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

Moon Miners' Manifesto

& The Moon Society Journal www.MoonMinersManifesto.com

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Above: an essential element of any space-based power system, giant power beam receiving antennas (rectennas) could be suspended over barren land but also over crops.

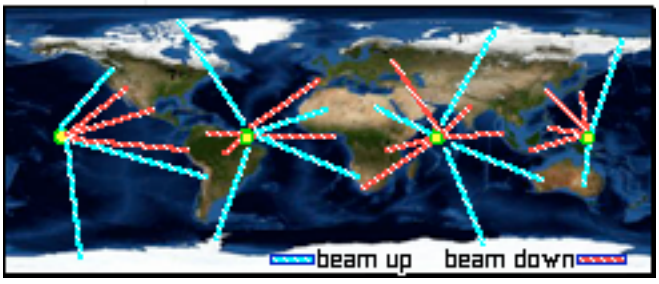
Feature Articles in This Issue

In FOCUS The NSSO Space-Based Solar Power Project could be 'Moon insurance,' should VSE be canceled

A year from now, the 2008 Presidential election will be over. Right now, it does not appear that any candidate, Republican or Democrat, is publicly committed to continuing to support the road back to the Moon, on which President Bush directed NASA to proceed. While there is broad, but not universal support for the new direction, we all know that Presidents can spurn public opinion. *(Commentary continued next page, Column 2)*

A World Wide Orbital Grid

This proposal by the MMM Editor, would on the one hand, fall short of establishing a Space Based Solar Power System, but on the other hand guarantee that SBSP is the only logical next step, while in the meantime, disarming all opposition from the current cartel of power brokers with a vested interest in the status quo. A WWOG would contain basic elements of the SBPS: power beaming (⇑+⇓) and rectennas. *==> pp. 4-5*



Moon Miners' Manifesto

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• **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first fifteen years have been re-edited, reillustrated, and republished in 15 PDF format volumes, for free downloading from either of two locations:

www.Lunar-Reclamation.org/mmm_classics/
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• **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; early use of Mars system and asteroidal resources; and establishment of permanent settlements supporting this economy.

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

• **MMM retains its editorial independence.** MMM serves several groups, each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test.

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• **The National Space Society** is a grassroots pro-space membership organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.

National Space Society, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 - www.NSS.org

• **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon." - Contact info p. 9.

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√ Mac compatible CD / or typed hard copy must be mailed to:
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⇒ IN FOCUS Editorial continued from p. 1.

An **Executive Summary** of the lengthy NSSO report is at:

www.nss.org/settlement/ssp/library/nsso.htm

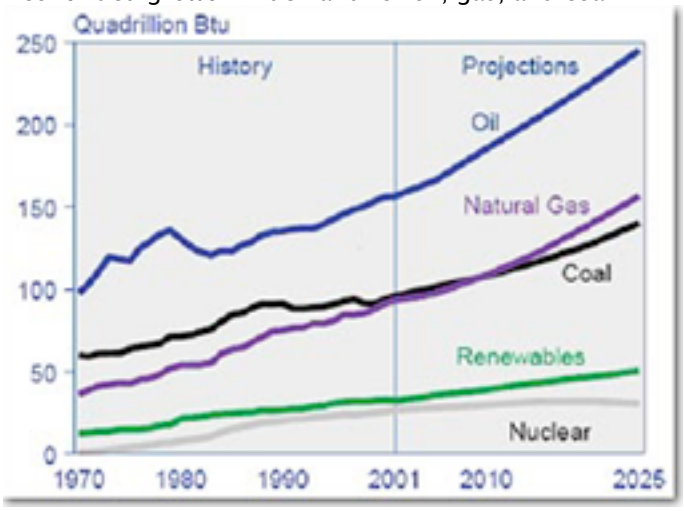
Also on this page put together by the National Space Society are links to the full 75 page report (a 3.5 mb pdf file), Audio and photos of October 10 press conference, Still photos and video of SBSP concept, and Some news reports about this study.

This quote from the report sums the situation up succinctly.

"The magnitude of the looming energy and environmental problems is significant enough to warrant consideration of all options, to include revisiting a concept called Space Based Solar Power (SBSP) first invented in the United States almost 40 years ago. A single kilometer-wide band of geosynchronous earth orbit experiences enough solar flux in one year to nearly equal the amount of energy contain within all known recoverable conventional oil reserves on Earth today. This amount of energy indicates that there is enormous potential for energy security, economic development, improved environmental stewardship, advancement of general space faring, and overall national security for those nations who construct and possess a SBSP capability."

--National Security Space Office, 10 October 2007

There is a very real urgency that we take careful considered steps at this time to reverse the current trends which promise unwelcome consequences for the next generation and those to follow. Yes, we are getting more environmentally conscious. Yes, more and more people are conserving energy and resources and turning to "green" energy sources, *but not enough.* This trend in the right direction is being swamped by continued growth in demand for oil, gas, and coal.



Yes individuals and some corporations and municipalities are getting the message, but it is necessary that national and international authorities get in step less the future be one more sad instance of "too little, too late." As individuals, those in a position to take the lead, for the most part older persons, may well not live to see the coming train wreck. But we owe it to our children and grandchildren to accept some greater load of inconvenience so that they too can experience the joys of life that we have had in the current era of prosperity.

Actions Called For: Power Beaming

The report points out that there are some unknowns about the technologies we believe can rescue our planet. There are uncertainties about power beaming, not that it is possible or feasible -- we know it works and it has been demonstrated on a small scale -- but as to its environmental effects. When talking to people about solar power satellites, and they ask how we are going to beam all this power down, I routinely say "either by microwaves or by laser. If we use microwaves, we will have to use a wavelength that does not heat up water or water vapor, as microwaves do in a microwave oven. We don't need to be creating clouds of steam and cooking birds!" While that is true, it is probably a simplification.

Do we have to build a demonstration SPS in orbit to experiment with wavelengths? I should think not. We could beam from point to point (hill crest to hill crest, ridge to ridge, etc.) and get a pretty good preview of the environmental impact of various wavelengths.

We have long realized that we need to keep the power density (watts per square meter) down, and this can be done simply by having large enough receiving antennas or "rectennas." These would be wire meshes suspended above the ground on poles. The power density involved would be such that farming or other acreage-hungry operations could continue as usual. This means that rectennas could be placed in many convenient places. We do not need to put them in barren deserts or out of the way places. We do need more information, however, as we cannot afford to be wrong about this.

On the other end, we need to develop power beaming technology so that we can keep the mass of equipment per amount of power beamed to as low a ratio as practical (cost-benefit analysis.)

Solar Power Arrays in Orbit

Most SPS schemes and proposals call for photo-voltaic (solar panel) means of power production. Some, however, have proposed arrays of solar concentrators. The most important consideration would seem to be to have the lowest array mass ratio to power produced. The lower the ratio, the less costly it will be to construct one of these SPS units.

Cost of Construction

We are talking about very large structures, possibly kilometers in width and length. No matter what the design, the total mass per each will be daunting to put into place. One school of thought hopes that we will have a considerable breakthrough in space transportation costs so that we can ship the most sophisticated and efficient parts up from Earth's surface. Well, we have been seeking the holy grail of Cheap Access To Space, CATS, for two decades now, without any new design or development promising more than marginal improvements. In our personal opinion, this search rates alongside that of the early New World explorers seeking the Fountain of Youth. But to indulge those on this search, were we to find a way to cut transport costs to a thousandth of what they are now, we would still have to face the environmental impact of thousands and thousands of heavy lift launches through the atmosphere. Even if dirty fuels were prohibited and we went with just liquid hydrogen and liquid oxygen, the effects of dumping that much steam into the stratosphere could itself be catastrophic. That's a lesson we cannot afford to learn the hard way!

The solution many are trying desperately to avoid is settling for a somewhat less efficient lower tech design that could be constructed with building materials that can be processed from lunar regolith. For some, there is a need for higher tech at all costs. We all know what that does to program costs. If not quite as good but good enough is vastly cheaper, then we have to shove the high tech addicts to the side and get on with "just doing it."

Almost two decades ago, a serious study by a think tank group assembled by the Seattle L5 Society chapter called SLuGs for Seattle Lunar Group studies determined that if we accepted an 8% extra weigh penalty, a solar power satellite could be built with 92% of its weight coming from lunar derived materials. That study needs to be redone in greater depth and in the light of all we have learned since. We call for such a restudy to be ordered in the immediate future. Time flows much faster than most of us like to think. We need to get on with our homework, *tout de suite!*

The report does suggest lunar sourcing, but again, there are many who for sundry reasons perhaps unknown even to themselves, do not want to accept such a solution.

VSE and/or SBSP

Now that is the question. It would be nice to have both. But those who are confident that the next US president will continue the current lunar initiative are perhaps more optimistic than the evidence (or lack of it) from statements by any of the present candidates would warrant. The fact is, that outside of paper studies, NASA as not really started "bending metal." That means, like it or not, the VSE is cancelable. We personally have long held that "nothing rational can come out of the political process" and that we are kidding ourselves that socialized space can work better than entrepreneurial space.

AT any rate, despite President Bush's clear call for a permanently manned moonbase with an open-ended future, all that Mike griffin is promising to deliver is a complex that astronauts can visit from time to time. We should already have been unhitching our hopes and dreams from this handicapped program that even at best would only give us an Antarctic style outpost, and a very small one at that, on the Moon, not the start of civilian industrial settlements.

That is why both the National Space Society and the Moon Society, at NSS' invitation, so strongly endorse the NSSO SBSP report and plan. This seems to be the more soundly grounded approach to the establishment of the Earth-Moon economy, in which activities on the Moon serve to address Earth's most urgent needs: abundant clean energy and environmental restoration, while in the process many thousands, even tens or hundreds of thousands of people will someday pioneer the Moon and make it "the next human continent," continuing our long human epic expansion "out of Africa."

The Space Based Solar Power initiative is our "moon insurance plan," should the Vision for Space Exploration be summarily canceled, or crippled. It is our insurance against a wide field of candidates, none of whom seem to "get it." It is our chance too, to enlist the less narrowly focused members of the environmental and green movements (of which I am proud to be one.) The SBSP concept is one whose time has come after 40 years of talk talk. *Let's all push it!* PK

WWOG – World Wide Orbital Grid

Space-Based Solar Power: Another Route

by Peter Kokh

Ground-Based Solar helps, but can never be enough

Space-Based Solar Power, or Solar Power Satellites combine two technologies: solar collection in space, and power beaming. The advantages of collecting solar energy in space are clear to anyone who has looked at the numbers. Yes, we do *also* need to greatly multiply the use of ground-based photovoltaic and other solar energy collection systems. But we would have to quite literally pave over the state of Arizona and much of neighboring states with solar panels to supply the national power demands, and the real estate costs of that could be higher than the up front costs of space-based systems.

