

Moon Miners' Manifesto

& The Moon Society Journal

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211

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Crew 53 awakes to some snow at MDRS, the Mars Desert Research Station in south central Utah.

Looking east with "Phobos Peak" prominent. With the overcast sky, and no glare off the snow, it looks quite moonlike.

How long will it be before a human crew looks out the porthole of their lunar landing craft to see the real thing?

And what country will they come from? And what does it matter?

What matters more is whether or not they will come to lay solid foundations for real resource-using settlement. If private enterprise is a major partner in the project, chances are better. If not, they will be nil. We'll get "Antarctica II."

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This is MMM's 21st Anniversary Issue **Feature Articles in This Issue**

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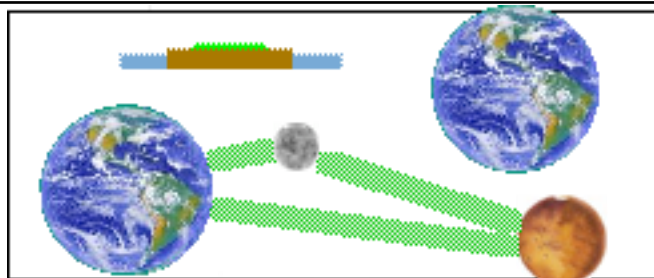
In FOCUS **Easing NASA out of the Space Transportation Business**

The very word "business" would seem to say it all. Business is for business, not for a government agency. The status quo has precedent however: "Amtrak." But in that case, we had reached a time when the various railroads no longer found passenger service profitable. Without the creation of Amtrak, passenger rail would have disappeared in the United States, at least for a while. Now, new private railroads have arisen, engaged in specialty tourist excursions, both in the U.S. and Canada.

Commentary, next page, Column 2

The Concept of "World" – Flat > Round > Solar

Four centuries ago, we had to get used to the fact that the "world" was round, not flat. In the generations to come we will get used to the idea that "the World" – the domain of humanity – is "circumsolar." When we travel from continent to continent we remain in the same "world" of interconnected horizons. Future humans will remain in the "interconnected world" when traveling to the Moon and Mars. Read our anniversary essay pp. 3-4.



Moon Miners' Manifesto

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

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• **Submissions by email** to KokhMMM@aol.com - Email message body text or MS Word, Appleworks, pdf attachments

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⇒ IN FOCUS Editorial continued from p. 1.

That there was reason for NASA to get into the business of space transportation as well as, and beyond the business of space exploration, does not mean that this situation should not be reexamined. The way NASA does business has guaranteed that "space transportation" will be terribly expensive. As an agency that must answer to the public, NASA must of necessity be very risk averse, simply because the public at large has become so, the pioneer spirit of Americans having largely evaporated through prolonged prosperity *à la Rome*. In other areas of great engineering endeavor, that there will be deaths is taken as a matter of course. But building bridges, tunnels, and tall buildings is the job of private enterprise, even when the bill is government paid.

Beyond the need to accept risk

Yet it is becoming ever more urgent that we find a way to get NASA to concentrate on what it does best, space exploration and Research & Development of the technologies needed for that effort. The cost of doing space will only come down when space transportation services are provided by private enterprises in competition with one another. The precedent we cited is not really a shield behind which to hide. Amtrak *is* in competition, not with other railroads but with Greyhound and other motor coach lines and with the Airlines.

We are nearing the dawn of a new era in space, when exploration will continue as a sideline while the real push will be human expansion to the Moon, driven by the need to preserve the viability of Earth and repair some of the damage that our clumsy adolescent civilization has caused in its "growing pains."

For this transition from exploration to human expansion, drastic cuts in the cost of transportation are needed. NASA has had no incentive to cut costs. It tallies the bill, and the government pays. But now we are talking not about a few dozen more exploration missions, but about routine "transit" between what will become a plurality of human worlds, one greater "interworld."

Creating a point of entry for enterprise

How can we encourage this transition in NASA's role? How can we grease the skids for the government space transportation system? One way is for Congress to mandate that NASA publish the designs, standards and requirements for the interfaces between the various stages of the new Constellation vehicle, the Ares. That simple move would allow private companies to design and produce alternate stages that could "plug-in" to the stack without difficulty. If a private company built a stage that was either more powerful, more capacious, more fuel-efficient, less expensive to manufacture -- or any combination of the above, NASA would be mandated to purchase it, or, if it is reusable, to lease it.

With such a mandated policy in space, we would gradually transition the NASA-owned Ares/Constellation into a family of newer, cheaper, better vehicles owned by private enterprise and either privately operated or leased to NASA, at a cost savings to everyone, taxpayers in particular. The effect would be to greatly accelerate the opening of the Moon, the development of its resources, the establishment of lunar settlements, and the mitigation by the use of lunar resources of Earth's serious energy and environmental degradation problems.

This would be a win win for everyone, with NASA now having more money for unmanned space exploration. We'd like to see the Moon Society and NSS, even the Mars Society come together behind this recommendation to Congress. To quote SFF founder Rick Tumlinson, "NASA must *open* the door to space, not *be* the door "

Realistically this won't happen until ...

Business needs incentive, the strong likelihood of significant profit. And nothing will provide that as much as high volume of orders, that is, promised high traffic. The Vision for Space Exploration, previously dubbed "the Moon, Mars and Beyond" will certainly *not* provide that volume. But the NSSO plan to build a network of solar power satellites using lunar materials, certainly *will*!

There are, however, space advocates who dearly want commercial space transportation to come into its own, yet seem content with the goal of a permanent lunar outpost structure, sporadically visited for a while, eventually to become a historic ruin. There are those who want us to open space to tourists, but do not necessarily want to see lunar settlement. Face it, we can't really open space without opening the boundaries of the human world to include "exo-continents" across the intervening seas of space, in one greater solar economy. Half measures won't do.

Is that why NASA never seems to mention solar power satellites anymore? Ever since Congress told the agency, after it had presented lawmakers with the three scenarios by which lunar resources could provide the world with abundant clean power, that this august body did "not want to hear the word 'Moon' anymore," NASA has had its tail between its legs. It is no surprise that it is not NASA but other parts of the government that are taking the lead in the NSSO plan, ironically citing NASA's own research.

But even before the government approves the NSSO report (or decides to become a has been over-the-hill nation), it would help encourage commercial providers to mandate that NASA publish those Ares interfaces and that any superior plug-in stages produced commercially must be substituted. We have to start somewhere, and in the more places the better.

PK

NEXT MONTH

The next issue of **Moon Miners' Manifesto**, #212, will be published in **February**.

January and July are our two annual months off, a burnout-prevention break, time to recharge our batteries, find fresh inspiration, and keep on going.

Instead, those of you with online access will be able to download volume #18 of the **Moon Miners' Manifesto Classics** as a free access pdf file.

This is a continuing effort to re-edit, reillustrate, and republish the classic non-time-sensitive articles from MMM's earlier years, in a format that can be read on any computer, and printed out in color for your library. Each issue covers one publication year.

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[MMM 21st Anniversary Essay]

AS THE WORLD EXPANDS

The Epic of Human Expansion Continues

by Peter Kokh

I have often heard the complaining question, "why can't we just stick to our homeworld," to which I am quick to reply, "It's too late for that. Our homeworld was Africa and we expanded beyond that nearly a hundred thousand years ago. Expanding our "world" defines that Epic. Who are we to be the generation that says "halt?"

This sort of impatience with endless progress" is hardly new. In the aftermath of World War I, leading up to World War II, the great pioneering British science fiction film "Things to Come" (Raymond Massey lead star), a film rendering of H.G. Wells' "The Shape of Things to Come" (1933) dealt with this impatience with endless change.

The irritating fact is that the pace of change, of progress, of expansion is ever accelerating, and adjusting to that is hard for many individuals.

It is more than four centuries since the "world" as known to Europeans grew by the "discoveries" of the Americas. In actuality the epic of expansion has always proceeded quite a bit in advance of popular awareness of it. Humans advanced "out of Africa" into Eurasia yet few people either in Africa or Eurasia may have been aware of the new larger combined "world."

What is a/the "World?"

Perhaps most people will understand "world" to mean "the planet Earth." We speak of other planets as other worlds. That *is* the contemporary understanding. But to get at the real meaning of "world" we must look at the concept phenomenologically. I would define world as

"a continuum of horizons,
from no point within which,
the whole is visible."

That fits the "world" of our most ancient ancestors, as well as of our own era. Interestingly enough, it does not fit O'Neillian space settlements as I have pointed out in my 1996 paper, "Reinventing Space Oases."

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

Originally, the "World" of humanity was Africa

While the exact figures may change as we learn more, the DNA evidence from mitochondria which are only passed on through mothers (as mitochondria are only found in the egg) is that all extant (living survivors) humans are descended from one female in Africa about 140,000 years ago. This does not say that there were no other proto-humans at that time, but only that, if there were, none of their descendants have survived. Nor does it say that this female mated with only one male.

The evidence goes on to conclude that all extant branches of humanity excluding modern day Africans, are descended from one female who made the crossing into Asia, not via Egypt, as previously thought, but across the straights of Aden at the bottom of the Red Sea, straights which these days are 20 miles across. At that time, 80,000 years ago, the "world" of humans began to expand considerably until all parts of Eurasia were inhabited, and migration into Australia and the Pacific Islands and even into the Americas had begun.

The World is Flat

But until we began to reach the "East" by going "West" the common perception was that the world was round. True, ancient Greeks had realized that the world was round from two lines of evidence:

- a. The curvature of the Earth's shadow on the Moon during lunar eclipses
- b. The change in apparent latitude of key stars as one traveled from Greece to Egypt

But to the average person the world remained flat.

The World becomes Round

In the 16th century as cross-Atlantic and around-the-world exploration became common, the reality of a round world sank in. Ever since, the spherical nature of the world has become ever more assertive as we have developed one new method of swift communication after another. When the first telegraph and telephone lines were laid across the bottom of the Atlantic connecting North America with Europe in 1866, the effect on public world consciousness was considerable.

Not quite a century later, Telstar 1, launched July 10, 1962, brought live television pictures originating in the US to France that same day. Ever since we have enjoyed live newscasts and sportcasts from around the world. We not only shared one round world, we were now actively interconnected over very short time intervals.

And now we have the World Wide Web, the Internet. The World has grown a brain of sorts. The "noosphere" predicted by French Jesuit philosopher Teilhard de Chardin (died 1955) has become reality.

