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

Moon Miners' Manifesto

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In FOCUS: A "Safe House" in Orbit that avoids the "Infrastructure Trap"

The debate over how to save Hubble appears to be over now: *we won't*. The Space Telescope's fate was sealed by the *Columbia* incident, after which it was agreed, that we would not launch the Shuttle unless there was a default place for the crew to hang out while waiting for a rescue, should their shuttle orbiter have to be abandoned: a "safe house." ISS serves as a safe house for SST missions to the station in its high inclination orbit. But Hubble is in an orbit from which the station can't easily be reached.

We have backed ourselves into a corner, a corner of our own making. And what is most regrettable is that space activists have had a hand in creating this predicament.

When we brought the Apollo Program to an early conclusion, canceling the scheduled A18, A19, and A20 missions, *everyone agreed* that before we could return, we needed a depot in space from which to stage more complex lunar missions. At as space "depot," Moon-bound personnel would transfer from some sort of shuttle that brought them up from Earth's surface, to an awaiting LEO to Luna (or LLO, low lunar orbit) "ferry." We all rallied around this perceived need. And in doing so, we fell into the trap.

With more people seeing the usefulness of an orbital *station* than for an orbital *depot*, it was inevitable that the station would be designed as an Earth-facing end in in itself rather than as a Space-facing stepping stone.

Yes, we need infrastructure, but *not all of it right away.* Railroads helped settle the American West. But we did not wait on them to begin that venture. How stupid could we have been to think that the depot must precede real traffic? Traffic comes first, then support infrastructure to make that traffic easier to support, develops *as needed* one step and phase at a time. The fact is, and yes, we must dare to say it, that Wernher von Braun himself got it wrong, and in our deference to him, we did not question him.

For example, a Safe House in orbit, or wherever it may be needed along the way, can be provided by a mated launch of a provisioned bare bones habitat capsule on an expendable launch vehicle, and left in space to serve that function for other manned missions into similar orbits. Don't have one handy? A second shuttle could be launched at the same time with minimum crew. Yes, it won't happen because it doesn't fit the game plan we've been following for two decades, the game plan that led us to the fix we are now in.

Robert Zubrin has been the lone person out there to see that ISS is a trap, a depot to nowhere. His "Mars Direct" being a bold plan to bypass it. [⇒ p. 2, col. 2]

From Junk to Music-Making on the Frontier

It takes imagination to see anything of use in a pile of "junk." Yet artists who cherish free materials have "dumpster-dived" for arts and crafts stuffs from time immemorial. Okay, but what about music? Now that takes a leap of imagination to be sure. But space frontier junk piles may be a major source of music-making artifacts. For more, read "Music from Junk" pages 7-8.

Moon Miners' Manifesto

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

• **Moon Miners' Manifesto CLASSICS :** Beginning with 'July 2004, we have begun an effort to re-edit, reformat, re-illustrate and republish the timeless articles of MMM's first ten years, with the intention of publishing two issues, each covering one year, in PDF format only, for free downloading, each January and July.

• **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; earliest use of Mars system and asteroidal resources; and the establishment of the permanent settlements necessary to support such an economy.

• **MMM's MISSION:** to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.

• **MMM retains its editorial independence.** MMM serves several groups each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test. Any presumption that participating organizations can be labeled by indirect mutual association is unwarranted.

• For the current space news and near-term developments, read *Ad Astra*, the magazine of the **National Space Society**, in which we recommend and encourage membership.

• **The Lunar Reclamation Society** is an independently incorporated non-profit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. LRS serves as NSS' Milwaukee chapter

=> www.lunar-reclamation.org

• **The National Space Society** is a grassroots pro-space membership organization, with 10,000 members and 40 chapters, dedicated to the creation of a spacefaring civilization.

The National Space Society, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 <= NEW HQ

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• **MMM's desktop publication** has received computer hardware and software support from the **Space Frontier Foundation**, 16 First Ave., Nyack NY 10960; 800-78-SPACE - SFF seeks to open the space frontier to human settlement as rapidly as possible.

openfrontier@delphi.com => www.space-frontier.org

• **The Moon Society** is "dedicated to overcoming the business, financial, and technological challenges necessary to establish a permanent, self-sustaining human presence on the Moon." — See contact information on page 9.

• **NSS chapters** and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.

• **Publication Deadline:** Final draft is prepared ASAP after the 20th of each month. Articles needing to be keyed in or edited are due on the **15th**, Sooner is better! - No compensation is paid.

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⇒ IN FOCUS Editorial continued from p. 1.

But our point is not that deep space manned missions must be "self-contained" but that far less elaborate and more mission-appropriate staging options are available. We cited double shuttle launches, as just one example. When Bigelow Aerospace's full scale operational inflatable Nautilus Habitat is ready, one could be launched into a deep-space-friendly lower inclination orbit (28° from the Cape will do, but lower would be better) and left there. Nautilus would need docking ability and solar power panels, and a means of periodic reboost to keep it at the desired operational altitude. For complex missions in which the craft bound for the Moon or Mars needed to be assembled, this could be handled *if the assembly could be designed to be effected simply by man-tended docking requiring minimal EVA time.*

As traffic to the Moon and/or Mars builds, a depot staging and servicing station could be built, *designed to grow with the traffic.* This concept of building an orbital *Taj Mahal* and completing it, before any further manned missions to deep space, back to the Moon or on to Mars, is indefensible. Von Braun authored it, and in unquestioning respect for him, we bought it hook, line, and sinker. We have no one but ourselves to blame for the 35 year hiatus, going on half a century, in manned missions to the Moon.

NASA, under O'Keefe, has shown some capacity and willingness to change long entrenched thought patterns and mission development paradigms. But the danger, inseparable from the reality of government financed and micro-managed programs, remains that any "rung" will be redefined *in committee* as an end in itself, no longer as a rung in a ladder leading to a rung higher up.

To this day, a discouragingly high percentage of space enthusiasts put all or most of their faith in government space, in the *socialized* space program. Without disrespecting the venerable old agency, our only sure and steady bet is the commercial path to space. Private enterprise *will build infrastructure - but only one stage at a time, as it is needed.* In our opinion, that's our only choice. - **PK**

Student Contest Winning Paper this Issue

On pages 4-7 of this issue, we are proud to publish the second of two winning papers in India's **Moon Mission Contest** cosponsored by The Planetary Society of Youth (TPSY), and the Moon Society. We had published the first paper in the December issue, MMM #181

Contest Specifics:

http://www.geocities.com/amplanetary/moon_mission_contest.html

Thanks go to **The Planetary Society of Youth (TPSY), India,** and especially to its director, **Amrut Yalagi**, for putting together this Moon Mission Contest and for inviting the Moon Society to help refine the contest design and format and to cosponsor the event.

Ground Penetrating Radar Study of Skylight (lava tube) Cave, Oregon

Portland State Geology Department
by Bob McGown < bobmcgown@comcast.net >

In September 2002, David Percy PSU geology instructor, PhD student, completed a follow up to the NIAC *Caves of Mars* study. Percy and fellow geology student Robert McGown set up equipment and got the images for the ground penetrating radar (GPR) study done at Skylight Cave 4500' near Sisters, Oregon. This lava tube cave has an entrance that is a sunken skylight located in mid span of the cave. There is a steel ladder in the entrance that allows access to the main lava tube body of the cave. Inside the cave, to the south, there is a 140-meter long tunnel to a large hornito chamber with three hornitos protruding through the surface that probably expelled gasses during the formation of the lava tube.

hornito: *Geology:* [surface description] a low oven-shaped mound, common in volcanic areas, (at one time, at least) emiting hot smoke and vapors from its side and summit.

Skylight Cave Map: www.highmars.org/niac/skylite2.html

GPR cross-sections of the cave were taken at two locations perpendicular to the length of the tube. The first cross-section was taken across the cindered road approximately 50 meters from the skylight entrance. David Percy had the computer and receiver in his customized GPR back pack stringing out the fiber optic cables with Robert resetting the transmitters every 3 meters for a 100 meter cross section pass. The actual test and compilation of the first cross section took about 20 minutes after set up and break down. The image was immediately viewed immediately on site after data was processed and over laid.

The second cross section was more difficult because of the tumuli that created a ridge along the length of the lava tube. Where the first GPR transmission was taken along a cindered flat road, the second GPR cross section was completed between the first and second hornito on a lava rock ridge. The transmitters were set up on the bare lava surface, sometimes at angles to the slope. Special care was taken with the fiber-optic cables and the placements of the transmitters. This data immediately was processed to reveal the image of the hornito chamber.

The study of the cave began with a preliminary cleanup. The cave was first mapped in a data point cloud on Aug 2002 with a 3-D Lidar radar digital scan with a Cyrax surveying instrument made by the Cyra Technologies, supplied by Pacific Surveying Supply. A researcher with Pacific Surveying Supply presented the data at the September NSS meeting to the Oregon L-5 society, a chapter of the National Space Society. The cave study included a NASA Institute of Advanced Concepts (NIAC) *Caves of Mars* investigation that included a CEMSS biosphere with computer data acquisition set up in the central hornito with the Oregon chapter of the Mars society and Oregon L-5 society. GPR data for lava tubes is especially interesting to NASA for remote studies of lava tube caves on the Moon and Mars.

