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

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

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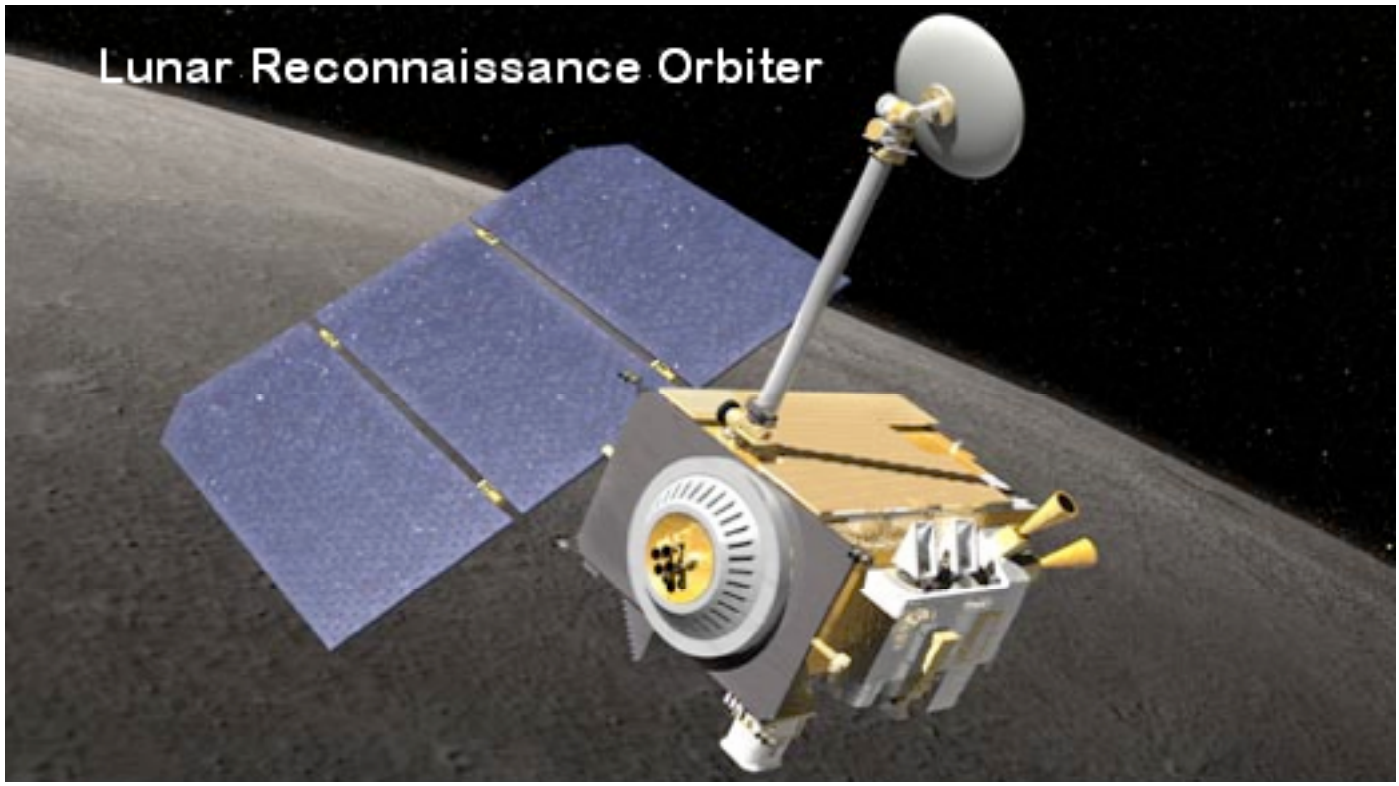

Above: LRO is finally in orbit around the Moon!

Feature Articles in This Issue

Planned Moon/Mars Atacama Research Station

At right you see a photo of the Inca de Oro Observatory, Diego de Almagro Commune, Chañaral Province, Atacama Region, Chile. This part of Chile is rapidly accumulating the largest concentration of "World-Class" Observatories yet. The proposed Moon/Mars Atacama Research Station *complex* will be located near here, with its outreach program tied in with those of this community of observatories. The Moon Society is very much involved in this project. See pages 6-7 below.

IN FOCUS ◎ What if NASA is Redirected Away From the Moon?

To tell the truth, The U.S. Return to the Moon Program has been on ever shakier ground since the day it was first announced by former President George W. Bush - its initial budget was already too skimpy. And as that situation only grew worse with time, NASA retrenched its commitment from building a permanently occupied moon base to building a permanent structure which could over several visits be eventually upgraded to permanent occupancy status, pending budget increases. [=> p. 2, col. 2]

Moon Miners' Manifesto

Published monthly except January and July., by the **Lunar Reclamation Society** (NSS-Milwaukee) for its members, members of participating **National Space Society chapters**, members of **The Moon Society**, and individuals worldwide.

