vk0Gbaxc&feature=channel

NASA solar observatory (SDO) takes amazing video images of the Sun *****

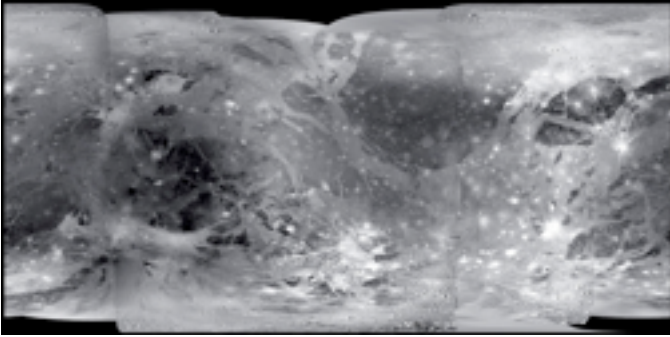
http://blogs.orlandosentinel.com/news_space_thewritestuff/2010/04/nasa-solar-observatory-takes-amazing-images-of-the-sun.html

"Fifty years after the creation of NASA, our goal is no longer just a destination to reach. Our goal is the capacity for people to work and learn, operate and live safely beyond the Earth for extended periods of time, ultimately in ways that are more sustainable and even indefinite."

MMM PHOTO GALLERY



WhiteKnightTwo/SpaceShipTwo in flight: Mark Greenberg



Mercator Map of Ganymede, largest moon in Solar System



Arctic Ocean Summer Ice as of 2007 – NASA to remap
<http://english.sina.com/technology/p/2010/0320/311028.html>



First rock selected for examination by Opportunity's new "smart" software recently uploaded

Hi-Res Photos of Phobos by German Aerospace Center–(DLR) High Res Stereo Camera (HRSC) on Mars Express



http://www.marsdaily.com/reports/MarsExpress_Returns_Phobos_Flyby_Images_999.html – story

Hi-Res images at following addresses:

http://www.dlr.de/en/Portaldata/1/Resources/portal_news/newsarchiv2010_2/7926_phobos_nadir_Hires.jpg

http://www.dlr.de/en/DesktopDefault.aspx/tabid-11/129_read-23079/gallery-1/gallery_read-Image.1.13503/

animated image of Phobos rotating

http://www.dlr.de/en/DesktopDefault.aspx/tabid-1/86_read-13776/gallery-1/gallery_read-Image.1.6639/

Below: Mosaic of 3 images taken by Viking 1 in 1978



A Probe to one of Titan's Lakes?

http://www.spacedaily.com/reports/Life_Without_Water_And_The_Habitable_Zone_999.html



Engineering drawing of proposed **Titan Mare Explorer (TiME)**, atop its carrier spacecraft. It would land in one of Titan's northern lakes, then drift across its surface, taking photographs and analyzing the lake's chemistry.

Credit: Lockheed Martin

Titan's surface hardly seems habitable with temperatures around $-290^{\circ}\text{F}/-179^{\circ}\text{C}$! While at those temperatures, water is as hard as granite, methane and ethane are liquids. Through repeated passes of Titan, the Cassini Saturn orbiter has sketched a whole hydrological pattern using these liquids instead of water and on an "annual" cycle 29 Earth years long. Titan keeps the same face turned towards Saturn and shares the host planet's long seasons. Cassini has not observed a full cycle but in the past 6 years has seen a fifth of it, enough to get a good idea of the rest.

While methane and ethane are the simplest of hydrocarbons, it is possible to build an enormous diversity of organic molecules from them. But it could hardly be "life as we know it." "DNA and RNA form out of compounds that require oxygen and phosphorus, and there's very little oxygen in the Titan system." And the very structure of DNA depends on liquid water.

Now there have been those willing to speculate, with almost nothing to go on, about "life as we do not know it." Some have speculated on silicon based life, and other wild organic pathways. But we have had nothing to go on but imagination. Titan may give us the only place in our solar system to find life that is truly "exotic."