On each lava tube wall, we laid out a 40-degree point cloud data set, to map the triple hornito chamber of Skylight Cave for the Cyrax surveying unit. The Cyrax 2500 unit uses 3-D Lidar scanning to create a million point data cloud to capture an image. Cyrax is one of the many products that Cyra Technologies, Inc. uses. For more information, visit their website: http://www.cyra.com/

In the cave, Robert and Gus made a map of the hornito ridges on the cave floor and where the CEMSS Mark II module would rest within a 12-foot scaffold stabilized by a roping system using rock anchors above the central vent. An 'umbilical cord' going through the central hornito vent will record and send data from the CEMSS sensor array to the computers at the base camp tent. The data acquisition will be powered by solar panels in the staging area behind the tent using 12/120-volt power feeds from the batteries and inverters. This electrical system reflects techniques developed to simulate a Martian lava tube base environment. The CEMSS Mark II module will contain duckweed and two female 'astro mice', who will live in the controlled, closed ecological environment for 72 hours. **<RMcG>**

[The author had to pay a significant sum to arrange use of the Portland State University GPR for this study. It was fortunate that Dr. Percy was interested in the study. Images of the GPR readings were supplied by the author but they were not clear enough to survive printing in MMM.]

Exploring Moon & Mars Lavatubes with GPR

by Peter Kokh

GPR is certainly a tool that will be of great use by explorers on the Moon and Mars searching for lavatubes, provided we have first determined an area to be "tube country." On the Moon, certainly, the GPR unit might have to be significantly more powerful. Whereas on Earth, lavatubes may lurk only a few feet below the surface, it is estimated that to have survived intact from their formation on the Moon in the period of great lava upwellings 3.5 to 3.8 Billion (big B) years ago to the present, the ceilings must be of the order of 40 meters thick, enough to withstand average random meteor and meteorite bombardment through *38 million centuries.*

If we can build such equipment, we can create low resolution maps of lavatube fields. The next step would be to use these maps to locate drill holes down which instruments can be lowered into the lavatube voids for more detailed radar mapping of their surfaces: ceilings, walls, and floors. We wrote about this in MMM # 100 Nov., '96, p. 6. Robotic On Site Lavatube Exploration & Surveying.

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

Can a Permanent and Economical Human Base be Built on the Moon?

by Theo Allan Fernandes, Mumbai (Bombay), India>

Foreward: Every time we look at the Moon in the night sky it seems to be pouring white light on us and tempts us to reach it. It was a mysterious rock before the Apollo program. Astronauts have indeed left their footprints on the Lunar dust, the first being the Apollo 11 Mission on July 20, 1969 with crew members Neil Armstrong, and Edwin E. Aldrin Jr, (Michael Collins, Apollo Module Pilot remained in orbit.) And the last mission being Apollo 17 in December 1972 – the 6th U.S mission to do so. Just as he stepped off the Lunar Module Neil Armstrong proclaimed, "That's one small step for man one giant leap for mankind". He then said it from his heart and hence predicted the future of space exploration. Today, not only America and Russia, but several other countries like Canada, India, Europe, China and Japan have the capacity to participate in space science exploration and mission programs.

Galileo was the First to focus his telescope on the details of the Moon's Surface in 1609. He recognized mountains and large, flat, dark areas, which he called *maria*, the Latin word for "Seas". But still people were eager to learn more about Luna (Moon) which has fascinated mankind throughout the ages. Scientists too had unanswered questions, before Astronauts reached the Moon. The Apollo Astronauts brought back 380 Kilo of Moon rocks, along with other crucial, not previously known information. Further scientific study of these rocks answered some of these questions to give us our current understanding of the Moon's past and present.

Formation of the Moon: Before the Apollo Missions, Scientists had three different theories about the formation of the Moon. Each posed further questions, however.

- The Moon had been a wandering planet that was captured by the Earth, But how could a small planet like Earth capture such a big Moon?
- The Earth and the Moon had form from the same rotating cloud of rocks and dusts. But if so, why didn't the Moon have a big, heavy core like Earth?
- A chunk of the Earth split off and formed the Moon. But, if Earth was once spinning fast enough to lose a piece of itself then it should still be spinning much faster than it is today.

Questions raised by each of these theories remain unanswered.

- The fourth idea: The giant impact Hypothesis, according to which an object as big as Mars struck the Earth, destroying itself and blasting off a huge amount of materials into space. Some amount of this material remained in the Earth's orbit and clumped together, to form the Moon. This idea made sense after the Apollo mission. As big impacts were common in the violent past. A giant impact might have released enough heat to create the Moon's Core of Magma also giving the Earth a tilt and Spin. The heavy core of the Mars-like object might have become part of Earth's, which clearly explained why the Moon's core seems small and light as compared to Earth's

Description of the Moon (Luna): The Earth's only natural satellite, the Moon has a diameter (3,476 kilometers) more than a quarter the size of Earth's. The Moon is 384,403 Kilometer distant from Earth surface. Its gravity is one sixth that of Earth's because of its smaller size, as we have seen demonstrated by the giant leaps of the Apollo Astronauts.

The Moon's top layer of crust and mantle is rock solid, about 800 kilometers thick, beneath which is a partially molten zone. Covering the Moon's crust is a dusty outer layer of rock called regolith. Both the crust and regolith are unevenly distributed over the Moon's Surface. The crust ranges from 38 miles on the near side to 63 miles on the farside. The regolith varies from 10 to 16 feet on the Highlands. There are many surface features such as craters, mountains ranges, rilles and lava plains. There are two basic types of terrain on the Moon's surface – the Maria and the Highlands.

The Moon does not possess any atmosphere, hence no wind and weather as on Earth. The temperatures on the Moon range from 100 degree Celsius at noon (when the sun is directly overhead) to 173 degree Celsius at night. The Moon outgases radon, a product of radioactive decay of elements in the crust, and possibly other gases, which may originate deeper within the Moon's interior. This outgassing may be one of the reasons for the sudden temporary glows, darkening and changes of color of the normally unchanging Moon.

The Moon does not produce its own light but instead reflects light from the sun hence looks bright. The rotation and revolution of the Moon both, around the Earth takes 27 days, 7 hours, and 43 minutes. As the angle of the sun is changing through this period, the length of the day/night cycle is about two Earth days longer. The lunar phase changes as the Moon orbits the Earth resulting in illumination of its different position relative to the sun as seen from Earth. The Earth's gravity has locked one Lunar hemisphere permanently towards itself. The Lunar sky is always black because there is no diffraction of light.

Some unanswered questions about the Moon:

1. Do albedo Swirls have magnetic origins?
2. Do the permanently shadowed areas on the Moon (Lunar Poles) harbor quantities of water ice and contain microscopic organisms that can live in extremely hostile conditions?
3. Does the Moon have reservoirs of trapped underground gases?
4. Can the Moon obtain magnetism from impacts by comets and asteroids

Purposes for future Moon Missions:

1. To conduct various scientific experiments and to study the Moon in greater depth.
2. To explore permanently shadowed regions at the lunar poles
3. To determine the bulk elements composition of the Moon as well as to identify potential Lunar resources, including water ice
4. To determine if life could evolve on the Moon given some basic conditions
5. To explore particularly a crater in the Moon's South Pole-Aitken Basin which may contain some of the oldest, if not the oldest, exposed material in the Solar System
6. To establish a large scale permanent human base supported by local resources on the Moon, which will be economically viable (feasible, possible and practical) and could even serve as a stepping stone for sending Astronauts to Mars and other planets of the Solar System
7. To find, and tap minerals (Lunar Resources) which could serve as a new and immense source of energy for Earth's growing power needs.
8. To establish global human settlement and perhaps terraform the Moon (make it conducive to life forms)

---------- [Paper Proper] ----------

Research Question: Can a Permanent and Economical Human Base be Built on the Moon?

Facts that are already known or hypothesis about the science related to my purpose/research question:

The Moon base constructed at the beginning could not be a large city or village with buildings. At first it will be only small enough to support team or certain specialized space scientists and engineers, about 500 to 1000 in number. Later on, once we are making use of local resources to defray costs of Earth import, will we begin expanding the Moon base area.

The reason why my purpose is interesting and or important: Among many other purpose this purpose of settling up a permanent human base on the Moon is interesting and/or important for the following reasons:

1. Our return to the Moon and establishment of a presence there will provide the fullest possible support to the Mars Exploration programs
2. The Moon, if mined, will be an enormous supplier of rare earthly and industrially strategic elements and will also provide abundant clean energy for Earth's growing power needs and thus help solve its environmental problems.
3. The Moon's farside is permanently shielded from the Earth's radio noise. This makes it the best possible site for Radio Astronomy
4. What we're doing to our own planet is scary. And what this ever friendly planet might become is even scarier. Besides several types of man made catastrophe, there are indeed too many threats from Earth approaching asteroids waiting to hit our planet.

The types of missions I propose to send:

1. To search for evidence giving details about the Moon's violent past and its evolution to its present state
2. To more completely map the Moon's elemental and mineralogical composition prior to selecting an outpost site which would suit the best, with respect to various factors
3. To establish astronomical observatories, including radio telescopes on the Moon's far side which is shielded from Earth's electronic noise
4. To explore the unseen, ever hidden far side of the Moon
5. To search for water ice at the Lunar Poles

Why I am choosing these types of Missions

It is globally true there are too many present and future threats to our planet and to our civilization. These can be in the from of Global Warming or from Impacts by asteroids and comets, both which would change the weather patterns and eventually wipe out a considerable portion of the World's Population. Even if Global Warming is managed, and Earth is spared from a serious impactor strike for far into the future, the Moon can serve as a priceless source for minerals depleted on Earth minerals and for potentially valuable elements like Helium-3. Development of boundless clean – energy could be supplied to reduce Earth's Ever-Growing demand. On transforming the Moon to an Inhabited World, the Moon will become a center for Mars and eventually Solar System Exploration.

"*A single planet civilization cannot survive n the long term*" - Captain John Young.