• **Moon Miners' Manifesto CLASSICS:** The non-time-sensitive articles and editorials of MMM's first twenty years have been re-edited, reillustrated, and republished in 20 PDF format volumes, for free downloading from either of two locations:
www.Lunar-Reclamation.org/mmm_classics/
www.MoonSociety.org/publications/mmm_classics/

• **MMM'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 Lunar Reclamation Society** is an independently incorporated nonprofit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. LRS serves as NSS' Milwaukee chapter: www.Lunar-Reclamation.org
• **The National Space Society** is a grassroots pro-space membership organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.
National Space Society, 1155 15th Street NW, Suite 500, Washington, DC 20005; Ph: (202) 429-1600 - www.NSS.org
• **The Moon Society** seeks to overcome the business, financial, and technological challenges to the establishment of a permanent, self-sustaining human presence on the Moon." - Contact info p. 9.
• **NSS chapter**s and **Other Societies** with a compatible focus are welcome to join the MMM family. For special chapter/group rates, write the Editor, or call (414)-342-0705.
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Moon Miners' Manifesto, c/o Peter Kokh,
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⇒ In Focus Editorial continued from p. 1.

The NASA Moon Program has been under attack for some time, both by Planetary Scientists who covet the money spent on it, and by Mars enthusiasts who want NASA's Manned Space Program redirected to Mars. But Mars would require even more money and so that new would be stretched out over even more time. "Mars by 2037" is hardly going to enthuse today's youth let alone the many adults who might never live to see the day. The more a program is stretched out over time, the lower the commitment and incentive to keep it going.

If the decision is for Mars, however, hardier technology would have to be developed. By retrenching from a permanently manned Moonbase to a simple picnic shelter on the lunar campgrounds, NASA justified its decision to halt all biological life support research, as unneeded by current committed goals. But we can't re-supply a Mars-bound craft with oxygen and water every two weeks for the six-month trip out, much less for the nine-month trip home. The ship must be life-support-self-sufficient - LSSS. And what better place to test such systems than on the Moon, where (1) you cannot cheat, and (2) if the system collapses, rescue, relief, or simple re-supply is only three days away, not as much as two years or more. So, from our point of view, a go for Mars would not be a total loss.

Our Society is an International one, and we want to see humans on the Moon. Granted, some want to see America on the Moon, some even America only. That makes no sense long term. If ever the lunar frontier becomes self-supporting, it will deserve political home rule, even sovereignty. Future Lunans would no more consent to American statehood, than our forefathers consented to remain under the thumb of King George. Americans kept British Common Law but left the King at home. It is clearly in the Society's interest to promote an international effort to establish a self-supporting human frontier on the Moon, earning its keep by helping Earth supply its ever-growing need for clean energy.

The Moon Society's interest is not in a US-only Moonbase, but in an International Lunar Research Park open to contractors, enterprises, and universities as well as all of the various national space agencies.

Nor need we wait for NASA to develop all the needed technology, especially in cases where there stands to be enough profitable terrestrial applications to motivate entrepreneurs to do the R&D now, paid for by willing consumers, rather than by grudging taxpayers.

Additional research can be done in or at various special-focus Lunar Analog Research Stations. The Moon Society is closely following, cheering on, and even cosponsoring analog station research and programs all around the world; in Canada, in Sweden, in Mexico, in Chile, and perhaps in India, as well as in the US. Simulations in these environments can help tweak the design of equipment, tools, methodologies, building material research and much more. The whole point of analog station research is *not to put off "until we are actually there"* whatever we can learn and develop *beforehand.*

The Moon Society's goals transcend those of NASA, and as much respect as that aging bureaucracy has earned, we owe it to ourselves not to put all our eggs in that fragile basket. Please read our recent report:
http://www.moonsociety.org/reports/beyond_nasa.html

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It's Not Getting Done!

#1 The Big Picture

By Martha Adams - mhada@verizon.net

\ If you are writing a one-paragraph work order or starting up a five-acre industrial complex, you need a Big Picture of what you're up to. What is your objective and how do you think you will reach it? At least time, money and risk cost? The Big Picture is not a rigidly defined machine, a piston-rod-crankshaft assembly. It's more of a pipeline, where the list of intermediate objectives is malleable and only the end objective is well defined.

Where the pipeline is not in evidence and the end objective is vague and elastic, that's a strong warning that it's not real. That it's PR or make-work. *With no objective nor any plan to get there, it's going nowhere.*

These 'Not Getting Done' pieces grow out of my own Big Picture of what needs doing to build off-Terra settlements. To get from here today to there *asap*. As I develop the following pages, I point to critical needs NASA seems to not have heard of, and to how a group of dedicated space settlements workers might come together and *build those settlements* we so very much need Out There.