It is "its water-loving and water-repellant ends" that gives DNA its helical structure. Is there a similar sort of polarity that can be based on a medium other than water? From the point of view that it is more important to explore the truly exotic than the merely different, "Robert Shapiro, a professor of chemistry at New York University, and Dirk Shulze-Makuch of Washington State University rated Titan a higher-priority target for investigation than even Mars." Now we must wait and see if NASA gives the TiME mission priority status. *Not to forget Europa!*

M A I L

T O

M M M

Demand Action on Base Load Solar Power

Target: US Government

Sponsored by: [Karen Cramer Shea \(NSS Blog\)](#)

<http://www.thepetitionsite.com/3/demand-action-on-base-load-solar-power>

Base load power is reliable 24 hour a day power.

How can solar power be reliable 24 hours a day?

Put the collector where the sun always shines, Space.

An idea for a Conference on Space Solar Power was the most popular idea across the entire government on the Open Government Ideascale. It was the most popular idea for NASA, the Department of Energy and for the Office of Science and Technology Policy. The reaction has been mainly to ignore it.

OSTP says this is not specific enough.

DOE is saying nothing about enacting any of the hundreds of ideas proposed by the public.

NASA is saying a Space Solar Power conference is infeasible and unpractical. A conference is infeasible and unpractical?

To make it more clear that it is being ignored at the time this is being written [opengovtracker.com](#) is down and no longer showing the most popular ideas from Open Government Ideascale. Also the site to comment on the NASA Open Government Plan is not functioning even though they promised it would be up by April 14th.

[\(http://opennasaplan.ideascale.com/\)](http://opennasaplan.ideascale.com/)

The idea that these 3 agencies refuse to act upon is:

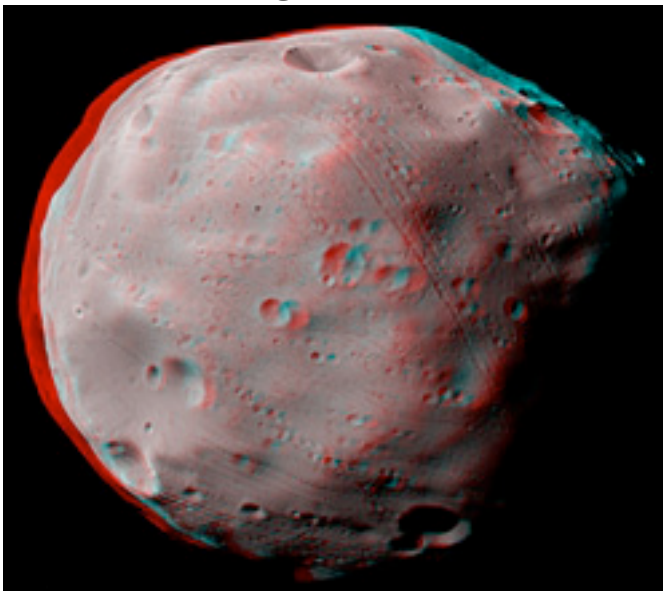
"Hold a conference on Space Solar Power which brings together NASA, the Department of Energy, The Department of Commerce, University researchers as well as corporations such as Solaren, PowerSat, Space Energy, Space Island Group, Boeing etc. Also inviting the Japanese, European, Russians and Canadians who are who are working on Space Solar Power. The conference would develop ideas on how best to bring this technology to reality. Space Solar Power offers unlimited, green, base load power. It is now time to turn this futuristic concept into reality with NASA in the lead."

The base load power which a solar power satellite could provide would be clean, green house gas free, easily transferable and exportable Power. Space Solar Power is also scalable. Space Solar Power could eventually meet all our electrical need. There are presently a handful of Space Solar Power companies, one of which has a contract to deliver power. None of these companies can succeed without government involvement since at a minimum they need approvals from multiple agencies to launch and operate solar power satellites. The government's refusal even to have a conference on Space Solar Power dooms this new green energy alternative before it can even get off the ground, literally. This shows government is simply not taking green energy seriously.

Comment: The Moon Society is a charter member of the 13 Member Space Solar Alliance for Future Energy, SSAFE.