Yes, we need to continue to make homes and all other structures more reliant on a combination of energy-saving construction methods and architectures, and on site energy generation. The more individual home and building owners do their part, the better. But a plan that counts on widespread support by individuals facing their own microeconomic facts-of-life is not a plan at all for a national, let alone a global, approach to replacing dirty energy generation systems with clean ones.

The Long Lead Time Hurdle

The problem with space-based power generation schemes, however, is that as much sense as they make, they will decades to put in place. That long lead time may be enough to discourage many and send them looking for second best options that can be put in operation in shorter time spans. It would be tragic if the Space Based Power strategy that the National Space Security Office called for on October 10th, is not pursued because supporters want all the plan, when in fact there is a nearer term option that could be very attractive, cost far less, and yet guarantee that the full plan be eventually realized.

Divide *and* *Conquer!*

We suggest that we concentrate on the most basic half of the plan: *power beaming, not just from space, but to space.* This would require rectennas in both orbit and on the ground. It would require considerably less tonnage of material for construction, a threshold that could be met by launching all the components from the Earth's surface. Why?

Detractors of Space Based Power Generation Systems number not only Mars advocates who disingenuously want to dismiss and discredit anything that may legitimize a return to the Moon and lunar industrialization, but vested interests in terrestrial power generation systems: coal, oil, gas, even ethanol. But this same unholy alliance would be all in favor of the establishment of a single world wide power grid, where excess power from anywhere could be beamed to space and relayed to wherever it was needed.

In other words, let's concentrate on the creation of a space-based world power grid first of all. Oil people, tar sands people, coal people, hydroelectric people -- they will all see the sense of that. The effect would be to stabilize the world economies and greatly level the economic playing field, benefiting developed and developing nations alike.

At the same time, we will have put into place an orbital power relay system, that when the shortages that come from uneven distribution of fossil fuels and other fuels can no longer be managed by shifting loads because the total amount of terrestrial power generation is now insufficient, you just need to add solar arrays to these orbital relay stations to tap a bottomless supply of clean power. See the NSSO quote on page 2, column 2. That the orbital worldwide power grid is in place will easily derail any further opposition to "out-sourcing" additional power generation to off-surface locations, made economically feasible by the use of lunar materials.

Wireless Power Transmission has been Demonstrated

On June 5, 1975, NASA successfully beamed 34,000 watts (34 kw) of power from the Goldstone Dish over 1.5 kilometers (0.9 miles) to a JPL-built rectenna on the Goldstone collimator tower on a nearby ridge -- *at more than 82% efficiency!* Watch this 2 minute Video:

www.youtube.com/watch?v=jd47JXuz0g8

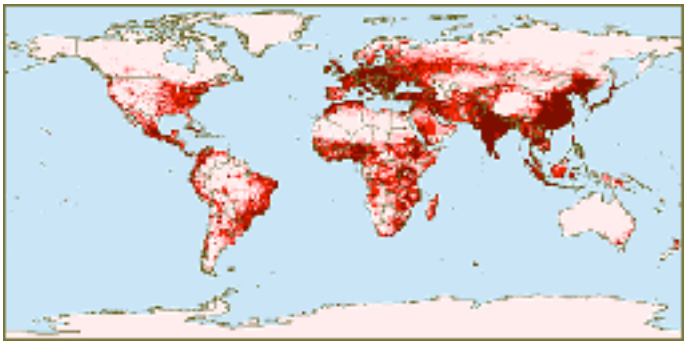
The WWOG could help now, in the interim, not only by shifting excess power, but by connecting to unused power sources.

It is our belief that since it does not require components made on the Moon, a World Wide Orbital Grid could be put in place in less than half the time needed for realization of Space Based Solar Power systems, *without detouring or delaying the latter.* Quite to the contrary, this phased approach would speed up full realization of the SBSP plan by effectively disabling opposition by the powerful vested interests of Coal, Gas, and Oil producers. Here is how WWOG would help:

- shift power loads globally rather than on the present subcontinental basis, with much greater flexibility of sourcing. Excess power from *Hydro-Québec* could be beamed to India as easily as to Arizona instead of just to the US northeast.
- Regions with chronic power shortages and no nearby sources of surplus power would find quick relief.
- Areas with fossil fuel reserves, instead of shipping those fuels (before or after refining) could derive added sales value by generating needed electrical power and exporting that by the WWOG instead of via pipelines and tankers which have environmental risks.
- Areas with little domestic power need but great capacity to produce power would now have a major export market to catapult the local economy into the new integrated world grid. Four examples:
  - ☑ Underpopulated Desert areas without fossil fuel reserves but with abundant sunshine/wind.
  - ☑ Antarctica: wind farms emplaced along it's 360° circling coast could beam power to power-hungry areas, without negatively impacting the Antarctic environment. Antarctica has the world's strongest, steadiest winds constantly blowing in the same direction, northward, away from the south pole. This power source is now untapped.
  - ☑ There may be similar steady winds buffeting the arctic coasts of Alaska, Canada, Greenland, Scandinavia, and Russia-Siberia
  - ☑ OTEC (Ocean Thermal Electric Conversion) units anchored off the US eastern seaboard in the Gulf Stream could supply abundant power to wherever needed. The Japan Current could be tapped also.

In short, not only would the WWOG even out power distribution globally, and with it level the economic playing ground, but it would tap considerable energy sources not now in play. This would help ease us through the period of two or more decades before a Space Based Solar Power Grid could be put in place, piggybacking on the already established WWOG. It is a win-win situation.

An orbiting solar array design currenty highy favored. How well a proposed design lends itself to construction with lunar materials should be the deciding factor.



Global Population Density Map. With a World Wide Orbital Grid, power generated in unpopulated areas, including arctic regions, could be beamed anywhere.

Phasing in Space Based Solar Power with a WWOG

- If we can't have our cake with frosting, let's push the cake by itself. In time the frosting will be added. The alternative is that we get nothing, the world sinking into energy wars and general disorder and chaos.
- The WWOG builds on existing power genera-tion systems, their present location, the needs of under-developed and developing areas, meshes well with world economics, will have the full support of power generation companies, and will create a new level (double entendre) of international cooperation.
- That's a plan that doesn't have to wait decades before results start justifying expenses.

How do we start?

There are several unanswered questions about power beaming through the atmosphere and to and from space. These questions concern efficiency and best choice of wavelength. safety for humans, wildlife, vegetation, and livestock. We need a step by step plan to investigate these uncertainties and zero in on the best options.

Then we build an orbiting rectenna and power beaming relay demonstrator, and if it passes muster, put it in operation in an area of that includes regular power need/supply inequities, both deficiencies and surpluses. Then we ramp up to mass production of these units and their deployment to create the WorldWide Orbital Grid.

Getting Everyone to "Buy In"

Along the way, we create a consortium of power generation companies and grid managers who want to be involved. Pair them up with developed and developing nations that see the WWOG as in their best interests and establish **a WWOG Authority** representing all these players and interests.

Finding investors is crucial. The members of the WWOGA (individual power generation companies) can place surcharges on their terrestrial power customers to help support expansion of the WWOG. Power generation companies with unsold excess capacity should be quick to invest as a way to maximize their profits and grow their power generation capacity.

No part of the inhabited or uninhabited world (not even the deep Arctic and deep Antarctic, from where orbiting relays may at times be too close to the horizon for effectve beaming) will be too remote to benefit. Power will be available not just to cities and manufacturing complexes but to agricultural and other areas: for irrigation and seawater desalinization, etc. Teleoperated nuclear plants could be established on remote uninha-bited islands, to contribute to the grid. In general, estab-lishment of a WWOG will lay economic grounds for would peace and prosperity. widespread economic well-being,

Of course, it does not stop dirty power gener-ation or start regreening the Earth, but by laying the natural foundations for SBSP while disarming all opposi-tion, it will bring the day of a prosperous cleaner and greener Earth that much closer, as well as make more inevitable the establishment of an Earth-Moon economy.

Meanwhile ...

There is much we can do in America and else-where to slow the growth of dependence on fossil fuels for power generation. We can do much more in the way of on site solar power generation for home and building use -- *and not just in the sunny southwest!*

"When you look at solar usage, the US is currently third behind Germany and Japan. Both of these countries currently have the solar footprint of Northern Michigan, but they are both able to make solar power work for them." - www.altenergystocks.com/ archives/2005/10/

By doing as much as we can with ground-based solar, we will not only be buying precious time, but we will be easing the public mentality towards a wold view in which solar energy is King. That will help weaken the influence of the Vested Interest coalition of oil, gas, coal.

Action Item

I will be presenting these ideas to the National Space Society Space-Based Solar Power committee for consideration. Dismissing this phased in approach in favor of going for the whole plan or nothing, involves the higher risk of failure. We need to avoid swimming upstream when there is this sure fire phased in plan that all interests involved will accept much more readily. And, though it is not much mentioned, a Space Based Solar Power system that does not aim at a World Wide Power Grid will only exacerbate the divisions in the world which motivate unrest, conflict, and war as well as unacceptable inequities. We are all in this together. There is no "American" solution, only a world wide one. **<pk/MMM>**

THINKING OUTSIDE THE MASS FRACTION BOX: 2

Improving on NASA's Lunar Architecture Design Goals

by Peter Kokh

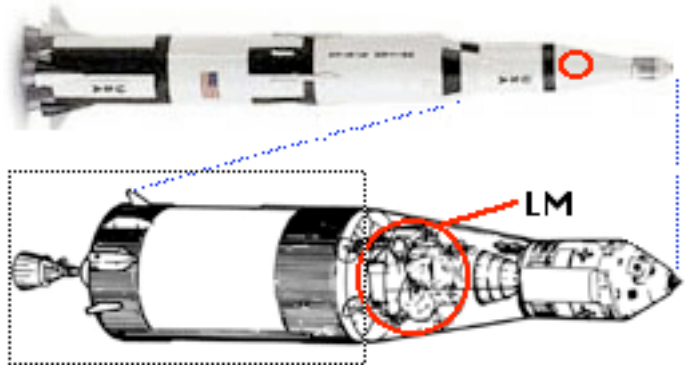
[Continued from MMM #209 p. 3]

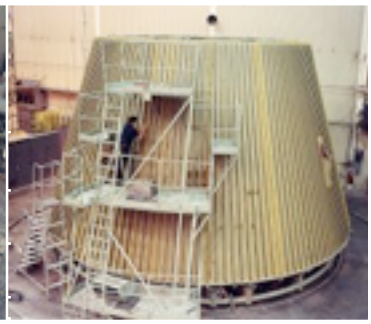
In the first installment last month, Part 1, we talked about making maximum use of everything landed on the Moon. That way *everything we land on the Moon* becomes payload delivered, *not just the crew and cargo.* Let's carry the argument further.