There is no good reason today why a first generation of human Martians isn't growing up on Mars now. Or off-Terra somewhere else today, like an Aldrin cycler. We need to do something about that. It is the largest and most serious problem facing our human reality today. We need to respond soon, because we risk responding too late.

I'll open with, why space settlements? At any time?

Because there's change coming. It's seductive to imagine our local Terra is a fine place for us all (if we can work out a few differences) and it will stay good into the indefinitely far future. That's not so! It is false because ongoing social / political process right here on Terra makes it not so. (Watch out for the closely related *climate change* now well started.) It is false because astronomical science shows us the violent character of our universe and that sooner or later, some of that violence will come to call. Here.

My second Big Picture point follows immediately from my first. A change, the Big One, will happen at some *point in time*. We have a hard deadline out there somewhere. Never mind the soft deadlines that come up in the news from time to time. This Big One is different. It changes our Terra beyond recognition. Some of us may survive that Big One and we can still live here, if we're lucky; but we can't count on that. We don't know what this Big One is; we don't know when it is. But thru science and rational thinking, we know it's out there in our local Terran future.

(Related comment, not amusing: "The reason the dinosaurs aren't here today, is they didn't have a space program." -- Jerry Pournelle, science fiction author.)

In fact, our deadline doesn't need even to be particularly catastrophic. Anyone who has lived on a farm can tell you what small seasonal variations can do to the farm's work and life. (A single hard hail storm comes to mind.) Much bigger than that can happen. I mentioned climate change. How stable are our world social and economics systems against such disruption? (Current events and recent historical research seem to show us, not very stable.) The big question around this topic is, if our Terran economic systems fall into chaos, can we build them up again? There are those who say, whatever our world becomes in the future, our ability to reach space will not stay with us if we fail to use it to large effect. (Use it or lose it.)

My third Big Picture point is, PR announcements don't reflect reality. They reflect someone's business choice of pretty pictures and nice words to improve their political environment and business climate a little. They sell a sweet reality, nice to accept. Thus the useful news in PR is generally indirect there. (The careful PR reader may discern significant news in what's omitted from the PR.) The news is under the surface and the reader finds it by careful testing against her personal Big Picture.

My final Big Picture point is, beware the apparently meaningful question, "What is space for?" Misunderstood, it can be put to service as an argument *against* human settlements off-Terra. Misunderstood, it supports endless philosophizing with no action ever.

In fact, all space out there, this universe, has no implicit purpose. Our Terran sky is not provided for our edification, instruction, or to provoke a vague and oceanic awe. No supernatural deity placed the whole rest of the universe out there for some immense and inconceivable objective with us, children of men, central to it. A random accident happened. The accident is us and if there is to be any meaning to this, we must make it ourselves.

As humans, we can find a purpose for our local Solar System. Like an empty field is completely changed by placing a house on it, space with people in it is completely different from space as a topic for abstract astronomy and cosmology researches. As soon as people are there, "What is space for?" acquires a very simple answer. *Space is for people*. Obviously!

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It's Not Getting Done!

#2 Long-term Analog Settlements

By Martha Adams - mhada@verizon.net

If NASA has a program to build off-Terra settlements and an economics and trade system to support them and their growth, then where is their research and engineering to do this? *Space is hard.* Where are they making ready for it?

We can't go out to space to learn how to live in space. The space environment is too hard to reach and too demanding once we're there, for us to hop out there and play around. To learn something about the human meaning of the space environment that fills most of our universe, link over to

http://www.geoffreylandis.com/vacuum.html.

(Note interesting and useful further links there.)

As you're reading Landis, notice especially that if you find yourself suddenly in a space environment, you have some 5-10 *seconds* of useful consciousness to do something to save yourself; but if someone else comes along and brings you back into a lifespace within about a minute, you probably survive. You can see that off Terra, you're not going to dash out in your shirtsleeves, run over to your neighbors place, knock on the (airlock) door,

and enter once it opens. There is also the matter of local and cosmic radiation.

And *this* is better than living on Terra? It's a good topic for anyone to work on who thinks about space. For many modern Americans, no, it's not better than living on Terra. But even today, America yet has pioneer people who can get along just fine without a soft and easy life, if America today seems largely dedicated to suppressing divergence from a quiet ...norm. And, anything out there off-Terra could be a whole lot better than Terra becomes, after some local or astronomical event as I've mentioned elsewhere in Adra. (Some may point also to rapidly evolving computer-based social-control technologies. Ref: China; George Orwell; Cory Doctorow.)

So coming generations really could live and work out there? Yes, provided a few of us make that happen. Which begins with a detail we take for granted here on Terra: lifespaces. Off Terra, nobody goes anywhere without a lifespace. Maybe a tiny one, like a spacesuit; maybe, someday, as large a lifespace as a "generation ship".