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

3d image of Phobos



You will need a color copy of MMM and 3-D glasses, or http://www.nasa.gov/mission_pages/MRO/multimedia/pia10371.html -- but you will still need 3-D glasses!



<http://i.space.com/images/astronauts-prank-100401-02.jpg>

Astronauts appear to be outside the new cupola, in space without space suits. A trick photo sent to HQ on April 1st!



**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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bobriverwest@yahoo.com 414-372-9613

LRS News

- **Astronomy day:** we have been invited to attend, but with ISDC in Chicago next month, we are too busy preparing exhibits for that event.
- **Rockets for Schools in Sheboygan:** Once again, our chapter meeting May 8th is the same day.
- **ISDC 2010:** In Chicago, Illinois this year, May 27-31, Memorial Day Week. Peter Kokh, Dave Dunlop, Charlotte and Gene Dupre, Dennis Groves, James Schroeter, and Bob Bialecki will be attending: 7 of us!
- **LRS Website SHIFT:** Because the Lunar Reclamation Society website has been "off the ether" for several months now due to DNS problems beyond our control, key pages of the LRS website have been reproduced on the Moon Society Milwaukee website, including Meetings announcements, and the page on experimental lunar agriculture, and the one on our experimental lunar painting project. The new MMM Glossary and the MMM-derived papers pages are now relocated to the Moon Society/publications/ website area.
<http://www.moonsociety.org/chapters/milwaukee/meetings.htm>
<http://www.moonsociety.org/chapters/milwaukee/lunax/>
www.moonsociety.org/chapters/milwaukee/painting_exp.html

LRS Upcoming Events

Saturdays: 1-4 pm

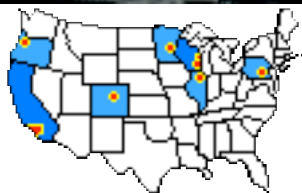
May 8th – June 12th (no July, August meetings)

LRS Meeting, Mayfair Mall, Garden Suites Room G110

AGENDA: Note change of web address !!!

www.moonsociety.org/chapters/milwaukee/meetings.htm

We have been discussing a summer field trip, something we used to do annually, but haven't done in several years. The suggestion on the table is a visit to the new Discovery World Wisconsin (with Aquarium) on the Lakefront – we have to pick a date. We can also look at a summer pot-luck picnic, possibly at Charlotte & Gene's.



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

May 16th, June 19th, July 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/

Calendar: MN SFS 2010 Past & upcoming chapter events

www.freemars.org/mnfan/MNSFS/2010-12-Review/

- ❑ May 10th, 2010 MN SFS Meeting
- ❑ May 14th, 2010 ISS-23 / STS-132 Display
- ❑ May 15th, 2010 CVAS Astronomy Day
- ❑ May ??th, 2010 ISS-24 Display
- ❑ May 27th-31st, 2010 [ISDC 2010](http://www.isdc.org/), Chicago
- ❑ June 14th, 2010 MN SFS Meeting

MN SFS's ISS-23 / STS-131 Space Display

<http://freemars.org/mnfan/MNSFS/2010-04-ISS-23-STIS-131-Display/>

Ben's Yuri's Night Pix

<http://freemars.org/mnfan/MNSFS/2010-04-Yuris-Night/>

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/>



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

Jun 17th – Aug 19th – Oct 21st – Dec TBA

We will have our usual exhibit table at Rockets For Schools on Saturday, May 8th

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: May 10th, June 14th, July 12th

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
856/261-8032 (h), 215/698-2600 (w)

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

• **PASA regular business luncheon/formal meeting 1-3 pm, the 1st Saturday of every month** (unless otherwise specified) 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: May 6th, June 5th, July 10th (2nd Saturday to avoid the July 4th holiday)

April 10th Meeting Report: We had a fun meeting, in part due to a TV show: The Colbert Report! Neil De Grasse Tyson came on and he and the host were like a duet, agreeing that we need a bigger, better space program! Yeah! (Since then our own Derrick Pitts has been promoting the President's plan to push for Mars). Good publicity for our desires.

