

Moon Miners’ Manifesto



& The Moon Society Journal

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In FOCUS: SPACE: “Information”

When I was in High School, in the early 1950s, the “future” was a time when all means of transportation and construction would be revolutionized. Cities would abandon street crossings at grade in favor of a maze of flying highway ramps. Monorail trains would cross the country in hours. Flying wing and flying saucer shape aircraft would dominate the skies. While in fact we have made advances in transportation, housing, and construction, 90 % of everything remains “old.” a natural pattern that will always be the case unless wholesale obliteration by war or natural calamity intervenes. The point is, however, that the “future” of the “fifties” is not our present.

The real and unsuspected revolution has been in information technology, and while many space buffs remain fixated on rockets and rocket science, the real revolution in space has been in what we know about the universe. Information is the crest of the wave of time.

Certainly for the astronomer and planetary scientist and the large percentage of the public who follow each new planetary mission, the ongoing revolution in our picture of the solar system from the Sun out to the Oort cloud is one that continues to fascinate.

Some have stated that the most significant product

Whets Appetite for “Experience”

of the Space Age is knowledge. I can well remember when all we know about the planets could be summed up in a page or two in a late 1940s “coffee table” book about “Nature.” Now we know as much about little moonlets hundreds of millions of miles from Earth as we did then about Mars -- not much more than a table of statistics: diameter, axial tilt, orbit facts, length of day, etc. And we must admit that some of what we thought we knew back then was not just sketchy, it was dead wrong. Venus is the classic example.

Some would sum up the products we can expect from space as “zero mass imports.” Information, information relays, information storage. But we must beg to differ. *When has it not been so* that information whetted the appetite for experience? The more we know about these strange worlds, many of them only recently discovered, the more we want to go see and experience their alien horizons and landscapes for ourselves. And if we can’t go ourselves, we want to see pictures taken *by human eyes* that could go.

Tourism is in many countries among the top five industries in terms of expenditures. In quite a few countries, it is number one. Space tourism? It may be for the jetsetters, at first, but the sustainable market for extreme and off-the-beaten-path adventures [⇒ p. 2, col. 2]

Fired Earth Structures as a Model for Moon & Mars?

At the California Institute of Earth Art and Technology in Hesperia, California, north of San Bernardino, creating fired earthen structures for people on Earth, and for future people on the Moon and Mars is taken seriously. The structures do make one think somewhat of the plans of the Mars Foundation for building on Mars out of local materials. But many challenges must be overcome. pp. 3-5



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- **Moon Miners' Manifesto CLASSICS**: Beginning with 'July 2004, we have begun an effort to re-edit, reformat, re-illustrate and republish the timeless articles of MMM's first ten years, with the intention of publishing two issues, each covering one year, in PDF format only, for free downloading, each January and July.
- **MMM's VISION**: "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; earliest use of Mars system and asteroidal resources; and the establishment of the permanent settlements necessary to support such an economy.
- **MMM's MISSION**: to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.
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⇒ IN FOCUS Editorial continued from p. 1.

is a clear indication that the time will come when many people will be able to go beyond Earth's shores, with careful income and savings planning. "The trip of a Lifetime" is a dream that a growing number of people hold up as a goal.

How far can this go? Suborbital hops will only work to increase the demand for affordable orbital excursions and for ever more orbital hotel/resort complexes. It may be a while before LEO has the same siren effect as Las Vegas, but I would not bet on it being more than a generation away at most. Meanwhile the advance guard of the wealthy and those not-so-wealthy that have planned well will be taking loop-the-Moon non-landing tours.

As destinations go, the Moon has the most important three attributes: location, location, location. In comparison to the Moon, a trip to Mars compares as a climb up Mt. Everest compares to a weekend trip to the beach.

For a while, those seeking experiences will push lunar development: places to go and things to do *on the Moon*. The virtual reality people will dominate the market for translunar experiences. VR itineraries will be available for many areas of Mars, compiled by robot rovers, and a scattering of human pioneers. Rover compiled data will be turned into Virtual Reality tours of ever more distant and hostile worlds. Even with the introduction of nuclear thermal rockets, a round-trip sight-seeing excursion to Mars or to the cloud tops of Venus will eat up a year or more of a tourist's life. But there will be those who will take the plunge. For some, there will be little to put "in order" before embarking on such a venture. Explorers and adventurers in the past often said their goodbyes for months and years at a time. Those times will return.

We don't mean to imply that information and experience are the only two realistic products from space. But it may well be that the latter leads to most of the others, including the development of local resources wherever tourists want to go bad enough. We can foresee a very varied line of exports from the Moon, especially to other markets in space such as low Earth orbit industrial parks and tourist oases, settlements on Mars, expeditions bound for the asteroid belt and beyond. But for other worlds, including Mars, building a viable economic scenario that involves trade is an uphill venture. How we will do that is far from clear, though some clearly "have the faith" if nothing else to go on.

From Earth it pays only to send people, tools, and seeds. It's steep gravity well, so steep, that there will be strong enough incentive to source all other needs locally or elsewhere in space. And that trade, in quite a few things besides "information," is what will develop the human economy from an Earth bound one, into an Earth-Moon one, and finally into a Solar System economy and civilization.

At least, that's how the "future" looks from here, fiftysome years latter.

<PK>

CREATING STRUCTURES IN LUNAR BED ROCK

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Abstract

Rock structures have been used on Earth for habitats and related infrastructure since time immemorial. This paper proposes the concept of using moon rocks, both raw and machined, to build permanent lunar colony infrastructure elements. Merits and challenges are listed.

Introduction

Highly efficient, long-lasting and successful habitats and related structures built of rock have been erected on Earth for thousands of years. While specimens abound all over the world, fine and lasting examples include the pyramids of Egypt, the pre-Celtic and cave structures of Europe, the ziggurats of central and south America and the temples of Greece, south east Asia and India. They were all built many, many centuries ago, and some of them are quite serviceable even today.

The Moon presents a highly rocky structure that appears just a few meters below its garden surface. It should be possible, with the proper tools and methods, to utilize this resource for building up the permanent lunar colony infrastructure.

Combating The Lunar Environment

Hard vacuum, Galactic Cosmic Radiation, high energy solar particles, large thermal variations during the lunar diurnal cycle and micrometeoritic showers make the lunar surface a very harsh environment for humans to inhabit without sufficient protection.

It is possible to provide a pressurized environment using an airtight vessel such as a hard or inflatable module. However, substantial physical matter (mass) is needed to effectively shield against temperature swings, radiation and the constant bombardment of micrometeorites. Carrying the required mass of shielding materials along from Earth is prohibitively expensive and impractical. Therefore, ideally, an initial lunar colony might do well to situate a pressurized habitat within a naturally protected and easily accessible location such as a lateral fissure or under an overhang within a crater. The next best but energy consuming, messy and risky shielding option might be to pile up the required thickness of loose material around a pressurized habitat.

Rock Structures

- A. naturally occurring and
- B. artificially built

Naturally occurring rock structures include, randomly distributed, geologically formed hollows or cavities on the terrain including craters, caves, gorges, volumes under rock overhangs, ravines and so on.

Volcanic, seismic, meteoritic, (for the Moon) as well as aqueous and aeolic processes (for Mars and other bodies with an atmosphere and surface liquids) are among the agents responsible for these formations. Many ideas have been proposed for utilizing these formations for extraterrestrial habitats.

Artificially built rock structures for the Moon are the subject examined in this paper. They include the use of raw or unimproved rock in various forms as well as tooled or machined rock for building permanent habitat structures and surroundings.

Rocks –Tools – Uses

Our hard data about lunar rocks comes primarily from specimens returned by Apollo and Luna missions. Moon rocks fall into four groups. They are basaltic volcanic rocks, pristine rocks, breccias, impact melts and lunar soil.

Using appropriate quarrying, transportation, tooling and laying/setting systems that include rock splitters, transport vehicles, crushers, shapers, polishers, connectors and robotic integrators, a very useful building capability may be evolved on the Moon and other planets, that might find extensive and highly effective use in the expedient and permanent build-up of extraterrestrial colony elements. Walls, aprons, towers, dome exteriors, roads and tunnels, landing pads and other exposed platforms are some of the elements that might make use of this technology. More than half of all the materials needed for building a colony such as the one depicted in the image below (Figure 1) could be derived from rock, both raw and processed.

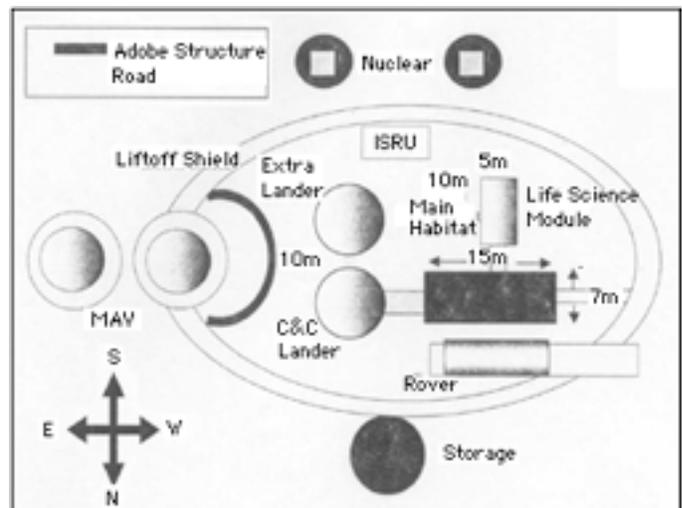


Fig. 1. Hesperia Lunar/Mars Base Site Plan Phase I: More than half of all the materials needed for building a lunar colony could be derived from rocks. Illustration by Dr. Anita Sengupta NASA/JPL

Technology Continuum Dilemma

Mankind has been building complex habitable architectures for millennia. The resilience of such structures are

partly due to the materials used but their habitability and serviceability are mainly attributable to empirically tested, evolutionary methods employed in their design and creation.