The advantages and challenges of the types of Missions I am proposing are as follows:

Advantages:

1. A permanent Moonbase would provide uninterrupted service and could be a center for long term investments
2. A permanently occupied Moonbase will be much easier to repair even if damaged
3. Many kinds of (research and construction) activities carried out on the Moon are much easier than in free space, because of the Moon's gravity.
4. Local Lunar materials and minerals would be useful for building up and expanding the Lunar base
5. Unique products may be producible in the nearly limitless extreme vacuum on the Lunar surface, in turn supporting Lunar Settlement.
6. About 45% of the Lunar soil and rock is made up of oxygen, and eventually can be used

Challenges:

1. What to do with the accumulated fuel waste, food waste and human waste on the Moon?
2. How can we enrich the soil for cultivating food crops on the Moon?
3. How can we obtain energy during nighttime
4. How can a life supporting system be used for the people on the Moon?
5. How can we extract Oxygen from the Lunar Soil?

I propose to address these challenges in the following effective ways:

1. These are all *carbohydrate* and other organic compounds and hence can be easily conserved, recycled and oxidized to give carbon-dioxide for photosynthesis of vegetarian food cultivation on the Moon
2. Organic methods including compost manures, worms, etc, are preferred for enriching the soil in a closed system on the Moon. Use of chemical pesticides will be strictly prohibited.
3. A small nuclear power plant will be constructed at a considerable distance from the Lunar base for providing energy during Nighttime
4. Life supporting systems require life giving elements: hydrogen and oxygen (for water), carbon and nitrogen. Plenty of oxygen is bound in silicate minerals of lunar rocks (about 50% by volume) and solar winds (composed of hydrogen, helium, neon, carbon and nitrogen) provides the rest stored in the upper layers of the moondust, retrievable by heating .
5. Oxygen can be extracted from the Lunar soil with the help of the Lunar Oxygen Extraction Pilot Plant.

Unaddressed Challenge: How to create air, water and organic things from minerals and inorganic matters?

Where am I planning to send my Mission? I would like to set up the Moon base at higher latitudes on the Moon, because the higher the latitude the lower Earth will appear above the horizon for a nicer view.

Site Location considerations of key importance:

1. All future Lunar missions should be strictly in accordance with the "Moon Treaty". If needed, the Moon Treaty should be amended
2. The doors should be kept open for equal participation of private enterprises
3. The Lunar resources should be used up to the fullest extent without causing any environmental damage to the Moon

4. The site of the Lunar base must be most suitable to carry out various scientific experiments
5. Sites of historical and other significance should be protected

Mission Goals: The data to be collected and why and how we will collect it

A. To determining how much light will plants need during the nighttime

Why: In order to control lightning costs and increase crop growth/harvest

How: By experimenting on the following factors,

1. Amount of time in light or darkness
2. Moisture of the soil and air
3. Watering
4. Air and soil temperature
5. Type of soil preferably, organic
6. Volume of soil per plant

B. To develop and test new technologies

Why: To support human space exploration to Mars and other destinations

How: Use Lunar materials and other Space resources

C. To determine economically minable richer concentrations of industrially strategic elements and subsurface reservoirs of gases?

Why: These minerals and elements will be helpful in building the Moon base and the excess can be exported to the Earth. Thus benefiting both

How: With the help of Neutron Spectrometer and Gamma Ray Spectrometer and other technologies

Additional data to be collected:

1. To study the effect of one-sixth gravity on cells, tissues and plants
2. What stage of embryonic development is sensitive to the reduced gravity level and why?
3. To identify the best location for an outpost from various points of view

Conclusion:

We should expand our civilization outward in space in a safe, supportable, sustainable, and unstoppable manner. The Moon represents the next vital step in this direction. It will be a land to be settled, a supplier of precious and important minerals for the development of clean energy in space and on Earth. Luna will be a location for soaring commercial enterprises. The Luna will be a training base for future explorer to Mars and other planets, hence shaping our future world.

Dream, Dream, Dream,
Dreams transform into thoughts
And thoughts result in action

"**Impossible**" is just a big word thrown around by small men who find it easier to live in the world they've been given than to explore the power they have to change it. Impossible is not a fact. It's an opinion. Impossible is not a declaration. It's a dare.

Impossible is potential.
Impossible is temporary.
Impossible is nothing

---------- Student Work Sheet ----------

Q 1. Do you see a future for a permanent human presence on the Moon? And if so, what shape do you see it taking? Science outposts only? Resource-developing settlements supporting themselves with experts to Earth and other outposts in Space as part of an expanded Earth-Moon economy?

The past has already witnessed human presence on the Earth's only satellite – The Moon, the last being the Apollo 17 mission in December 1972, the 6th U.S. Landing Mission. The need of the present is a permanent human presence on the Moon, of which I am sure, will be accomplished in the next 2-3 decades, based on the following indications:

1. The Indian Space Research Organization (ISRO) will send its first unmanned mission to Moon in 2007-08
2. Japan has set itself a 30 year plan to establish a permanent Moon base. Japan is planning an unmanned lunar flight called "Lunar A"
3. China too has announced plans to go to the Moon. China would be putting a man on the Moon by 2010, establishing a Moon Base soon afterwards.
4. U.S. plans have been announced to build a permanent base for men on the Moon
5. The European Space Agency has launched an unmanned mission to the Moon called "SMART-1"

A Nuclear power plant for nighttime energy shall be constructed at a considerable distance from the lunar base. A power plant consisting of solar cells (photovoltaic cells) for daytime energy shall be stationed near the base. Local Lunar materials would be quite worthwhile for building up a Lunar base. Some methods like:

- Extraction of Oxygen from Lunar Soil will provide an important resources.
- Oxygen, Iron, Titanium and Sulfur production from ilmenite
- Iron and Steel alloy manufacturing

Low gravity mining of Earth deficient elements on the Moon (such as Helium-3) and exporting them to the Earth will help establish an Earth-Moon Economy which in turn will solve Earth's energy problems.

Q 2. What kind of Sports activities do you imagine on the Moon? Will there ever be any Olympic Lunar event?

The Moon being the top tourist destination of the near future will offer entirely new low gravity games developed specifically for the Moon. But some of sport events, the ones traditionally played on Earth would be modified for lower lunar gravity e.g. *heavier* javelins, shot puts, discus; and *higher* basketball hoops, high jumps poles. Yes indeed there would be an Olympic Lunar event called Lunar Olympiad would be held every half a decade (every 5 years) and would bring loads of people and participants skywards to watch and participate in this one of its kind event.

Q 3. If in the future, a Lunar frontier is opened for people, what positive psychological effects if any do you expect this may have on those of us who remain on Earth?

A lunar frontier of the future will not be large enough to provide shelter to a large portion of Human Population, due to lack of resources and other problems. Thus, most of us would not be fortunate enough to visit this sea of Tranquility. But this will surely make us proud to be a part of the most developed creation of God – Human beings, who with their hunger for achievements exceeding the limits, made it possible

not only to land but to live on the Moon. Remaining on Earth will not make us feel isolated because it is where it all began - the Creation, the Evolution, the Development and the Achievement. We will be happy to see or hear about any of our friends or relatives who land on Moon. Though most of us may be eager and strive hard to visit the Moon oneday, some may be happy because they live more at ease than those who live on the Moon. As once said wisely after a day ends, one must come back to a place which he proudly calls Home Sweet Home.

Q 4. Should the Moon Treaty be changed to provide for the development of the Lunar resources, with due protection for the Moon's environment and its scientific, geological, and scenic treasures?

The "Moon Treaty" is a agreement governing the activities of states on the Moon and other celestial bodies which was opened for signature at New York on December 18th, 1979. The existing articles of the Moon Treaty should not be amended because it has already paid attention to these very important factors in its agreement of 1979 as follows:

- Article 6: State parties may in the course of scientific investigations also use mineral and other substances of the Moon in quantities appropriate for the support of their Mission.
- Article 7: State parties shall take measures to prevent disruption of existing balance of its environment…
- Article 11: ….. The main… shall include: The orderly and safe development of the natural resources of the Moon.

But two new articles should be added: In accordance with the Article 18 of the Moon Treaty

- New Article 22 stating protection of private enterprise and the role of tourism, and
- New Article 23 stating the areas visited by the American Apollo and Soviet Lunakhod Missions may be considered as historical treasures and must be protected.

Q 5. Why would you like to take trip on the Moon? Why?

Yes, I'd like to take a trip to the Sea of Tranquility. The Moon, whose light shows me the right direction to my home sweet home when there's no light due to electricity problems. I would like to visit the Moon as the best tourist destination with half work and the rest play. I would like to sink in every imaginable (as though on Earth) sort of environment the Moon would provide. The Earth would be a splendid sight from its surface. It would be a trip of a lifetime.

The Lunar base would be the fruits of seeds sown by those who have achieved mastery in their respective fields. It would be a great adventure to be deeply connected with the satellite of the third planet from the Sun. On looking at out Home planet Earth from the Moon it would seem as if I have reached a place of Sanctity. I hope reading this, millions would like to visit the Moon one day just as I do.

Q 6. Do you think that putting an outpost on the Moo will be help to human exploration of Mars?

Mars being the closest place to look for life elsewhere, as well as the most promising place to look, will surely get great help and support from establishment of an outpost on the Moon. Lunar Mines and factories would be the supply source for various Metals and Equipments needed for manned and unmanned Mars Exploration. The Moon's resources can be used to manufacture items needed to support the Mars Initiative. A Moon base will play an important role as a stepping stone to Mars and eventually to other planets of the Solar System. **<TAF>**

Making Music without Importing Instruments

Music from Junk

Monster Musical Instrument Shop

by Peter Kokh

The Frontier Situation

Music without musical instruments? That's easy. Our computers can generate any music we want. That may satisfy some, but not all. Some artistic souls will want to generate music the old fashioned way. Yet musical instruments will be luxury items imported only at exorbitant cost. A ban on importation of musical instruments would not stop the music, however. Instead it would encourage and energize an amazing creativity.