Humans: from Africans to Terrestrials, to Solarians

During the past century or more, we have equated "World" with "Earth" but that perception, that identification, as logical as it now seems, is going to change. Think of it. The "world" can also be described, without prejudice to the definition I offered above, as

"a continuum of horizons,
from no point of which, the whole is visible,
but between all points of which,
travel and communication may become routine."

Communications with the Moon involve a delay of under 3 seconds, between Earth-Moon and Mars, between 6 and 40 minutes. Compare that with the delay in communications in the 16th Century -- as much as months -- when everyone accepted that all parts of Earth made up one world.

That "World" defines a set of routinely intercommunicating living spaces, is more apt a definition than any which restricts "World" to any one celestial body. Now I put "routinely" into the definition to exclude possible extra-solar civilizations many light years apart, where sporadic one-way communications taking generations is possible.

"Our" world will in time include settlements on the Moon, expeditions in transit within the solar system, and outposts on Mars, and even beyond. You can get an answer to a question sent to an outpost on Pluto within a day, a lot faster than Queen Isabella and King Ferdinand heard back from Columbus. **The world, to future generations, will not mean "Earth". It will mean the inhabited part of the Solar System. Get used to it!**

From just one Earth continent, to all planet Earth, to everything in Earth's orbit around the Sun, to

everything reachable within Earth's Solar System, the Epic of Human Expansion continues and is inevitable. If it were to stop because of deliberately cherished ignorance or through a failure of will, mankind will have betrayed its mission. "Go and expand into all the world." "All the world" is on the verge of becoming "all the Solar System."

"World" is as inclusive as technology allows

Our world to the extent that it means "everything within our reach" keeps expanding as our technology keeps expanding. Our Epic has involved one great leap after another. The time has come for the next. Not to take this leap means to turn our back on the potential within us, to say "No" to God or to whatever forces you prefer to believe have resulted in our existence.

Copernicus opened up our eyes to a universe populated by other worlds (this time, used in the sense of planets, or better, as bodies which could conceivably be or become theaters of human or intelligent activity. But it is only the age of the rocket which has allowed human travel to "continents" across the ocean of space, that has brought us to this point. Tomorrow, "world" in the sense of the evening news, will routinely include venues beyond the "original" seven continents. With modern communications it makes no difference if we are reporting human news stories from the Moon, from Antarctica, from any other terrestrial "Timbuktu" or from elsewhere in our own local community. The boundaries of "the human theater" commonly called "the world" are expanding outward.

In the era when humans lived only in Africa, the "world" included but one continent. Even as humans expanded through Eurasia, we were still confined to one big interconnected supercontinent. That the "world" would leap ocean barriers to the Americas, Australia, and the Pacific Islands was the first giant leap, the point at which we became truly intercontinental, perhaps as much as 40,000 years ago. The intervening seas did not matter because we could travel and communicate across them, at first with difficulty, but then routinely.

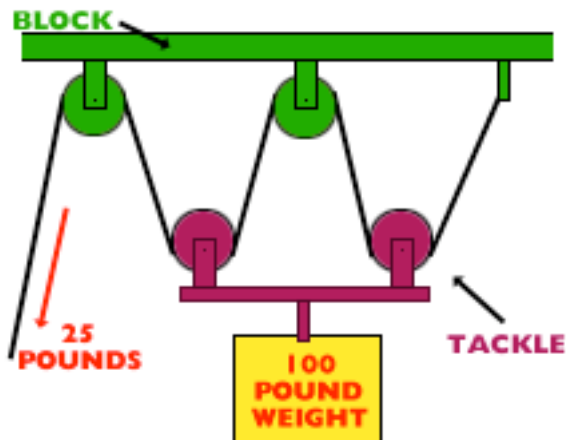
With the age of aviation, it has become irrelevant if there is land or sea along our route. Can "short" stretches of Earth-hugging "space" be any different? The spacial "straight" separating Earth from Moon is no longer a barrier to either routine travel or routine communication. The Earth-Moon system will become one "world."

Both travel and communication will take longer to other points in the solar system, but are of little consequence in comparison to the difficulty of travel and communication in the post-Columbus, post-Magellan world. To continue to think of "world" as confined to Earth, is to think in tribal terms.

This Epic leap is not yet a solidified reality. It will become so as early science outposts on the Moon are followed by civilian industrial settlements engaged in making a living by selling goods and services of use to those remaining on Earth and endeavoring to manage their growing energy and environmental issues.

In a very real sense, the global decision to expand our present global economy to include the Moon will be the most critical test humanity has ever faced. At no time in the past have we faced such an opportunity and temptation to say, "No, enough already!" At no other time have we had the chance to betray our self and our "mission," the ultimate test of human free will, to become or not "Solarians." <MMM>

THINKING OUTSIDE THE MASS FRACTION BOX: 3



The Block & Tackle Pulley as an Analogy of the Power of Leveraging Concurrent Space Developments to deliver *much more* to the Moon

by Peter Kokh

"in Earth orbit you are halfway to anywhere"

- Robert A. Heinlein

The "effective" cost of goods delivered to the lunar surface depends on the amount, or lack of infrastructure along the way.

Archimedes invention of the pulley more than 2200 years ago is one of the most important mechanical contributions to early civilization. By realizing a predictable mechanical advantage, the "energy cost" of moving an object from one plane, say Earth's surface, to another, say the Moon's surface is significantly reduced. The block and Tackle pulley multiplies the advantage.

What does this have to do with space transportation in general, and with the cost of delivery of goods from Earth to the Moon in particular? We certainly are not talking about setting up a physical block and tackle system in space! Rather we want to apply the analogy above in a way that illuminates the best way for us to proceed.

In short, transporting things to the Moon without any intervening infrastructure, i.e. not cashing in any infrastructure discounts or advantages, is going to remain very expensive. The "Moon Direct" plan, if we can call it that, is the "horse blinder" choice. "We are directed to put an outpost on the Moon, not to establish infrastructure along the route." What looks like dedication will someday reveal itself to be an outright waste of resources and opportunities. Future Lunans may even view it as criminal.

In previous parts of this article, we have noted that anything taken to orbit that might be useful in setting up shop on the Moon, but left to fiery destruction as its orbit decays, could be taken to the Moon at much less expense from LEO than from Earth's surface – if Heinlein is right, for about half the cost. And that includes a lot of material, whether usable in its current form or

not. The deliberate "wasting" of the External Tank is but the most obvious and long standing forfeit of opportunity. We fully understand all the disadvantages and obstacles to reusing the ET. But they are insignificant in comparison to what could have been gained by committing to the modest expense of parking them in a higher very long duration orbit until the opportunity to use them in LEO or take them to the Moon arose. As a Society, we have become addicted to favoring short-term advantages over long-term goals, and such a habit, if we don't fight the addiction, could have us following the Romans into oblivion. Again, I understand the excuses. But excuses are just what they are.

The same holds true of anything else delivered to LEO and GEO, which when no longer useful there, could be delivered to the Moon at "half the cost." LEO and GEO are pulleys in any future fully developed lunar transportation system. So is the Earth-Moon L1 Lagrange point and other lunar orbits. Anything delivered that far that could be used, reused, restructured, or cannibalized on the Moon will be far cheaper to deliver than an equivalent item all the way from Earth.

The Lunar side of the Block & Tackle

I remember Gordon Woodcock's paper which sought to prove that lunar oxygen used to refuel Moon-bound cargo ships, could only reduce the cost of shipping to the Moon, but not make it profitable. Duh! What's wrong with reducing costs? Lunar oxygen, which is abundant beyond exhaustion, can be shipped to L! and to LEO with every returning vehicle, to partially refuel each next Moon-bound craft. LOX is thus another pulley in the system. As to LH2, which is *not* in large supply on the Moon, we oppose shipping that off-Moon as fuel, or even for using on the Moon as fuel, except for fuel cells in which hydrogen can be recovered. Any shipment of hydrogen off the Moon limits the size to which lunar settlements and biospheres can grow. In that perspective, such shipment and usage becomes treasonable against the Lunan Frontier.

Lunar Exports

Many people point out that the Moon has nothing of value "on Earth" except perhaps Helium-3, and maybe platinum (I am very dubious of this latter idea.) What these people are failing to understand is that the logical export partner of the Moon, is not Earth, but LEO. *Anything that can be made on the Moon to fit service needs in LEO can be shipped to LEO at a 20:1 fuel cost advantage over shipment of equivalent goods up from Earth's surface.* Of course, that statement does not factor in the need to amortize the costs of developing lunar industries needed to export such items. That does not change the argument, however.

Items made of concrete, cast basalt, glass, alloys of steel, aluminum, magnesium, and titanium are candidates. Yes, there will be some specialty materials that lunar industries won't soon be able to match. But in designing LEO installations – space stations, laboratories, factories, tourist facilities, whatever, if the design team tweaks the design to use lunar products, the cost savings will be considerable. Even dehydrated food, over 50% lunar oxygen by weight, can be shipped more cheaply to LEO than from Earth! The point is, that all these export products will help defray the cost of shipping things in LEO the rest of the way to the Moon. Another Pulley!

Not to forget GEO

GEO -- Geostationary Earth Orbit -- is long overdue for wholesale restructuring of the way the limited and invaluable slots along this orbit are assigned and utilized. With large platforms supplying power and station keeping, serviced by robotic tugs, many communications and other GEO satellites can share the same orbital slot, taken to the platform by the tug, and "plugged in." GEO is almost saturated in our present "hunter-gatherer" level of allotting space. How will products from the Moon help?

We already understand that lunar materials can bring down the cost of solar power satellites and relays in GEO by substantial proportions. [See last month's MMM proposal for a World Wide Orbital Grid.] These same materials can help build new and larger platforms for communications and other uses. And the tugs needed will be of use as well in LEO in maximizing reuse and salvage of items in orbit, including gathering them for transshipment to the Moon. GEO platforms, power systems and tugs -- another Pulley"

"Mechanical" Cost Advantages

Any estimate of what it will cost to open the Lunar Frontier, that neglects the opportunities to ship to the Moon anything shipped to LEO, GEO, or other points in between and no longer needed at those points, or which neglects to credit exports from the Moon to LEO, GEO, or other points between will necessarily be fantastically outlandish.

At the same time, we are not saying that opening the Lunar Frontier will quite pay for itself in the near future. That said, we are confident it will do so much more quickly than most authorities now estimate. Those less optimistic predictions are a natural, given the human tendency to be too optimistic in predicting the near-term future and far too pessimistic in predicting the long-term future.