But, you may reasonably say, how do we build lifespaces? (Glad you asked.) We do it by thinking and research and engineering. By recalling related experience: aircraft, submarines, diving and high-altitude suits. By everything from simple lab work to complete studies in effigy. By building and operating *analog settlements* to establish realistic ranges for a host of parameters and practical details. Such research and engineering can look like a game and in fact, serious gaming is a part of the work.

Analog settlements are how we learn to live in space while we are still here on Terra. Serious work on this topic has been done already -- Biosphere 2 and Robert Zubrin's analog Mars missions come to mind. But much remains to be done and anyone working at space settlements, wants to attend to who is doing what.

I suggest that for best return from the following, you want to break off and go now to this Biosphere 2 site: http://en.wikipedia.org/wiki/Biosphere_2. Read it and visit two or three of the links provided there. Then come back here, having just acquired a birds-eye view of how large analog settlements projects can be hard to do.

I think this over-view shows why such work is not much in the news: it's difficult, it's slow, it's not exciting, a good outcome is not guaranteed; and it eats up time and money. As people live for months or years in a limited environment (like a prison, in fact), it hardly generates the excitement and conflict the news media want. Except if something goes very wrong, of course. Yet whatever the work or nuisance to do these analog settlements projects, it's clear that whoever would go out to space *must* do them. First. We must do our research and engineering first and do it here; and then do our space settlements asap next.

Nobody is above these basics I've just pointed out. Thus we can look at what NASA is doing, and we see something central missing from their program. A gaping hole there. Where is the analog settlements work?

When NASA started their Great New Program to repeat Apollo (with improvements, the PR says), I asked, where is this getting us? I'm still asking that, because, this Great New Program seems to carry, behind its fanfare, some serious issues. Namely:

1) it's slow and runs over long time. This makes the Program terribly vulnerable to political meddling, adjustments, and "earmarks."
2) It speaks of revisiting Luna (About time!) and even of bases there, but it fails to address the extended future that is (if we choose it) out there.
3) Someone else could easily leapfrog and surpass such a weak and slow program; thus we may eventually arrive ...somewhere, to find a "greeting" committee already there. And, of course,
4) just in case NASA or someone else is doing the needed settlements studies, *where is this work happening?* Without this, all else amounts to nothing? It's a really interesting question: remember the Lockheed Skunk Works? Some people like to seek out and analyze small news details to find large secret programs. I haven't heard any of them are finding anything of this, which makes a strong case there's nothing there to find.

Well, maybe other countries are working at space settlements? Where, or in what countries are they doing serious analog settlements research and we aren't hearing about it?

One finds in the news that Washington's programs are basically "what Americans want." Assuming this for the moment, we come to interesting questions. Why do "Americans want" senseless and expensive wars? Which drain America's resources off the top and return nothing? Why are Americans opposed to spending "large" amounts of money (as much as 10% of a war cost) on space, which offers the greatest returns of any option in sight? (Imagine the year is 1500 AD and "What is *America* for?") But that goes off-topic here: I want to talk about *settlements* in space.

As I write, today, "Settlements in space" is basically a getting-off-zero problem. It's new, sort-of. (We had it almost entire, fifty years ago.) Nobody ever did that before, nor anything much like it (except Apollo). Yet if the objective is resolved into its major parts, none of those are new. They are generally the application in a different environment of basics commonly known to students in good high schools. That is, *to children.* It's only when you put those old basics into a space environment, that the "settlements in space" problem acquires some appearance of imposing magnitude. (Helped along by the practical challenge of *getting there,* which is actually a different test entirely.)

The problem is both simplified and made more difficult by the practical necessity of lifespaces. Off Terra, if you're alive, you're in a lifespace. However, for millions of years past, we've lived in the open outdoors of Terra. Across all our species evolution, nobody ever lived permanently in sealed lifespaces. Now comes change, and we'll have to adapt our lives, our culture, and eventually our physical selves, to live with this new reality of sealed lifespaces within a large and totally hostile environment. I expect this will prove to be a hard requirement to meet. (But our fishy ancestors did it! They came up onto dry land out of Terra's primeval ocean, and they did it without our technology. Space is the same basic challenge. I think "evolution" takes on a new meaning here. Today, we can do space.)

But today, I see no NASA analog settlements program. To do space, we must learn how first. We'll have to mock it up and work it out, right here, long term analog settlements, to learn the operational principles in

appropriate context. Robert Zubrin and Mars Society have been doing analog Mars settlements. Biosphere 2 tried a large ecological system experiment. *Much* more is needed, and whoever talks of space settlements isn't serious about their topic until they are seen making ready for what they say they're going to do. *Someone* must run several analog space settlements over time: at least one of these must run five years, at a guess. Including study of culture issues and the social psychology of such closed environments. Can NASA do that?