In MMM #3 March 1987, "Moon Music*" we took up this challenge.

http://www.asi.org/adb/6/9/2/2/003/moonmusic.html
Republished in the first volume of MMM Classics:
http://www.lunar-reclamation.org/
mmm_classics/mmmc1_Jul2004.pdf

We can make some kinds of instruments out of lunar materials, but. But forget anything made of wood, copper or brass. Iron, steel, aluminum, glass, concrete, ceramics - yes. Wood, copper or brass - no. Wood incorporates hydrogen and carbon that should be recycled to maintain the biosphere. Copper, from which brass is made, exist on the Moon, so far as we presently know, only in economically irretrievable traces. That leaves out most wind instruments.

Ingenuity will come up with substitutes. Incredibly beautiful music can be made from a cut-off 55 gallon drum whose bottom is then beat with a set of sledge hammers into a complex concave shape capable of sounding from 3 to 36 full, round, vibrant notes. We can make music with glass tumblers and ceramic tubes etc. The article cited above had many more suggestions.

"Scrap" will be a "lunar material" also

But in addition from fashioning musical instruments from scratch out of processed lunar materials, some frontier artists may choose to simply make them from "junk" or "scrap." We recently read the article "Recycled Rhythms" in the column "One Small Step" in Sierra - Jan/Feb 2005. The article told the story of **Donald "the Junkman" Knaack**, Percussionist, Manchester Center, Vermont. Visit his website: http://www.junkmusic.org

Knaack uses only junk metal - wrenches, pipes,etc., chains, brake drums, hub caps, pan covers, seashells etc. - we can use items discarded by manufacturers as seconds and by consumers as broken, or just as "replaced", spent artillery shells, rifle barrels, Scrap metal parts of many kinds will lend themselves to percussion sounds.

Beyond Percussion

But some shapes, of metal, glass, and ceramic should yield bell-like notes with a distinctive pitch, A mix and match "full set" of them would allow the artist to render almost any melody of whatever beat.

Whereas traditional musicians attempt to use recognized instruments with fairly standardized types of sounds, Lunar and Martian pioneer "junk musicians" will be more inclined to experiment. And if their ensembles do a poor job of rendering known and cherished melodies, they will just create music specially tailored for the instruments they have fashioned. The "sound" will be unique. Junk Music could become a popular genre on both frontiers, adding much to the specialness of space frontier cultures.

The music will not be "refined" but neither will the spirit of frontier folk be refined. Refinement will come over generations, as frontiers become less rough and rugged, and survival becomes less problematical.

The Lunar & Martian Junkpiles

The junk will come from abandoned and derelict space ships, from broken down rovers and overland coaches and rigs; from fuel tanks and shipping containers. It will also come from the detritus of frontier industry. And surely, some of it will come from the consumer cycle. Agricultural "scrap" will also do at least temporary duty in music making. Hollowed out guords, bamboo pieces, just plan sticks, and wood, andreeds, and ... the list goes on.

The point is that junk is here and now, whereas specially designed and fashioned instruments made from the new suite of processed lunar and Martian materials will come on line more slowly. More importantly, "junk is junk-cheap." While instruments imported from Earth will be exorbitantly expensive, those carefully fashioned from the new frontier -processed materials will embody the costs of the processing and manufacturing, assembly and tuning, etc. Cheaper, but not free.

Frontier Junk Music as an Export to Earth

Junk Music is of terrestrial origin. What "the Junkman" has done is but to call fresh attention to a type of experimental musical expression that has always been with us probably since long before the dawn of recorded history. But it has definitely not been mainstream as more "cultivated" music has long prevailed. Fresh is good, however, and whether or not the Knaack's music catches on is not the point.

On the frontier, Junk Music may take on a prominence that it could never attain here, a prominence out of necessity. And it will be good, and fresh. It will inspire and enhearten the pioneers. Whether they gather to hear impromptu "junk jams" or practiced "junk concerts," this is a musical tradition sure to be on our road to the stars. At the outset at least.

One cannot believe that this raw, rugged, brash sound from the lunar and Martian burrows will have its devoted fans on Earth. There will be both recordings and live telecasts and webcasts.

Some terrestrial youth may be inspired by it to dream of joining the pioneers. Others will be turned off, probably for the better. The early frontier will be a rough place, where sacrifices are made, but the rewards of leading significant lives and helping launch new worlds will be great.

Starting a frontier tradition now

In the 1987 article, I proposed that chapters try to put together "lunar ensembles" that would use only those instruments that could be fashioned from readily available lunar-processed materials. Whether they only played "frontier filk" songs or also re-rendered popular terrestrial favorites, their music would give color, life, and detail to the otherwise blank visions of life on the lunar frontier. To our knowledge, no one has taken us up on this proposal.

An ISDC pipe–dream

When on the road trip home from ISDC 1993 in Huntsville, Alabama, Dave Dunlop and I decided to bid on hosting ISDC 1997 in Milwaukee (we lost this bid to Orlando by one vote, but successfully rebid for the 1998 event), a lunar ensemble was part of our grand design for the banquet entertainment. Alas, this, like many other planned special features, this was something that required both a lot of lead time as well as the right person to head it up. "Lead time turned to lead (the metal)" as it is wont to do, and the right person never came along.

What about at M.A.R.S. or at M.D.R.S.?

Perhaps some individuals volunteering for future two week crew assignments at the Mars Arctic or the Mars Desert Research Station will take up the idea and get something started. Despite efforts to recycle, both facilities produce their share of trash laden with unsuspected potential: broken parts from machinery and equipment; tin cans and other containers: and more.

Willing crew members could experiment with this stuff, carefully collecting objects that produced distinctive sounds. If persons on following crews kept adding to the salvaged music making stuffs, eventually the "junk jam" that resulted would start to sound really good. A few recordings sold at Mars Society Conventions and at the annual ISDCs and the bug would start to catch on.

Others could experiment at home. Each new convention or ISDC could schedule a "junk jam" and perhaps a quickly rehearsed "concert." And Voilà! A frontier tradition will have been born.

As Robert Zubrin has remarked, there has been no frontier without its special music and heartening songs and event-remembering ballads. Music may seem the least important aspect of a frontier opening effort. But in some ways it might be one of the most critical elements of all.

"Shall we jam?" **<MMM>**

The Moon Society

J O U R N A L

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**

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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!

2005 could be Exciting and Productive

By Peter Kokh, Moon Society President

Many of the events that will shape 2005 from a space enthusiast point of view are already underway. The Cassini probe is making its rounds among Saturn's large retinue of moons. Its hitchhiker companion, Huygens, has already descended to the mysterious surface of Titan, second largest and most intriguing moon in the Solar System and its findings continue to pour in, with new discoveries being made as we continue to analyze and process them. The Spirit and Opportunity probes continue to work tirelessly on overtime on Mars, sending back unbeliev-able photos, while ESA's Mars Express orbits above, continuing to find indications that microbial life still persists on Mars to the present day.

Other exciting events are on the books for later in the year: the two-person 5-day orbital mission of China's Shenzhou 6; the return of the Space Shuttle to active duty focused on completion of ISS; and the perennially promised launch of TransOrbital's Trailblazer 1 probe to the Moon.

Finally there will be the political drama, never smooth, never just as we'd like it, of implementation of the Moon, Mars, and Beyond space vision. But for us, it is not a year to stand by and watch wonderful things unfold and develop around us. That should be after hours entertainment. Our major preoccupation should be with finding more ways to make an effective difference.

We hope to make real progress in our announced projects, begin new ones, establish new collaborations and solidify ones already entered into. We hope to grow the Society's membership.

Along the way, we need to work on increasing the Society's public profile, and the recognition of the name "The Moon Society." Already, we have had one opportunity. On Sunday, January 2nd, we were the guest of the hour and a half long web show, The Space Show. Host Dr. David Livingstone interviewed me, having me respond to questions and comments sent in by listeners. The show is broadcast live in Seattle, elsewhere only on the Internet. You can listen to a tape of this show on a Windows Media Player b y going to http://www.thespaceshow.com and scrolling down for the 1/2/2005 link.

We need to be on the lookout for more such opportunities. Indeed, we are badly in need of a volunteer PR person to take charge of this effort. Perhaps you! On our volunteer page there are other suggestions for involvement. We need to grow our core team! Want to have a piece of the action? Just write volunteer@moonsociety.org.

We will have a presence at ISDC 05 in Washington DC in May, and at the Mars Convention in Boulder, CO this August. It promises to be a busy year. Indeed, the excitement of 2005 will come of itself. The year's productivity, however, will be up to us **<TMS>**

[Moon Society Partner Organization Oregon L5 sent this well-thought out, carefully developed Memo to GWB]

Memo from Oregon L5 Society Research Teams to the President's Commission on Moon, Mars, and Beyond

http://www.OregonL5.org/l5memo.html

2004 February 18: Oregon L5 Society, a chapter of National Space Society, has researched planetary bases and activities since 1986, with an emphasis on potential advantages of lavatube caves. If present as expected on the Moon and Mars, these huge caverns can increase capabilities, improve safety, and reduce costs of planetary bases. We have also explored other concepts that may apply to the Commission's Charter; please follow links for details.