The Translunar Injection Stage as a Deliverable

Any part of the Earth Orbit <> Lunar Orbit ferry vehicle that delivers the landing craft to low lunar orbit for its descent to the Moon's surface, *which is not needed for the return to Earth orbit* can be delivered the rest of the way to the lunar surface at little extra cost. What things this may consist of depends on the vehicle's design. Expended fuel tanks (unless they are refueled with lunar liquid oxygen) and farings are two obvious suggestions. Of course, this implies that these items can be replaced in LEO for the next trip out to the Moon.

In Apollo, the Saturn 3rd stage that brought the LEM and Apollo Command Module was effectively tossed overboard, left to crash on the Moon. (area in dotted box)





Saturn SIVB *left* **SIVB Adapteer Skirt *right***

http://en.wikipedia.org/wiki/Saturn_V#S-IVB_third_stage

The SIVB: 58' 7" [17.85m] tall/long; 21' 8" [6.6m] wide, such a volume landed could provide ample storage, or, set on its side, a spacious 2-floor habitat module. The adaptor skirt covered the SIVB engine and mated the SIVB to the Saturn 2nd stage. This could be saved also.

Yes, to deliver this stage the rest of the way to a soft landing on the Moon requires more fuel, but at least the oxygen required could be brought up from the lunar surface. Delivered, this adds large fuel tanks which could be put to welcome use in the moonbase, plus an engine, cannibalizable wiring and other components. Remember, we already paid the freight to get it almost all the way!

Those with shortsighted vision would not want to bother, but if you are a prospective lunar pioneer, not to take advantage of such a golden opportunity would be unforgivable, and as lunar frontier history may someday judge, forever listed as an act of unthinking treason against the future Lunar Republic.

We are not suggesting that the Lunar Module ride to the surface atop this 3rd stage, *though if we decided to do that,* the weight savings involved in not needing to equip the Lunar module with its own separate descent stage engines and tanks, might go a good ways toward paying for the extra fuel.

The equivalent of the Apollo Command Module needed to return crew to Earth orbit or to Earth directly, could be dropped off en route, breaking into lunar orbit, while the 3rd stage with lunar module and minimalized ascent stage continued directly to the lunar surface. It's a different lunar architecture but the potential payoff in "total payload delivered" is too great not to pursue. As we work out the design and tradeoff particulars, a show-stopper problem may emerge, but with the right attitude, we can bet that a doable workaround will be found.

In the scenario above, even the farings that protected the lunar lander on its trip up through Earth's atmosphere, could make the trip all the way. They would surely be useful for one thing or another.

A Proper Guiding "Philosophy" is essential

We must always keep in mind that *maximum total payload mass delivered is the Holy Grail.* That implies, of course, that we have predesigned every "hitchhiking" component to be able to serve new uses and functions on the Moon, or have made that component of a material that we cannot yet produce on the Moon, or may never be able to produce, such as copper, brass, zinc, lead, and reshapable thermoplastics, to name a few.

What about parts for which we can foresee no reuse or reapplication potential? We can think of two approaches right off the bat. Make them of materials needed on the Moon. Store them up until someone does have use for them. At the very least, they can be used in frontier sculptures, symbolizing the effort it took to establish the frontier! Art is one very important way we begin to accept our new surroundings as "home."

Face it, we will not have bottomless financial reserves, we will need to be spartan. Why not borrow the operating principal used by the poor who need to use *all of everything that comes there way,* in this example, a slaughtered pig -- "use everything except the squeal." To put it in more common terms, we need to maximize and ramp up our "resourcefulness."

This is not "Apollo II"

We need to remember that in the Apollo program, the idea was not to establish a permanent base, but to conduct a series of science "picnics" at scattered surface sites. In that light, minimizing landed mass on the Moon was the proper design goal. Now, as we pick one site and try to build it up to the point where it becomes a truly functional complex serving a wide variety of operations on a long term basis, everything changes. We will want to deliver as much, not as little, as possible.

By including as second class payload, not just crew, cargo, and initial cabin, but the entire landing craft and perhaps the entire assembly that left Earth orbit

bound for the Moon, we demolish the Old "mass fraction limits" on deliverable payload. And we demolish those limits at relatively little extra expense. The payoff of adopting this design philosophy is that a given stage of moonbase buildout can be reached in fewer trips from Earth, or conversely, with the same number of trips from Earth, we can reach a much larger, more complex and elaborate lunar outpost buildout.

This is important for an operation that needs to maintain public and political support to continue. The more we achieve with the lowest cost, the faster our presence on the Moon grows first to a fully functional science and exploration outpost, then towards one involving a growing number of civilians involved in industrial operations aimed at tackling Earth's energy and environmental problems, the more surely it will survive changes in political administrations, and congressional whims.

A parallel with the Opening Act of the Universe

The only safe lunar outpost expansion philosophy is an "inflationary" one, growing and evolving very fast, *not very slow*. Until we reach a stage where our presence on the Moon can survive periods of interrupted support from Earth, everything is tentative, subject to a change in the winds that could mean a second retreat from Luna.

Such a swift buildout approach will, when all is counted up, be significantly less costly than a go slow, pay as you go approach. Time is the most costly expense a of all. We should know this from the Shuttle program. Initial cost per launch figures where based on sixty launches per year, one every six days. Now we are lucky to do four or five. But the expense of the standing army of people needed for turnaround, as well as of management, never goes down in proportion to mission rate.

Further, with each delay, inflationary pressures come into place. To get our money's worth we not only have to reuse everything sent *toward* the Moon *on* the Moon, but we need to buildout our lunar facilities and operations with all due speed.

The "Medium is the Message"

We noted last month that extending Marshal McLuhan's dictum that the Medium is the Message to rocket transportation and delivery architectures, the rocket itself can be part of the payload, if properly designed, in all its parts, for useful applications at the delivery site.

Meanwhile, the original second stage, which delivers the moonbound stack to Earth orbit, should itself be predesigned so that all its components can serve some useful function in Earth orbit, building up the transportation hub with refueling, assembly, and maintenance operations functions. We've already paid the freight to deliver its fuel-expended dry mass to LEO. If we do not leave it there and find someway to use it to ramp up orbital operations, we are just tossing money away. Here too, we can treat the Mass Fraction limits.

It begins to look as if the Mass fraction rule was a product of neanderthal thinking. We got to where we are by taking advantage of every opportunity, not by mindlessly throwing opportunities away, because in our narrow horseblindered professions we can't see the possibilities!

Next Month, Part 3 - Bootstrapping through LEO and LLO with early lunar products. <MMM>

It Came From The Bowels of The Moon

A Science-Speculation Essay by Peter Kokh

[a fun piece written for a Milwaukee Horror Con "It Came from Lake Michigan" the weekend before Holloween]

Many of us believe that it is likely that "other intelligent species" have come this way before. Perhaps as explorers, maybe as pioneers, or in search of lucrative trade. Maybe even as imperialists. Earth has been around for some 4.6 billion years having formed more than eight billion years after the first stars. Plenty of time for other, earlier civilizations to have risen and perished in that time. Astronomers believe that earlier stars and their planetary systems were less rich in the elements that form rocky worlds like ours. Yet that some may have not enjoyed life long before ourselves seems inconceivable.

Let's suppose for sake of argument, that we have been visited a hundred times since Earth was formed. Averaged out, that's one visit every 46 million years. And there is a 50-50 chance we have been visited as recently as 23 million years ago, and a 1 in 100 chance that someone came calling as late as 460,000 years ago.

Hmmm!? Now there is a problem with averaging things out that way. For one thing, the pace of visits should have started much more leisurely as "way back then" there were likely fewer intelligent civilizations than we imagine that there must be today. Then the pace gradually picked up. So the interval between visits may have decreased on a logarithmic scale. But who knows? Maybe we got lucky enough to have had a visit in the past ten thousand or so years since the ice age and the birth of human civilization as we know it. But also possibly, the Sun and Earth have been in the "boondocks," off the logical routes of interstellar exploration and expansion. All we can do is wonder "for the sake of argument."

Perhaps that 100 times in the lifetime of Planet Earth is too pessimistic. Perhaps it is too optimistic. One thing is sure. Time, and by that we mean the amount of time before the present, is as vast as space. The two go hand in hand. The chances of finding a contemporary civilization, one both nearby in space and nearby in time, are much slimmer than that of identifying a civilization whose Sun was once a neighbor of ours but which has either drifted far away, or that civilization has long succumbed to the ravages of time; much slimmer too than finding a contemporary civilization, contemporary in that we now detect its signals, though it is so far away that it too may have passed into oblivion since the message was sent.

But, again, for the sake of argument, let's say that our solar system has indeed been visited, explored, inspected, mapped, catalogued, etc. Let's say that this has happened more than once. Still the odds are overwhelming that our last visit might have occurred before the rise of modern man, cultural man, technologically inventive and scientifically curious man. This "last visit" could have occurred in the past 5 million years, at a time when the evidence of simian and primates was clear and the evidence that Earth would soon bring forth its own dominant species, a species which like there own, could

alone help their homeworld's "Life" sprout elsewhere throughout their system and beyond. What message could have been left?

But just as plausibly, our last visitors may have come calling much earlier: in the age of the dinosaurs, or even earlier when multicellular life was first forming in the oceans and seas. But it might have been clear to the visitors even then that this young Earthlife had the potential to go all the way -- in time. What message for a far far future Earth-dominant species could the visitors have left, should they so have felt inclined?

That's one question. Another is where could they possibly have left a message or a calling card, even a "Cheshire Smile" for us to know that someone from somewhere and somewhen had come calling? Where could they have left it where it would not have been destroyed by the ravages of Earth's active geology and weather? Nowhere on Earth!