Since as big slow projects go it's just not that large a challenge, I believe that yes, NASA can. If they will, is something else. For whatever practical reasons, NASA's feet are firmly glued to Terra's surface, and their programs seem designed to keep it that way. I foresee that someone else must do that basic work and then progress to space settlements. There is a simple program and progress indicator: at least three long-term analog space settlements because one won't be enough. And it wants to *start now.*

*[Editor: Note that NASA **is** involved in the H**aughton Mars Project** on Devon Island, at a site about one kilometer from the Mars Society's Flashline Mars Arctic Research Station. Other partners in HMP are Canada and The Mars Institute.]*

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It's Not Getting Done!

#3 Economics Gaming

By Martha Adams - mhada@verizon.net

Off-Terran business economics will prove another hard challenge after the lifespace and social issues studied in the analog settlements projects. I see two reasons for this. The business economics of space settlements must extend far in space and among many concerned people and institutions. And extend far in time. And over the long run, a business economics that works is as necessary to life off-Terra as the air and water in the lifespaces. It is a central part of what the people who are there do there; and it pays the costs of Settlement operation and growth.

How will business economics work in space? Some details will certainly be very different from local experience here on Terra. History provides useful parallels. A few centuries ago, business people could wait months or years for business to complete that they had started. (Giving us today's expression, "My ship came in!") It does make a difference that today, business parties across the solar system can communicate with lags up to a few tens of minutes, but manufacturing and shipping hardware and materials across space seems likely to require years of time. History's useful parallels, won't be answers.

We can't afford put out a few settlements and speculate as to their eventual economics. Before we put our space settlements out there, we'll need to study how business economics probably works there. That study, and testing, must start at least as early as our first work on longterm analog settlements. Its results will certainly bear upon site choices. We must understand early-on what the basic economics will approximately be for each particular settlement. I expect the early work of space settlements to include serious economics modeling and gaming to study this new field of business and economics in space. (Which carries a risk. An old hippie saying goes, "Where all think alike, none think much." Here, it's a warning to the small space settlements community that this work, so like gaming, risks having too few people and a single closed group doing the work.)

I think here is where those who advocate just one settlement for starters, go severely wrong. Three settlements might be a practical minimum. I expect this topic to develop over time about the usual way: cycles of trial and error, supported by theory in its present state; cycles of assessing what was learned. Such work, done in effigy, won't cost as much as the analog settlements projects, although it's equally as necessary. It can be set up by knowledgeable people as computer games. (For an old and limited traditional game, think 'Monopoly'.) To see reasons not to try this first for real out in space, see today's American economy.

Over historical time, you see a lot of trial and error in Terran economics. As I write, one might mention today's American economy in particular. In this trial and error, if something crashes, well, someone takes a beating. I look for economics in space to work different from this, because space is a seriously hostile environment.

Whoever intends to face this large business ecology challenge, is working at it now. In those wonderful NASA programs, I don't see that. The reasonable belief from what's visible out there is that *NASA's feet are firmly glued to Terra's surface, and they're going to keep it that way.*

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It's Not Getting Done!

#4 Hardware

By Martha Adams - mhada@verizon.net

There's a risk for any organization that it freezes into working at some subtopic and after that, it goes nowhere. For instance, it might degenerate into an organization for mutual social backscratching and classy costly banquets. Here, there's a risk the space settlement organization falls into indefinitely extended planning and research. For this reason, the organization wants people in it whose lives and objectives focus on getting those habs out there now.

Namely, people whose lives are about development models; about hardware to ship off Terra and others will live their lives in it and if someone isn't ready now then they want to set trivia aside and hop to it immediately. This is not a place for party people. A Settlements project requires hard-driving managers who refuse diversion from the work at hand.

Artists may offer such diversion. Any engineering work wants artists. Nicely done artwork and videos that illustrate program objectives as if they are complete through to (successful) reality can immensely help the workers get there. However, art also makes nice entertainment. If you're on vacation, why not sit back and enjoy the pictures? If you're not sure of your engineering, why not sit back and enjoy the pictures?

Which makes good art a risk. The best art is not the hardware it pictures. Sitting back to watch nice

pictures won't bring any hardware to reality a minute sooner. The future you want only exists after you build it. The organization pulled together, the money in hand, the Terran industrial base starting to work, the problem is habs, lifespaces and their support systems, and where to put them. The sooner the better, and it's going to be a lot of hardware. Let's think about making hardware.

Each young engineer who begins in the work, passes through a small crisis. The crisis is, to cope with the risk of building the hardware. Plans on paper or in a computer system, are malleable and (relatively) inexpensive. Hardware is commitment and answering to the guys with big money. Not everyone can do it. Thus not all with an engineering education are engineers. As work moves along from the idea of space settlements, to the fact of hardware to be shipped off-Terra, this commitment is one of the big risks along the way.