Charter: A sustained and affordable human and robotic program to explore the solar system and beyond:

Rains of Rock: "When are martian meteor showers, how big are they, and where do they come from?" ("Mars Meteor Survey," [http://www.oregonl5.org/mist/l5lpi01.html] Lunar and Planetary Institute (LPI) Mars Exploration Workshop)

Lavatube Sensing: "Many of the sensors currently proposed to be placed aboard precursor missions for other reasons can also serve as elements of lavatube search and confirmation." ("Lunar Lavatube Sensing," [http://tinyurl.com/3fkcq] Lunar Resource Assessment Technologies Wrkshp [abstract])

Radar Flashbulb: "...rf energy can penetrate the dry lunar surface, reflecting off large discontinuities within the lunar material, including the voids of lavatube caves...." ("Probing Lunar Lavatube Caves by Radar Illumination," LPI Workshop on New Views of the Moon; [tinyurl.com/yppcd][PDF])

Mother Goose: "One unique approach recently proposed employs specialized swarms of insect-like mini-robots accompanying one or more flexible rover/relay station robots." ("The Mother Goose Project," [tinyurl.com/3q9gh] NASA Institute for Advanced Concepts (NIAC))

Mars Caves: "...relatively simple, easily-deployable subsurface habitats are constructible in caves, lavatubes, and other subsurface voids" ("CavesofMars" tinyurl.com/ypvvk NIAC)

Charter: Extended human presence across the solar system beginning with a return to the Moon before the year 2020:

Lavatube Bases: "It would be structurally, economically, and even aesthetically advantageous to utilize lavatube resources which are already in place and available to us on the Moon and Mars." ("Utilityof Lava Tubes on Other Worlds," LPI Workshop on In Situ Resources [tinyurl.com/22qc2]) "Building lunar bases inside these natural shelters yields major savings in capital and operational costs and increased safety from the very beginning of human occupation on the the Moon." ("Lunar Lavatube Base Construction," Space 2000 Proceedings, American Society of Civil Engineers (ASCE), Reston VA, USA, p. 631-637.)

Fossil Water: "Ice in Martian lava tube caves would have scientific and developmental value." ("Martian 'Ice' Caves," [tinyurl.com/2ssoq] LPI Mars Exploration Workshop)

Flat Crops: "Bioregenerative life support on Mars will require more than your 'garden variety' crops." ("Flat Crops for Mars," NIAC) [tinyurl.com/2nd6w]

Charter: Innovative technologies, knowledge and infrastructures to explore and support decisions about the destinations for human exploration:

No Launch Needed: "VLB techniques could now provide a synthetic aperture large enough to image large lavatubes close to the lunar surface (within 200 m)." (Billings, Thomas L., "Remote Sensing of Lunar Lavatubes from Earth," Journal of the British Interplanetary Society (JBIS) 44, 1991, pp. 255-256)

Oregon Moonbase: "The Lunar Base Research Team of the Oregon L5 Society... proposes development of a lunar analog facility at a lava tube complex in Central Oregon." ("Site Characterization and Phase One Development Plan for Oregon Moonbase," NASA Office of Exploration Contract NASW-4460; [Executive Summary][tinyurl.com/2bzyc)

Gecko-Tech: "The combination of better potential for financial returns, and more secure investment through better safety for each base site, allows more productivity for investments to expand human activities throughout the solar system." ("Gecko-Tech in Planetary Exploration and Base Operations," [tinyurl.com/2rvlr] ASCE Robotics 2002)

Lavatube Entrances: "Since lavatubes on the Moon or Mars are expected to be vast, the effort of entrance amelioration is small relative to the sheltered space it makes available." ("Lavatube Entrance Amelioration on the Moon and Mars," [toinyurl.com/2ww55] ASCE Space 2002)

Moon Lighting: "Sulfur Microwave or Sulfur RF Lamps are the most efficient technology available today (Rubinstein 1995) (Table 2), and their major constituents are available on the Moon." ("Moon Lighting: Illumination for Lunar Base Construction and Operations," [tinyurl.com/ywudx] ASCE Space 2002) [[see MMM #136 June 2000, p 3. Nightspan Lighting, Sulfur Lamps & Light Pipes]]

West Pole: "Two simple changes would bring the lunar coordinate system up to modern standards, improve utility, increase efficiency, and reduce errors." ("Lunar 'West Pole' Prime Meridian," [tinyurl.com/33sy9] ASCE Space 2002)

Mars on a Windy Beach: "Specifically, some distinctive scoured landforms may indicate exposed and accessible permafrost-soaked sands, and gullies appearing to have been formed by water emerging near the tops of steep slopes may instead be formed by very dry, waterless processes in sand or dust." ("Mars at the Beach," 2003 Mars Society International Conference, Eugene OR)

Charter: International and commercial participation in space exploration to promote scientific, security, and economic interests:

Small Business in Space: "Sustainable planetary bases will be more than research outposts or company towns. Allowing entrepreneurs the freedom to set up their own small businesses is a system that has worked very well to tap local resources and human creativity.... Many small businesses, each contributing in their own way to the economy, will be more robust, more sustainable, and more enriching than any single target business.... Extra space should be allowed for unforeseen purposes, and for expanding families, small businesses and tourist needs. If planners do not provide avenues for growth, they may make it impossible for communities to thrive." ("'As long as we're here...': Secondary Profit Generators for Moon and Mars Bases," [tinyurl.com/32xsb] ASCE Space 2002)

We also recommend as a general principle that landers scheduled for the Moon and Mars be made of standard and modularized parts as much as practicable. It costs so much to ship things up to the Moon and Mars, that we should make these artifacts recyclable by future missions. The ability to take apart a device to recover motors, solar cells, radio circuitry, and instruments will help keep those who come later at least a little ahead of the game. We should give them every advantage we can. If possible, all satellites should also include a GPS transmitter to build up a global navigation system, even more important for the trackless Moon and Mars than it is for Earth.

We are encouraged by President Bush's announcement and feel this new vision is informed by some of the best ideas developed over the last 30 years. Members of Oregon L5 Society are at your service should you have questions or desire further discussions.

- Allen Taylor - President, Oregon L5 Society [ORL5]
- Robert McGown - Chair, Lunar Base Research Team [LBRT]
- R.D. 'Gus' Frederick - Chair, Mars Instrument and Science Team [MIST]

- Bryce Walden
- Cheryl Lynn York
- Dick Steffens
- Tom Billings
- Thomas Hanna
- Doug Weathers

Oregon L5 Research Teams, Oregon L5 Society, Inc.

Progress Report – "Rent–MDRS": Renting the Mars Desert Research Station for Lunar Outpost Simulation Exercises

By Peter Kokh. Interim Project Manager

We were, for a moment, disappointed when we learned form MDRS Mission Support Manager, Tony Muscatello, that the only opening this field season (Fall 2004 through Spring 2005) was the period from February 19-March 5. This was much too soon for us to prepare. Currently, we have four volunteer applications for the six crew member slots (we'd like a dozen or more so that we can pick the best mix of talent) and we are not yet ready with supporting equipment. Even more importantly, we have yet to look for financial sponsors of the $8-10,000 needed.

But as President Emeritus Greg Bennett points out, postponement of this ambitious project to the next field season beginning in the Fall of this year, will give us time to put together both a stellar crew and a stellar mission.

Meanwhile, I felt it necessary to go to Utah myself to check out the MDRS facility. This will provide a reality check for many of the projects we believe it will be useful and productive for us to undertake their when the time comes. Accordingly, I put in an application for a regular crew assignment. My long time friend and space associate from the NSS Minnesota chapter, Ben Huset, had also applied, and we collaborated to be assigned to the same crew.

As I write this Sunday morning, January 30th, just one week from this moment 10 am Central, **February 6th**, I will be in the air between Denver and Salt Lake City, the rendezvous and staging point for MDRS-bound crews. Ben and I will be at MDRS for two weeks, departing the **20th**.

The choice of **Crew #34** is especially favorable, as this will be an "engineering retrofit" mission rather than a simulations mission. I will be helping redo all the electrical wiring in the Hab (yes, that's one of my talents) and in re-drywalling the interior, and possibly in some exterior re-plumbing tasks as well. So I hope to get to know the MDRS facility inside and out, as well as get in some EVA time!

It will be cold, possibly with snow, possibly some mud (*ghad, I hate mud!*) But it should still be milder than in Wisconsin where I live. In other words, "no sweat!."

Ben is from even colder Minnesota. I expect to have him on our first MDRS Moon Mission crew also, as our "Number One" as the range of his expertise from computer systems, to agriculture and greenhousing, to running observatories will be an unbeatable mix.

Those of you who are reading this on the pdf file, can follow our exploits starting on the following webpage.

http://www.marssociety.org/MDRS/fs04/

Just check out the Crew #34 daily reports.

Moon Society at ISDC 2005

Report by Peter Kokh

Perhaps no Moon Society Speakers

This year, there will perhaps be no presentations from Moon Society members. I had hoped to report on the MDRS Moon Mission project as well as give one or two other talks about the Moon. But this ISDC committee has very strict guidelines for presenters. Abstracts must be in by March 1st - no problem. Manuscripts must be in by April 22nd. No problem with the deadline, but these days, I don't do manuscripts. I prefer to talk live, off the cuff, from brief itemized notes, with supporting transparencies.

Perhaps this year I could make an exception, and that will determine the subject matter. It makes sense in terms of economy of time and effort to choose a topic on the Moon Society's list of subjects for development as a position paper. As that will need to be done sooner or later. But, in truth, time is very short, and there has been too much else that has demanded priority attention and energy..

But Networking is where it's at

Those who have never been to a space conference may expect that presentations are everything. I thought so when I went to my first ISDC, back in 1987 in Pittsburgh. But you soon learn that presentations are just the excuse to get together and network. The really significant things that happen at a conference, perhaps not apparent until many years later, are the contacts and planning and plotting that go on in the hallways as people meet and buttonhole one another, pick brains, and find ways to collaborate. It can be heady stuff. Hallways *and* the nightly hospitality parties: it was at a combination of both in 1988 in Denver, that the **Lunar Prospector** effort introduced in Pittsburgh the year before, finally took a giant leap forward towards reality. **SpaceHab** is the result of one prior hallway deal. And on.