When Apollo 15 moonwalkers, David Scott and James Irwin, landed along side a portion of the meandering lunar valley known as Hadley Rille, they looked for clues to its origin. Running water could not have carved the valley. It was too winding to be a fault line. Soon, lunar geologists, or "selenologists," came to a unanimous conclusion. The rilles all appeared as features of various maria, frozen lava plains. The evidence was clear that the lava sheets have must have had little viscosity, or they would not have spread hundreds of miles. On Earth we find these kind of lava plains also, for example in the Pacific Northwest. How the lava sheets spread is by rivers of lava. The top exposed to the cold of atmosphere, or on the Moon, the greater cold of space, soon congeals, then the sides. When the flooding has stopped, a lava tube is left. Some of these, too near the surface, collapse and become winding ditches. But whoa! On Earth lavatubes are typically 10-30 yards across and just about as high. If Hadley Rille was a collapsed lavatube, that tube must have been gargantuan, hundreds of yards across or more. Scientists soon realized that this could and would happen in the Moon's lighter gravity, just one sixth of our own.

Next question. Are all the original lavatubes collapsed? No! We see clear proof that at least some segments are intact, and probably whole tubes. Near the center of the Nearside lies Hyginus Rille, wandering for hundreds of miles. But here and there are interruptions, places where the rille "stops" and then, miles ahead, "starts" again. Those interruptions look like land bridges over the rille. Indeed, they are uncollapsed tube sections.

Now all the maria must have formed that way, but we do not see rilles everywhere. There must be many places where the original tubes are still intact with no surface entrances. Indeed, some maria formed layer upon layer. It is possible that each layer has intact lavatubes, gargantuan voids tens of miles long -- or longer. *The Moon has bowels!*

Someday, these "hidden valleys of the Moon" may harbor industrial parks, farms, even human settlements. What else? Well consider that they all were formed 2.5 and 3.8 billion years ago. They have been intact for an inconceivably long time. What a place to put the Grand Archives of All Mankind, even of all Earth Life! There, these records and artifacts would rest without decay in the cold black vacuum of these voids, until the Moon ceased to be. And there you have your answer. Our visitors could have left us an incomprehensible gift, safe until we became mature enough to find them.

Okay, we answered the 2nd question first: Where could visitors have left a message or record for us to find that would have been able to survive the ravages of time: geology and weather? In an uncollapsed lunar lavatube. Those that were intact would have been intact for billions of years already and should be for billions of years to come! Talk about security!

Now back to the first question: What would they have wanted to leave behind for us, whoever and whatever we turned out to be? Now, of course, many of us Star trek fans know the answer. The Prime Directive would not only have mandated that we not find what they left behind until we were advanced enough to appreciate it, but that they not leave behind anything which would short-cut our own scientific and technological evolution but also anything which might play havoc with our culture or cultures. Yes there are skeptics and cynics, but it may well be that the only civilizations that survive to become spacefaring will have come to appreciate the hard way, as we have, that the Prime Directive is not something Gene Rodenberry thought up, but which intelligent species everywhere must come to appreciate. The wreckage of primitive cultures in our own past is evidence enough.

Suppose we believers in the Prime Directive are on to something? I propose that this would boil down to two simple guidelines: (1) tell the natives nothing about ourselves; (2) tell them instead about the past of their world; preserve for them records of that past that otherwise would be sure to be erased by plate tectonics and weather. In other words, all we, as the visiting species, leave behind of ourselves, is a "Cheshire Smile." That is how I propose the visitors, any one advanced enough to have wandered by, will look upon the opportunity. Here it is there message to us in their own thoughts.

"You will know that we have been here, that we foresaw the probability of the rise of a dominant species that could carry its planet's life beyond its spatial shores, and that we cared to give you a gift of knowledge about the state in which we found your planet when we passed by: the shape and position of its continents; mountains, and rivers, and lakes, and ocean trenches; the volcanic hot spots and rifts and plate boundaries; the weather and climate; detailed depictions and models of all the life forms, plant and animal and even microbial, that we inspected. These are things you could never discover, no matter how valiantly you tried to reconstruct your planet and biosphere's past from the partial and haphazardly scattered clues that time has left behind.

"More, we can leave you an atlas of your heavens as they were then. They were full of stars and star clusters and nebulae that may now have drifted halfway around the galaxy. We can show you your neighboring galaxies to compare with the distribution you find today.

"But no, we won't tell you where else we found life in our explorations. No, we won't describe ourselves, our physiologies, our cultures, religions, or histories. But what can be more than to know just simply that we were here, looked forward to your emergence, and cared enough to reveal some of your very own past?"

So there you have it. The greatest find of all time, and maybe for all time to come, will have ***come from the Bowels of the Moon!*** **- PK**

The Moon Society

JOURNAL

http://www.MoonSociety.org

http://www.MoonSociety.org/blog/

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/

Moonbase Simulations - Lunarpedia wiki

Moon Society DUES with ***Moon Miners' Manifesto***

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

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

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

Moon Society joins The Space Solar Alliance for Future Energy (SSAFE)

http://ssafe.org/

from President Peter Kokh

October 10, 2007: We are used to NASA being the source of most space initiatives. But times are rapidly changing. The Space Prize phenomenon, after the long awaited success of the X-Prize Challenge, now seems to have developed a self-sustaining momentum with prize-driven developments likely to become a major force in the realization of human activity into and in space.

Now the Defense Department's National Security Space Office (NSSO) has led a study group to investigate space-based solar power (SBSP) and has found SBSP to be an especially promising way to reduce US dependence on foreign-oil and as a way to reduce global warming. At a National Press Club event, today, sponsored by NSS (the National Space Society), the NSSO released its findings. Buzz Aldrin was one of many notables on hand.

http://spacesolarpower.files.wordpress.com/2007/10/final-sbsp-interim-assessment-release-01.pdf

But NSS, determined to take maximum advantage of this opportunity, had put together in advance a 13-organization alliance to push Space Based Solar Power. SBSP is key to the very existence and focus of one of the two organizations whose merger gave birth to NSS in 1987, the L5 Society, which promoted the ideas of Dr. Gerard O'Neill to use lunar resources to build solar power satellites to secure an abundant clean energy future for Earth. Space Settlements would house the workers who assembled these satellites. The NSS Space Settlements Committee, of which I am a member, has been focusing on ways to promote a demonstration of the technologies involved. For an NSS report on the event with photos, see:

http://www.nss.org/news/releases/pc20071010.html
http://www.nss.org/settlement/ssp/library/nsso.htm

As for the Moon Society, focused as we are on the creation of "an Earth-Moon Economy" which will involve substantial civilian settlement of the Moon, promotion of this scenario is very important. True, there are competing energy scenarios: Dr. Criswell's Lunar Solar Arrays, and Dr. Kulcinski's Helium-3 fusion, using relatively abundant lunar He-3. It is not the Society's role to favor any one of these scenarios over the others, but to promote the development of all three, *letting "technology pick the winners."*

A full list of the current thirteen members, see our Lunarpedia article (thanks to James Gholston):

www.lunarpedia.org/index.php?title=Space_Solar_Alliance_for_Future_Energy

Society members invited to participate in NSSO study

√ **Dr. Peter Schubert**, Senior Director for Space & Energy Research, Packer Engineering, Inc., Naperville, IL (Key Expertise: lunar ISRU, propellantless propulsion, hydrogen storage, nanotechnology, MEMS, materials processing - high temp and electronic, intellectual property creation)

√ **Charles F. Radley**, Associate Fellow AIAA, Spacecraft Systems Consultant, Micro Aerospace Solutions, Inc., Key Expertise: Spacecraft Systems Engineering

√ **Arthur Smith**, Cofounder Alternative Energy Action Network. Other affiliations: American Physical Society (employer), Brookhaven National Lab. Key Expertise: =>

[Moon Society joins SSAFE cont.]

Basic physics & materials issues, economic analysis. Smith's blog study had caught NSSO attention:

www.altenergyaction.org/mambo/index.php?option=com_content&task=view&id=129&Itemid=27

Dr. Schubert is a current Moon Society Board member. Charles Radley is current Moon Society Vice-President. Arthur Smith served as a Moon Society Board member from 2003-04.

Also on the NSSO team is Moon Society Advisor **Geoffrey A. Landis Ph.D.,** Scientist, Power and In-space Propulsion Division NASA John Glenn Research Center Key Expertise: Solar energy, advanced concepts, physics, electrical engineering. Several others are well known to us.

Advantages of this study being done outside NASA

The NSSO study will not compete with other missions and initiatives in the NASA budget. Nor will it be perceived as "another 'make work' scheme for NASA. The involvement of the Defense Department may alarm some, but as it is clear that the DoD wants private enterprise involvement, the foreseen solar powersat network would be for the benefit of more than the military. In fact, the committee recommends that the US government be *an "anchor tenant" only.*

Most of important of all, as a DOD initiative, it is much more likely to be funded by Congress, than if it were to compete with Space Science and the Moon effort in NASA's budget.

Opposition is sure to come, especially from vested energy interests -- from those corporations who now have a stranglehold on world energy supplies and do not relish sharing the pie with newcomers. It is precisely to make an end-run around this opposition that as an individual,I am introducing ar 2-phase approach, concentrating on a first phase with great economic appeal but which will serve as a springboard for a complete system.

Coming in MMM

Starting on Page 3 in this issue, we will run a series of articles on this very critical issue.

A long road ahead

Much research is needed before we can start talking about construction of a demonstrator system. The SBSP study report also finds that:

> "although SBSP holds great promise to deliver clean and renewable energy to all nations of the world, the potential environmental impacts of the various systems and mitigation options to minimize those impacts require greater study."

In short we need to be sure that the system of power beaming *through Earth's atmosphere* has minimal impact on the atmosphere itself and on living creatures, both airborne and on the surface in the areas where the vast rectenna arrays will be located. Previous research had tended to indicate that such impact would be minimal and acceptable. *But we need to be sure.*

Significantly not mentioned

From our point of view, the deployment of *hundreds of* Solar Power Satellites makes *environmental and economic sense* only if they are built of lunar materials. We have to work hard to make this point, based on early but careful analysis of several studies including one done by Seattle Lunar Group Studies (SLuG), the think tank of an earlier iteration of the Seattle L5 chapter, which indicated that a solar power satellite of set power output could be built of 92% lunar materials at a (greater) weight penalty of only 8%. This study needs to be repeated given what we know today, twenty years later. Earth-launched SPS systems would require thousands of very heavy lift vehicle launches, with an unacceptable environmental impact, defeating one of the two major purposes. But using lunar materials is going to raise alarm bells for some, though it is precisely what we in the Moon Society very much want to see happen.