I wonder if this has something to do with NASA's failure to go anywhere over several decades since Apollo? To do something? ...Interesting, but off-topic.

Today's NASA machinery that so nearly copies the Apollo machinery of fifty years ago, is called "progress." Well, it redevelops some of the know-how we lost when Apollo was killed. There might be good in that. But it's not serious movement toward building real live space settlements.

Starting to build hardware will be a beginning, not an end. The work can move quickly to a production line and near mass production. Thus the cost of building settlement cores drops. Which calls for each unit that is produced, to be as like as possible to its predecessor and to its next. Which idea in its application tells us, if we're going to do an initial production run of six settlements, they are going to be a lot alike.

I think this example makes my point. We step away from the idea of building many settlements not one, because it's necessary. We step away from the idea our settlements are all different because they go into slightly different places, because they really aren't so very different at all and we need the economy of (as near as we can get to) mass production.

Meanwhile, back in Washington DC, there are a few practical problems:

- ITAR,
- The thinking it codifies,
- The people who think like that.

And as history shows, for whatever reason, Washington wants to make wars, not space settlements. Seeds for the next war are visible today. After wars, there's not much money for anything like space settlements. Which leads me to believe, humans in space is not going to grow very much until there are enough humans in space to develop economics not locked to what Washington does, and this won't develop in a hurry.

For now, in the perception of most people, "space is NASA." And I cannot believe NASA is going to do space settlements. Their feet are too firmly glued to Terra's surface, and they're going to keep it that way.

[Editor: *Stay tuned for next month's Power Conclusion* as Martha Adams takes up the topic of **The Future**.}

Martha Adams has been a Moon Society a little over a year, and lives in Quincy, MA, a suburb of Boston. We met her in person, recently, at ISDC 2009 in Orlando.<**MMM**>

Playing with Modular Designs for the MoonMars Atacama Research Station

By Peter Kokh, Member Advisory Team

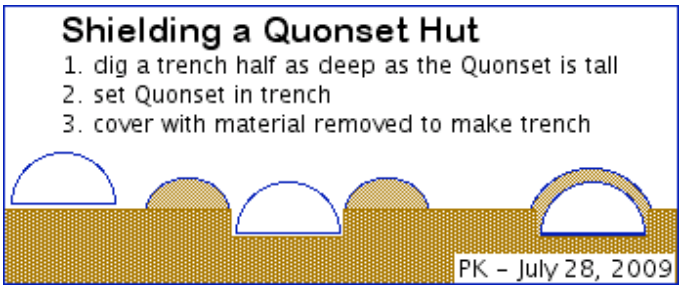
For those readers familiar with the appearance of the Mars Desert and Mars Arctic Research Stations, the shape of MMARS in the Atacama Desert of northern Chile near the Inca de Oro Observatory, will be quite a departure. Starting with a suggestion from Don Foutz, handyman extraordinaire and jack-of-all-trades on call 24-7 for MDRS emergencies from nearby Hanksville. To keep costs down, Don suggested using the wingless fuselage of a large surplus aircraft.

The Chilean Air Force, who is very much behind the MMARS effort, took the hint. They had two surplus Hercules C130B Cargo planes. Actually, that shape is close to one of the proposed Mars landing craft, and the basis for Mars Society Australia's Mars-Oz analog station design. But as big as a C130B might seem, its one floor has less square footage than the MDRS "double tuna can." And that, as far as we are concerned, is perfect*!*

MDRS has from the start begged for expansion with modular additions. Too many incompatible functions are forced into the same space when they should be mutually isolated. Suggested expansions go nowhere.

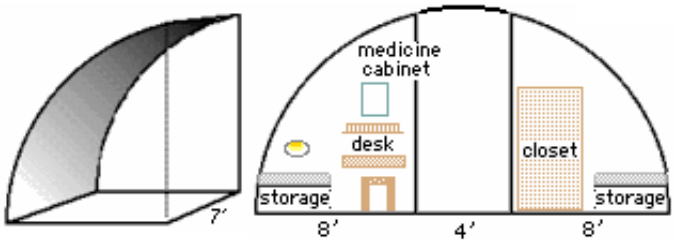
We'll put the Command Center in the C130B with Communications, Computer Work Stations, EVA Capcom, Mission Capcom and other similar functions inside its 42' long, 10' wide, 9' high cargo hold.

Lower the tail ramp and enter a series of hallways (10' wide semi-trailer beds may do, with room for storage lockers on one side, photos and art on the other). These lead to a trio of 20' wide, 60' long Quonset huts. They will be set in trenches then covered (shielded) with the material excavated to make the trenches: this will help maintain benign internal temperatures. A buried Quonset looks like a buried cylinder: very fitting!