Space Architects, Designers, Engineers and Builders may all do well to expand their world view about man-made lunar structures. The highly constrained, narrow, often trendy, state of the art high technology driven mindset will have to accept and be inspired by a more broad-minded "Technology Continuum" philosophy, seeking solutions from age old and time tested concepts for building spaces for habitation and adapting them appropriately for extra-terrestrial applications.

Merits and Challenges

1. Rocks of varying types, shapes and sizes are abundantly available on the Moon.
2. The low gravity allows for easier handling of massive blocks from quarry to tooling and placement.
3. Raw, unmachined rocks may be sorted/graded and neatly arranged/packed to create a variety of useful structures including shadow walls, radiation shielding, paving, glare and backscatter mitigation, dust traps and covers,
4. and elevated foundations and rough hewn platforms using age old "dry packing" technology.
5. Machined blocks may be precision-cut into slabs, blocks, bricks, columns and beams that can be used as exterior and interior load bearing and finishing elements in lunar colony buildings and related infrastructure.
6. Having been created and subjected to the space environment for geological time, they are very durable in the extraterrestrial environment
7. Existing quarrying and tooling machines may provide valuable insight in the design and operations of robotic equipment that can be built and remotely operated to build up a warehouse inventory of rock products and material well in advance of human arrival to permanently settle the Moon.
8. The combination of low gravity, the absence of lateral loads (wind, seismic activity) and precipitation, (forces that constrain the size and form of Earth bound structures) may allow "dry packed" lunar structures much more morphologic freedom, with the possibility of constructing very tall and slender structures, long, uninterrupted canopy spans and so on.

For reasons of landing safety, conventional primary landing zones for IOC bases are proposed in smooth, level terrain, free of rock fields and outcrops. Ironically, rock strewn regions around fresh craters as well as sites rich in rock outcrops would offer ample opportunity to collect, tool into shape and even sculpt building structures employing low energy expenditure methods. Such sites may also harbor natural formations to protect habitats from

mm, radiation and effects of thermal cycling.

Challenges

1. Quarrying, tooling and finishing create substantial high energy debris that must be curtailed at the source. Particularly on the Moon, these particles can easily approach or exceed orbital velocities and thus create environmental havoc. So, it is important to process rock in a careful environment.
2. Having been created and exposed to vacuum for geological time, lunar rock is stable in its natural, mostly anhydrous composition. Its use in relatively humid habitat interiors may require some study and possibly special processing to maintain strength and stability.
3. Extensive testing alone can provide the data needed before commissioning these rock products for lunar building applications. So, more testing of lunar material is essential to identify merits and limitations, and appropriate use of rock for building Moon colonies and related infrastructure.

Conclusion

Humanity has successfully built rock structures and habitats on Earth since time immemorial. We are continually discovering prehistoric civilizations through hewn and processed rock structures still standing all over the world, the only surviving remnants of their culture. This is indeed a testament to their durability.

Lunar rock materials are plentiful on the Moon. They may be used for lunar colony buildings. Raw, unfinished rock has several exterior uses while tooled rock may find extensive application both for load bearing structures and also for finishing exteriors and interiors.

Existing tools and machinery used on Earth may be adapted for robotic operation on the Moon that could build up a lunar rock products warehouse inventory of colony building materials well in advance of human arrival.

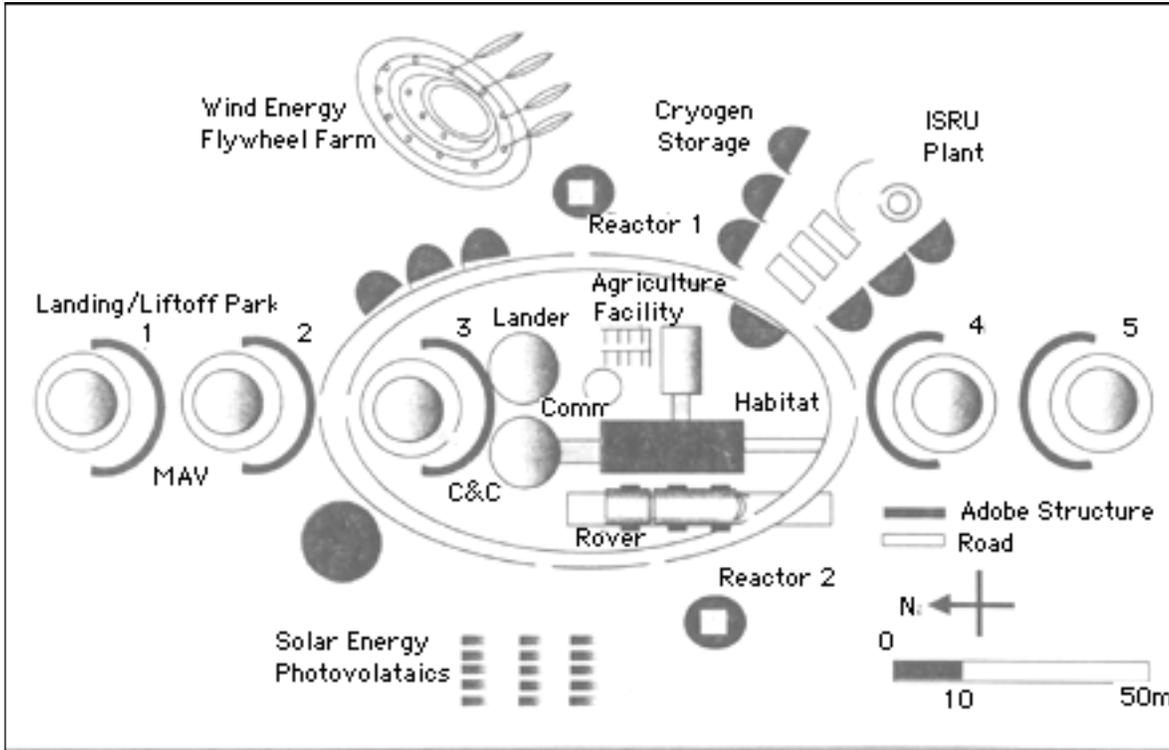
Space architects, engineers, designers and builders may do well to adopt a "Technology Continuum" philosophy and broaden their palette of high technology materials and artifacts to include timeless ways of building. We must utilize the best materials and practices handed down over the millennia as we proceed to build meaningful, efficient and aesthetically becoming permanent structures at the final frontier.

References

- Schrunk, D., Sharpe, B., Cooper, B., and Thangavelu, M., The Moon: Resources, Future Development, and Colonization. Wiley-Praxis, New York and Chichester, England, 1999.
- Thangavelu, M., *MALEO: Modular Assembly in Low Earth Orbit. Alternative Strategy for Lunar Base Development*. Journal of the British Interplanetary Society, January 1993.

- ◊ Khalili, E.N., *Ceramic and Fused Adobe Structures Generated In-Situ*, Lunar Bases and Space Activities of the 21st Century Ed., Wendell Mendell, Lunar and Planetary Institute, 1985.
- ◊ Eckart, P., *The Lunar Base Handbook*, McGraw Hill, New York, 2000.

- ◊ Thangavelu, M., *MALEO: Modular Assembly in Low Earth Orbit. Strategy for Lunar Base Development*. Journal of The British Interplanetary Society, January 1993.
- ◊ Khalili, E.N., *Lunar Structures Generated and Shielded with On-Site Material*, Aerospace Journal, American Society of Civil Engineers, July 1989.



**Hesperia Lunar/
Mars Base Evolved
Site Plan**

Illustration by Dr.
Anita Sengupta
NASA/JPL

<MT/USC>

Hesperia Calearth Links

Cal-Earth: California Institute of Earth Art & Technology
<http://www.calearth.org/>

- What is Cal-Earth? • News Articles
- Photo Gallery • Emergency Shelter • Eco-Dome
- Vaulted House • Nader Khalili • Cal-Earth Projects
- Apprenticeship Courses • Planetary Architecture
- Cal-Earth Products • Children at CalEarth
- Visiting • Khalili's Message • Contact us

Directions to Cal-Earth and Hesperia, CA
Just north of the San Bernardino National Forest on I-15

Interactive Zoom in/out Map from Mapquest for
 10177 Baldy Lane, Hesperia CA 92345

<http://www.mapquest.com/maps/map.adp?searchtype=address&country=US&addtohistory=&searchtab=home&formtype=address&popflag=0&latlongtype=&latitude=&longitude=&name=&phone=&level=&cat=&address=10177+Baldy+Lane&city=Hesperia&state=CA&zipcode=92345>

MMM Back Reading:

MMM #20, NOV.1988, pp. 5-6 "CERAMIC CITY"

Hesperia Calearth Photo Gallery



A Lunar

EXPLOSIVE

by Dave Dietzler <pioneer137@yahoo.com>

Explosives usually consist of organic chemicals containing hydrogen, carbon and nitrogen. On the Moon these are rare and we need large masses of explosives for rock blasting. Rather than waste H, C and N that are so valuable for life support systems for making explosives we might be able to use abundant magnesium and oxygen. John Wickman of Wickman Spacecraft & Propulsion Company [<http://www.space-rockets.com/wspc>] determined that magnesium and LOX don't make a good monopropellant because this mixture was shock sensitive and detonated. This might be a blessing in disguise. Magnesium metal tanks might be loaded with a slurry of magnesium and LOX and detonated with an electric spark plug.