Building an SPS from lunar materials means that we can not rely on using the latest in photovoltaic technology for low weight high efficiency solar energy collection. We must use cruder materials with lower efficiency. On the other hand glass glass composite strut and space frame platforms may be superior in many respects than construction using the latest in terrestrial metal alloys.

Rectennas, the giant collectors needed to receive beamed energy from space, need not be built on empty barren, unproductive land. Studies to date indicate that they could be built over agricultural areas and other productive environments without foreseen problems. A rectenna "net" would spread over a few square miles.

NSSO recommendations for enabling legislation

The group recommends that both federal and state laws be examined to *remove impediments and emplace enabling legislation.* SBSP should be qualified for favorable treatment on the same grounds as other non-grid electrical suppliers such as small hydroelectric and wind power generators. "The U.S. Government should *increase and accelerate its investments* in the development and demonstration of key component, subsystem, and system level technologies that will be required for the creation of operational and scalable SBSP systems."

Further, the study reports its conviction that "a small amount of entry capital by the US Government is likely to catalyze substantially more investment by the private sector." "A national investment in SBSP may return many times its value." Energy companies concur.

To the reader

We recommend that in the interests of becoming better informed of all the identified issues, challenges, and opportunities involve, readers and members would do well to browse over the entire report.

http://spacesolarpower.files.wordpress.com/2007/10/final-sbsp-interim-assessment-release-01.pdf

Meanwhile, the Moon Society, and Moon Miners" Manifesto, will take advantage of every opportunity to promote this venture, use it as a focus of our societal and chapter outreach, and help bring the public up to speed. It is unfortunate that Al Gore, in his book and documentrary "Inconvenient Truth" did not focus at all on space based solutions. We live on an island. It is just plain stupid not to fish in the sea. Earth is an island, space energy our fish. ***Kudos to NSSO!*** **<MSJ>**

Why not take the Outreach Plunge?

from Peter Kokh <kokhmmm> 414-342-0705

Okay, so you don't talk much to other people about your fascination with space. You don't care to be classified as an out-of-touch-with reality geek. We've all had that experience I'll bet. But as I quickly learned when I was first recruited along with a dozen other L5 Society members in Milwaukee by the Chicago and Minnesota L5 chapters back in August 1986, this all changes when you are armed with exhibits and displays that help people visualize what you are talking about. In the past 21 years, I have manned thirty or more exhibit events: at malls, in theater lobbies, at science fiction conventions, libraries, museums, wherever we could find an opportunity.

I have come to find this kind of work exhilarating. Sure, if you expect to be recruiting new members right and left you are destined for a big disappointment. Yes, you'll meet other people interested in space. But perhaps most who stop by, curious enough to ask what this is all about, the reward for you is to see their eyes widen as you open new horizons to them, new ways of looking at things, triggering lightbulb flashes in their eyes of eureka moments. Next time someone talks to one of these people and dismisses space, they are likely to say, "I don't know about that. I saw this fascinating exhibit of how we could live on the Moon, make ourselves comfortable, and earn our keep helping Earth solve its energy and environmental problems." They may not be able to explain it, but you've helped weaken the opposition that is rooted in just plain not knowing any better. The ripples expand.

A few months ago, I got a call from a Wayne Klingman who said that they were hosting a new Sci-Fi/Fantasy/Horror/Gaming con in Milwaukee, called *It Came From Lake Michigan.* and for the sake of balance they wanted someone to come who knew the space angle. Could I make it? I accepted the challenge on the spot.

And challenge it proved to be. The event was held the weekend of October 26th-28th. And the "con" was not exactly as advertised. Not really any Sci Fi, a bit of fantasy, 60& Horror films with some actual stars and starlets and costume and makeup people on hand, and 40% Gaming. Some, of course, passed up my two tables without so much as a glance. Their loss. To those who stopped, I explained that I was invited "to provide balance" and they listened with growing interest.

> After a while, it occurred to me that there was indeed a horror angle to my exhibit: the horror that we retreated from the Moon in December 1972 and that it might be 50 years since then before we return.

Not only do I love outreach and talking to people with a passion, but I love making exhibits. For the 1998 International Space Development Conference which was held in Milwaukee that year, I had made a modular lunar homestead on a 36" x 80" hollow core door (a much more stable platform than a heavier sheet of plywood.) I used 4" sewer schedule PVC fittings: straight sections, T's, cross T's, Elbows etc. as an analogy of modular components that could be assembled in an amazing variation of layouts. They represented concrete, glass composite, or metal alloy modules that might be made on the Moon.

My "moon Manor" example was a 3,600 sq ft home flooded with sunshine via heliostats that followed the sun across the lunar sky, had breathtaking picture windows that were really large scale periscopes, a toilet system that pretreated its own wastes while nourishing abundant green vegetation and keeping the air fresh and sweet. The home was covered in 2-4 yards/meters of moondust (sculpted and fleck-painted styrofoam) for protection against the cosmic elements and to provide thermal equilibrium. The home opens onto a pressurized street (part of the exhibit). Lunans could go anywhere in their settlement, dressed as they were. Space suits will be for depressurization drills or actual field work.

People get the idea. We'd go to the Moon with a starter base made on Earth and then expand with structures made on the Moon. We could be comfortable. Of course they wanted to know what they would do to earn their keep. That's where you tell them about solar power satellites, solar arrays on the Moon, and Helium-3. Once they see that all this is to help solve *Earth's* problems, you can see their vision of things expand in their eyes!

I haven't taken that big moonbase around for some years now. It requires two people to handle and a 7ft. cargo bed. The '84 Audi wagon I had when I built it, took it with ease. But most wagons and SUVs can't. So in 2005, I built a smaller, lighter, one person portable version for our Moon Society booth at the 2004 Mars Society Convention in Chicago. It does the trick. One side is painted in Moon tones, the other in Mars tones, to get across the idea that we can do this on both worlds.

Even if this is not how we actually build off planet when the time comes, the exhibit opens eyes and minds.

This lighter version has gone lots of places. *My big regret is that I haven't been able to duplicate it so that every Moon Society Chapter and Outpost that wants to get into public outreach can have one.* But as I thought about this at the Con, I decided I could create a materials list and step by step instructions so others can duplicate it or adapt it. So that's another action item on my list!

Then I thought, "if only we could make **a hobby kit** of a starter moonbase on these lines, with available additional components *and market it* so that *kids* could create whatever layout for a moonbase/settlement they wanted! I'll be brainstorming this idea further, then asking for assistance in making it real. Two-D exhibits are good, but 3-D ones are better. If you would like to try outreach where you live, contact me! <**MSJ**>

MEMBER SPOTLIGHT

Focus on Individual Members who are doing much for the Society, and/or for the Space Movement in general

by Moon Society President, Peter Kokh

Spotlight on Ken Murphy

Ken is a Moon Society member and member of the Leadership Council. He is also president of the NSS North Texas Chapter, and was co-chair of the highly successful 2008 ISDC in Dallas. As tall and lanky a Texan as you could imagine, with his cowboy hat and boots always on, he was easy to find at ISDC.

In his spare time, Ken is in the banking business.

Last, but hardly least, Ken is the creator of the most complete online Lunar Reference Library:

www.outofthecradle.net/categories/lunar-library/

And yes, that is a plug. You owe it to yourself to become familiar with this tremendous resource. It will come in handy, should you ever need information about the Moon and not know quite where to look.

Ken also guest blogs now and then, on fellow Moon Society member Jonathan Goff's site:

http://selenianboondocks.blogspot.com/

We first met Ken at ISDC 2004 in Oklahoma City. He had put up table after table of Moon related books and paraphernalia in the kids room. It was awesome, and I immediately called it to the attention of ISDC co-chair Claire McMurray and suggested the display be moved to a prominent location in the main ISDC exhibit area, which it was, *tout de suite!*

Ken's email address screenname could not be more fitting: murphydyne. He is a one man Dynamo, a powerhouse of energy that enthuses all around him. While Ken is very active in the National Space Society, we are happy to share his time, and fortunate to have him as a member. *Salut!* **<MSJ>**

Ken Murphy reviews

"EVOLUTION'S CHILD: REPUBLIC OF LUNA"

Author: Moon Society member **Chuck Lesher**

http://www.outofthecradle.net/forums/viewtopic.php?p=590#590

Author's website: http://charleslesher.com/index.php?option=com_content&task=view&id=13&Itemid=27

Murphy: "The book is quite forward in decrying fundamentalism, and this may throw off some readers."

> "Lunarians believe strongly in the sanctity of all life, human and otherwise, and therefore cannot comprehend the wanton destruction wrought on the biosphere of Earth in the name of 'God/Allah/G-d'."

"If you don't like your theology being questioned/threatened/derided, then this book is not for you. For more tolerant folk, this is quite a story that keeps building and building to the climax. There is a lack of real denouement, so one wonders as to whether the author has more of the story in mind." *But read the whole review!*

Chapters & Outposts

Bay Area Moon Society

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

Meeting **4th** Thurs. montlhly at Henry Cates' in San Jose

Contact: Henry Cates <hcate2@pacbell.net>

Moon Society St. Louis

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

Meeting the **2nd** Wed. monthly at Buder Branch Library 4401 S. Hampton, in the basement conference room

Contact: Keith Wetzel <kawetzel@swbell.net>

Moon Society Phoenix

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

Contact: Craig Porter <portercd@msn.com>

We are gearing up for **TusCon** Science Fiction Con the weekend of Nov. 9-11, InnSuites Hotel in Tucson. Con website: http://home.earthlink.net/~basfa/

Our goal of course, is new members for both Moon Society Phoenix and Moon Society Tucson.