A Quonset of this size is an inexpensive choice. We could have bought a dozen for the price paid to fabricate the MDRS hull (in both cases, prior to outfitting.)

- **The Crew Quonset** will have a dozen "state-rooms", showers, urinals, and a Quiet Lounge. [top next page]

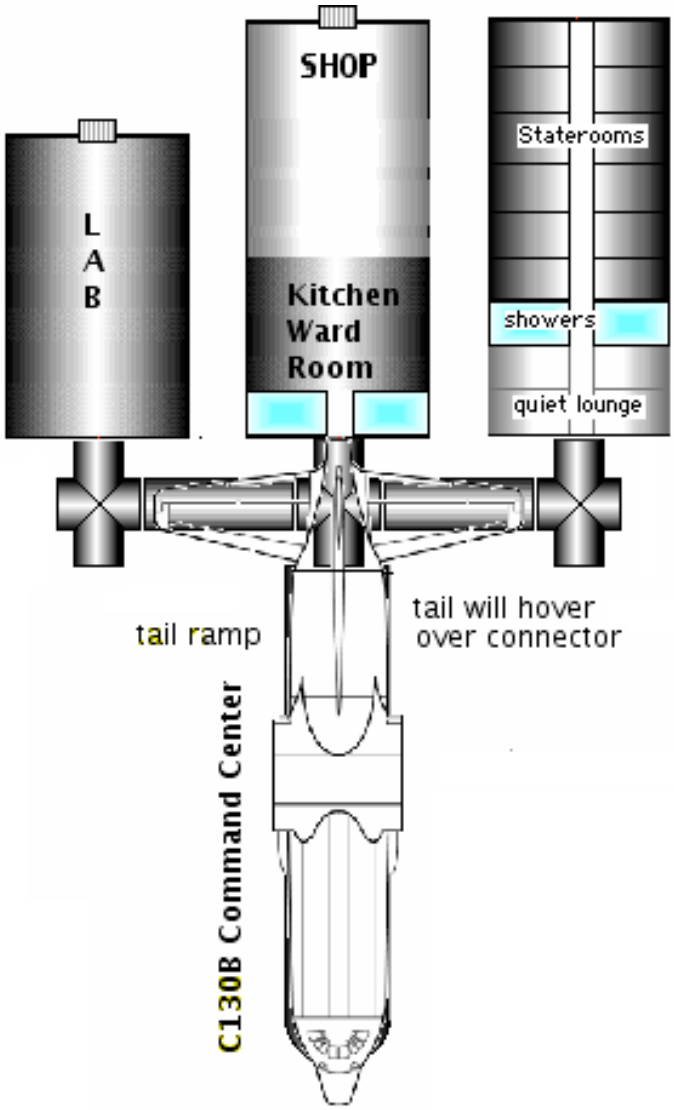


- **The Science Lab Quonset** will provide spacious, well-equipped Lab space with plenty of storage for geological and biological samples as well as equipment.
- A third will house the **Workshop**, repair and fabrication area towards the rear, and the **Kitchen, pantry and ward room** (dining) to the front – well separated, of course. This unit will also have **the toilets**.

To see the illustrations, go to our MMARS Google Groups site: http://groups.google.com/group/moonmars

On the right hand side, click on files. Look for the following:

20'x50'QuonsetCrewModule.gif
OperationalPhase.gif
shielding_quonset.gif



Now, when and if MMARS is built, it may look quite different from these sketches. But we are still playing with concepts that seem appropriate for the situation. Our team has a wealth of capable persons with a wide set of expertise. So the interplay of ideas is good.

It is one thing to come with a neat design. We have to find a combination of ready-to-adapt structures and easy-to-install outfitting elements. If we have everything designed down to the last rivet, the team will assemble in February at the Santiago International Airport to put together the C130B Command Center, which will then go on display at the 2010 International Air & Space Show (FIDAE) there in March. If you are realistic, you will realize that a lot could go wrong. That's why our MMARS team is working hard to come up with not just the neatest solutions, but with the cheapest and easiest to assemble. We'll have a Chilean team of a few dozen workers at our disposal, but unless we are fully organized, and all our material needs are delivered on time, a disappointing result is quite possible.

The Moon/Mars Atacama Research Station has one thing going for it, Chilean Air Force determination to see it built and become fully operational as the showcase of Chile's contribution to brainstorming how open-ended expandable outposts can work on Moon and Mars. We are delighted, of course, that the General in charge of this project explicitly requested Moon Society involvement. It give us an ideal opportunity to further develop and test out concepts that we have been playing with for our own Lunar Analog Research Station, a project that the National Space Society has indicated a willingness to co-sponsor.

The site has been narrowed down to an area that is largely free of vegetation, and has coloration that in some places looks lunar (grays and whites) and in other places reminds one of Mars (tans and ochers). The backdrop is doubly spectacular: the Andes to one side, and some of the darkest night skies in the world above.