Mitch Gordon brought a variety of material including Ad Astra with material on the Hubble Space Telescope primarily. And the other major articles were on Space Solar Power systems. This research was here and in Canada. The Naval Research Lab is the U.S. group mentioned. See the publication or go to nss.org for more. He also brought a new logging system to keep track of spending for our 501c-3 status. For our spending on Carver Award material he also gave Earl a check for about half of what was given away, the rest being a donation. And the good things go on: Mitch informed us several weeks later that we have an invitation to be at the Franklin Institute

For Astronomy Week on the same date as our Super Science Saturday in Trenton. He is looking into outreach in May at local street festival too. And finally; Mitch has written a blog on an awards contest that he thinks would be useful: he proposes that some of the Moon Rocks be used to create jewelry as a way of bootstrapping a lunar jewelry industry by familiarizing creative artists on Earth with the material. Details of selecting candidates are to be worked out. He noted we also get Mars rocks too!

Dotty reported on a variety of museum activities ranging from The Franklin Institutes showing of Hubble on the I-Max screen to Moon Shot at the Franklins Fels Planetarium and "Two Small Pieces of Glass" on the telescope were among other offerings. And, as mentioned before, Space Command will be expanded and, in tribute to Ben Franklin, the Electricity Exhibit will return. She also brought "All I Really Need to Know I

Learned from Star Trek" by Dave Marinaccio (bought at Lunacon in March).

Larry reported that we have a Facebook presence, which you reach by spelling out our group's name: the philadelphia area space alliance. Larry will be moderator for this group. Our event pictures for the Carver Science Fair (elementary division) are on our site and the senior division is coming. And, thanks to Michelle and Mitch, Larry will have images from Super Science at Trenton, and The Franklin Institute respectively, soon.

Janice, our new associate member, talked about her continued research on Apophis and about the possibilities of deflecting it. She has found that it will approach Venus in 2016, and wonders if anyone has considered using this close approach, and a nudging device like an ion rocket or even nuclear detonations, to alter its' path to definitely miss the Earth. She is talking to a NASA individual on this idea. Ideally it could be steered into Venus! She has put her ideas on our Blog.

Earl brought material from several source, and waited to include our April events. From the January/February Amsat Journal on a new educational project called the Funcube. This British project will use a single satellite, of the Cubesat type, as support for the Science, Technology, Engineering, Math initiative, and as an additional resource for the GB4Fun Mobile Communications Center. The intended audience is students in primary and secondary schools. It will use 145 MHz as the telemetry frequency and will a student science experiment in materials science. Source: press release reprinted on page 31.

There is also a lot on solar cells used in early satellites (still functioning), and more. From Test and Measurement World for March: Reaching Out by Rick Nelson Editor in chief is an article about robotic arms in various applications. The company discussed is Alliance Spacesystems, which developed arms, and other robots assemblies, for the Phoenix Mars Lander and other space applications, including one for a possible robotic repair of Hubble. And from Scientific American for March two good reports: Ralph Lorenz and Christophe Sotin wrote: **The Moon that would be a Planet** about Saturn's moon Titan and what we have learned from Huygens and Cassini data gathering. Lots of real pictures and a description of the atmospheric cycle (The Methanological cycle, similar to the hydrological cycle on Earth but with Methane as the liquid).

The other piece is on that perennial next decade, twenty year, someday technology: fusion. **Fusion's False Dawn**, by Michael Moyer. Described are several techniques that have promised fusion, if we could build a bigger, more powerful, etc device. Skeptics think that we will never create a commercially useful reactor. For the amount spent so far, billions of dollars over the decades, a great deal of alternative energy sources could have been put into production, in my opinion. The article does not include several technologies that need funding to really test, such as Tom Ligon's fusor. And from the Web: There is great material on the goggle Lunar X-Prize on its website including pictures of new rover entrants (videos) and a version of the contest for younger people, called Moonbots: A Google Lunar X Prize Lego® Mindstorms® Challenge. This is for parent and child teams and was started April 15 for Phase 1. See The Launch Pad area of the sites for this. Also look at the rover teams!