We have scheduled a special 2 hour panel "The Settlement of the Moon in Science Fiction and Facts." Participants:

- **Dr. Alan Binder**, Lunar Research Institute, the author of "Moon Quake" and Principal Investigator for the highly successful *Lunar Prospector* mission, 1998-9.
- **Chuck Lesher**, author of *"Evolution's Child"*
- **Ben Nault** (moderator), president, Tucson L5 Space Soc. and organizer of Moon Society Tucson Outpost.

welcome to the new

Moon Society Tucson Outpost

Contact: Ben Nault <bnault@comcast.net>

[MMM Editor:] Ben Nault is the retiring president of the Tucson Space Society NSS chapter. His core interest is in the Moon, and he is determined to build a Moon Society chapter here in the Tucson area, birthplace of the L5 Society, home to Biosphere II, with Mt. Lemon and Kitt Peak Observatory complexes operated from the city. Tucson is home to U-AZ, heavily involved in space projects, including the Food Growth Chamber for the Amundson-Scott station at the Antarctic south pole. With that much going for Greater Tucson, and Ben's own talent and experience, we are looking for great things.

Ben has a life-long interest in space exploration has led to involvement in several space-related projects. Among his public education efforts are several museum exhibits and Kitt Peak National Observatories' educational programs that he set up. He is a published author of magazine articles and is active with several space-related organizations. He has also contributed to NASA's Apollo Lunar Surface Journal. Professionally, he manages software and technical development projects.

Moon Society Milwaukee Outpost

See **Outreach Report** on page 11

GREAT BROWSING !

NSS Book Review: Hurricaine Moon
http://www.nss.org/resources/books/fiction/SF_016_hurricanemoon.html

NSS Reviews & Recommended Reading
(this list is continually being added to)
http://www.nss.org/resources/books/

NASA Searches for New Spacesuit Tailors
http://news.yahoo.com/s/space/20071001/sc_space/nasasearchesfornewspacesuittailors

IMAX to Chronicle Hubble Space Telescope
www.spaceref.com/news/viewpr.rss.html?pid=23589

Asteroid 1994 GT9 now 7307 Takei (Star Trek's "Sulu")
http://ap.google.com/article/ALeqM5hVWTJEsSIC5Bf0Mu72MxMAROtwowD8S1FCDO0

Looking back to Sputnik, and Forward
http://www.thespacereview.com/article/972/1

Ken Murphy (NSS, Moon Society) reviews two 1950s-era books that took very different approaches to how humans might go to the Moon
http://www.thespacereview.com/article/968/1

Do we need NASA?
http://www.news.com/Do-we-need-NASA/2009-11397_3-6211308.htm

Help Save the Arecibo Radio Telescope
www.nasawatch.com/archives/2007/10/saving_arecibo.html

NSS' Space Settlement Library - 17,000 pages!
www.nss.org/settlement/manufacturing/library.htm

All About Space-Based Solar Power
http://ssp.space-frontier.org

Space: Key to Unlocking Humanity's Vast Potential
http://www.thespacereview.com/article/977/1

Regulation: major problem or myth?
http://www.thespacereview.com/article/975/1

"Better Incentives, better results" - an awesome blog about "Space Prizes" in every conceivable area
http://spaceprizes.blogspot.com/

Luna Gaia: self-sufficient Lunar Habitat designed
http://www.cosmosmagazine.com/node/164

Russian Banks willing to finance Space Tourists
www.interfax.ru/e/B/politics/28.html?id_issue=11883255

Kaguya (Japan) Lunar Mission update
www.space.com/missionlaunches/071009-kaguya-update.html

Students find 2,500 previously unknown asteroids
www.space.com/scienceastronomy/071009-asteroids-found.html

Space Based Solar Power and Strategic Security
http://spacesolarpower.files.wordpress.com/2007/10/final-sbsp-interim-assessment-release-01.pdf

Clues to Saturn's strange moon Iapetus
http://ciclops.org/view_event.php?id=69

1st 42 of 350 dishes of the Allen Telescope Array (ATA) for SETI searches are in place
http://www.seti.org/ata/index.php

GREAT SPACE VIDEOS !

MOON COLONY VIDEOS - The Moon Society

Pete Worden (NASA Ames): low cost lunar orbiters
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1267577868

Pete Worden, Part 2
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1267612858

Pete Worden, Part 3
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1267587873

Moon Animations
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid537018483

Tranquility Dome
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid537018483

Moon Colony TV
http://www.mooncolony.tv

VIDEOS FROM OTHER SOURCES

NASA 1975 Video on Space Settlements
http://www.youtube.com/user/spacesettlemen

Armadillo Aerospace Lunar Lander tests
media.armadilloaerospace.com/misc/sas07_high.mpg
media.armadilloaerospace.com/2007_10_21/modFreeFlight.mpg

Bigelow Videos from outside Genesis I module
www.nasa.gov/externalflash/cev/index_noaccess.html

Videos from Bigelow's Genesis II
www.bigelowaerospace.com/out_there/video_gen_II.php

Solar Power Satellite Animation
http://www.nss.org/settlement/ssp/sspvideo.htm

SLIDE SHOWS

Cool Views from Space: 14 slides
www.msnbc.msn.com/id/10913792/displaymode/1107/s/2/

New Worlds: 14 slides
www.msnbc.msn.com/id/21088978/displaymode/1107/s/2

Jewels of the Sky: 15 slides
www.msnbc.msn.com/id/20823830/displaymode/1107/s/2

Eye on the Cosmos: 17 slides
www.msnbc.msn.com/id/20535259/displaymode/1107/s/2

Shooting Stars: 18 slides
www.msnbc.msn.com/id/20264640/displaymode/1107/s/2

Hot Spots of the Cosos: 15 slides
www.msnbc.msn.com/id/20056073/displaymode/1107/s/2/

The Glow of Space: 14 slides
www.msnbc.msn.com/id/19810770/displaymode/1107/s/2

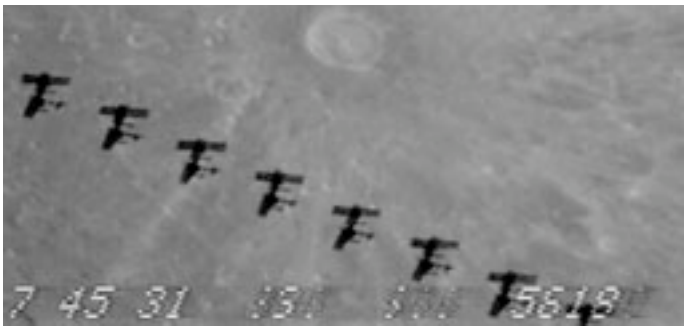
Out of this World Trips: 17 slides
www.msnbc.msn.com/id/19600189/displaymode/1107/s/2

Visions from Beyond: 18 slides
www.msnbc.msn.com/id/18938090/displaymode/1107/s/2

Rings of Blue: 16 slides
www.msnbc.msn.com/id/18921430/displaymode/1107/s/2

MMM PHOTO GALLERY

Earth, *in Kaguya's Rear View Mirror*

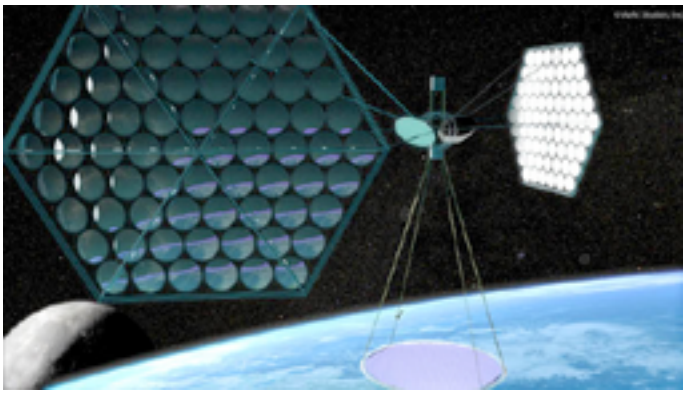


ISS, silhouetteed over the Moon June 4, 07

[Russian Federal Space Agency] living quarters of the planned simulated **Mars 500** mission

http://en.rian.ru/russia/20070822/73361660.html

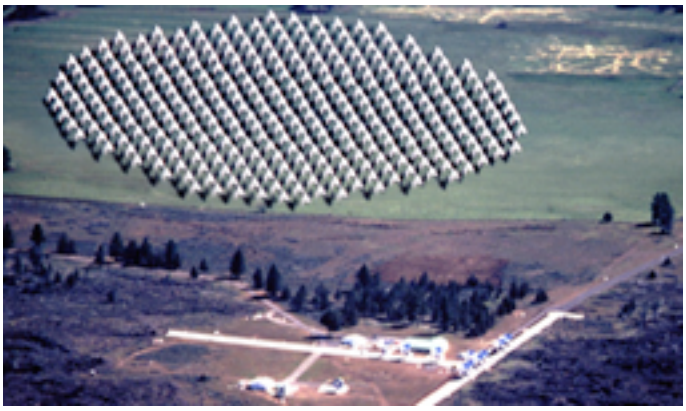
October 4, 1957–2007 Sputnik's 50th Anniversary!



Space Based Solar Power System (from NSSO report)
http://spacesolarpower.files.wordpress.com/2007/10/final-sbsp-interim-assessment-release-01.pdf
(see report pages 9–10, this issue)

42 0f planned 350 dishes of the Allen Telescope Array now ready to take the S.E.T.I. search to a new level.
www.coe.berkeley.edu/forefront/spring2006/seti.html

Below: What the completed array (ATA) will look like



Luna Gaia

An MMM Special Report

by Peter Kokh

An International Space University Team Project to design a 90% selfsufficient moonbase for 30

http://ssp06.isunet.edu/document/document/team_project/LunaGaia.**pdf**

[the above download is a 6.8 mb 168 page document]

Seemingly coming out of nowhere, LunaGaia is a "from scratch" plan to deploy a 30 person moonbase at one of the Moon's poles along with the means for electrical and life support. This reviewer has but scanned through 40% of the report which has delved in depth into a host of related issues. LunaGaia commands respect!

About International Space University - www.isunet.edu/

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

"founded in 1987 by Peter Diamandis, Todd B. Hawley, and Robert D. Richards. ISU currently offers two degree granting programs -- Master of Space Management and Master of Space Studies--in addition to a non-degree-granting Summer Session Program.

"The permanent campus of ISU is located in Illkirch-Graffenstaden near Strasbourg, France. The permanent campus hosts ... both Masters' programs, while the Summer Session is held in a different city each year.

"ISU was founded on the "3-I" philosophy to create an Interdisciplinary, Intercultural and International environment for study and training as a Space professional.

"Since 1987, ISU has graduated over 2400 students from 93 countries."

In this brief space, we can but touch on some of the parts of the report that jumped out at us.