In short, we will hope to have a productive presence at this ISDC, presentations or not. Chairman of the Board Randall Severy and Board member Dana Carson are also likely to be in attendance. We do have a strong cluster of members within 200 miles of DC.

Moon Society NSS "talks"

One of the things likely to be discussed is the shape of future collaboration with the National Space Society. This was the hot item in Oklahoma City last year, but our "talks" with NSS leaders were put on the back burner when NSS itself became entangled in bitter and prolonged board debates over the suggested reorganization of that society. It will only be productive for us to bring up the matter again once the dust at NSS has settled, and then it will all depend on whether we like what we see.

Keep tuned!

Chapters & Outposts

ISDC 2005 in Washington, DC : A Unique Opportunity to Build the Moon Society's Mid-Atlantic Chapter and our DC area presence

It is not easy for chapters to find local activities on which they can "piggyback" an outreach effort. This year, our Mid-Atlantic chapter (enough members for a charter but not yet organized) has a stellar opportunity in the major confluence of space enthusiasts, supporters, and the space-curious - many of them from the local area - at this year's National Space Society International Space Development Conference in Washington, held just across the Potomac in Arlington, VA.

Putting that opportunity to good use is easier said than done. The Mid-Atlantic chapter is invited to share fully half the Moon Society information table. We can do more!

We will look into the idea of an additional special badge for Mid-Atlantic Moon Society chapter members as conversation starters. We can put out chapter flyers on the Con's freebie table. The Moon Society and the chapter could co-host a hospitality function. Most importantly, our area members can aggressively make acquaintances with other enthusiasts from the area, saving contact information for future use. *It's a plan. Making it real is up to us.*

We will look into the possibility of day passes for area members who cannot afford to take in the whole event but would like to gather at the event. If this is possible, we will be notifying all members in the surrounding area.

Moon Society St. Louis

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

Moon Madness Night - Friday, Feb. 11th, at the Center for Creative Learning, members of the St. Louis chapter will gather for a Moon science extravaganza for second grade students and their parents. This is an annual event

On the web page cited below are some photos showing chapter members at an earlier "Moon Madness" event held in 2003. Shown are Burt Sharpe [co-author of "The Moon: Resources, Future Development, and Colonization"], Dave Heck [of Boeing St. Louis], Christie Dudley , Dave Dietzler [frequent MMM contributor], Keith Wetzel [chapter president], and Chris Nobbe [the teacher who organizes the annual event.] There is an error in the caption of the photo at lower left. Dave Dietzler is second from the left, and Keith Wetzel is third from the left. What a crew!

http://www.moonsociety.org/chapters/stlouis/MoonMadness03.html

GREAT BROWSING !

The B612 Project: "Significantly alter the orbit of an asteroid in a controlled manner by 2015."
http://www.b612foundation.org/

Russia to Mars by 2014
http://english.pravda.ru/science/19/94/379/14772_mars.html

Titan: Arizona in an Icebox?
http://www.planetary.org/news/2005/huygens_science-results_0121.html

ORBITER - a free space flight simulator
http://www.medphys.ucl.ac.uk/~martins/orbit/orbit.html

International Lunar Observatory
http://www.spaceagepub.com/ilo/ilo.home.html

A Pristine View of the Universe - from the Moon (by Roger Angel)
http://www.universetoday.com/am/publish/pristine_view_universe_moon.html?2812005

Beyond the Biodome
Biosphere II's decline into fodder for B-grade movies.
http://www.thespacereview.com/article/305/

Strategies for Martian Exploration
Martian exploration concepts under consideration that try to combine the best aspects of robots and humans.
http://www.thespacereview.com/article/310/1

THE SPACE BOOK WORM

Lunar Prospector: Against All Odds

by Alan Binder, Lunar Research Institute

(Principal Investigator, Lunar Prospector)
(Member, Moon Society Board of Advisors)

This important book, chronicaling the nearly 15 year struggle to get a must-do project from paper studies to reality, as told by the man at the center of it all, has been published and can be purchased directly from Ken Press in Tucson (call 5220 743-3200 or email ken@ kenpress.com).

The book costs $44.95, has nearly 1100 pages of text, over 70 B/W pictures, and numerous appendices.

The author's website (lunar-research-institute.org) has the color photos, an outline, the appendices, and the same ordering information.

Shenzhou 6: a Giant Leap Forward for China

MMM Report based on Several Sources

October 14th, 2003 marked a major milestone in the history of the Space Age. A Chinese aviator, Yang Liwei, joined the ranks of Yuri Gagarin and John Young as the first citizen of his country to orbit Earth in a capsule, Shenzhou 5, produced by China.

Now China is working hard to follow suite with a far bolder manned mission. On January 20, China Daily reported that the launch of the country's next manned mission will take place in September or October of this year (2005.)

Shenzhou 6 will put two taikonauts into orbit for five days. This mission will expand China's space man hours of experience nearly tenfold. It will also provide much more time for science experiments and medical monitoring.

But the extra productivity will not just come from the extra man hours. The spacesuits to be worn by these next two taikonauts will be removable in flight, allowing them to move about the capsule and orbital module and reentry module in more a comfortable "shirtsleeve" mode. And this considerable leap forward in ergonomics should also result in a considerable increase in their productivity.

the Orbital Module, a cylindrical chamber at the top of the Shenzhou spacecraft, not entered by Yang Liwei, will in Shenzhou 6 carry a number of experiment stations as well as containers of samples. Thus Shenzhou 6 will mark the beginning of China's manned space science program.

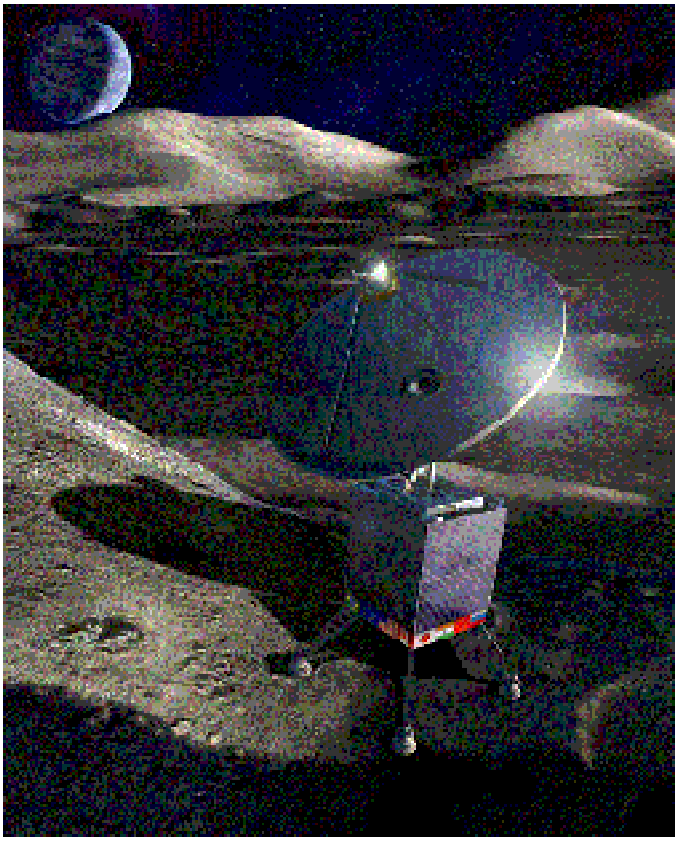
China has been experimenting with "space seeds." So it is likely that the Shenzhou 6 Orbital Module will contain a number of plant germination & growth and other agricultural experiments. But other experiments such as crystal growth and Earth and space observations are likely to be supported as well.

After five very busy days, the two taikonauts, along with experiment samples, will deorbit. However, as in the precursor manned mission and prior unmanned Shenzhou orbital launches, the Orbital Module is likely to continue orbiting for a half year. It will not be another piece of inert orbital junk, however. As previously, it will be equipped for remote teleoperation of Earth Observation instruments, taking every opportunity to derive maximum benefit from the launch. **</MMM>**

International Lunar Observatory Initiative

Formation of Advisory Committee, New Website

Group Will Seek to Define Astrophysics From the Moon (Mission) Objectives and Priorities



January 20th - The International Lunar Observatory (ILO) initiative saw significant progress in 2004. After researching the benefits and possibilities of conducting lunar astronomy (astronomy from the Moon), the originator of the project, Space Age Publishing Company (SPC), has convened a network of about 20 of the world's foremost lunar development and astronomical experts to serve on the initial ILO Advisory Committee. The formation of the Committee is complemented by a new ILO website linked to www.spaceagepub.com by SPC at the start of the new year.

Members of the ILO Advisory Committee hail from Canada, Japan, India, Russia, Europe and across the USA. They are considered to be among the world's leading astronomers, astrophysicists, observatory technicians, space authors, engineers, entrepreneurs, researchers and visionaries, and occupy important positions throughout the international space community. Additional members are currently being identified in China as well as other key global space and astrophysics centers. Committee members will spend 2005 determining the most meaningful scientific return possible from placement of a small robotic telescope at the lunar South Pole. Many ILO Advisory Committee members are also members of the International Lunar Exploration Working Group (ILEWG), the world's foremost network of space science professionals involved in lunar exploration. The ILO Advisory Committee is also tasked with helping to gain institutional support for the ILO mission.

The new ILO website delivers updates and detailed information on the ILO initiative. The site also contains detailed information on the benefits humanity gains by conducting astrophysics from the Moon and the field's brief history, which includes Captain John Young's use of a telescope / camera in the shadow of the Lunar Module during 1972's Apollo 16 mission.

Space Age Publishing Company is excited about the new committee and looks forward to educating the public about the tremendous as-of-yet unutilized advantages of lunar astronomy (operating observatories on the Moon). "This newly-forming ILO Advisory Committee is challenged to establish a toe-hold for lunar base build-out and to meet the great 21st century imperative for human survival and advancement: Seeing Humanity Become a Multi-Planet Species," says SPC founder Steve Durst.