Activity report: we had a great time at Super Science Weekend at The New Jersey State Museum! Although we were placed in an odd location, near the dinosaur education groups (which Dennis found disturbing) inside the building (no solar power display), the audience loved us. We ran out of most of the handouts that we brought. A number of them were copies of things from Moon Miners that I thought the public would find interesting. In particular, both the material from the report on the X Prize in Moon Miners and the Wisconsin Helium Three mining machine (by Dave Dietzler) went, as did a Lunar Lava Tube handout I created. The Moon miner material also included the various websites for affiliated organization. Most of our Moon Society bumper stickers (thank you Peter!) went, as did some other handouts on science and energy. I built a small model of the large lava tube discovered by the Kaguya spacecraft. This set next to our original display really interested the visitors. We have sent a picture of the earlier, elaborate, display and have to do "The Empire State Building in a Lava Tube" pictures for publication. The pictures from Sky and Telescope, for February, from the Kaguya where very useful (the issue included LCROSS material too). Lots of interesting questions and comments.

At the Franklin Institute, Mitch single handedly covered the two tables he had and managed to do a great job. He spoke with Astronomer Derrick Pitts of the Institute about our being there for events in June and July and we will be there if there are events. Thanks to Derricks' presence we often get more visitors. And thanks to the Museum, Mitch had some help to hold down the fort when he need help. Several members where unable to attend, and although I had Dennis Pearson's help, Mitch did it alone. More members needed! I think that is the situation for many groups.

Submitted by Earl Bennett.



Earl with lunar lava tube display at Trenton Super Science event 4/24

CALIFORNIA

SDSPACE.org

San Diego Space Society

<http://sandiegospace.org/>

info@sandiegospace.org

Meeting the 2nd Sunday monthly

Next Meeting: May 9th, June 13th, July 11th

Serra Mesa Branch Library 9005 Aero Dr, San Diego

Quarterly Newsletter: **The Bussard Scoop**

CALIFORNIA

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/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: May 16th, June 19th, July 17th

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

SAT May 15th, 1 pm OASIS Board Meeting

Long Beach Public Library, 101 Pacific Hwy

Tentative: following Board Meeting

Free OASIS Lecture series: **Shuttle Retrospective Lecture**
by Ron Urquidi, Rocketdyne engineer.

Long Beach Public Library, 101 Pacific Hwy, Long Beach

FRI May 21st Astronomy Night

Cerritos Public Library, 18025 Bloomfield Ave., Cerritos

Saturday, June 12th OASIS LECTURE SERIES:

Ed McCollough: "Space resources & colonization"

Location/Time: TBD

Friday, June 18th (tentative)

Tour of Space-X, 1 Rocket Road, Hawthorne, CA 90250,
(310) 363-6000 ***OASIS members only*

Saturday, June 19, 3 pm OASIS Board Meeting, Home of
Bob and Paula Gounley_17381 La Paz Road_Altadena, CA

Th-Su July 1-4, 2010 Westercon 63, Pasadena Hilton,
Pasadena. We will once again have a fan table and be
doing space programming for this convention. *Join us!*

Saturday, July 17th, 1 pm OASIS Board Meeting and
Anniversary Potluck: Polliwog Park, Manhattan Beach, CA



OASIS welcomes members of all ages, even young Daleks!

Moon Miners' MANIFESTO

Lunar Reclamation Society Inc.

PO Box 2102, Milwaukee WI 53201-2102

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=> For those outside participating chapter areas <=

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Payable to "LRS", PO Box 2102, Milwaukee WI 53201

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• \$15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)

• \$12 low "one rate"

MINNESOTA SPACE FRONTIER SOCIETY

• \$25 Regular Dues

OREGON L5 SOCIETY

• \$25 for all members

O.A.S.I.S. L5 (Los Angeles)

• \$28 regular dues with MMM

PHILADELPHIA AREA SPACE ALLIANCE

• Annual dues for all with MMM \$25, due in March
or \$6 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