The siting question

The team went into great depth comparing the advantages and disadvantages of various proposed moon base locations, *and came up with a different pick than NASA* (the agency says the South Pole is its provisional choice but it is not a decision that can't be changed.) The ISU team picked the Moon's North Pole, "specifically the area surrounding the Peary Crater. ... When the North and South Poles are compared though composite images of light exposure, the North Pole shows a greater area of illumination. ... and a greater solar flux."

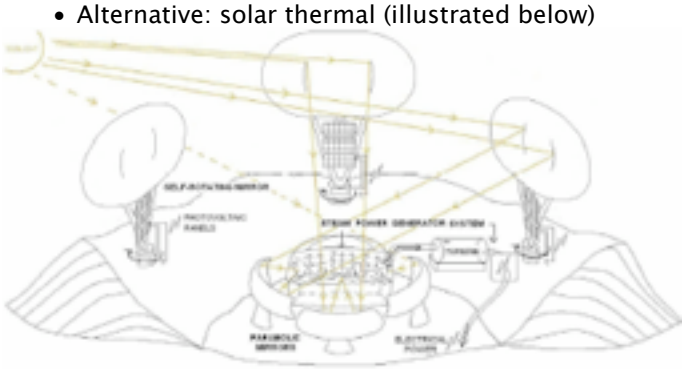
Two additional advantages not cited by the team are that (1) Lunar Prospector found that the abundance of hydrogen (presumably water ice) is twice as high in the north polar regions as in the south polar area; (2) the cross-highland distance from the north pole to the nearest mare/highland coast is less than half the distance in the case of the South Pole.

Interestingly, the team would put the outpost on a slope, (the Peary site offers a "high ridgeline" with the plant growth area at the bottom, so that crew-exhaled CO2, heavier than air, would naturally migrate towards the agricultural area where it is needed. Water filtration would take place at the higher levels where exposure solar UltraViolet would kill any pathogens.

Power Systems

The project team also compared advantages and disadvantages of various potential power *generation* systems: photovoltaic, solar thermal, nuclear fission, microwave energy transfer, and nuclear fusion. For power *storage,* they considered fuel cells, batteries, flywheels, and capacitors. Their recommendations:

- **Power Generation:**
  - Baseline: nuclear fission;
  - Alternative: solar thermal (illustrated below)



- **Power Storage** (& Regulation):
  - Primary: flywheels
  - Secondary, fuel cells

[Note: an option not considered, but the subject of research at MSOE (Milwaukee School of Engineering) is a solar thermal "technology [that] would make the most of the huge temperature variation between the deep, perpetually shaded craters such as Peary near the North Pole or Shackleton in the south, and the rims which receive direct sunlight." The system would have an efficiency of 40% much greater than photovoltaics." See:

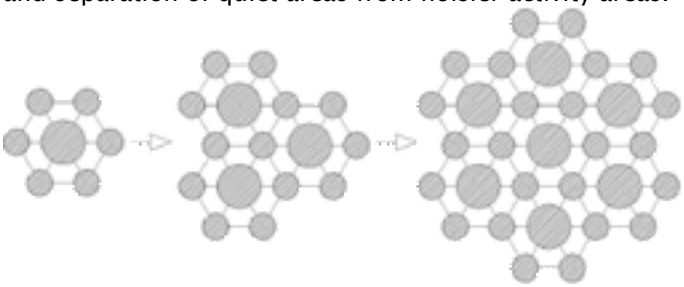
www.msoe.edu/home/profile_detail.shtml?inode=95807&pageTitle=Out of this world project]

Life Support

This is a major focus area of the study. The team started with data from the International Space Station and other sources. They considered air and water recycling needs along with nutritional needs. In our opinion, they do not adequately address the critical morale need for menu variety and diversity.

Moonbase Layout

The team wanted a functional base design that would serve as a cell for extensive buildout, settling on a hexagonal plan. They considered natural air flow patterns and separation of quiet areas from noisier activity areas.



Check it out

No one page report of this extensive and deeply researched 168 page report could begin to do it justice. What struck me (so far!) may not be what gets your attention. If you are interested in the details of lunar outpost planning, I encourage you to download the paper and study it in the detail it deserves. **<pk/MMM>**

CHANG'E-1 FLIES!

www.chinadaily.com.cn/china/2007-10/24/content_6204269.htm

October 24, 2007: XICHANG – The launch of China's first lunar probe Chang'e-1, on a Long March CZ-3A booster, was successful, a Chinese official announced Wednesday evening at the Xichang Satellite Launch Center in southwest China's Sichuan Province.

Li Shangfu, director of the Xichang launch center, made the announcement after the craft successfully entered the earth orbit and unfolded its solar panel, paving the way for its transfer to the lunar orbit.

Chang'e is expected to orbit the Moon for a year, testing technology for future missions and studying the lunar environment and surface regolith. Based on the DFH-3 Comsat bus, it has a mass of 2350 kg. Compare that with 3000 kg for Kaguya and 2180 kg for NASA's Lunar Reconnaissance Orbiter.

The 130 kg payload includes a stereo camera system to map the lunar surface, an altimeter to measure the distance between the spacecraft and the surface, a gamma/X-ray spectrometer to study the overall composition and radioactive components of the Moon, a microwave radiometer to map the thickness of the lunar regolith, and a system of space environment monitors to collect data on the solar wind and near-lunar region.

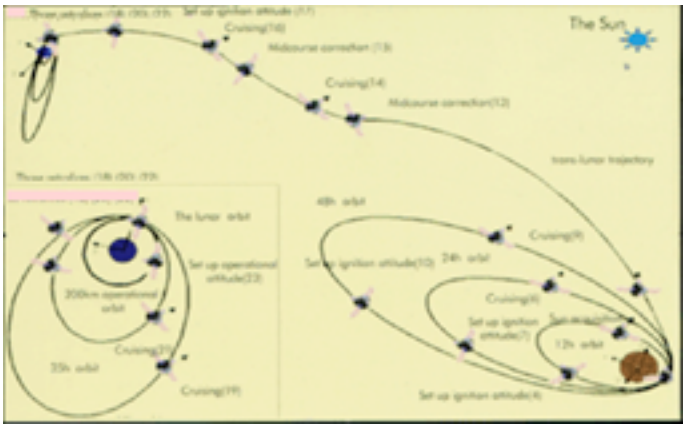
嫦娥 ***Chang'e*** is named after a fairy goddess who in a Chinese legend flies to the Moon.

MMM Report

The worldwide Lunar Community congratulates China on its successful launch of its ambitious Chang'e-1 lunar orbiter, China's first planetary mission. Following Japan's successful launch of its own lunar orbiter, Kaguya, just 6 weeks ago on September 13th, this launch is the second salvo of an international effort, dubbed *The Lunar Decade*, to learn more about the Moon, with emphasis on preparation for manned Moon landings planned by several nations: India, China, Russia, and the US (NASA).

According to the Beijing Declaration, the nations involved in this effort are coordinating their efforts especially as to calibration of instruments and interchange of data, for the optimum improvement in our picture of the Moon, its origin, history, ongoing evolution, and resources significant for human pioneers.

The Road to the Moon and Timeline



[Image inverted and re-rendered by MMM]

Chang'e's path to the Moon will be similar to Kaguya's. After perigee on each of three Earth orbits, a burn will extend its apogee higher to 51,000km, 71,000km and 120,000km with orbital periods 16h, 24h and 48h respectively. A final translunar injection burn will place Chang'e on route to the Moon where it will go into a polar orbit around the Moon. Burns at the first three perilunes (point of closest approach to the lunar surface) will lower the apolune, reducing the orbit period from 12h to 3.5h to 127min at which the orbit will be circularized. After a checkout period, the science mission will begin.

Mission Objectives

(http://en.wikipedia.org/wiki/Chang'e_program)

1. Drawing "pictures" of the moon and obtaining three-dimensional images of the lunar surface. Dividing the basic landforms and structures of the lunar surface and initially making outline graphs of lunar geology and structures, so as to provide a reference and basis for later soft landings. The orbit of Chang'e 1 around the moon will provide complete coverage, including areas near the north and south poles not covered by previous missions.
2. Probing useful elements on the moon surface and analyzing the elements and materials, primarily making maps of the distribution of various elements on the moon's surface. China hopes to expand the number of the useful elements to 14, compared with the five kinds previously probed by the United States, and will conduct an overall prospect evaluation on some useful resources on the moon's surface.
3. Probing the features of lunar soil and evaluating its depth, as well as the amount of helium-3 resources.
4. Probing the space environment between 40,000 km and 400,000 km from the earth, recording data on the primitive solar wind and studying the impact of solar activity on the earth and the moon.

China Sources:
www.clep.org.cn/index.asp?modelname=eng\en-news
www.cnsa.gov.cn/n615709/n772514/n772543/93744.html

NASA Source:
http://nssdc.gsfc.nasa.gov/planetary/prop_missions.html

Wikipedia Source:
http://en.wikipedia.org/wiki/Chang'e_program

Other:
www.planetary.org/explore/topics/chang_e_1/ **</mmm>**

Lunar Reclamation Society, Inc.

P.O. Box 2102
Milwaukee
WI 53201

www.lunar-reclamation.org

Ad Astra per Ardua Nostra
To the Stars through our own hard work!

2006 LRS OFFICERS | BOARD* | Contact Information

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< James_Schroeter@excite.com > 414-333-3679
TREAS./ Database – *Robert Bialecki 414-372-9613
Newsletter Mailing – Carol Nelson 414-466-2081

LRS News

• **Peter, Michael Guthrie men outreach table at ICFLM**: October 26-28, State Fair Park Youth Center, we found that quite a few horror movie fans attending the 2007 "It Came from Lake Michigan" Horror Movie Fest, also were interested in what we had to tell them about the Moon in our Future. It was fun for us. Not your usual Sci Fi "con".

LRS Upcoming Events – November, December

Saturday, November 10th, 1-4 pm

LRS Meeting, Mayfair Mall, Garden Suites Room G110
AGENDA: www. lunar-reclamation.org/page4.htm
Reports on ICFLM, Kaguya and Chang'e lunar probes; other space news and developments; Planning our annual Holiday Potluck and Classic Science Fiction Movie event.

Saturday, December 8th, 1-4 pm

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

Annual pre-Holiday Potluck & Classic Sci-Fi Film

- **Joint event** of LRS and the Wisconsin Mars Society with former members and NSS members invited
- **Exhibit** materials on hand (hopefully something new!)
- **Pot luck** 1-2 pm: no guidelines, bring something to share, home made or purchased, hot or cold, solid or liquid, your choice.