The ILO mission's feasibility was confirmed in the ILO Phase B Study/Final Report that SpaceDev, Inc. completed for SPC's subsidiary, Lunar Enterprise Corporation, on 19 November 2004. The report was presented the following week at the ILEWG's International Conference on Utilization and Exploration of the Moon 6 (International Lunar Conference 2004) in Udaipur, India by SpaceDev CEO and founder Jim Benson.

The new ILO webpages can be found at
www.spaceagepub.com/ilo/ilo.home.html

Anyone with questions or desiring more information about this exciting aspect of humanity's renewed lunar exploration efforts should feel free to contact SPC at any time (please note that we are on HST). Aloha.

About Space Age Publishing Company: Space Age Publishing Company, publisher of Lunar Enterprise Daily and Space Calendar weekly, operates offices on Hawai'i Island, Hawaii (1988), and in Palo Alto, California (1977), USA, and pursues a business plan for its third office on the Moon. With its Lunar Enterprise Corporation subsidiary, Space Age advances and supports a wide variety of scientific, commercial and international lunar activities and enterprises – such as the International Lunar Observatory – consistent with a human return to the Moon within the decade. Space Age also promotes Hawaii Space Tours, Stanford on the Moon and the Ad Astra Kansas initiatives.

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808-885-3473 -Website: http://www.spaceagepub.com
Email: news@spaceagepub.com

Mars Science Laboratory (MSL)
Eight Investigations Selected by NASA

December 14, 2004 RELEASE: 04-398: NASA has selected eight proposals to provide instrumentation and associated science investigations for the mobile Mars Science Laboratory (MSL) rover, scheduled for launch in 2009. Proposals selected today were submitted to NASA in response to an Announcement of Opportunity (AO) released in April.

The MSL mission, part of NASA's Mars Exploration Program, will deliver a mobile laboratory to the surface of Mars to explore a local region as a potential habitat for past or present life. MSL will operate under its own power. It is expected to remain active for one Mars year, equal to two Earth years, after landing.

In addition to the instrumentation selected, MSL will carry a pulsed neutron source and detector for measuring hydrogen (including water), provided by the Russian Federal Space Agency. The project also will include a meteorological package and an ultraviolet sensor provided by the Spanish Ministry of Education and Science.

The selected proposals will conduct preliminary design studies to focus on how the instruments can be accommodated on the mobile platform, completed and delivered consistent with the mission schedule. NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., manages the MSL Project for the Science Mission Directorate.

Selected investigations and principal investigators:

1. **Mars Science Laboratory Mast Camera** -Michael Malin, Malin Space Science Systems (MSSS), San Diego, Calif. Mast Camera will perform multi-spectral, stereo imaging at lengths ranging from kilometers to centimeters, and can acquire compressed high-definition video at 10 frames per second without the use of the rover computer.
2. **ChemCam: Laser Induced Remote Sensing for Chemistry and Micro–Imaging** – Roger Wiens, Los Alamos National Laboratory, Los Alamos, N.M. ChemCam will ablate surface coatings from materials at standoff distances of up to 10 meters and measure elemental composition of underlying rocks and soils.
3. **MAHLI: MArs HandLens Imager for the Mars Science Labor–atory** – Kenneth Edgett, MSSS. MAHLI will image rocks, soil, frost and ice at resolutions 2.4 times better, and with a wider field of view, than the Microscopic Imager on the Mars Exploration Rovers.
4. **APXS: Alpha–Particle–X–ray–Spectrometer for Mars Science Laboratory** – Ralf Gellert, Max-Planck-Institute for Chemistry, Mainz, Germany. APXS will determine elemental abundance of rocks and soil. APXS will be provided by the Canadian Space Agency.
5. **CheMin XRD/XRF: An X–ray Diffraction/X–ray Fluorescence instrument for definitive mineralogical analysis in the Analytical Laboratory of MSL** – David Blake, NASA's Ames Research Center, Moffett Field, Calif. CheMin, will identify and quantify all minerals in complex natural samples such as basalts, evaporites and soils, one of the principle objectives of Mars Science Laboratory.
6. **RAD: Radiation Assessment Detector**– Donald Hassler, Southwest Research Institute, Boulder, Colo. RAD will characterize the broad spectrum of radiation at the surface of Mars, an essential precursor to human explora-tion of the planet. RAD will be funded by the Exploration Systems Mission Directorate at NASA Headquarters.
7. **Mars Descent Imager** – Michael Malin, MSSS. The Mars Descent Imager will produce high-resolution color-video imagery of the MSL descent and landing phase, providing geological context information, as well as allowing for precise landing-site determination.
8. **SAM – Sample Analysis at Mars with an integrated suite consisting of a gas chromatograph mass spectrometer, and a tunable laser spectrometer** – Paul Mahaffy, NASA's Goddard Space Flight Center, Greenbelt, Md. SAM will perform mineral and atmospheric analyses, detect a wide range of organic compounds and perform stable isotope analyses of organics and noble gases.

NASA Comment:

"This mission represents a tremendous leap forward in the exploration of Mars," said NASA's Deputy Associate Administrator for the Science Mission Directorate, Dr. Ghassem Asrar. "MSL is the next logical step beyond the twin Spirit and Opportunity rovers. It will use a unique set of analytical tools to study the red planet for over a year and unveil the past and present conditions for habitability of Mars," Asrar said.

"The Mars Science Laboratory is an extremely capable system, and the selected instruments will bring an analytical laboratory to the martian surface for the first time since the Viking Landers over 25 years ago," said Douglas McCuistion, Mars Exploration Program director at NASA Headquarters. **<NASA>**

For more information check the MSL website:
http://marsprogram.jpl.nasa.gov/missions/future/msl.html

ISDC 2005 – MAY 19–22, 2005 WASHINGTON DC

http://isdc.nss.org/2005/
"Your Ticket to Space"

ISDC 2005 will feature dozens of sessions on space science, technology, policy, commerce, exploration, and more, all focused on bringing ever closer the vision of spacefaring civilization.

Schedule: Current plans call for full days of conference tracks on Thursday through Saturday (May 19-21), and a half-day on Sunday morning (May 22). An opening reception is also tentatively planned for Wednesday evening (May 18).

Tracks and Sessions (what follows is the barest outline:
For the full Call For Papers listing go to:
http://isdc.nss.org/2005/cfp.html

1) Government sector track - Education - History - Law & policy - Moon, Mars & Beyond
2) Private sector track - Commerce & Space businesses - Finance - Lobbying - Media & entertainment - Suborbital & FAA/AST - Spaceports - Space tourism & experiences - Vehicles & hotels
3) Science track - Astrobiology/Exobiology - Earth science - Lunar science - Mars science - Near Earth Objects & planetary defense - Saturn science - Space medicine & physiology. - (Interstelar) Space science.
4) Settlement track - Developments in Lunar settlement concepts. - Developments in Mars settlement concepts - L5 & other. Developments in other space settlement concepts
5) Technology track: Agriculture & Life support - Computers, communications & software - Open source software - Power & propulsion - Resource utilization - Space elevator - Nanotechnology
6) Teen programs - Space arts competition. Present your music, poems, short stories, paintings, films, public service announcements.

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

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

https://starwoodmeeting.com/Book/nss

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

The 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 FEBRUARY & MARCH Events

Saturday, FEB. 12 th, 1–4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110

Come to the meeting for a gab session about space. Peter will be in Utah at the Mars Desert Research Station (MDRS) as a member of crew #34. Meanwhile, you can follow the exploits of Crew #34 at:
http://www.marssociety.org/MDRS/fs04/

Saturday, MAR. 12 th, 1–4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110
AGENDA: www. lunar-reclamation.org/page4.htm

- **Space Updates:**
  - Cassini's continued exploration of Saturn's moons
  - The Huyghens probe's discoveries on Titan
  - NASA's plans for next Shuttle flight
  - The Space Station
- **Peter's Report on his visit to the Mars Desert Research Station in Utah**, complete with pictures, lessons learned, implications for the proposed Moon Society MDRS Rental Mission, for a proposed future Moon Society Lunar Analog Research Station, and possible LRS tie-in projects.
- Peter's report on his participation in **MarsCon** in the Twin Cities, March 4-6th.

U.S. CHAPTERS

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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**

Feb19 - Mar 19 - Apr 16

[Last year, February 2004, we sent the following]

Memo from Oregon L5 Society Research Teams to the President's Commission on Moon, Mars, and Beyond
http://www.OregonL5.org/l5memo.html

You can read this Memo on pages 10-11 above. We have recently been working with other interested persons and parties under the aegis of "the Lunar Coalition" in an effort to take advantage of additional opportunities to influence NASA's development of the return to the Moon mission]

WISCONSIN

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@excel.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**

FEB. 17 th: The Stoelting House, **Kiel**
MAR. 17th: UW-Sheboygan, Room TBA, **Sheboygan**
APR. 21st The Stoelting House, **Kiel**

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 2004 Activities Summary
http://marvin.freemars.org/mnfan/mnsfs/2004-Review/

MN SFS Jan Meeting pics
http://www.freemars.org/mnfan/mnsfs/2005-Jan/

Ben Huset will be a part of Crew #34 at the Mars Desert Research Station, MDRS, Hanksville, Utah February 5-20th
Follow his exploits at: www.marssociety.org/MDRS/fs04/

PENNSYLVANIA

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.