Magnesium burns with 10,640 btu per pound. Mixed with the correct amount of oxygen at a ratio by weight of 3:2 we'd get 7090 btu per pound of Mg/LOX mix. One pound of TNT releases 2300 btu and one stick of dynamite 2000 btu. So this might be a decent explosive. Flame speed must also be considered. Hydrogen burns with 61,000 btu per pound but only has a flame speed of 8 ft/sec. Gasoline has 20,500 btu per pound and has a flame speed of 70 to 170 ft/sec. The plastic explosive C4 and RDX, chemically similar to TNT, both have a detonation or flame speed of about 27,000 ft/sec. And TNT has about 23,000 ft/sec. The actual explosive properties of Mg+LOX must be determined by experimentation.

The volume of one pound of magnesium is about equal to the volume of 9.2 fluid ounces of water and 2/3 pound of LOX would be equal to about 9.4 fluid ounces of water. So a small tank of Mg/LOX with about 7090 btu and roughly the energy of three sticks of dynamite would be a little bigger than a one pint jar. How much explosive power it really has because of its flame speed is something we must research. A valuable discovery may await us.

NOTE: When ground up into a powder a pound of magnesium dust will occupy more volume than in solid form because there are spaces between the particles, but the actual volume of the particles without the spaces is the same as the solid block from which it was ground up. LOX will fill the spaces between the particles and some will fill extra volume, so the simple volume calculation for the explosive slurry based on density alone is valid. When the slurry is agitated and the magnesium particles dispersed throughout the LOX the volume of neither substance based on weight and density does not change. As for surface tension effects or the contraction/shrinking of magnesium particles in super cold LOX, those are details to be worked out by experimenters.

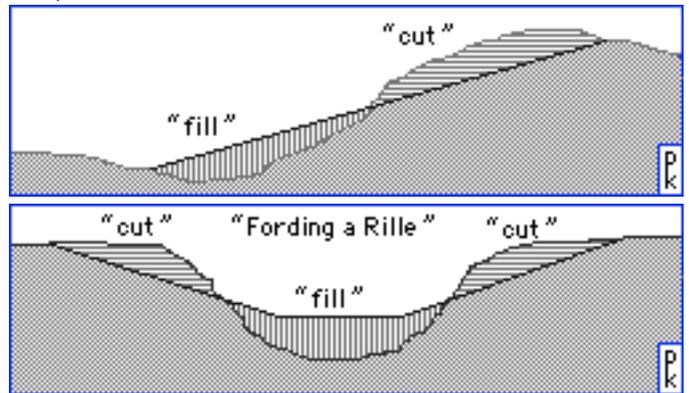
Let's hope some college students at a school of mines or somewhere read this and pick up on it or Wickman does a little research if he hasn't already. This should not be an expensive project for people with access to LOX who know how to handle explosives safely.

Constructive Uses of Explosives on the Moon

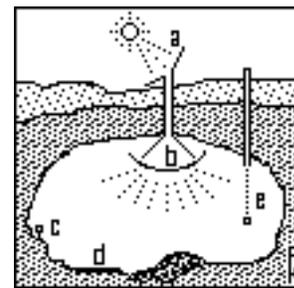
by Peter Kokh

Some, adversely conditioned by the use of explosive devices in war, all too much in the news in our times, may be slow to see the value of explosives on the Moon. But any tool has positive productive and creative uses as well as negative destructive ones. Explosives are no different. We simply have to look at their positive use in our own down-to-Earth technology.

Frontier road construction crews will need reliable explosives for "cut & fill" operations to make roadways more level, minimizing the grade elevations when crossing ridges, hills, and mountains.



Teleoperated machine site preparation for new outpost sites may need explosives to remove boulders from the location, or to excavate furrows in which to set Habitat modules so that they can be more easily covered with a shielding blanket of regolith.



Creation of entrance shafts to intact lavatubes may take carefully controlled explosives to gain freight elevator access to these ideal sites for such area-intensive installations such as industrial parks, farms, warehouses.

Boring tunnels through Crater rims for road way access between the crater floor and surrounding areas. We may need to bore tunnels through mountain ramparts as well to avoid lengthy, time-wasting circuitous detour routes.

Sub surface mining operations will depend on the availability of explosives to dig mining shafts, drifts, and stopes, should we detect by surface soundings, or by drill cores, the presence underground of valuable ores not found in equally concentrated form in the pulverized surface blanket (regolith). <MMM>



by Dave Dietzler <pioneer137@yahoo.com>

1. We have thought for a long time, based on our theories of stellar and solar system formation, that planets must orbit other stars.
2. In the sixties [thought] we discovered large planets orbiting nearby red dwarfs by the "wobble" method.
3. In the nineties we did discover large planets orbiting stars like our Sun by the doppler method.
4. We have yet to discover planets the size of Earth orbiting other stars. The Terrestrial Planet Finder that will launch in 2014 will use advanced imaging technology to do this. It will even be able to analyze light from terrestrial type planets to detect oxygen and water vapor. We will be able to determine the mass of these planets and their distance from their suns to determine whether or not they are in the life zone.
5. Our next step will be to construct more sophisticated instruments, perhaps huge space telescopes, that can detect the spectra of things like chlorophyll or even industrial pollutants. Perhaps we will develop instruments that can image these worlds; even see their continents and oceans.
6. Next, interstellar probes will be launched to inspect these worlds at close range. The most interesting targets will be the ones that are in the life zone, have oxygen and water, and possibly indications of life. The probes will probably be laser sail propelled or mag-sail/particle beam propelled, and they will brake into the target solar system with magnetic sails. They could maneuver around in the target system with magnetic sails and make close approaches to the planets we are interested in, even go into orbit around them and drop small landing probes to the surface. These probes will be controlled by AI computers capable of independent decision making since they will be to distant for radio control from Earth.
7. Finally, manned missions to the stars.

Life-supporting planets may be rare

Mercury, Venus and Gas Giant planets cannot support life, but are interesting for other reasons. Earth sized planets outside the life zone will either be frozen or so hot they become like Venus. Marslike planets inside the life zone might support life. We don't even know for sure whether Mars has life now or did in the past and this is a question we hope to answer in the 21st century. The discovery of life on Mars, past or present, would be of great significance, and the discovery of life on planets orbiting other stars would be too. Earthside planets may be found with life at various stages of evolution like mere algae in the seas, plant and animal life in the seas, life on the land from higher plants to higher animals; but the greatest discovery would be intelligent life.

Do we know enough to define Intelligent Life?

How do we define intelligent life? Certainly, apes, dolphins and some other species indicate that they have some intelligence, but we hope to someday find creatures much like ourselves. They might be similar to highly evolved mammals or birds or even insect like creatures. Primates are not the only candidates for higher evolution. Bears stand upright at times and use their forepaws. Some ant species have been shown to engage in group work activities! To evolve to large body and brain size insects would have to develop a better breathing system and probably shed their exoskeletons in favor of endoskeletons. *Unlikely!*

Can civilization develop in the Ocean?

Octopi have been shown to engage in intelligent behavior but it is hard to see them existing on land, but what if large brained octopi evolved out there somewhere and built a fantastic civilization beneath their sea? They wouldn't have fire, metal working and electricity to be sure*, but they might know how to use harder stones to carve softer stones or corals or even polar ice into various imple-ments and habitations.

For such creatures, exploring the land would be like our adventures into the deep sea or outer space. They might know how to harness other creatures found in the seas or even have advanced biotechnology. Certainly they would have vast knowledge of life in their seas, foods and medicines; language, something equivalent to poetry or song, and folk lore, even religion, especially if they are social creatures.

How could they store knowledge other than by memorizing and passing knowledge down generation after generation? What kind of writing could survive underwater? Perhaps they could make elaborate stone mosaics held together with some natural adhesive that last for decades before dissolution in water and are copied over and over again like books once were. If the evolved endoskeletons they might eventually evolve into land creatures and create advanced technology with fire, metals and electricity like the octo-spiders of Sir Arthur C. Clarke's *Rama* novels.

Technologically advancing civilizations

Finding civilizations at a similar level of technological development will require quite a bit of coincidence or "good luck." We could transmit radio or laser signals at Earthside worlds and wait for a reply, but will they be listening at the right frequency?

So many factors were involved in the evolution of human civilization and technology, from leaving Africa and learning to live in the colder climates to the necessities of war, that we cannot expect other intelligent creatures to have followed the same pattern. Perhaps man with his phallic aggression and creativity is one of the few creatures who would build rockets and star ships. Most creatures on Earth are so well adapted to their environment that they don't need tools, but man was poorly adapted to his environment physically and used his brain to adapt his environment to suit his survival and reproductive needs by making tools, weapons to fend off large predators, building shelter, using fire, etc.

Other creatures in the universe, even very intelligent ones, might be so well adapted to their environments that they did not need to invent technology and subsequently even explore space. Their rate of reproduction might not be nearly as great as humans.

For us humans, year round fertility and sex drive has almost been a curse upon us that has led to overpopulation and natural population checking mechanisms like epidemics, famine when local food supplies were outstripped and even war to keep us from over running nature for millions of years. This has also forced us to invent hunting, livestock keeping, farming, food preservation and medicine.

Creatures who mate only during the mating season and produce much smaller broods would not endure the cursed fertility that we have, mythologized as original sin, and would not have to invent so many things to promote the survival of their offspring. So while we might not be alone in the universe when it comes to life itself, even intelligent life, we might be very rare when it comes to technological civilization and even rarer when it comes to space faring civilization.