SALVAGE-1 – 1st episode of a 1979 TV Series starring Andy Griffin, Joel Higgens, and Trish Stewart: A Junkyard owner gets hold of a NASA rocket and plans to go to the Moon and bring back one of the Moon Buggies for salvage – run time 1 hr 35 min – ***begins 2 pm sharp***

Movie Review:
www.livescience.com/blogs/2006/04/04/salvage-1-the-best-space-movie-youve-probably-never-heard-of/

MMM 8 NSS Chapters Strong

NSS Chapter Events

Space Chapters HUB Website:
[http://nsschapters.org/hub/]

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.
Acme Coffee & Gifts at Washington and 14th Street
in downtown Oregon City – ***new location!***
NOV. 17th – DEC 15th – JAN. 19th

Chicago Space Frontier L5

610 West 47th Place, Chicago, IL 60609
INFORMATION: Larry Ahearn: 773/373-0349

The J.A.M. [Dr. Mae C. Jemison Space Center, I.F.L.Y Academy & Museum] foundation, the educational branch of the Chicago Space Frontier L5, is giving Kelly High School a pilot program on jobs on Earth for space. The school is building a science gate to use with a summer camp program in 2008. They are also going thru the gate to the Moon and Mars, on each of which they will build a village (10 ft.x 10 ft. x 7 ft.) for the summer program.

Minnesota Space Frontier Society

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

Tom Greenwalt (w) 763-784-6244 (h) 763-442-6015
David Buth (w) (612) 333-1872, (h) (763) 536-1237
Email: tomg@mnsfs.org
[www.mnsfs.org/]
MN SFS News & Pictures

MN SFS celebrates 50th Anniversary of Sputnik: Pics: http://freemars.org/mnfan/MAS/2007-10-Oct-Meeting/ Cake provided by MN SFS.

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

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

We meet the 3rd Thursday of the month 7-9pm

NOV 15: UW-Sheboygan, Room 6101, **Sheboygan**
DEC 20 The Stoelting House, **Kiel**
JAN 17: UW-Sheboygan, Room 6101, **Sheboygan`**

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/]

[http://www.phillypasa.blogspot.com/]

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

The November meeting will be at the Sheraton Philadelphia Center City at 17th and Race Streets. In December we are back at the Food Court. Call Earl/Mitch 215-625-0670 to verify all meetings.

Next Meetings: NOV 17 - DEC 15 - JAN 19

October Event notes: Our members took part in several pro space activities this month, one at a professional space event, the grand opening of The NASTAR (National Aerospace Training And Research) Center which included events starting on Wednesday the third, including dinner with Buzz Aldrin as the speaker. Thursday continued the activities including tours, presentations by several people you may have heard of, Gregg Olsen and Anousheh Ansari, and a number of other business, political and educational parties. I arrived in the middle of Anousheh's' talk with the audience, but ahd a great location near the podium. After the close of talks, by the President of Environmental Tectonics Corporation, the parent of The Nastar Center. I talked to Gary Fisher, who was able to attend most of the days events, and toured the facilities

The business will accept private individuals for various training activities including: testing in a chamber that can be used for hyperbaric (high pressure) and high altitude training, a small multi axis centrifuge (that can run up to over 2 gees), a cockpit trainer with rotational and variable angle capability, and a large centrifuge with high rate (20 plus gees!) capability with the ability to swap pre configured modules for different test/training needs in an hour. When Rob, our guide, took us through the big centrifuge area Mr. Jensen was on the steps of the capsule having a photo shoot. One of the reasons he was able to make his personal trip to The ISS was the special training he received at the Center. If you are thinking of going into space, from "just for fun", to seeing if you have "the right stuff" to testing and training for a sub orbital, orbital, or extended stay activity (such as the I.S.S. or Richard Branson's future facilities) this is a place you should check into.

Our thanks to Alex Howerton, Business Development Manager, Space Training, of the Nastar Center for inviting our members to this event. Its great that Environmental Tectonics brought the facility to our area

The other event we where part of in October was at The Franklin Institute on the weekend of October 6 and 7. This was The Fiftieth Anniversary of Space Exploration at the Institute. It started off well with my lucky meeting with Derrick Pitts, Planetary Scientist there, at the garage on premises where I gave him the Nastar event brochure.

Soon after opening we had Dotty and Larry come, Mitch Gordon, Michelle Baker, and Garry Fisher. A good thing too, as we had quite a crowd during various waves of visitors, and the arrival and departure of our members during the day broadened the discussions that the visitors could have. With the later addition of Hank Smith we had good coverage of most possible questions, with the occasional visit from Derrick Pitts adding to the excitement.

The PASA Space Week table at The Franklin Institute
Michelle (Miki) Baker and Hank Smith, PASA's Science Fiction Outreaqch Coordinator, are shown with several differently colored Cube-Sat mockups, which caught the attention of kids and parents.

The Institute had several tables of its own set up with lots of free handouts at a table, and lots of free

"rocket launches" at some others! On the second day it was primarily myself, Michelle, Mitch and Hank at our tables, with another staff member of the Institute, who gave the L.E.M. tours, sitting in sometimes. Much of our effort was directed at the Cubesat display and using them for stimulation of recollection of space events, and using them to personalize the way the people visiting , and there children, when they grow up, could directly work on the exploration of some aspect of space. This was well received and I think this will have a good long term benefit for directing people towards space science and technical education in general. The "hands on" aspect of this kind of satellite was the thing that brought me into the AMSAT Corporation.

And there was more! The "Gravity Bricks" had competition from a simulated weight display at the Institute but kids liked ours more (I think). Each of our members enjoyed the give and take with the visitors and we hope Mitch will arrange a return next year. See our website for pictures.

In lieu of our regular meeting report, I will include that in the November report, I would like to point out an excellent source of general interest material I have been reading. This is Wired Magazine which has had a number of current and future event oriented articles. This has included several on space entrepreneurs, Elon Musk and Richard Branson among others, and a number of other interesting reports on private space enterprise. I had even missed a one page report in the September issue on the Lunar Dust collection challenge (four competitors, nobody won this initial trial, which means the prize will be up to ~ 750,000 next time). I have reported on the Lunar rover competition, which will be great if it becomes a rally, and the most recent report is on Richard Branson and his plans: Space Invader by Vince Beiser in the November issue. Good details and pictures. Consider subscribing

And last, due to its fleeting availability, the November Nuts and Volts has a Near Space article on the use of LEDs. as light sensors with narrow band response characteristics. This is a clever (and economic) use of a devices properties. The report is "Led Based Photometer" by L. Paul Verhage

Submitted by Earl Bennett

COLORADO

Front Range L5 Society

[Greater Denver North]

1 Cherry Hills Farm Drive
Englewood, CO 80113

http://www.angelfire.com/space/frl5/

Eric Boethin 303-781-0800 eric@boethin.com

Meeting monthly, every 1st Friday, 7 PM

Denver University's Olin Hall, Room 105
http://www.du.edu/maps/olin.html
at **2190 East Iliff Avenue**, Denver, CO

Next Meetings: DEC 7 - JAN 4 - FEB 1

Note: Due to unforseen circumstances the public meeting and speech by astronaut Duane Carey scheduled for Friday October 26th at 7 pm at the Hyatt Regency Tech Center Hotel has been cancelled. We will try to reschedule Mr Carey for a later date.

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.

Next Meetings NOV 17 - DEC 15 - JAN 19

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

Upcoming Events

- **Fri. Nov 17 Sunset (4:49 pm PT) Griffith Observatory Star Party**, 2800 East Observatory Road, Los Angeles. Requires timed-entry reservation to attend. $8 adults, $4 children 5-12 & Seniors over 60. www.lacity.org/rap/observatory/vshuttle.html or www.laas.org/Events_StarParties-Public.htm 1-888-695-0888.
- **Sat. Nov 18, 3:00 p.m. --** OASIS Monthly Business Meeting at the home of Steve Bartlett and Tina Beychok, 7108 East Peabody St, Long Beach. Call the OASIS Hotline for more information: 310/364-2290
- **Dec 1, *Time TBD* --** OASIS presentation on the Mars **Phoenix** mission [http://phoenix.lpl.arizona.edu/] Long Beach Public Library, Los Altos Branch, 5614 Britton Drive, Long Beach. **Return to this page for updates on the start time.** Call the *OASIS Hotline,* 310/364-2290, for more information. *This event is not library sponsored.*
- **Dec 15, 3:00 p.m. --** OASIS Monthly Business Meeting, at the home of Bob and Paula Gounley, 1738 La Paz Rd. Altadena. Call the *OASIS Hotline,* 310/364-2290, for more information.

Looking Ahead

- **Fri-Sun Nov 23-25, 2007 -- Loscon 34**, [www.loscon.org/] the annual regional science fiction convention of the Los Angeles Science Fantasy Society [www.lasfs.info/]. OASIS will again be providing science programming and doing public outreach at this event. We also throw a great party!. $45 adults, $22;50 kids. Los Angeles Airport Marriott, 4855 West Centrury Blvd, Los Angeles.
- **January 2008 Orbital Express --** OASIS is working to schedule a presentation on the **Orbital Express** project [http://www.arpa.mil/tto/programs/oe.htm]

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PHONE#S _____

○ **$45 National Space Society dues** include *Ad Astra*
○ **$20** NSS dues **if under 22 / over 64.** *State age* ___
600 Pennsylvania Ave SE #201, Washington DC 20003

Moon Society dues include *Moon Miners'Manifesto*

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

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

INDEX to #210 November 2007

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Send proper dues to address in chapter news section

=> *for those outside participating chapter areas* <=
○ **$12 USA** MMM Subscriptions; ○ US**$22** Canada;
○ US**$50** Surface Mail Outside North America
Payable to "LRS", PO Box 2102, Milwaukee WI 53201

CHICAGO SPACE FRONTIER L5
○ $15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)
○ $12 low "one rate"

MINNESOTA SPACE FRONTIER SOCIETY
○ $25 Regular Dues

OREGON L5 SOCIETY
○ $25 for all members

O.A.S.I.S. L5 (Los Angeles)
○ $28 regular dues with MMM

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○ Annual dues for all with MMM $25, due in March or $6 times each quarter before the next March

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○ $15 regular, ○ $10 student,
○ $1/extra family member

"SSS" c/o B. P. Knier, 22608 County Line Rd,
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