I was asked recently to outline "The Ten Steps Needed to Create an Earth-Moon Economy." I dislike preset outlines. Whether it is five steps or fifty is uncertain. But this set of articles on "Thinking outside the Mass-Fraction Box" are my first installment towards an answer to that request. In other words, *we are not going to succeed in setting up an Earth-Moon economy without paying attention to "the pulley points" along the way.*

LEO & GEO can only be fully developed using the significant cost advantage of Lunar materials and exports.

The Moon cannot be fully developed without access to materials and items shipped to LEO which when they are of no further use there, are then transshipped to the Moon.

The first Step: a refueling station in LEO

At the 2007 International Space Development Conference in Dallas over the Memorial Day Weekend, Dallas Bienhoff of Boeing gave a convincing presentation that simply by refueling Moon-bound craft in LEO, we could deliver 60% more goods for the money. Please view the three video segments produced by the Moon Society in which Bienhoff explains his thesis.

1. <http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1171893807>

2. <http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid117335232>
3. <http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1171893809>

Bienhoff is correct in saying that NASA has an obligation to identify the least expensive way back to the Moon. However, that constraint imposed by Congress, is shortsighted, in words we all know, "*pennywise and pound foolish.*" The current Spartan approach can only be defended if setting up a lunar outpost is a goal in its own, without considering further use of that outpost, or further lunar developments.

Many years ago, I wrote in an In Focus editorial which I can't locate at the moment, that the space enthusiast community has all too often attempted to sell the *ladder* of our dream *one rung at a time*. When we do that, the rung in question gets designed as a be-all and end-all in itself, *not as a rung leading to the next rung, not as part of the ladder*. Thus we have only ourselves to blame for the Space Station becoming a black hole for funding, leading nowhere. In the selling of the Station, it became not a depot to outer space as conceived of by Wernher von Braun, but a downward looking Earth-research laboratory, the pride of "yo-yo space." We were afraid that if we talked about our real dream, no one would listen. The result of this space enthusiast consensus strategy of the early eighties is 20-some years since of going nowhere.

If we promote the NASA permanent, but not permanently occupied, science outpost as a goal in itself, that's what it will become. Because we can't allow ourselves as a nation to look further down the road, we will continue to make stupid shortsighted decisions which will only bring further delays to opening the Moon.

Anything that is worth doing is worth doing right. We have to rethink the NASA moonbase *as a rung in a ladder*, that means flushing LAT-2 down the LATrine. It's a quite brilliant design intended to lead to nowhere.

Ten Steps to an Earth-Moon Economy? It includes building up a block-&-tackle-reminiscent set of cost savings enhancers in LEO, GEO, L1, and on the Moon itself. And it includes dumping LAT-2 constraints. NASA has rightfully canceled further biological life support system research as not of use for its current concept of the lunar outpost. Can there be any more eloquent clue that the agency is off track, way off on a tangent?

NASA itself admits the potential for using lunar resources, but has chosen for this Congressional assignment to constrict its vision to what is pertinent for the mission so defined. In its dedication, NASA has unwittingly chosen to become part of the problem. Yet the agency has enormous expertise and problem solving resources. It needs a change in direction that unleashes those talents. Perhaps the next administration will see to that. In the Apollo program, NASA was at its prime. Under present leadership, the agency is playing a caricature role, expertly. But this is the price we pay for a space program that continues to be a political football.

We, those of us in the bleachers, disparaged by NASA and the government alike, have to be vigilant for ways to make an end run around what is happening. The LEO and GEO and even Lunar export options we have mentioned will be the work of private enterprise. That's our point of entry. Optimism has to be earned. <MMM>

LEAG Workshop Summary

by Larry Jay Friesen, Moon Society Advisor

The **Lunar Exploration Analysis Group (LEAG)** held a workshop titled **Enabling Exploration in Houston, Texas, October 1-5, 2007**. LEAG is a group of scientists charged with giving NASA advice about the Moon-Mars Exploration Vision, especially about science to be done on the Moon and Mars during manned operations or in preparation for manned operations.

This workshop was chaired by Dr. Clive Neal of Notre Dame. Its focus was to identify barriers to the realization of the Exploration Vision, to find ways to overcome them, and to identify opportunities for achieving the Vision more quickly, more efficiently, or less expensively. The workshop was hosted by the Lunar and Planetary Institute (LPI).

Monday Oct. 1 The morning session focused on Community Updates, briefings by people representing NASA HQ from the Exploration Systems Mission Directorate (ESMD), the Science Mission Directorate (SMD), the Space Operations Mission Directorate, and the Lunar Architecture Team (LAT)-2.

NASA is seeking a system architecture that enables sustained lunar presence *early*. NASA wants to develop infrastructure *while* engaged in science and exploration. They seek to develop an *open* architecture, to make external cooperation with other nations or with the private sector easy. NASA is also looking for a *Commercial* Orbital Transportation System (COTS). Elements NASA intends to develop itself are the Ares I and V launch vehicles, the Orion Crew Excursion Vehicle (CEV), and the lunar lander.

Thirteen international space agencies are participating or are interested in doing so. Many countries have mature plans, including lunar robotic programs. The next step is forming an Exploration Coordination Group.

The ESMD briefer showed simulations and video of a rover called **ATHLETE** (All Terrain Hex-Linked ExtraTerrestrial Explorer). It has legs with wheels at their ends. It combines the efficiency of wheels with the ability of legs to deal with slopes or obstacles.

LAT-1 came up with the concept to start with an outpost before sorties. **LAT-2** focused on operations. They have tried to compare merits of different approaches. They want the architecture to be flexible to redirection. Each option considered included a long range pressurized rover.

Monday afternoon was for Workshop and Working Group briefings. The Constellation Office's motto is "Lunar sooner". While designing the Constellation system, they keep the Moon in mind while they prepare for Earth orbit.

Brad Joliff from the NASA Advisory Council presented recommendations from the Workshop on Science Associated with the Lunar Exploration Architecture held in Tempe, Arizona Feb. 27 through March 2 of 2007.

The report of the Outpost Science Exploration Working Group (OSEWG), chartered by ESMD & SMD to coordinate science and exploration planning, discussed preserving the integrity of lunar surface samples during storage and transportation, and "high grading" samples. Outpost crew members will accumulate more samples than can be transported to Earth. How do we pick which samples to send to Earth quickly?

The Field Exploration & Analysis Team (FEAT) identified a need to start training astronauts early for field work on the Moon. It takes time to develop the skills to recognize rock types in the field.

A Lunar Dust Workshop identified a huge number of dust issues. Their full report will be out later.

The Mars Design Reference Architecture needs long duration tests of crew support systems, to understand the radiation environment, test medical diagnosis and treatment, and understand human response to long term exposure to low g.

Tuesday Oct. 2: The morning focused on international partnerships. Canadians, Italians, British, and Japanese are very interested in lunar and Mars exploration.

The afternoon session was on In Situ Resource Utilization and Outpost Sustainment Demonstrations. NASA considers that ISRU is not initially on the critical path, but that a scalable test system should be flown early. The *first* outpost mission will at least need dirt moving capability for ground clearing, berm building etc. Plans are in work for scavenging H₂ from lander tanks. NASA is looking at processes for extracting materials from lunar regolith that are robust to different feedstocks.

Jean-Claude Piedboeff of the Canadian Space Agency said that for sustained presence, you need to simplify operations and make sure the crew has medical support.

Japan's SELENE mission to the Moon will assess surface composition, including looking for polar ice.

Larry Clark offered the American Institute of Aeronautics and Astronautics' take on ISRU. Near-term requirements include regolith excavation and transport. We need to transition to larger scale tests of extraction processes, not just lab scale. We need to develop dust tolerant valves, seals, bearings, and joints and to develop a road map for what technologies need to be ready when.

Rod Wilks spoke about how additional international and commercial precursor missions can enhance current exploration efforts.

During the question and answer period, David McKay of JSC described processes they are developing using microbes to extract useful materials from lunar regolith.

Wednesday Oct. 3: The first part of Wednesday morning was devoted to the role of robotic missions. Jeff Taylor of the U. of Hawaii, along with Frank Schowengerdt, discussed roles for state governments in space exploration activities.

Tony Lavoie of Marshall Space Flight Center discussed NASA's Lunar Reconnaissance Orbiter (LRO), a polar mapper. He also discussed LCROSS, a Lunar Crater Observation and Sensing Satellite, and a new lunar mapping project which is a tool to inform the Constellation program.

Paul Spudis outlined purposes for robotic missions: gaining strategic knowledge, emplacement of assets before human presence, and helping set precedence among potential outpost sites. Techniques include orbiters, landers, surface rovers, global or regional sensor networks, and sample returns. In Spudis's opinion, we need a campaign of robotic missions, not just one. In addition to providing needed data, they will keep the Moon alive in the minds of the public and Congress.

The second part of Wednesday morning and the afternoon dealt with how to involve commerce in the lunar enterprise. Paul Eckert of Boeing outlined an approach to developing lunar relevant commerce and paying for it one step at a time. A business would start by selling a product to an existing market, develop a new (say, lunar) product for an emerging market, then sell both legacy and new products.

Tom Taylor of Lunar Transportation Systems talked about commercial transportation and lunar mining. He proposed reusing tanks landed on the lunar surface, or using a

lunar lander as a drill stand, for drilling research cores. He discussed transport legs and nodes, and recommended containerized cargo. Taylor brought experience from Alaska's North Slope. There, no transportation system worked all the time. The solution: have at least 2 systems. Logistics are important. It was vital to make connections removable. He recommended using bar codes and good "plug and play" marking. Arctic engineering is different from regular engineering; lunar engineering will also be.

Dallas Bienhoff of Boeing showed the value of an orbital propellant depots for enabling NASA to send much more mass to the Moon. Bienhoff made another presentation about steps that can be taken toward a goal of 1 gigawatt of electric energy on and from the Moon by 2020, using a process of creating solar cells out of lunar regolith that has been demonstrated on Earth.

Robert Richards of MDA, a Canadian space company, stressed the value of missions of opportunity.

Wednesday afternoon began with Manny Pimenta of Lunar Explorer, LLC describing the Lunar Explorer, a software simulation of the entire Moon. It can be used as a training tool for future lunar outpost crew members; the first edition is available to the public at \$39.95 each.