It isn't hard for me to believe that an intelligent species with much lower reproductive pressure could stay in it's equivalent of Africa for hundreds of millions of years with a technological level no higher than that of Egypt, as long as their planet did not undergo major climatic changes during that time. They might be a lot less curious than us apes too! These creatures might never reach into space or have radio or laser communication systems but they could have much to offer in the way of art, philosophy and theology.

We must explore Mars to answer the question: "Does life of any kind of life emerge on other worlds?" We must industrialize the Moon and solar system if we are ever to venture beyond into the galaxy. If we are to become the

primary star faring civilization in this arm of the galaxy, it will be our duty to protect indigenous life on other extra-solar planets. We will go for the quest of knowledge and not to conquer, colonize and swamp space with humans, although there are probably worlds where we can coexist with native life, and worlds like the Moon where we can live without conflict.

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Editor's Remarks: The aspects of "The Question," "Are we Alone?" are so manifold and convoluted that it would take a fair size book to begin to treat them all. In a short article, no writer can do more than touch on a few considerations of interest to him/herself. Certainly the aspects touched on here are significant.

- ☑ What sort of worlds are suitable for intelligent life?
- ☑ We naturally define intelligent in terms of our own achievements in using our brains and hands to adapt to our world and adapt our world to ourselves. We remain "generic," unspecialized in any of the ways that risk setting a course for an evolutionary dead-end. We can at will specialize ourselves by choosing our tools, leaving our physical interface with nature as universal as possible.
- ☑ We are air-breathing land creatures. Could technology-using species arise in the sea? *I think the author puts limits on a sapient octopod race that need not apply. The "Wisefeet" could stay in the water, yet build rafts on top of which they could conceivably use fire and other tools that require air. *Our own* Octopi have two strikes against them as to further advancement: a very decentralized nervous system, and copper-based blood instead of the 20 times more efficient iron-based blood we have. Scratch those two mis-turns, and who knows how far invertebrate intelligence could go?
- ☑ The chances that we will "find" intelligent life elsewhere are not as good as the chances that there "is" intelligent life elsewhere. It's not that civilizations do not want to be found, though that may not be an uncommon outlook. It's simply a question of technology and economics: *it is far easier and cheaper to listen effectively, than to send messages effectively.* To send with real hope of being heard, requires a centuries' long cathedral-building project of extreme and unquestioning dedication: one must broadcast in all directions of the sky for decades, centuries, millennia, or even more. *Civilizations will be as far apart in time, in any given area, as they are apart in space, at any given time.*

<PK>

Relevant Readings from MMM #61, DEC 1992

- p 4. Are We Alone?;
- p 5. What is a "Humanoid"?
- p 6. Galactic Topography 101;
- p 7. The "Heliades Cluster"?
- p 8. Sending interstellar signals;
- p 9. Cheshire Messages

The Moon Society



JOURNAL

<http://www.moonsociety.org>

Please make NEWS submissions to KokhMMM@aol.com

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

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

PROJECTS: www.moonsociety.org/projects/

The Artemis Project™ - Project LETO™ - Rent-MDRS

Moon Society DUES include **Moon Miners' Manifesto**

- **Electronic (pdf) MMM \$35 Students/Seniors: \$20**
- **Hardcopy MMM: U.S. & Canada \$35 Elsewhere: \$60**

Join/Renew Online - www.moonsociety.org/register/

Mail Box Destinations:

- **Checks, money orders, membership questions**

Moon Society Membership Services:

PO Box 940825, Plano, TX 75094-0825, USA :

- **Projects, chapters, volunteers, information, etc.**

Moon Society Program Services

PO Box 080395, Milwaukee, WI 53208, USA

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

Will there be an "Artemis Moonbase Sim 2"?

Moon Society President's Report

Last issue, we reported on a successful first Moon Society Mission at the Mars Desert research Station in Utah. We learned enough about what we could do there to warrant planning an even more ambitious set of projects for an encore "rotation" in the 2007 MDRS Field Season. The Mars Society would be happy to host us again - we were good guests. But there is much more to a decision than that. At this time we are looking at a number of options, and until we can compare the bottom lines of all of them, which way we ought to go is not clear. *Patience!* Life is like that.

The awesomely otherworldly beauty of the terrain within the Mars Hab's horizons takes you off Earth all right, but puts you on imagined Mars, not imagined Luna. Yet the Hab itself serves as a simulated outpost, and that's worth something. We can continue to concentrate on projects of relevance to outposts on either world. But should we?

The ability to pay for the construction of our own facility isn't a near term prospect. So that is not a concern.

There is an otherworldly analog facility in Hesperia, CA but that is hardly suggestive of what we imagine in the future on the Moon, either.

There are lunar analog terrains, lava flow sheets complete with intact lavatubes, in Oregon, Idaho, Northern California, and Washington State in this country and elsewhere in other countries beyond. But none of them features a working Hab or other structures we could use.

Do we then look for trailerable, inflatable, "knock-down" structures? What would be the cost of renting, or buying each? How much would it cost to furnish each? And would we have to rent or lease a site?

But then there are valid things we could do that do not depend on geology or outdoor analog "atmosphere." Inside a blacked-out aircraft hangar, would could control the lighting and simulate the Moon's 29.5 day dayspan / nightspan cycle to study ways to budget and manage energy-intensive and manpower-intensive operations alternately.

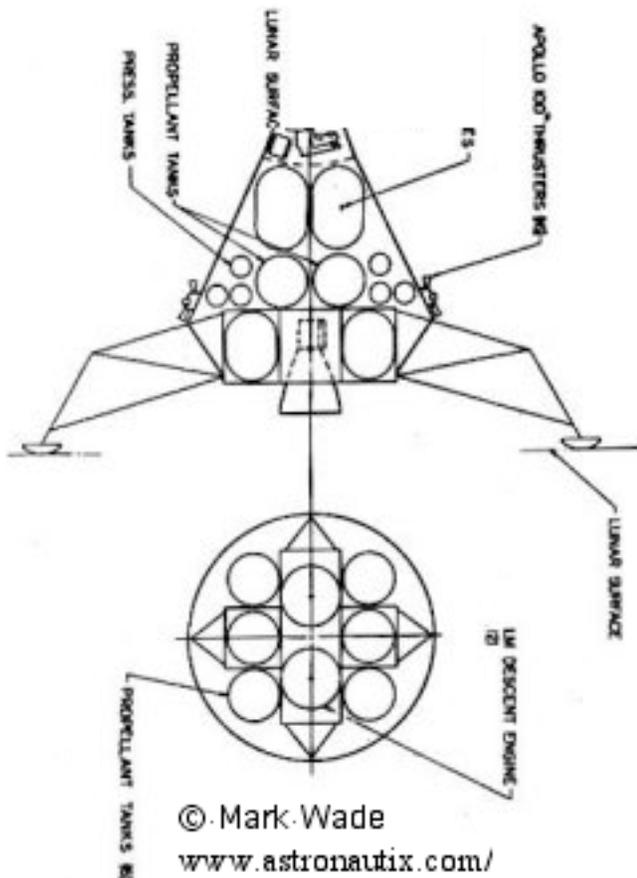
Logistics are important. We can run longer, even continuing simulations, if we bring the "outpost" to where there is a standing cluster of enthused volunteers such as in an active Moon Society or NSS chapter or at a major University with a strong space program.

Biologically-assisted life support systems do not even need a "crew" to provide a "load" - anyone doing whatever will do. There are ongoing experiments the Society could support.

Yet the highly visible MDRS facility in its photogenic surroundings, has continuing media exposure and public recognition. Can we beat the MDRS rent somewhere else? Maybe, maybe not. Honestly, we do not know. So there is a lot to consider, and it is premature to lean in any one direction. *Aggressive patience* will find the way. **PK**

From the Pages of Could-have been History
Gemini Lunar Surface Survival Shelter

<http://www.astronautix.com/craft/gemelter.htm>



Drawing of the Gemini Lunar Surface Survival Shelter.

- The shelter would be landed, unmanned, near the landing site of a stranded Apollo Lunar Module.
- In the event the LM ascent stage would not light to take the crew back to the Apollo CSM in lunar orbit, the two astronauts could go to the shelter and await a rescue mission.
- The astronaut in the CSM would return alone in the Apollo spacecraft.

Credit: McDonnell Douglas

This was one of three variant Gemini-based rescue schemes looked at by McDonnell Douglas in the wake of the Apollo 1 fire when it became clear that "the Apollo mission profile was inherently risky, and the likelihood of a crew being stranded in lunar orbit or on the lunar surface was relatively high."

The other two schemes studied were:

- The Gemini Lunar Orbit Rescue Vehicle
- The Gemini Lunar Surface Rescue Spacecraft

L.U.N.A. – What’s in an Acronym?

from Peter Kokh

M.A.R.S. - the **Mars Analog Research Station** program got off the ground running back in 1999 with an acronym that made instant sense. The Mars Analog Station program has been a considerable success on several fronts. It has earned major and repeated publicity. It gets out the message to the public that Mars is doable. It has helped recruit enthusiastic new members. And above all, we have learned many valuable lessons simply by through "going through the motions" in the process of field testing equipment and procedures and systems.

Would it be possible for the Moon Society in affiliation with the National Space Society to do the same with a Moon-focused analog station program? There is no firm commitment or plan to do so, but in the wake of a productive two week Moon Crew exercise at M.D.R.S. in Utah, this is certainly a question that many of us in both the Moon Society and NSS are asking. It is certainly something more easily planned than pulled off.