Feb 20 (a Sunday)- **Mar 26th** (4th Saturday)- **Apr 16**

• **December 18th Meeting Notes:** We had no meeting! well, actually we had no formal gathering for PASA business but did gather several times for presentations and informal chats and dining during **Philcon**, The Philadelphia Science Fiction Conference. For many of us our host for the event was Hank Smith who invited us to participate in areas we felt we had competence in or could contribute to. The first panel I was on, and first of our group, occurred at 10 p.m. on the 10th. The topic was"The Future of Robots in the Military" with a number of interesting comments coming from members of the audience

who enjoyed talking about what might be achieved,

such as the Tactical Autonomous Combatant and trends toward "smarter" and "smarter" systems. Right now attention in the media has leaned to ground vehicles but aeronautical systems have been quietly getting more capable. Jed Shumsky (Neuroscientist) and Phillip Thorne (Nanotechnologist) where the "experts" part of the panel

In addition I was also part of a Sunday panel on communications during daylight and again had great comembers. To my surprise author Mark Wolverton, who we tried to get for a book tour, was on the panel. Since his recent book was on the Pioneer deep space probes this was very appropriate. My part was mainly as moderator and basic explainer of comm. systems struggles between bandwidth and information encoding. Much discussion and great audience feedback

Gary Fisher had a great presentation with a good audience and able assistance of Gus Sheerbaum and Richard Mallon-Day. The talk was on "The Mars Homestead Project" which is about the living on the planet part of the exploration and colonization efforts. This will take a lot of effort: to find out more go to www.marshome.org. Gary is currently President of the Mars Society Independence Chapter but is thinking of stepping down from that post due to his work load. He will continue to work with the Society as an active member. Again, a diverse set of backgrounds: Gary from operations and business management, Gus from I.T. and Richard both dolphin research and software development.

All in all a great event: former member Michelle Baker did a standing in the isles presentation for J.P.L. (maybe two presentations next year) and she commented that "I like presenting at this event This audience gets it" Our visiting non member Janice appeared on a panel misnamed "Clean Fuel Alternatives/Recycling" which was great fun if you like positive statements and august pronouncements followed by "but that's not true, correct, accurate" and so on from both the other panel members and the audience. Tip: when you have people who are currently doing research in a given field on the panel and in the audience you should have an open mind. There was a number of engineers in the audience as well and some fondly regarded ideas (including one of mine) where vaporized, or at least reappraised, by applied science.

And last: sometimes holding forth on a topic with someone can lead to finding a fellow fan of something you enjoy. This happened to me while lamenting the talk radio field. I met a fan of the late Jean Shepard who was an entertainer from the 50s to the 70s and is known to the general public from "A Christmas Story" played in this season. It turned out that Carl Frederick was also a fan with fond recollections of Jeans show. I later learned that Dr. Frederick was also a researcher in Far Infra Red Astronomy and an author of science fiction (see Analog for March 2005). Did I mention that he invented the digital modem? You never know. *Submitted by Earl Bennett*

• **January 15th Meeting and Activities Notes:** We had limited attendance at our January 16th meeting for several reasons including event post mortems (Hank: for Philcon), expanding professional activities (Simon: for his various architectural profession activities) and many other members family and business obligations. However: we must be doing something right, we are welcoming new member Ernst Hohmann who has joined us this month. I will forward his membership and that of Dorothy Kurtz who has renewed early. Good news! Meeting Notes: We had a small but enthusiastic gathering this time, partly due to our success at Titan! The Huygens probe images where amazing and deceptive as well. I found images at esa.com the European Space Agency website. The images where relatively small and this caused the scale to be hard to determine. In fact Huygens' splash down (yes!) and the "prequel" Cassini mission profile figured prominently in Dorothy Kurtz's' reports from the National Geographic and The New Scientist. The publications are good for background and now have real data for general selection among the theories about this huge "moon" with an atmosphere.

Additionally, in Hank Smiths absence, Dorothy also reported on upcoming science fiction events including Katsucon, an Anime (Japanese sci-fi "cartoons") convention from 2/18 to 2/20. See there website: katsucon.com or Google. She mentioned Lunacon from March 18 to 20th with a good science track. This will be at the Sheraton Hotel in East Rutherford N.J.

Mitch Gordon talked on several topics including book signing events and authors doing readings as well as: A reprise of thoughts caused by the November Moon Miners Manifesto on a favorite topic of his "Space Tourism, Do You Want to Go?". Mitch is trying to bring the authors to Philadelphia and specifically to a site at one of our Universities in the city.See the article in Moon Miners on page 15. His report also included material from the November/ December Futurist on innovation and relaxed funding going hand in hand. This is as opposed to extremely tightly focused funding with very little or no slack for things discovered in the course of the main project. N.A.S.A. for example used to have a fair amount of this as part of the way the organization worked.

There is also a piece by Art Shostak who is both former teacher at Drexel University and the president of our chapter of the World Future Society on "High School for Futurism."

And also: the Winter issue of Ad Astra the official publication of The National Space Society with the primary emphasis being on the International Space Development Conference which will be held in Washington, D.C. from May 19 to the 22nd. Mitch and Dotti and Larry are planning to attend and we may have non N.S.S. members going as well. See the link from our "website" (http://pasa01.tripod.com)

There was much other material including a thought

piece "Terraforming Earths Evil Twin, Venus," which has an overly dense atmosphere, and how to thin it. Methods noted include orbiting asteroids into it, the classic modified algae (from the late Carl Sagan) and even nuclear detonations. What about Power Sats. and beam powered carbon sequestering machines? Of course this would require massive industrialization if it where done and some of the techniques could be developed for Earth. And again visiting authors and Universities as well as working on our groups agenda for the year.

Go Mitch! Larry our webmaster asked again for material to add to the website and was asked to ad a link for Marshome.org which is an outgrowth of interest in Mars settlement that Gary Fisher, our Mars Society Coordinator, is working on. By the time this is published the pictures of the Marshome presentation should be at our site.

Earl Bennett brought in material from several sources including: A science fact article from Analog (March issue) on "The Prehistory of Global Climate Change" by Richard A. Lovett . Quite a bit of material on previous "events" including those beloved of paleontologists and asteroid defense enthusiasts as well as other "less radical" changes like those that drove the "Okies" off their land to go to California as refugees. Much material, references.

Earl also brought material on Space from The Radio Amateur Satellite Corporation including "Command Systems" the subject of the article (loong actual title) by Jan A. King, VK4GEY/W3GEY who explains some of the detailed considerations in choosing a communications system. The author explains how the Doppler Effect means for non geostationary orbiters and how your operating frequency affects the carrier and the modulation. Very detailed on subtle (and not so subtle) problems that can sometimes wear out a satellite much before its predicted life.

Another report from their publication, The AMSAT Journal for November/December, was on "A Visit to The James S. McDonnell Space Hanger" by Perry Klein, W3PK, w3pk@amsat.org This short piece has a number of pictures of unusual spacecraft memorabilia including a full scale model of Oscar One launched in 1961! In the background of one of the pictures is another historic object, a replica of Columbia. This place looks like an interesting "Day Trip."

Also noted from the December, 04, Laser Focus World is a summary: "Illuminating Achievements" by John Wallace, Senior Editor, containing "Transcendent energies" on progress in producing high powered beams (Mega Joules) from Glass Slab Lasers for Fusion and optical fibers at kilojoule output levels for other applications. And much more.

Apology and late note:. Someone came on the wrong day I published and I apologize to them for the mistake. I also have good news for February: we will have a treat at the meeting: Gary Fisher will share his birthday gift with us! O.K. so it's a recording of his gift: his flight on the "Vomit Comet" Zero G simulator! This should be fun. *Earl Bennett*

CALIFORNIA

OASIS

OASIS: Organization for the **A**dvancement of **S**pace **I**ndustrialization and **S**ettlement
Greater Los Angeles Chapter of NSS

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

Events Hotline/Answering Machine:(310) 364-2290
Odyssey Ed: Kat Tanaka - odyssey_editor@yahoo.com

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

oasis@oasis-nss.org

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

Regular Meeting 3 pm 3rd Sat. each month
Microcosm, 401 Coral Circle, El Segundo.

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

- **Feb. 19th, 3:00 p.m.** -- OASIS Monthly Business Meeting at Microcosm, 401 Coral Circle, El Segundo.
- **Mar. 19th, 3:00 p.m.** -- OASIS Monthly Business Meeting at Microcosm, 401 Coral Circle, El Segundo.

Looking Ahead

- **Feb 19, 12:00 noon** -- "Spirit and Opportunity Mars Rovers," by Saina Ghandchi and Nagin Cox, JPL. Sponsored by California Space Institute. Webcast at http://calspace.ucsd.edu.
- **May 19–22, 2005** -- International Space Development Conference (ISDC), Washington, DC. For more information, see http://isdc.nss.org/2005/. Registration rates climb steepy after January 1st.

Recuring 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/.

SOLAR SYSTEM AMBASSADORS
www.jpl.nasa.gov/ambassador/

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- **Hardcopy MMM**: U.S. & Canada **$35** Elsewhere: **$60**

P.O. Box 940825, Plano, TX 75094-0825, USA

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Send proper dues to address in chapter news section

=> for those outside participating chapter areas <=
❍ $18 Individual Subscriptions to MMM/MMR: Outside North America ❍ $50 Surface Mail -- Payable to "LRS", PO Box 2102, Milwaukee WI 53201

CHICAGO SPACE FRONTIER L5
❍ $15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)
❍ $15 reg. ❍ $20 family ❍ $12 student/senior

MINNESOTA SPACE FRONTIER SOCIETY
❍ $25 Regular Dues

OREGON L5 SOCIETY
❍ $25 for all members

O.A.S.I.S. L5 (Los Angeles)
❍ $25 regular dues with MMM

PHILADELPHIA AREA SPACE ALLIANCE
❍ Annual dues for all with MMM $20, due in March or $5 times each quarter before the next March

SHEBOYGAN SPACE SOCIETY (WI)
❍ $15 regular, ❍ $10 student,
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