Ken Davidson of NASA headquarters discussed letting NASA see itself as a *customer* for commercial space capabilities. He wants to encourage development of whole industries, not just companies. He discussed barriers to entry into the space business, and policies that can affect these. Competitions and prizes can encourage space activity. He thinks encouragement of space commerce ought to be a major policy issue.

Thursday Oct. 4: Thursday morning dealt with sample return and lunar exploration.

Charles Shearer of the U. of New Mexico discussed synergy between sample return and other types of observations and why sample return is important. Gary Lofgren of JSC discussed sample contamination issues.

Jeff Taylor and Paul Spudis said it is important to have field work, either robotic or human. There will be a need for some level of *in situ* analysis. An advantage of humans is that they can return to specific field sites.

Dean Eppler of JSC discussed again the issue of high grading, as well as what sort of analysis capacity will be needed on the Moon, and the need to document samples collected.

Thursday afternoon dealt with the role of technology in field exploration and astronaut training. Dean Eppler interviewed Apollo astronauts. Among their recommendations: Design equipment to fit the task, not vice versa. Allow more crew autonomy in mission and task planning. Suit mass is not a big deal on the Moon; it will be on Mars. Suits must be maintainable and durable. Every astronaut liked the Apollo suit life support system. Separate dust exposed equipment from living quarters. Custom fit gloves. Tool stowage needs to be looked at. Rovers should be repairable. Thought needs to be given to tool design for lunar surface use. There need to be systems that allow crew members to handle lunar samples they collect on the run. Experiments should be sturdy, not easily broken. Crew, equipment, and anything else connected with the mission should be integrated.

Gary Lofgren spoke about how Apollo crew members were trained. Training Apollo crews was fundamentally geologic training of engineers. It was important to develop a common language, so that, everyone (trainers, geolo-

gists, astronauts) described tasks in the same way. Surface crew members need observational skills, and to be able to describe what they see systematically. You need to train the crew, CAPCOM, and supporting scientists together. It is best to keep soil samples separate from rocks. One desirable thing lacking in Apollo would be simple field analysis tools.

Jake Maule discussed tools existing or in development that could be used on the surface of the Moon or Mars, including hand held portable instruments. When coordinating humans and robots, they tend to operate on different time scales.

Brian Wilcox of JPL discussed a concept for mobile habitats mounted on the ATHLETE carrier. This could move habitats (even a small distance) from a lander's touchdown point to mitigate problems associated with landing debris, and also help mate up habitats. Wilcox also showed designs for a small pressurized rover. If two vehicles went out together, they could go beyond "walk back" distance from the Outpost; if one broke down, the other could get all crew members home.

Charles Weisbin's research group at JPL has developed a computer decision tree tool to aid comparison of various modes of human-robot interaction.

Friday Oct. 5: The morning session dealt with lunar outpost site selection. Jeff Plescia of Applied Physics Laboratory proposed that environmental conditions may be paramount for outpost site selection. Because the objective is sustained presence, science is unlikely to drive site choice. Spatially dependent environment properties include lighting, thermal properties, and topography.

Rick Tumlinson of the Space Frontier Foundation spoke on site selection and commercial opportunities. In his view, sustainability is not enough; an outpost needs prosperity and growth. Multiple revenue streams will be needed. He prefers resource rich, energy rich areas as candidate outpost locations.

Bill Larson of NASA discussed how ISRU might affect outpost site selection. We can make all products currently specified in the architecture, in the quantities required, anywhere on the Moon. Thus ISRU won't be a site selection driver. He discussed how outpost location might affect power availability.

Robert Gershman of JPL talked about the lunar site selection process in LAT-2. Safety requirements were a high priority. They want low slopes, few or no large rocks, sun elevation angles adequate for landing operations for a long enough period each lunar day, and low arrival delta-Vs. They also desire a natural barrier between the landing zone and outpost, to minimize problems from dust kicked up by engines.

Brad Joliff of Washington University spoke about science criteria for lunar outpost site selection.

On Friday afternoon, we had reports from moderators of individual sessions and general discussion. Those attending wanted to put forth a lunar exploration goals document from this LEAG workshop. A consensus was reached that the LEAG should "push back" against NASA's assertion that ISRU is not in the critical path for the lunar initiative. The mission statement was to return to the Moon "to stay". ISRU is not in the critical path to get to the Moon, but it is absolutely in the critical path to stay.

The LPI announced a new web based information portal to provide access to everything "lunar", to aid the lunar science and exploration community in working on the lunar initiative
<LJF/MMM>.

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!

The Moon Society needs to Grow

from Society President, Peter Kokh

The Moon Society Leadership Council has been considering several ambitious new projects. Personally, I have always been inspired by the productivity of the Planetary Society which proposes and carries through to completion one new project after another, year after year. To make this possible TPS is always asking its members to donate for specific projects. This is a wise tactic as few people are motivated to donate to “general purpose” funding needs. Specific well defined projects that are doable with member help are much more likely to gain member support and donations.

That is the case with the Moon Society as well. Our treasury is largely needed to fund continuing operations. This year we did spend \$5,000 plus on Video production, and certainly have received more than that in value from Chip Proser's dedicated work. This was a project to create Outreach Materials the Society can use to attract new members, and to demonstrate to current members what we are doing.

But we can conceive of many other exciting things we can do. The catch is that to execute projects we need talented volunteers, and we need money. Space Societies at large can commonly count on 5% of their members being active in one way or another. Here the Moon Society gets high marks. A recent check found that 10% of our membership is active in Society endeavors or in personal efforts that promote the Society's goals.

If one thing emerges it is that we need more members in general, as well as more talented volunteers in particular. And we need donations to make dreams come true.

I am asking you to help. You may personally not have discretionary time to give to Society efforts, or if you do, you may lack “special talents.” On this score, don't sell yourself short. Send me a personal note on your talents and interests and on the topic “buttons” that get your space juices going. [email kokhmmm@aol.com] and perhaps I can find some area in which you can help.

If you have friends who have special talents that we may find useful, why not share with them your vision of the Moon's role in Earth's future. Point out that the Moon is Earth's. It shares Earth's orbit around the Sun, orbits Earth directly, is Earth's “hinterland” or reserve territory. We can tap the Moon's resources without trashing it, and save Earth's environment in the process.

Another thing you can do is pay for a library subscription. You can do this most economically directly through the publisher of MMM, The Lunar Reclamation Society, PO Box 2102, Milwaukee, WI 532101 for just a \$12 check or money order made out to LRS. While the Moon Society gets no extra money out of such a gift, it does get more publicity, and the more people who know about the Moon Society, the faster membership will grow.

If you do have discretionary money, click on the make a donation button down the left hand column of our homepage and send us an email that you want it to fund projects or this or that project in particular.

We also need fresh leadership to replace those who have served long and well and wish to retire. Our annual election process will begin shortly.

Together we can do wonders!

PK

Society's Role must Expand with Coming Acceleration of Lunar Exploration Activity

Message from Society President Peter Kokh

Lunar Decade, Salvo I: the Big Space Powers

We're halfway through what can be called Salvo I: Japan and China have successfully launched their Kaguya and Chang'e-1 lunar orbiters, respectively. Within the coming year, India expects to launch Chandrayaan-1, and the US/NASA its Lunar Reconnaissance Orbiter with the hitchhiking LCROSS lunar impactor. All four of these probes have impressive instruments designed to disclose information about the Moon so far not available or available only in tantalizingly low-resolution.

Lunar Decade, Salvo II: New Space Players

But other nations are getting aboard as well. ESA itself has no lunar probe in the works, excepting ESMO, the European Student Moon Orbiter. But three members of ESA, Italy, Germany and Britain are in various stages of preliminary development of their own national lunar missions. And to the east, both Russia and Ukraine (owns the Dnepr rocket) are looking at possible lunar missions.

Lunar Decade, Salvo III: Non-National Efforts

Under this heading I would put ESMO, European Student Moon Orbiter encouraged by ILEWG and ESA, and the copycat ASMO, American Student Moon Orbiter encouraged by NASA. Also the newly announced Google X-Prize Rover Challenge program.

Lunar Decade, Salvo IV: Rovers & Sample Returns

China is planning a rover and a sample return mission, while Japan and Russia are working on a salvo of seismic impactors. There *will* be others.

In the Interim: Review of the Space and Moon Treaties

In past decades, the divisions over the language of the Space and Moon Treaties (the latter, with its anti-enterprise language not signed by the United States thanks to a strong campaign by the former L5 Society) seemed somewhat moot as we were far from a situation in which either would come into play. That is no longer the case. We will need legal regimes in place that clearly set rules that both protect the Moon as a scientific heritage and allow for resource development where that development is critical to helping solve Earth's major intertwined Energy and Environment problems.

In the Interim: Development of Commercial Launchers

The COTS program in which NASA provides up front partial funding for the development of commercial man-rated launchers to service the International Space Station after the Shuttle is retired, may or may not be successful. To some, COTS appears to be a set-up, NASA's way of getting upstart competition out of the way, on the grounds that NASA must know that matching funds will not be raised in the private sector to compete with the agency's deep pockets. It is in everyone's interest that NASA get out of the business of space transportation, a business that makes NASA a socialized program, the very antithesis of the "as American as Apple Pie" image the agency seeks to perpetuate. We *need* NASA to develop space exploration probes and key technologies, period. But sooner or later commercial space transport *will arrive*.

Moon Society Interests: Globalization of the Effort

One way to guarantee that the Moon will be opened to civilian industrial settlements that are involved in helping solve Earth's Energy-Environmental super-problem is to globalize the space movement. In such a situation, a "Failure of Will" on the part of any one nation, such as the United States, will not change the outcome. To some, this outlook may seem unpatriotic. In fact, the Founding Fathers did not want us to rely on government. There is ample enough evidence that the outcome of political processes is seldom rational.

We do want the present VSE program to continue. The fact is that whoever the next president is, Democrat or Republican, cancellation of VSE is possible. We are an International Society and we need to cheer on all efforts to further explore and eventually to develop the Moon.

We closely monitor what is happening in other nations, and give encouragement where we can. For example, Society Director of Project Development David A. Dunlop and I have been giving support to Mexican grass roots efforts to encourage the creation of AEXA, the proposed Mexican Space Agency. We are aware of space-faring ambitions of nations such as Korea and Malaysia.