Meanwhile, we muse. It would be nice if we could follow suit with one or more **L.U.N.A.** facilities. But how would you render "L, U, N, A" ... ? Well we have a head start with the first letter: "L" is for "Luna" or "Lunar." After that it gets harder.

Take the letter "U" and flip through the dictionary for words that might work: ultra, umbra, umbrella, under, unity, urban, utility, utilization. Some interesting words, but you have to make your choice work with the "N" word that comes next.

Take "N" and again flip through the dictionary: nascent, native, national, neutral, nexus, nocturnal, nominal, normal, novo. Again, you have to make your work work with the "U" choice that precedes it.

I've gone through this exercise several times over the years, each time only to set down my best effort as not quite good enough. This time, we may have it on something.

L.U.N.A. = Lunar Underground Network Accelerator

"Underground Network" works on two levels.

It signifies the extra-NASA, extra-Contractor public network or working collaboration of motivated organizations and individuals.

It signifies the subsurface complex of habitats, connectors, factories, utilities, farms, etc. that will be needed to make a settlement viable on the Moon.

"A" for "Accelerator" also works, calling to mind the various particle physics labs around the world. But for us, what we are accelerating is the ramp up of public support and well as the soonest possible realization of our dream of resource using settlements on the Moon.

Making L.U.N.A. a reality is another thing! <PK/MSJ>

The Artemis Project™ *Can* Succeed

Commentary by Michael Mealling
former President of Artemis Society International
now with Masten Space Systems

As I discovered with the Artemis Project, any endeavor like this has a huge "chicken and egg" problem:

In order to receive those charitable donations you need to show significant and continuing progress, but in order to show that progress you need very large amounts of cash in hand to prime that pump.

If you can start out with a large enough sum to create a perception that the effort actually does something (e.g. The X-Prize) then the donations will come in and you can continue that effort. But without it you are continually struggling with a credibility problem that you simply cannot overcome.

Other things I've learned:

- **You can not rely on volunteer labor.** You need professionals and paid contractors doing the labor. Volunteers are good for small projects and very distributed tasks but an all volunteer space program would never get a foot off the ground.
- **You need to start small.** The first 'mission' cannot be so hard that you will never get there. The Artemis Reference Mission set such a high expectation that it created both a giggle factor and almost guaranteed failure.
- **Marketing must be directed outside the 'typical' community.** Our community may be energized but we are not generally a wealthy crowd. At the earliest opportunity the marketing campaign must be as widely and as globally advertised as possible. There is more money available outside the US than inside it for something like this.
- **It must be very visibly branded.** People who will donate money to something like this will want that fact advertised very widely. That means swag [sic] for them to boast that they were involved and media coverage of any missions so the donor gets a very public feedback loop.

Some reading this may think I am calling the Artemis Project™ a failure. I actually don't think that. I think it has had some problems but these could be overcome with not too much work. It would need to be reorganized. The existing model of member companies donating revenue into a cash 'stockpile' that is run by a private 'parent' company (TLRC) with no visibility assumes a level of trust that simply doesn't exist. It also had little to no participation by anyone that had business experience. But the basic idea behind ASI is almost exactly what Sam Dunkin is suggesting in his piece: <http://www.thespacereview.com/article/434/1> - Whether or not it can be fixed and used is a separate discussion.

But does any of the above discussion solve that chicken and egg problem? No. But here's something that might: NASA's schedule puts the first returning NASA employee on the Moon in 2018 and the Lunar Reconnaissance Orbiter launches in 2008. It's more than possible to beat NASA back to the Moon in both cases. My suggestion is to create a foundation whose initial task is simply to put a small rover on the Moon with a simple video camera. Yes it's similar to several of Luna Corp's suggested missions but the main difference is timing. My contention is that after Burt Rutan's successes and NASA's recent problems with Shuttle the climate has changed sufficiently that donations toward a cheap mission could do the trick.

At the last Return To The Moon Conference [Las Vegas, July 21-23, 2005] Rex Ridenoure, CEO of Ecliptic, issued a challenge to beat NASA back as a way of ensuring that the policy and perception gains made with Rutan's flight continue outward into cislunar space. I suggest we take up that challenge using a non-profit foundation along the lines of what Sam Dunkin is suggesting. <MM/MSS>

Artemis Data Book News



From Dr. Peter J. Schubert <pschubert1@indy.rr.com>

Recently I've changed careers, and joined an engineering firm doing consulting and R&D. My specific role allows me to focus on space research, and to build upon my three existing space patents and several publications of original work. At Packer Engineering, we have a summer intern program, and I have requested a small team of students be assigned to me.

I would like to propose that, with your guidance, we have these students do gap-filling and updating of the ADB [Artemis Data Book - /www.asi.org/adb/]. We have an excellent technical library here with 3 full time library science people. The students come predominantly from various engineering disciplines including aerospace. With guidance from you and the ARTEMIS team, I'd like to offer our help.

Peter J. Schubert, Ph.D., Moon Society Member



Reply from Gregory R. Bennett, The Lunar Resources Company, Moon Society President Emeritus.

Peter Schubert's idea of recruiting students to help with updating and upgrading the Artemis Society International site sounds like an excellent plan to me!

I also think that Now Is The Time. Two major changes are driving this. First, NASA is pushing really hard (to the tune of half a billion dollars) for commercializing space transportation, which promises to reduce the potential costs for the Artemis Project quite dramatically.* Second, next year NASA will start its major thrust toward establishing a government base on the Moon, knocking down

[Gregory Bennett's reply to Peter Schubert, continued]

a lot of the barriers to our goal of creating a permanent, self-supporting lunar community.

These events are causing me to again wax optimistic about the prospects for the Artemis Project. Every dollar they can cut off the transportation costs and every nugget of hardware they develop lowers the bar another fraction of an inch, bringing us ever closer to our goal.

I see two major areas for updating the Artemis Project web site:

1. Writing articles that fit within the outline of the Artemis Data Book.
2. Redesigning the front end and creating web pages that summarize the project in an entertaining manner.

Both of these are huge projects.

Gregory R. Bennett

The Lunar Resources Company

Chapters & Outposts

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

Bay Area Moon Society

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

From: Bill Clawson <billclawson@yahoo.com>

he group continues to meet regularly on the 4th Thursday evening of the month at a member's home.

Moon Society St. Louis

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

Contact: Keith Wetzel <kawetzel@swbell.net>

Show-me-con Report: The chapter is preparing an exhibit and presentations for this upcoming science fiction convention to be held April 21-23, at the (Lambert International) Airport Hilton.

A Visit by the Moon Society President:

On Saturday afternoon, April 8th, Peter Kokh met with MSStL members Bob Perry and Dave Dietzler for a tour of the Missouri Botanical Gardens and its Climatron Tropical Forest display. We discussed a lot of things, from the recent Moonbase Simulation exercise at the Mars Desert Research Station to how essential abundant plant life will be for permanent settlements.

It was a beautiful, sunny, spring day, and we had lunch outdoors. Peter was in town for the weekend on personal business. This was his 2nd visit to the chapter.

Moon Society ASI-MOO users welcome to join in on new Thurs. Eve. "Space Chats" on NSS-MOO

See page 16, Column 2 this issue for more information.

Longtime NSS member and Moon Society life member Cheryl York (Portland, OR) has run a Thursday night Space Chat for two decades on AOL. With AOL no longer offering this service, Cheryl has moved to the MOO environment, NSS area. Moon Society/ASI members are already familiar with the MOO. You are welcome to join in the open topic discussions.

Moon Phase Java Applet

<http://paulcarlisle.net/old/MoonCalendar.html>

You can set the calendar to any date from 3999 BC to 3999 AD. Clicking any day cell on the calendar will take you to a screen presenting a more detailed view of the Moon on that day, down to the hour, along with other information about the Sun and Moon. The distance of the Moon that day is given along with the time of Moonrise and Moonset, Sunrise and Sunset, and the distance of the Sun. The program reads your computer time setting and gives the data for your time zone.

Look up the phase of the Moon for the day you were born, for example.

Learn Lunar Geography Painlessly

You can learn more and more about the Moon's nearside features in a pleasant and painless way. Simply book www.lpod.org and visit it daily. By this time next year, you will be an expert on nearside Selenography!

<http://www.lpod.org>

New Outposts in Salt Lake City & Montreal

William Fung-Schwarz <was2@utah.edu> has agreed to be the new local contact in metro Salt Lake City, Utah, and Laurel Ladd <scarlets@videotron.ca> has agreed to be the new local contact for the Montreal, Quebec area. Both served as crewmembers on the recent Moon Society mission at the Mars Desert Research Station.

The Salt Lake City metropolitan area has a population of a million people, a million and a half if you count the adjacent Provo, Utah area. Greater Montreal has a population of some three million.

Growing Outposts

An outpost is a presence of the Moon Society that is short of full chapter status (which would require a minimum of three persons and organization.)

Outposts and Chapters, U.S. and elsewhere are listed on our Chapters Page along with three NSS chapters that partner with the Moon Society. If you live in any of these areas, get in touch with your local contact person. If you live in an unrepresented area consider volunteering to be a local contact! Email: chapterscoordinator@moonsociety.org

GREAT BROWSING !

NASA, Astronomers, Budget Priorities: Shift from a science-oriented to mission-oriented agency
<http://www.thespacereview.com/article/572/1>

NASA & Partners: revised ISS assembly sequence
<http://www.thespacereview.com/article/571/1>

Chaotic Dynamics, spacecraft propellant, and how the Moon formed.
<http://www.thespacereview.com/article/569/1>

Backstar: secret 2-stage Space Plane?
<http://www.thespacereview.com/article/576/1>

History of the cancelled Blue Gemini Program
<http://www.thespacereview.com/article/582/1>

Crying Wolf on Asteroid Threats
<http://www.thespacereview.com/article/581/1>

NASA's Terrestrial Planet Finder Mission
http://planetquest.jpl.nasa.gov/TPF/tpf_index.cfm

Unfettered Brainstorming: The Moon & Beyond
<http://www.moonminer.com>

The SETI Optical Telescope Project
http://www.planetary.org/programs/projects/seti_optical_searches/

Asteroid Impact Mapping Project
http://www.planetary.org/programs/projects/asteroid_alert/

SETI Radio Searches
http://www.planetary.org/programs/projects/seti_radio_searches/

The Exo-Planets Catalog
http://www.planetary.org/programs/projects/catalog_of_exoplanets/

The Extra-Solar Planets Transit Search
http://www.planetary.org/programs/projects/transit_search/

Shoemaker NEO Grants
http://www.planetary.org/programs/projects/neo_grants/

Flying the First Solar Sail
http://www.planetary.org/programs/projects/solar_sailing/

Europa Mission Campaign
http://www.planetary.org/programs/projects/explore_europa/

The Pioneer Anomaly
http://www.planetary.org/programs/projects/pioneer_anomaly

Moon, Mars, Space Blogs

Moon Society Blog
"Artemis Moonbase Under Construction"
<http://www.moonsociety.org/blog/>

Planetary Society Blog ***
"Making you a part of the next age of Exploration"
<http://www.planetary.org/blog/>

NSS Chapters Weblog
<http://chapters.nss.org/weblog/>

Selenian Boondocks (Jonathan Goff)
<http://selenianboondocks.blogspot.com/>

Out of the Cradle ****
Chronicles of the New Space Age
<http://www.outofthecradle.net/>

Space Transport News ** (ProSpace)
<http://SpaceTransportNews.com/>

RocketForge: a Blog for the Space Age **
<http://www.rocketforge.org/>

Space for Commerce Blog (Brian Dunbar)
<http://space4commerce.blogspot.com/>

Space News Blog – Robotic Exploration
<http://spacenews.dancebeat.info/>

The Bad Astronomy Blog
<http://www.badastronomy.com/bablog/>

Science News Blog – Science and Space
www.sciencenewsblog.com/

Space: What Now? Blog
<http://www.spacewhatnow.com/>

Yahoo 360° – Artemis Moonbase Sim 1
<http://360.yahoo.com/shewhotreadslightly>

Martian Soil – Daily News on the Red Planet
<http://www.martiansoil.com/>

Mars Times – Blog information, ratings, reviews
<http://portal.eatonweb.com/weblog/29144.html>

Teledyn – Mars Blogs
<http://blog.teledyn.com/node/810>

Mainly Martian
<http://mainlymartian.blogs.com/>

Mars Rover Blog
<http://www.markcarey.com/mars/>

The Cheap Mars Flight Blog
<http://timeliketoons.tripod.com/gyatm-blog/>

Live Science Blogs
<http://www.livescience.com/blogs/>

[This list will *not* be posted monthly]

WORLD WATCH

AFD News Service

LAUREL, MD. According to a spokesperson for t Johns Hopkins University Applied Physics Laborat (APL) Pluto's two newly discovered satellites, S/2005 P1 and S/2005/P2, both much smaller than Charon, are so far identifiable from one another only by their position. Their absolute magnitude spectra, and photometric data all appear to be identical within a narrow margin of error, makin them virtual twins. "We are at a loss to explain their amazing similarity," said an APL spokesman "but we reject out of hand, the ludicrous sugges tion that both moonlets may be artificial, possi alien craft or orbiting warehouse of some kind. They do reflect light like polished balls that h lost some of their sheen, but we are certain tha there is a natural explanation for that reflecta feature."

STAR CITY, MOSCOW, RUSSIA. A 2 year old femal chimp, named Alla, has been in training for thre months as a possible 3rd crew member for an upcoming flight to ISS. The advantages of having "chimp-assistant" on board are that chimpanzees have prehensile feet as well as hands, and are noted for their acrobatic agility which is expected to transfer to weightless environments.

Alla is already trained to change her own diaper when needed. She has also mastered the rather complex task of looking at a picture of a **object** and then at a picture of the cabinet or b number in which it has been placed. On cue, she will promptly retrieve it with little effort or hesitation. She takes along a sack to store obje that may be in front of the target item. When sh finds the prize, she holds on to it with one foo while using her hands to remove the other items from the sack, and replaces them in the cabinet bin from which she took them.

Her handler-trainer, Anzhelika Ulyanov, says she is very agile and it is hoped that she will adapt to the weightless environment of the Space Station quite naturally. The Station has handholds all over the place, and Alla is essentially four-handed.

Cosmochimp Program Manager Dimitri Andreyevsky thinks Chimps like Alla will become mainstay of manned space exploration. They can entertain themselves and do not get bored with repetitive tasks. On long journeys such as to Ma and beyond, they could take care of many routine tasks, and yet need less creature comforts than humans. They also consume less food and water th the average human crewperson. They are also cont with smaller, more spartan sleeping quarters - j a quiet, out-of-the-way corner will do, plus a blanket. Alla will not need to occupy a crew ber on the Station.

This is the first experiment of its kind. Previously, in 1961, a 4-year old Chimp named Ha rode a Mercury capsule into space and back and lived to age 27 "to tell his grandchimps about i preparing the way for Alan Shepard's first U.S. suborbital flight.]

"We anticipate that Alla will capture the hearts and minds and imaginations of young peopl the world over as she acrobatically scampers all throughout the Space Station. It sure won't be business as usual, but it may well become busine as usual if she adapts and performs as well as w expect her too," said Ulyanov.

CENTER FOR SPACE SCIENCE AND APPLIED RESEARCH CHINESE ACADEMY OF SCIENCES, BEIJING, CHINA. Whi the Changé Lunar Orbiter is receiving the bulk o both Chinese national and international attentio another Chinese interplanetary mission is in the early brainstorming stages, with no indication a this time whether or not it will advance off the paper to budget line item status.

Code-named **Ying-Huo-Chong** (Chinese for "firefly"), this is a mission to deploy a steera inflated instrument platform or dirigible on Ven to explore the atmosphere from somewhat above th cloud deck to the atmosphere just below the clou

Ying-Huo-Chong would follow its own Expert Navigation Program and task schedule when out of contact with Earth, but would be reprogrammable when it was in line-of-radio contact with Earth. To conserve fuel, the lighter-than-Veneran-air craft would drift with the 200 mph winds when it reached its program altitude, and then start its solar-powerd propeller when instructed to change direction. The mission would begin at the highes altitude where atmospheric and cloud chemistry would be studied. The altitude would be lowered controlled outgassing, with the craft leveling o at interim altitudes within the cloud deck down below the cloud deck until either temperatures a pressures or both overcame the probe's systems.

Ying-Huo-Chong would carry a high-res camera to study the surface in visible light fro below the cloud deck, both for visual mapping, a as a test of atmospheric clarity at various subn bilar [sub cloud deck] levels. The photographic mapping, confined to narrow bands around the planet, would be the first photos of Venus since the landing photos of the early Russian probes.

If flown successfully, this mission could add immensely to our knowledge and understanding our wayward twin planet. Cloud chemistry analysi is expected to tell scientists if the clouds cou be mined to support ISRU purposes at high altitu over Venus.

CSSAR insists, however, that this mission is a purely paper exercise intended for training young scientists. No one was willing to discuss chances that this interesting and challenging pa mission might ever make it off the drawing board

MMM's 19th annual Happy April Fools Day News

From NASAwatch:

Speech by OSTP Director John Marburger to 44th Robert H. Goddard Memorial Symposium

"The Moon has unique significance for all space applications for a reason that to my amazement is hardly ever discussed in popular accounts of space policy. The Moon is the closest source of material that lies far up Earth's gravity well. Anything that can be made from Lunar material at costs comparable to Earth manufacture has an enormous overall cost advantage compared with objects lifted from Earth's surface.

The greatest value of the Moon lies neither in science nor in exploration, but in its material."

<http://www.spaceref.com/news/viewsr.html?pid=19999>

[American Geophysical Union NEWS]

24 Oct 2005 Release No. 05-37 For Immediate Release

Creating a Better Transmission System for Deep-Space Applications

WASHINGTON -- Recent advances in wireless computing technology could improve deep-space missions like asteroid research and remote spacecraft operations by changing the way signals are sent from Earth. A new method designed to effectively deliver commands and instructions using hundreds of millions of tiny transmitters linked together could also free the giant satellite dishes currently used to send and receive the long-range information for other applications. A research paper describing the scheme for relatively simple high-power transmitters [was] published in the October issue of *Radio Science*, a journal of the American Geophysical Union.

The technique is based on a principle known as a phased array, a method to align a number of mini-transmitters alongside one another and direct their combined beam into the sky. Such a system has previously been used for military radar technology, but has only recently become cost effective for civilian use because of improvements in consumer computing technology, according to the paper authored by Louis Scheffer at Cadence Design Systems. He indicates that the advantages from so many individual transmitters, using designs similar to cell phone technology, could include improved reliability and efficiency over currently used systems while reducing the transmission costs associated with the mammoth satellite dishes. Overall, he suggests that the net result could be significantly lowered costs for space communications, more data from science spacecraft, and an increase in planetary and deep-space research that requires remote signals.