Instruments designed to map resources – Instruments chosen for lunar probes are selected from proposals by lunar scientists seeking to scratch their own personal scientific itches. With the exception of water, few seem to be interested in resources as such. That said, all the instruments so far selected for the four first salvo probes are sure to shed light on resource distribution, even if indirectly. *We need to identify those resource elements that are falling through the cracks of capability of the combined arsenal of probe instruments*, and encourage new probes designed specifically to map those elements.

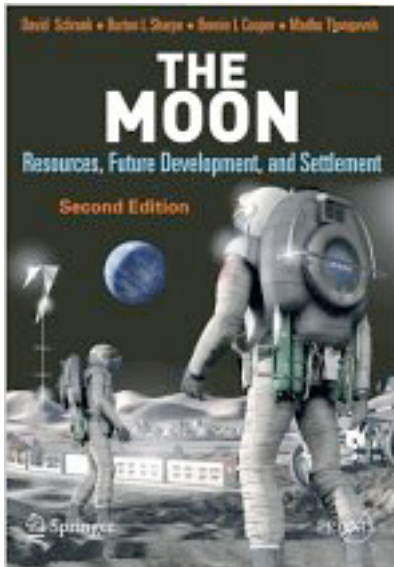
Fixing the Moon Treaty – We must promote the formulation of a resource-development-friendly legal regime, by hosting/cohosting symposia, workshops, and conferences, working to ensure balanced treatment of views by carefully crafted Calls for Papers. We can do this as part of our contribution to NSS' annual ISDC.

Development of Needed Technologies – Through the University of Luna Project, we are attempting to involve students and entrepreneurs in novel ways to advance the state of readiness of not yet mature technologies needed to expand from an initial science outpost towards real settlement. In this effort, the Society and the ULP will endeavor to host, encourage, and support engineering competitions and other ways to advance these goals.

Outreach – The public at large, even those who support a return to the Moon, alas, even some of our own members, do not understand the need to develop an Earth-Moon economy if we are to save Earth for future generations as a Green oasis that we must not let perish. Many of those who support VSE do not understand how people can or would want to live on the Moon to help achieve these ends. We have lots to do by way of outreach, and our job is an unending one. In fact we must ever reexamine our own role. How well is it designed to achieve our goals?

To be Continued: What we succeed in doing will depend on how well we marshall our individual talents. <MSJ>

The Moon: Resources, Future Development and Settlement



by David Schunk
Burton Sharpe
Bonnie L. Cooper
Madhu Thangavelu
(Authors)

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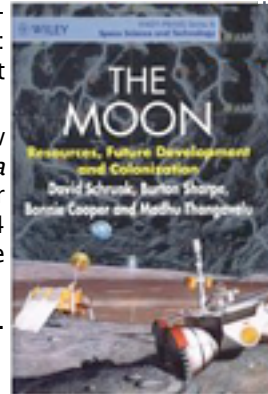
List \$34/95

(Amazon.com \$26.56)

Review by Peter Kokh

First, three easy clues to avoid buying the first edition, when you want the second:

- The titles are slightly but significantly different: the original hardcover is titled "The Moon: Resources, Future Development and **Colonization**" while the new updated and expanded paperback edition is titled "The Moon: Resources, Future Development and **Settlement**"
- The price of the original, now out-of-print, *if you can find a used one*, is probably over \$100. Compare that to the "4 per \$100" price of the new one from online discount sellers
- The Cover is distinctly different. At right you see the *old* cover



For my 2000 review of the original work for Amazon.com, see [the second item](http://www.amazon.com/gp/cdp/member-reviews/A10CUFTP74EVI4/ref=cm_pdp_about_see_review?ie=UTF8&sort%5Fby=MostRecentReview) at:

http://www.amazon.com/gp/cdp/member-reviews/A10CUFTP74EVI4/ref=cm_pdp_about_see_review?ie=UTF8&sort%5Fby=MostRecentReview

If there is one book which best sums up the hopes, dream and vision of The Moon Society, and of supporters of The Moon's "Future Development and Settlement" everywhere, it is this one. And that is not just because I had the honor of contributing Appendix T: "Beyond our first Moonbase: The future of human presence on the Moon." [preprinted in MMM #201]

What's new in the new edition

Much has happened relevant to our future on the Moon in the eight years since the first edition appeared. ISS has fostered significant international cooperation, and many more nations are taking advantage of the opportunities of space activity. The Bush Administration has got us out of looping the world endlessly back on the path "to the Moon and beyond." Private enterprise is seeking an ever greater role. Space Tourism is an emergent reality.

Inflatable structures and other structural and architectural innovations increase our options and improve our chances of unqualified success.

And we continue to learn much more about the Moon and its promise. The promise that the authors laid out for us in the first edition, now appears even greater. They have reorganized their sketch of how we would progress from the first human return missions towards settlement and growing use of the Moon's resources.

We find ourselves at the start of a Lunar Decade in which the US, China, India, Russia, Europe, and individual European countries (Britain, Germany, Italy) are all actively planning significant missions to the Moon. The first two missions are even now underway. This effort does not end with orbiters armed with powerful instruments that promise to greatly increase of pre-return knowledge of the Moon's resources as well as understanding of the Moon's origin and past.

In addition to appreciable recasting the original material, the new edition has a hundred more pages of added appendix material: text, charts, illustrations about supporting technology developments. We've learned much more about the potential of robots on the Moon, about lunar regolith and how to handle it, making lunar simulant, about the promise of local resource utilization with many more ways of processing regolith now demonstrated. The prospects for international involvement in setting up a whole network of astronomical observatories on the Moon is high and growing. Rapid prototyping is an emergent technology that may speed lunar industrialization.

The list of Acknowledgments has grown considerably in reflection of the significant increase in the number of people, institutions, and organizations now working towards the common goal of creation of an Earth-Moon economy.

The new edition reflects the latest in NASA Lunar Architecture planning, but contributes much more. Modular Assembly in Low Earth Orbit (MALEO), teleoperated construction, repair, even human surgery will reduce risk and workload for the human crews on the Moon. And now we expect much greater benefits from human-robot synergies. Robots are at their best in the presence of humans and vice versa. It's no matter an either-or choice.

As in the first book, the authors sketch out just how exploration, with infrastructure not far behind, can expand out of the south polar base to cover the south polar regions and then head towards the equator and the lunar globe at large, all based on solar power. The infrastructure will include railroads, a much more energy efficient form of transportation than roads and road-based vehicles. It may seem strange to predict railroads on the Moon. But aviation is not possible without an atmosphere of appreciable density, and railroads need only power, not air. MMM has also long forecast the rise of lunar railroads.

At a greatly reduced price (nw paperback vs old hardcover) this book is a must in every lunar enthusiast's library. I encourage readers to buy it, and read it cover to cover. If we as a Society are to strive intelligently, we need to be as well informed as we can be!

<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 Chip Proser

Chip is a Moon Society member in Los Angeles, CA, with a considerable list of achievements in Hollywood.

See: www.imdb.com/name/nm0698734/

On August 10th, Chip was interviewed on Dr. Peter Livingston's "The Space Show" about "his new documentary, now finished, "Gaia Selene: Saving the Earth by Colonizing the Moon." The discussion was far more comprehensive than the documentary with questions about space solar power, nuclear power, energy from the Moon, energy wars, and more." You can listen to the interview by going to:

<http://www.thespaceshow.com/detail.asp?q=752>

On that page there is also a short bio, reprinted below



Chip Proser (www.stickymedia.com/) – Chip Proser is a well-known writer, director, cinematographer, and film producer. Mr. Proser has either created, wrote, produced, or directed numerous films and documentaries, including many having to do with space. He has filmed space conferences including conferences for the Space Frontier Foundation, he wrote for MARS Run for HBO, and has won significant awards, including Emmy Awards, the Hatch Award, a Peabody Award, and much more. Some of his projects include Top Gun and Pensacola: Wings of Gold. Mr. Proser has completed his new documentary, "Gaia Selene: Saving the Earth by Colonizing the Moon," regarding solving terrestrial problems by returning to the Moon and <http://stickymedia.com/> making use of lunar resources to solve for example, energy and environmental problems. Please visit his website at for full screen credits and more about his new documentary project and television series.

Chipp had previously appeared on The Space Show on February 8th and November 7th, 2004 and again on May 9th, 2006.

When Moon Society Director James Gholston suggested that we create a DVD/Video that showcased the Vision and Mission of the Moon Society, for outreach and recruitment purposes, we contacted Chip for help, and without hesitation, he said "sure!" At ISDC 2007, Society Siretor of Project Development David Dunlop and I buttonholed potential interviewees and whisked them up to our suite for Chip and son Noah were all set with green screen and lights to tape the interviews. Dave and James took turns asking followup questions tailored to the speakers areas of interest an expertise and designed to guide the interview to maximize its usefulness to us.

Since ISDC, Chip has taken the raw footage and produced thirty-some video segments which you can find at www.moonsociety.org/video

While wwe paid for Chip's expenses, his efforts went well beyond that in producing 1st class products.

Chapters & Outposts

Bay Area Moon Society

<http://www.moonsociety.org/chapters/bams/>
Meeting 4th Thurs. monthly at Henry Cates' in San Jose

Contact: Henry Cates <hcate2@pacbell.net>

Moon Society St. Louis

<http://www.moonsociety.org/chapters/stlouis/>
Meeting the 3rd Wed. monthly at Buder Branch Library
4401 S. Hampton, in the basement conference room

Contact: Keith Wetzel <kawetzel@swbell.net>
Moon Madness Night, Friday January 11, 2008, 7 – 9 PM

Moon Society Phoenix

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

Meeting the 3rd Saturday of the month
Next meetings **DEC 15th** and **JAN 19th**
at Chompie's at 1160 E. University at 3: PM.

Contact: Craig Porter <portercd@msn.com>

Saturday, November 10th, Moon Society Phoenix co-founder Chuck Leshner was on a panel at a Sci-Fi convention in Tucson – see below.

We are working on our new chapter website and are ready to apply for full chapter status.

Moon Society Tucson Outpost

Contact: Ben Nault <bnault@comcast.net>

On October 4th, we participated at the Pima Air & Space Museum's 50th Anniversary Event: Sputnik: T+50 Years and Counting [Tucson is in Pima County, AZ] Moon Society Advisor Alan Binder was one of several speakers. Dr. Binder's Lunar Research Institute is located in Tucson. <http://www.lunar-research-institute.org/>

Nov. 9–11, we were at the Tus-Con 34 sci-fi convention, InnSuites Hotel – <http://home.earthlink.net/~basfa/>

On Saturday, we put on a special Moon track: "The Settlement of the Moon in Science Fiction & in Fact." The participants were:

- Dr. Alan Binder, Lunar Research Institute, author of "Moon Quake" and Moon Society Advisor.
- Chuck Leshner, author of "Evolution's Child" and Moon Society member.
- Ben Nault (moderator), president, Tucson L5 Space Society and Moon Society member.