Currently, planetary radars and distant spacecraft communications need transmitters with extremely high

power, which has been accomplished by combining a strong microwave source with a large reflective antenna. This is now done with giant satellite dishes mechanically steered to a point in the sky. NASA's Goldstone radar, for example, the agency's sensitive, deep-space analysis radar, uses a 500 kilowatt transmitter and a 70-meter [230-foot] reflector for tracking asteroids that may collide with Earth. The large antenna is focused on only a small point in space at a time, and must be adjusted--and occasionally shut down--due to changing weather conditions. In addition, Scheffer points out that while almost all of the world's largest antennas are used to both send and receive, the powerful transmissions severely hinder their ability to detect faint signals from space.

"Imagine trying to listen for a whisper while you are shouting," Scheffer said. "Also, these antennas are incredibly busy, so only a small fraction of the possible science gets done."

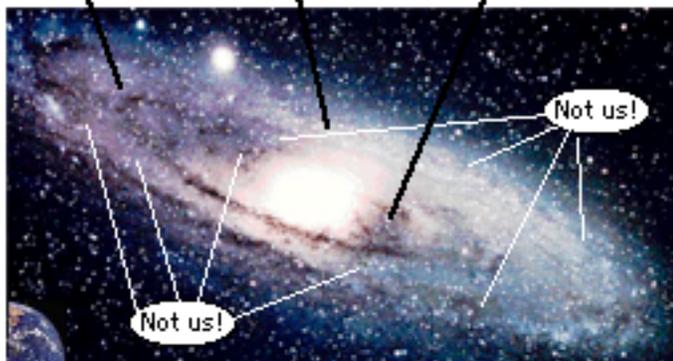
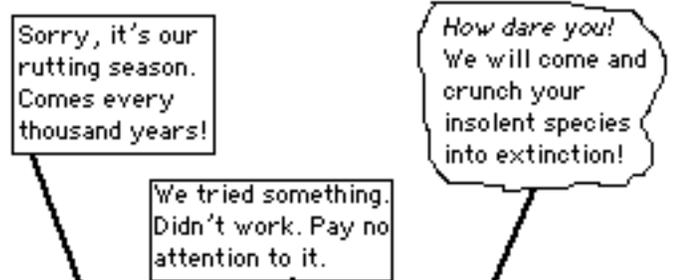
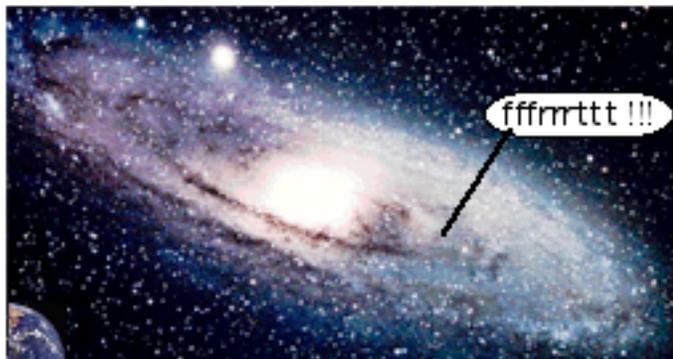
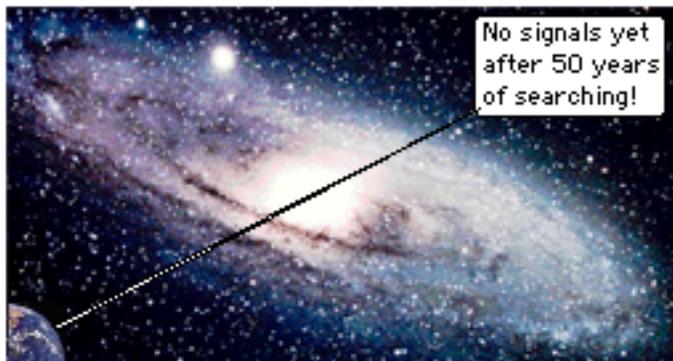
He proposes a large, flat array of low-power transmitters printed on a number of circuit boards and attached to an unmoving infrastructure on the ground, controlled by computers, which can deliver an enormously powerful beam in any direction, or even multiple directions at once. The paper outlines the requirements of a new system that would offer enhanced reliability, since a single failure would not affect the overall signal, and improved maintenance costs because of its lack of moving parts and weather resistance. The system Scheffer proposes is designed solely to transmit, as is needed for planetary radar and spacecraft control. The transmitters would also allow existing antennas to operate in a more efficient receive-only mode.

If available mass-production manufacturing techniques used for electronics can be assumed for the centimeter-sized chips, a transmitter similar to the Goldstone radar could be constructed for nearly one-quarter the cost, Scheffer reports. He notes that the significant amount of research and work done in the field of phased array radars renders the development of such a system plausible, though no previous applications to earth and space sciences have been studied. He further suggests that as computer chip technology continues to improve, additional wavelength and smaller antennas are possible to further improve the systems.

The first possible application would likely be for spacecraft command and asteroid research to observe objects that may pose a threat to Earth. A more speculative implication, according to Scheffer, is that the technology could enhance the range for the Search for Extraterrestrial Intelligence (SETI) program and allow it to search for fainter signals over a more extensive range than was previously economically possible.

The research was funded through Cadence Design Systems.

Contact: Harvey Leifert (202) 777-7507 hleifert@agu.org



Thursday Evening Space Chat on NSS MOO

2006 January 26 Thursday

To NSS Chapter Leaders and active members

Space Chat is coming to the internet at large! For decades, National Space Society has provided America OnLine (AOL) with weekly Space Chats in their Space Exploration Online section. Now AOL has gotten stingy and dropped its program for volunteer chat hosts. As a result, Cheryl York, who has conducted weekly Space Chats every week (with few exceptions) for those decades -- sometimes from her hotel room at science fiction conventions, sometimes from the floor of the ISDC Awards Banquet, usually from home with the help of her Space Chat Cat -- has decided to leave AOL and open the NSS Space Chat to the internet at large (yay!).

CyberTeams has offered to let Cheryl open a new space at the NSS online MOO just for chat. Get in on the ground floor and help design the new space. She's also looking for other reliable and responsible people to open additional chats on different nights.

Space Chats will be held on Thursday evenings, 8-10 EST | 7-9 CST | 6-8 MST | 5-7 PST at NSS MOO:

<http://moo.nss.org>

Until a new chat space is created, it will probably be in one of the existing meeting rooms off of the main lobby.

If you can't make next Thursdy, try again the next week. Drop Cheryl a note <lunlass@comcast.net> if you are interested in helping. Cheryl is "stardust" on the MOO.

Those not already familiar with the MOO should spend some time in advance, making sure the web-based Java client works for them, or trying out their dedicated MOO client (for the Mac, try Cantrip - look for the right version for your OS).

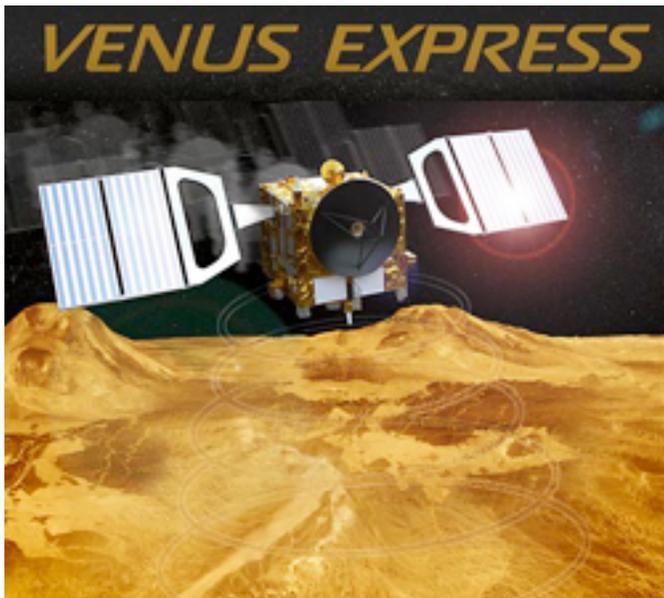
On Behalf of Cheryl York, NSS Space Chat Host,
 Bryce Walden
 Oregon L5 Society, Inc.
<http://www.OregonL5.org>

NOTE: Moon Society and Mars Society "MOO Veterans" are welcome to join in! If you have trouble accessing the NSS area on ASI MOO with your existing username and password, apply to Bruce Makenzie for access:

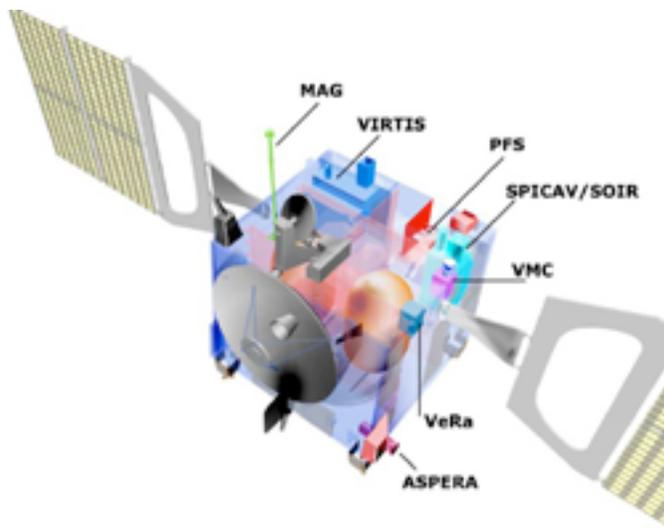
<BMackenzie@alum.mit.edu>

*We shall not cease from exploration
 And the end of all our exploring
 Will be to arrive where we started
 And know the place for the first time.*

T. S. Eliot in "Four Quartets"



http://www.esa.int/SPECIALS/Venus_Express/index.html



Venus Express' instruments. Details in MMM #191, p 15

MMM Special Report with Coomentary by Peter Kokh

April 10, 2006- Venus Express enters orbit around Venus, set to begin its science mission in mid-May, with enough fuel for an extended multi-year mission.

http://www.esa.int/SPECIALS/Venus_Express/SEM2GQNFGL0_0.html

Science Objectives

http://www.esa.int/SPECIALS/Venus_Express/SEML26808BE_0.html

What's Next?