This was a two hour event with presentations by each author in the first hour (+/- 30 mins each), with Q&A, and panel discussion during the 2nd hour.

In the afternoon, both Dr. Binder and Chuck Leshner were available at the Mass Autograph session to meet people and sign their books. Both authors had books available for purchase.

Moon Society Houston Outpost

<http://www.moonsociety.org/chapters/houston/>
Contact: Eric H. Bowen eric@streamlinerschedules.com
Meeting **Mon. Jan 28**, Park Place Regional Library

GREAT BROWSING !

New insights into mass & origin of Saturn's Rings
www.astronomy.com/asy/default.aspx?c=a&id=6104

The mystery of 2-faced Iapetus (moon of Saturn)
www.astronomy.com/asy/default.aspx?c=a&id=6101

Pluto-bound New Horizons pass of Jupiter reveals many changes since Galileo's 4-year visit.
www.astronomy.com/asy/default.aspx?c=a&id=6075

NASA to establish Lunar Science Institute at AMES
http://www.nasa.gov/home/hqnews/2007/oct/HQ_07233_ARC_Lunar_Institute.html

NASA assigns Constellation work to Centers
www.nasa.gov/mission_pages/constellation/main/index.html

China's Future Space Plans wait on new Launcher
http://news.xinhuanet.com/english/2007-10/31/content_6982857.htm

Our First Lunar Program: What We Got From Apollo
http://www.moondaily.com/reports/Our_First_Lunar_Program_What_Did_We_Get_From_Apollo_999.html

Sun Power and Energy Beaming
www.nss.org/settlement/ssp/sunpower/sunpower13.html

The Space Settlement Art Gallery
<http://members.aol.com/oscarcombs/gallery.htm>

Space Solar Power Library – continuing to expand
<http://www.nss.org/settlement/ssp/library/index.htm>

Academic Views of Space
<http://www.thespacereview.com/article/987/1>

New Challenges for the Outer Space Treaty
<http://www.thespacereview.com/article/982/1>

Review: The Endless Universe Alternative Models of the Big Bang
<http://www.thespacereview.com/article/978/1>

China, the US, and Space Solar Power
<http://www.thespacereview.com/article/985/1>

Review: Living Off the Land in Space
<http://www.thespacereview.com/article/983/1>

Exploding Moon myths: or why there's no race to our nearest neighbor
<http://www.thespacereview.com/article/999/1>

Why "Save Mars" is worth the effort
<http://www.thespacereview.com/article/998/1>

What Hilary Clinton did, did not say about Space
<http://www.thespacereview.com/article/997/1>

Conversation: Saving Space Junk: Taking Archeology into Orbit
www.archaeology.org/0711/etc/conversation.html

China Considers Commercial Shenzhou Flights
www.flightglobal.com/articles/2007/10/22/218817/china-considers-commercial-shenzhou-flights.html

New Mexico Reveals Spaceport Design
www.msnbc.msn.com/id/20587196/

Best of the Moon Books 2007
www.outofthecradle.net/archives/2007/12/best-of-the-moon-2007/

GREAT SPACE VIDEOS !

MOON COLONY VIDEOS – The Moon Society

30 plus thought-provoking videos, produced for the Moon Society by Chip Proser (Celestial Mechanics, Inc.) can be found at.

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

or at:

<http://www.mooncolony.tv/>

<http://www.stickymedia.com/>

ASSORTED SPACE VIDEOS

Space Based Solar Power

<http://www.youtube.com/watch?v=BoxXIF9mepU>

X-Prize / Grumman Lunar Lander Challenge Video
http://www.space.com/xprizecup/video/player.php?video_id=071029xpc07_ng_llc_update

Wireless Power Transmission Demonstration 06/05/1975
www.youtube.com/watch?v=jd47JXuz0g8

It's Mars Rising – Discovery Channel 6 Episode Special Preview (with short commercials)
<http://dsc.discovery.com/video/player.html?playerId=203711706&bclid=1267587881>

ASU Video on Upcoming Moon, Mars missions
<http://www.azpbs.org/asuspotlight/player169.php?id=24&episode=105>

ASSORTED SPACE SLIDE SHOWS

Space Journeys: 18 slides

www.msnbc.msn.com/id/18355325/displaymode/1107/s/2

From Earth to the Stars: 17 slides

www.msnbc.msn.com/id/18355239/displaymode/1107/s/2/

Bursts of Glory: 20 slides

www.msnbc.msn.com/id/17843063/displaymode/1107/s/2/

See the Cosmos: 17 slides

www.msnbc.msn.com/id/17351353/displaymode/1107/s/2

High Def Antarctica: 10 slides

www.msnbc.msn.com/id/21992916/displaymode/1107/s/2/

ASSORTED SPACE DVDs

Postcards from the Future

<http://www.postcardsfromthefuture.net/home.php>

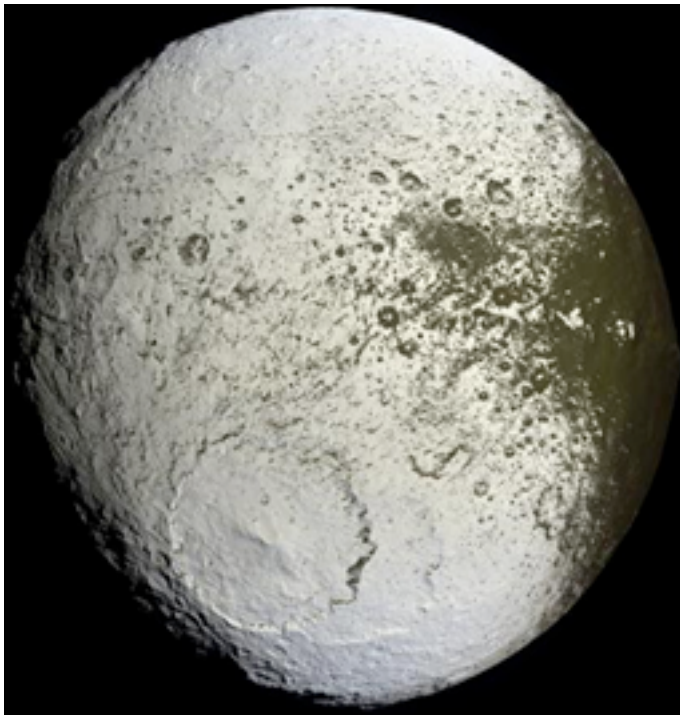
NOTE: Readers can help maintain this monthly list by suggesting items to be included. Email the editor at kokhmmm@aol.com – subject line: "Space Videos etc."

Retro Space Art from Times long gone by

Thanks to Birger Johansson, Sweden

Enjoy!

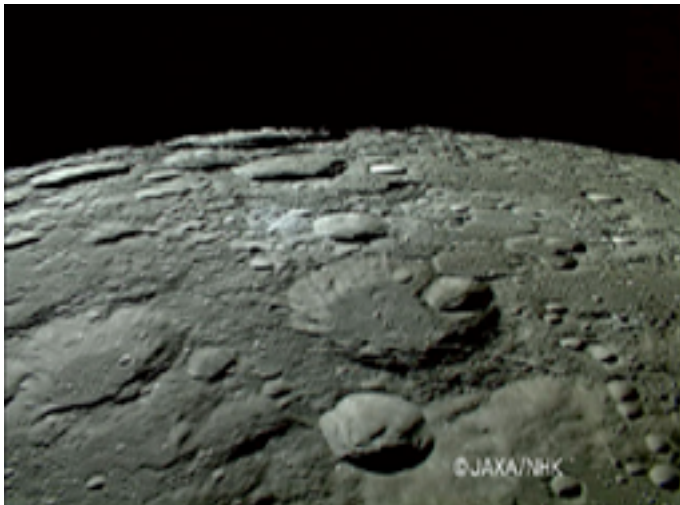
<http://www.darkroastedblend.com/2007/11/retro-future-to-stars.html>



The Mystery of 2-faced Iapetus

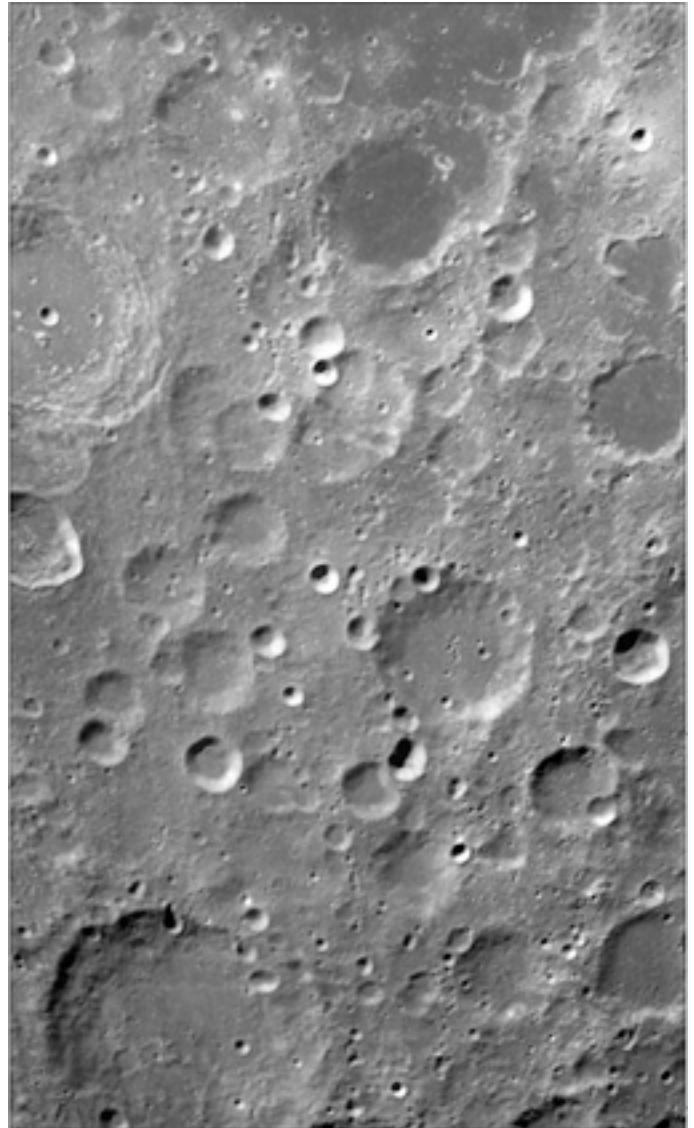


Revised Rocketland Global craft seats one \$250k passenger next to pilot, four more behind at \$200k
<http://spacefellowship.com/News/?p=3476%23more-3476>



Kaguya's first photo of the Moon, in HDTV

First photo of Lunar terrain sent back by China's Chang'e-1



"Lunar Unicycle" by Frank Tinsley, 1959 - see link for "Retro Space Art" page 13, bottom col. 2



Creating a Gravity Map of the Moon's Farside:

Nov. 6, 2007 – There are a couple of errors in the article about the Japanese lunar orbiter "Kaguya" that appeared in the Oct. 2007 issue of MMM I would like to correct.

First, in the paragraph discussing the two sub-satellite that have been launched from Kaguya it is stated that "..., Kaguya hopes to accomplish the first live-time gravity mapping of the lunar farside. For lack of such live-time relays, we have not been able to map the gravity field of the lunar farside to date." This is false, Lunar Prospector (LP) produced to first complete global (near- and far-side) map of the Moon's gravity field without the use of a sub-satellite – a feat though impossible before it flew the mission (see pp 24 –25 and p 1041 in **Lunar Prospector: Against All Odds**).

The farside gravity mapping was made possible because LP was a simple spin stabilized spacecraft which produced Doppler data nearly 5 times better (0.22 mm/sec data) than required to do the mapping and because we produced long arcs (up to 56 day or 700 orbits) of undisturbed tracking data. Thus the data were so good the harmonic analysis of the information gave us a complete map of the global gravity field.

Second, the MMM stated mass of LP of 158 kg refers to its dry mass. LP's launch mass, fully fuelled with 137 kg of hydrazine, was 297 kg. I assume Kaguya's reported mass of 3000 kg is its fully fuelled launch mass, if so, then LP's 297 kg mass is the one to use in the article. Alan Binder, PhD

Lunar prospector Principle Investigator

[Editor: the misstatement referred to above is from NAXA, the Japanese Space Agency, which MMM merely quoted.]

Why Space?: The NSS Rationale for Exploring & Settling the Endless Frontier

The futurist Arthur C. Clarke once said that every revolutionary idea passes through three phases, which can be characterized by the statements of its critics:

- 1) "It'll never work – it's pure fantasy."
- 2) "It might work, but it's not worth doing."
- 3) "I said it was a great idea all along."

The idea of space settlement has passed through the first phase and is well into the second. At present it is indeed hideously expensive to send anything into space. Continued technological progress will lower that cost – if we continue to devote the necessary resources to developing the appropriate technologies.

But the triumph of any revolutionary idea is not inevitable; it must first persuade enough people, with enough economic clout, that it *should* triumph. So let us examine the reasons why this particular revolutionary idea is worth pursuing.

Because Space Has Resources to Enrich Earth

The majority of people on Earth live at an economic level that is far below that of the Western democracies, but they have the same aspirations for prosperity as their wealthier neighbors. It would be arrogant and cruel to tell them that they must limit their ambitions because the finite resources of this single planet we live on are already spoken for. Nor do the citizens of the more

privileged nations wish to return to a more limited and frugal lifestyle.

Yet the resources of this Earth are limited, and however we attempt to conserve them, they will someday run out. The end of our petroleum reserves is already in sight. As resources become more scarce, the competition for them will become more fierce. Wars will be followed by a decline to perpetual poverty for all humanity. This is a bleak prospect, but it is a future that need never come to pass. The human future can be prosperous for all people, not just the privileged few, if we develop the vast resources of space.

In the process of settling space we will learn, among other things, to locate and access energy and material resources to support our growing economy. Outer space holds virtually limitless amounts of energy and raw materials, from Helium-3 fuel on the Moon for clean fusion reactors to heavy metals and volatile gases from the asteroids, which can be harvested for use on Earth and in space. Quality of life can be improved directly by using these resources and also indirectly by moving hazardous and polluting industries and/or their waste products off planet Earth.

The resources of our solar system are almost unimaginably vast. To get some idea of their magnitude, consider that just one of the thousands of cataloged Near Earth Asteroids (NEAs), 3354 Amun, is made of iron, nickel, cobalt and platinum-group metals with an estimated value of \$20 *trillion* dollars – about twice the Gross National Product of the United States!

Space Technologies Will Enrich Our Lives On Earth

We are not talking here of "spinoffs," items of hardware developed for space that find uses here on Earth. Those are happy coincidences, but in economic terms the critics of space investment are right in calling them trivial. The really big technological payoffs are entirely new fields of engineering, leading to such applications as the manufacture of products in microgravity that cannot be manufactured at all in the gravity on Earth's surface. We have not even begun to scratch the surface of these possibilities, but they will ultimately transform the Earth's economy. For the moment, we can only point to ultralight devices and high-strength materials that have been developed for use in the harsh space environment and been put to wide use as basic tools in Earthside industry, and say "The best is yet to come."

Because We Need to Learn What's Out There

It is human nature to learn more about our origins, our past, our fellow life forms, our environment, our limitations, and our possibilities for the future. Such explorations give our lives context and meaning. Earth is but a tiny container of knowledge compared to the entire incredibly vast universe. Our existence is miraculous, and an investigation of that existence is certainly a worthy quest for several lifetimes. The quest to find other life also adds richness to the tapestry of our lives.

Knowing what's out there isn't just a matter of abstract scientific curiosity. In the long run, it can be a matter of life and death. Asteroids and comets (many of them still undiscovered) cross Earth's orbit every year. Some, like the Shoemaker-Levy comet that struck Jupiter in 1994, and the Tunguska meteor that flattened 830 square miles of Siberian forest in 1908, have the potential to cause planet-wide catastrophe. To detect and deflect

such threats, we will need to operate in space as freely as we do on earth. Likewise, our ability to exploit the limitless power of the sun (reducing our need to use carbon-based fuels and the pollution they cause) will depend on our building large structures in space. We need to start developing these capabilities now.

Robots can do things that human beings cannot and don't want to do: like traveling to the extremely hot atmosphere of Venus or the crushing gravity of Jupiter or spending hours or days gazing fixedly at objects millions of light-years away. On the other hand, despite incredible advances in electronics, artificial intelligence, and materials, robots cannot repair themselves or move around simple obstacles without a team of programmers back on Earth. Human beings are natural explorers; they can move more quickly across an alien surface; they can make repairs and judgment calls on-site; and they can more quickly formulate and test hypotheses. And, as the late astronaut Gus Grissom said, "In the final analysis, only Man can evaluate the Moon in terms understandable to other men." We need people out on the frontier, living, working, playing, and exploring.

Because We Need a Frontier

The success of our unmanned space probes and commercial satellites has led some critics to say that human space flight is unnecessary because robots can do the job better. This is shortsighted. We send people into orbit because orbit is the first step to getting anywhere else. And that is the true purpose of spaceflight: to send people elsewhere, to have people living and working in space, to create new homes for humanity. Why is that important?

History teaches, over and over, that societies that have pushed their frontiers have prospered; those that have not have withered. Space is the ultimate, boundless frontier. No society has ever gone wrong betting on the frontier. Nations are invigorated spiritually, and prosper economically, by challenging and finding new uses for new frontiers.

Humanity today desperately needs to break free of its confines and breathe the invigorating air of a new frontier before it drowns in its own juices. The human soul has an unconscious yearning for wider horizons, nobler ambitions – a place to direct its energies, a place to gain mental and spiritual muscle in pushing against physical barriers. This yearning of the soul *will* express itself one way or the other. Either it will be directed outward to healthy objectives, or it will turn inward on itself and find increasingly neurotic and self-indulgent expression in social conflict and narcissism.

Space offers us a new frontier for exploration and adventure, opening the way to new forms of thought and expression, culture and art, law and government. The opening of "the New World" to western civilization brought about an unprecedented 500-year period of growth and experimentation in science, technology, literature, music, art, recreation, and government (including the development and gradual acceptance of democracy). The presence of a frontier led to the development of the "open society" founded on the principles of individual rights and freedoms. Many of these rights and freedoms are being placed under increasingly stringent limitations as human population grows and humanity moves towards a "closed society," where eventually

everyone eats the same, speaks the same, and dresses the same. Cultures that do not explore, die!

Because Space Will Inspire Our Best

In this age of the bottom-line, it is natural to look for concrete economic returns to our investments. But not all rewards can be easily measured, and we need to remember Albert Einstein's admonition that "Not everything that can be counted counts, and not everything that counts can be counted."

In 1913, recruiting crewmembers for his Antarctic expedition, explorer Earnest Shackleton placed the following newspaper ad:

"Men wanted for hazardous journey. Small wages. Bitter cold. Long months of complete darkness. Constant danger. Safe return doubtful. Honour and recognition in case of success."

More than 5,000 men answered the call. They didn't do so because of bad employment prospects; the British economy was at its prewar peak. So why did they clamor for the opportunity to risk life and limb for an uncertain reward? They answered because they wanted to be a part of history.

In exactly the same spirit, the Sputnik generation answered the challenge of space. They worked long hours to learn and apply the difficult science and engineering skills that they would need to put footprints where no human footprints had ever been before, and hoped it would be their boots that would make them. No quest for material gain or abstract altruism could inspire that level of dedication and sacrifice, but the grand adventure of reaching new worlds kindled the best minds of a generation. The legacy of the race to the moon is not a half-dozen faded flags and a few footprints in the lunar dust. It is an educated workforce that has turned its talents to many other high-tech challenges, from computer design to medicine. Putting footprints where no footprints have been will always have the power to inspire hard work and discipline, with all their attendant benefits to society as a whole, and there are plenty of new worlds left for that purpose.

Because We Must: The short answer to why we go into space is simply that "we must." Staying at home, waiting to run out of resources or to be wiped out by the next asteroid strike is not really an option. We demand better alternatives to meeting our energy needs than carpeting the Earth with solar cells and blackening the sky with wind generators. And it is simply alien to our human nature to look away from a great adventure.