Next Venus express will gather preliminary data, with images available the first day. . Then, starting April 15th and concluding May 6th, the craft will execute a series of seven maneuvers to reduce its initial orbit from a low of 248 miles and a high of 217,000 miles to a low of 148 miles and a high of 41,000 miles which will be its science orbit. Initially planned for a 243 day (2 Veneran days) mission, the probe could operate for twice or even three times that.

Seeking Answers to these Questions:

- What causes the super-fast atmospheric rotation and the hurricane-force winds?
- What maintains the double atmospheric polar vortex?
- How does the cloud system work?
- How do clouds/haze form/evolve at different altitudes?
- What is at the origin of mysterious ultraviolet marks at the clouds tops?
- What processes govern the atmosphere's chemical state?
- What role does the 'greenhouse effect' play in the global evolution of the Veneran climate?
- What governs the escape processes of the atmosphere?
- Are there water, carbon dioxide or sulfuric acid cycles?
- What caused the global volcanic resurfacing of Venus 500 million years ago?
- Why are some surface areas so reflective to radar?
- Is there present volcanic or seismic activity on Venus?

New Questions will be posed by the Answers:

The history of space exploration, and indeed of science in general, has been that every answer poses even more unsuspected questions. We learn more and more, but among the lessons is a growing appreciation for how much we do not yet know. Planets are not simple objects that can be described adequately in a paragraph, an article, or even a good book.

We will be learning about enigmatic Venus for a long time to come. One thing is predictable: there will come a time when we have learned all we can expect to find out, given due respect to cost/benefit ratios, from orbital probes. We will need long-enduring semi-permanent science observation platforms that float in Venus' atmosphere at various levels. They should have some navigational capacity both as to altitude and latitude. They should be able to optically map the surface at high resolution, and characterize it both mineralogically and chemically. In time, one or more of these "aerostat science platforms" showed be manned. The point is that the best science and the most science is done from up close and over long periods of time.

Nor should we cross off surface probes despite the fact that the few we have sent remained alive for only an hour, give or take. We need to design pressure resistant and heat resistant and corrosion resistant components. That's a tall order, but we haven't gotten to this point in science by saying "we cant!"

Consider that NASA is now working on a Terrestrial Planet Finder that is expected to confirm "Earth-like" planets around distant stars. It was not that long ago that such a device would have been science fantasy, not even good science fiction.

As the old saying goes, "tell me all the reasons we can't do this or that. Then tell me how we are going to do it anyway." The history of science and exploration is one of neutralizing "we can't do that" assertions. Only the laws of physics can say "no."

<MMM>



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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Newsletter Mailing - Carol Nelson 414-466-2081
(*Board Members & Ken Paul < kenpaul@cape-mac.org >)

LRS News

- **Peter visits St. Louis Chapter:** On Saturday, April 8th, Peter paid a visit to Moon Society St. Louis members while in town on personal business.
- **Two Speaking Engagements in Highland Park:** Peter has accepted an invitation to speak on M.D.R.S. and the Moon on Wednesdays, April 19th and 26th respectively at the Highland Park Illinois Senior Center.

LRS Upcoming Events – May, June

 **Saturday, May 13th, 1–4 pm**

LRS Meeting, Mayfair Mall, Garden Suites Room G1 10
AGENDA: www.lunar-reclamation.org/page4.htm

Peter will report on the Moon Society-LRS-NSS Mission in Utah. He will discuss whether or not we might want to do this again, and how we might pull it off, financially. Reports on Summer events, Updates on space and space mission news, conferences etc. A look at the calendar ahead.

 **Saturday, June 10th, 1–4 pm**

LRS Meeting, Mayfair Mall, Garden Suites Room G1 10
AGENDA: www.lunar-reclamation.org/page4.htm

Reports on Summer events, Updates on space and space mission news, conferences etc. No meetings in July, August. Next scheduled meeting will be September 16th, the 20th anniversary of the meeting at which the Milwaukee Lunar Reclamation Society was born! With that in mind, we will discuss how to celebrate at the June meeting.

U.S. CHAPTERS



NSS
Chapter Events
MMM
6 Chapters Strong

Space Chapters 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

April 15th – May 20th – June 17th

MINNESOTA



Minnesota Space Frontier Society

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

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

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

Email: tomg@mnsfs.org

[www.mnsfs.org/]
MN SFS News & Pictures

Twin Cities Regional Science Fair pics

<http://freemars.org/mnfan/TCRSF/2006/>

Ben's Marscon 2006 pics

<http://freemars.org/mnfan/MarsCon/2006/>

Ben's MDRS Crew 45 pics

www.freemars.org/mnfan/MarsSociety/2006/MDRS/Crew45/

Yuri's Night Party

A Yuri's Night party, celebrating the 45th anniversary of cosmonaut Yuri Gagarin's first successful orbit and human spaceflight in 1961, was planned for Wednesday, April 12th at Joe's Garage, 7pm till ?? 1610 Harmon pl, Minneapolis, 55403

Sheboygan Space Society



728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376 (h) <willf@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 Thursday of the month at 7-9pm

APR 20th The Stoelting House, Kiel

MAY 18th: UW-Sheboygan, Room 6101, Sheboygan

JUN 15th The Stoelting House, Kiel

Upcoming Events

Rockets for Schools - Fri./Sat./Sun. May 12th, 13th, 14th

We will be having a display at the Armory as usual

Philadelphia Area Space Alliance



PO Box 1715, Philadelphia, PA 19105

c/o Earl Bennett, EarlBennett@erols.com

215/633-0878 (H), 610/640-2345(W)

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

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

Next Meetings: April 15th - May 20th - June 17th

No Report has been filed for the March 18th meeting

SOLAR SYSTEM AMBASSADORS

www.jpl.nasa.gov/ambassador/

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OASIS

**OASIS: Organization for the Advancement
of Space Industrialization and Settlement
Greater Los Angeles Chapter of NSS**

P.O. Box 1231, Redondo Beach, CA 90278

Events Hotline/Answering Machine:(310) 364-2290

Odyssey Ed: Kat Tanaka - odyssey_editor@yahoo.com

[<http://www.oasis-nss.org/>]

oasis@oasis-nss.org

Odyssey Newsletter Online

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

Regular Meeting 3 pm 3rd Sat. each month

Microcosm, 401 Coral Circle, El Segundo.

• **April 15th - May 20th - June 17th**

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

Upcoming Events

- **Sat. April 22nd, 3:00 pm** —OASIS Monthly Business Meeting at the home of Steve Bartlett & Tina Beychok, 7108 E Peabody Street, Long Beach. *Note that this date is one week later than normal, because of Easter.*
- **Sat. April 29th, 3:00 pm** —OASIS hosts a presentation by Doug Jones of XCOR Aerospace, *Rocket Racers: The Sport for the 21st Century* at the Long Beach Public Library Los Altos Branch located at 5614 E Britton Dr, Long Beach. Attendance is free and open to the public. *This event is not library sponsored.* Call the OASIS Hotline for more information: 310/364-2290.

Looking Ahead

- **Thu.-Sun. May 4-7, 2006** -- The International Space Development Conference (ISDC), the annual meeting of the National Space Society, Sheraton Gateway Hotel, Los Angeles. The theme for the conference is Exploring Together. More information on the web at:

<http://isdc.nss.org/2006/>

or contact us by email: oasis@oasis-nss.org

OASIS is coordinating volunteers for the conference.

Scheduled tours of JPL and new Mohave Spaceport Site. This is the 1st ISDC in LA area since 1990 (Anaheim.) More info in this issue of MMM, page 13.

Recurring Events

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

NAME _____ STREET _____ CITY/ST/ZIP _____ PHONE #S _____	Member Dues -- MMM/MMR Subscriptions: Send proper dues to address in chapter news section =>for those outside participating chapter areas<= <input type="radio"/> \$12 Individual Subscriptions to MMM/MMR: Outside North America <input type="radio"/> \$50 Surface Mail -- Payable to "LRS", PO Box 2102, Milwaukee WI 53201
<input type="radio"/> \$45 National Space Society dues includes Ad Astra <input type="radio"/> \$20 NSS dues if under 22 / over 64. <i>State age</i> _____ 600 Pennsylvania Ave SE #201, Washington DC 20003	CHICAGO SPACE FRONTIER L5 <input type="radio"/> \$15 annual dues
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	OREGON L5 SOCIETY <input type="radio"/> \$25 for all members
	O.A.S.I.S. L5 (Los Angeles) <input type="radio"/> \$25 regular dues with MMM
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	SHEBOYGAN SPACE SOCIETY (WI) <input type="radio"/> \$15 regular, <input type="radio"/> \$10 student, <input type="radio"/> \$1/extra family member "SSS" c/o B. P. Knier, 22608 County Line Rd, Elkhart Lake WI 53020

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