The ultimate purpose of going into space is to live and work there – just as the ultimate purpose of exploring the New World was settlement, not merely to wait for reports from automated vehicles. We do not send our cameras to the Grand Canyon; we go ourselves. The United States sent Lewis and Clark not just to describe the American West, but to learn where and how people could live there. People have always found ways to prosper in unique environments, however harsh, and we will do so on other worlds. We cannot begin to live and work in space without first going there. And it is human destiny to escape the cradle of our planet of birth. In response to the question, "Can we afford space?" the answer is most decidedly yes. The more important question is: "Can we afford not to go?" and the answer is most definitely no. #



**Lunar Reclamation
Society, Inc.**

**P.O. Box 2102
Milwaukee
WI 53201**

www.lunar-reclamation.org

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

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TREAS./ Database – *Robert Bialecki 414-372-9613

LRS News

• **Cloning LRS Displays:** Peter Kokh had previously posted detailed step by step instructions for creating a set of “gravity bricks” on the Space Chapter Hub at www.nsschapters.org/hub/. His next project is to do the same for the small version of the Lunar Homestead display. If other chapters choose to clone our displays, people in their communities can benefit. No schedule!

• **New Displays Proposed:** Peter is brainstorming some new display ideas aimed at getting basic ideas across:
□ a LavaTubarium (in an aquarium like container)
□ a lunar outpost under a common shielded canopy

• **Annual Christmas Party December 8th a big success:** Some 17 people enjoyed an especially varied potluck spread. Everyone introduced themselves. We had two guests from the Chicago chapter, three from the Badger Space Group in Madison, and two from Sheboygan Space Society who joined LRS members and friends. Two took advantage of the opportunity to renew, and we gained a new member, Dave Dunlop’s friend Delores from Chicago.

We all enjoyed our classic Sci- film, **Salvage-1** featuring Andy Griffith, 1979. Several people asked where they could get a copy of the movie. Times Forgotten, PO Box 16742, Albuquerque, NM 87191-6742 The movie is the 2hr series opener. You get the whole series in a 4 DVD pack for \$31.95 + \$7.50 Sh&H = \$39.95. Online at:


<http://www.uniquevisionsentertainment.com/>

Television%20series%20page%202%20in%20box.htm

About Salvage-1: check out the following

✓ www.livescience.com/blogs/2006/04/04/salvage-1-the-best-space-movie-youve-probably-never-heard-of/
✓ www.geocities.com/CapeCanaveral/Launchpad/9782/salvage1.html

LRS Upcoming Events – January, February

 **Saturday, JAN 12th, FEB 9th, 1–4 pm**

LRS Meeting, Mayfair Mall, Garden Suites Room G110

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

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.

Bourne Plaza, 1441 SE 122nd, Portland, downstairs

• DEC 15 – JAN 19 – FEB 16

Chicago Space Frontier L5

610 West 47th Place, Chicago, IL 60609

INFORMATION: Larry Ahearn: 773/373-0349



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's regularly puts up 'Current' space displays, space flight ISS-16/STS-120 is on public view at two sites.

Minneapolis Community & Technical College (MCTC)

<<http://www.minneapolis.edu/>> Astronomy Dept., 1501 Hennepin Avenue, Minneapolis, MN 55403

Radio City Inc. <<http://www.radioinc.com/>>

2663 County Road I, Mounds View, MN 55122

Diversicon Pix: www.freemars.org/mnfan/Diversicon/2007/

St John's Fair pix: www.freemars.org/mnfan/St-John's-Sci-Fair/

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/sssf/>]

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

DEC 20 The Stoelting House, Kiel

JAN 17: UW-Sheboygan, Room 6101, **Sheboygan**

FEB 21: The Stoelting House, Kiel

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://phillypasa.blogspot.com>]

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

Next Meetings: DEC 15 - JAN 19 - FEB 16

October 20 Meeting Summary: Our treasurer, Michelle, says "we are solvent". As usual a concise report. Since the postal box is a major expense for us, we discussed what to do about future costs: we will keep the box for six more months and then Mitch Gordon, our resident Citizen, will take on the duty of getting the mail at his place. This will help keep us solvent.

Mitch put in a request for brochures from NSS and we had them in time for Philcon. Since this was our next event we talked of gathering for our annual informal Philcon luncheon or dinner.

Luncheon it was! Larry, our webmaster, talked of the site and the draw of our event pictures. This is good as it shows what a small group of creative people can

come up with. Thanks to material, labor, and financial contributions of several of our members, we were able to do the things in the pictures. Larry also mentioned working on correcting our blog listing which he subsequently did. Go to our website and look for "photos".

Dotty talked of Space Station, the Movie, which was in our area, and recommends the "3D" version. There were several movies in our area after this in 3D, but none space related. She also recommended "The Heart of the Sun" which was at The Franklin Institute recently.

Mitch also was sent a response from NSS on his request for a revival of the Why Space? Q & A series that had been available some time ago. I noticed that NSS had subsequently sent out a set of material on the answers to "the hard questions" as they called them. They also sent new tabletop display material (content?) and lots of stuff labeled "hopefully useful". And lastly: a reprise of "Going Native on Mars" from Ad Astra.

November at Philcon: those who attended and participated at this annual event had a great time with Mitch and Earl being on panels and other members attending. Hank Smith, our Sci-Fi Coordinator, was spotted once as he traveled at the event but was largely behind the scenes. A number of regular attendees appeared at panels and stand alone events I was interested in which included: "The Threat of Emerging Diseases, Pandemics, and Drug Resistance" all concerns for us as they could hobble the civilization that makes our expansion into space possible (Friday at 8 p.m.); "Human Spaceflight" with myself on a panel with IT. manager Frank O'Brien (moderator) author Mark Wolverton, and Dr. of Psychology Tobias Cabral as panelists. It was a packed, mid sized, room with a number of good points from the panel and audience: Frank brought up a word that most of us don't often think about but that is effectively with us all the time: Logistics. To drive home the point he wanted to make on this subject he had on display his companies everyday household products that would be necessary on long term missions, the primary focus of our talk.

Think about it: toilet paper, medicinals, tooth-paste, water, and much more. He described the amounts in mission terms and the quantities are sobering. Tons per person, even with good recycling of some materials. This is for long duration flight to Mars and back. One way trips were discussed but required an advanced in situ resources system to be in place in any event. The varied types of crews were talked of including sexual groupings: do we as a kind want this pioneering effort to succeed? or do we want a particular grouping that could fail due to internal conflicts over the mission time scales? Tough questions and not often considered as we mostly talk tech problems, not social and psychological concerns.

Speaking of tech however, there were several panel of note in this area. Dr. Seth Goldstein described his work, with help of his college student on Programmable Matter as a really cool example: he brought some of the first devices they have built with stressed silicon as a working material: fundamental to all of our efforts in science is materials science and the presence of real prototypes, not as noted in another talk "Power Points", as well as great slide shows of larger experiments, running in Power Point window displays, that were being used to test software on easy to construct hardware. Another talk was on NanoTechnology with a lively back and forth on

where we are and how far out we can confidently predict. The Costumer Guest of Honor, a researcher with IBM, Kevin Roche, was part of this panel as well as "So You Want to be a Scientist?" the last panel I attended Sunday.

Several other things of note: there were two Sputnik Anniversary related events, both involving Dr. SETI, ak. Dr. H. Paul Shuch, one a musical "filk" event and the other his visit to Russia and how the scientific establishment commemorated the event there. An educational and entertaining presentation: he has got to have a great sense of humor and a fine balance to have gone through what the bureaucracy put him through to be able to actually be part of it. The comparison of what was in the papers from us and them where amazing: our reports where mostly "look how dangerous this could be!" and there were more "here is what we did, here is where to listen to it, and this is the orbit it is in" and some how wonderful our system is that made this possible too.

PASA Vice President Mitch Gordon was on the panel: The Future of Government with the question as to whether science fiction can truly envision a new form of government. With his back- ground as a World Federalist and Futurist I,m sure Mitch gave it a good try.

Our luncheon included Mitch, Dotty, Larry, and Gary Fisher, who posed some good questions from the audiencel. Gary had just returned from a Students for the Exploration of Space (SEDS) event at MIT and described an interesting rover concept called "The Athlete Rover" which could roll and climb over obstacles depending on what its controllers or software decided. This device, as described, looks like a "thin" platform less than a foot thick but eight feet across. The wheels are on the end of arm that can be raised into, and reclined into, a number of positions that would allow it to walk up barriers. This was a one third size model. Full size would be twenty four feet across, thus making it a mobile platform that could carry habitat and other structures. Look for SEDS on the Web for more.

Finally: Tom Ligon has an article: " The World's Simplest Fusion Reactor Revisited" . He has worked for a number of years, most recently with the late Dr. Robert W. Forward on the concept of electrostaticly driven particle fusion. His report, in Analog Science Fiction and Fact for January/February 2008, includes the latest version of the device that uses magnetic reflectors to reduce energy loss (via particle loss), and talk of the funding search. See the references and the Google video lecture: "Should Google Go Nuclear? Clean, cheap nuclear power (no, really)." Google Tech Talks, Nov.r 9, 2006. Dr. Bussard lectures.

Report 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 Monday, 7 PM
Englewood Public Library, Englewood, CO 80110
 1000 Englewood Parkway
 First Floor of the Englewood Civic Center
Next Meetings: JAN 7 - FEB 4 - MAR 3

CALIFORNIA



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

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


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

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

oasis@oasis-nss.org

Odyssey Newsletter Online

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

 **Regular Meeting 3 pm 3rd Sat. each month**
Microcosm, 401 Coral Circle, El Segundo.
• DEC 15 - JAN 19 - FEB 16

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

OASIS News

- OASIS welcomes **Bill Ernoehazy** as our new web-master. Bill did some of the initial design for the original site and will be updating the site to make it more pleasant and useful. Bill can be contacted at webmaster@oasis-nss.org.

Upcoming Events

- **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

- **Dec 1**, OASIS hosts a presentation on the **Phoenix mission to Mars**. Long Beach Public Library, Los Altos Branch, 5614 Britton Drive, Long Beach. Call the *OASIS Hotline*, 310/364-2290, for more information. *This event is not library sponsored.*
- **January 2008 Orbital Express** -- OASIS is working to schedule a presentation on the **Orbital Express** project [<http://www.arpa.mil/tto/programs/oe.htm>]



Recurring Events

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

"Is the Moon a wasteland?" - Walter Cronkite
"There is no such thing as waste,
there are only resources we are too stupid
to know how to use."

Arthur C. Clarke, to Walter Cronkite
 during the launch of Apollo 13

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