The nearest major city is Copiapo (accent on the final o) with some 200,000 people. The people there and in other neighboring towns are excited about the project, as a visitors center will be included along with a wide range of public and student outreach activities. Some of this is already in place in association with what is now the world's largest concentration of World-Class observatories, surpassing both Kit Peak and Mauna Kea.

The educational outreach program is run by TATA, The Astronaut Teacher Alliance based in San Diego. http://www.spaceportacademy.org/tata If the association with Chile seems strange, is is the result of a CA-Chile agreement signed by Gov. Schwarzeneger! ###

Extracting Minor Elements From Moondust

Titanium, Sodium, Chromium, Manganese, Potassium, Phosphorus

By Dave Dietzler pioneer137@yahoo.com

Elements present in small amounts by weight percent:

In **lunar mare regolith**:

titanium 3.1	sodium 0.29	chromium 0.26,
manganese 0.17	potassium 0.11	phosphorus 0.066

In highland regolith:

titanium 0.31	sodium 0.31	chromium 0.085
potassium 0.08	manganese 0.0675	phosphorus 0.05

We can see that the concentrations of sodium, potassium and phosphorus are about the same in both types of regolith. As for titanium, chromium and manganese, mare regolith is richer. This is another good reason for basing on a lunar mare coast. The question is, how do we extract these useful elements? I won't go into the extraction and uses of titanium because that is well explained elsewhere. Before discussing possible means of extraction, let's examine the uses of these elements.

Phosphorus is needed for n-type solar panel material. Along with potassium it is one of the three major fertilizer ingredients with nitrogen being the third. Potassium and sodium can be reacted with water to make potassium hydroxide and sodium hydroxide-caustics for soap making by mixing them with vegetable and/or animal fats. Soap will be an essential for humans on the Moon. Sodium is needed to make table salt, another essential for humans, and sodium hydroxide reacted with silica can make sodium silicate, an inorganic adhesive with many uses from painting to binder for sand molds. Sodium could also be used for sodium-sulfur batteries and high-pressure sodium vapor lamps. Sodium oxide is added to silica to make glass with a lower melting point. This makes the glass easier to work. Chromium and manganese can harden steel and give it corrosion resistance. Stainless steel is up to 25% chromium.

{**Editor:** Sodium and Potassium can also be used as dopants to lower the melting point of mare regolith in the making of glass matrix in which to embed glass fiber made from highland regolith. Thus Sodium and Potassium could be critical to production of glass-glass-composites which may become a major building material for solar power satellite components.

Also, sodium silicate and potassium silicate based metal oxide "paints" will be the basis of a new art medium, with alkyd, acrylic, and latex paints being exorbitantly expensive imports. #]

I haven't seen much data on the extraction of these elements from lunar regolith so what follows is hypothetical. When following the scientific method that's where we start. Eventually we will need experimental testing of these hypotheses. Let's begin with potassium and phosphorus. During serial molten silicate electrolysis, these two elements are deoxidized at lower energies than ferrous iron. When extracting iron and oxygen by electrolysis these should boil out of the melt since their boiling points are much lower than the 1300-1600 C. temperature of the melt. They will probably react with the oxygen and form oxides that don't boil until very high temps. Will the oxides be wafted away by the oxygen bubbling from the melt and then be trapped in a condensor/filter or must inert gas like helium or argon be flushed through the furnace to keep them from settling back into the melt? Research is necessary to answer this question.

Sodium is deoxidized at higher energy than iron but lower than silicon. When conducting serial electrolysis after iron removal to get silicon by increasing voltage the sodium should boil out and will probably oxidize, so we have the same situation with sodium as we did with K and Ph.

If we can get these oxides we will then have to reduce them with hydrogen or carbon then use fractional distillation to separate the pure elements. We might want them in salt form so they might be leached in acid, treated with chlorine, passed through ion exchange columns, etc. Additional research is called for.

Manganese and chromium are deoxidized at higher energy than iron but lower than silicon. They have high boiling points and will remain dissolved in silicon as it is extracted. The silicon could be purified without any chemicals perhaps by vacuum distillation and zone refining. The Mn and Cr should be left behind after distillation and could be added directly to steel in mixture or they could be separated chemically. This might involve reacting them with chlorine gas to form salts then leaching away the MnCl2 with ethanol. The salts would then be electrolyzed to get pure metals and recover the chlorine. Ethanol could be made by fermentation of plant products grown on the Moon.

Before closing, let me comment on sulfur, another minor element present at from 540 ppm to 1700 ppm that could be used for everything from sulfuric acid to sulfur cement. Roasting sulfur out of large masses of regolith during volatiles harvesting could lead to the formation of sulfuric acid that would be hard on equipment. My impression is that most of the sulfur is present in troilite, FeS, of meteoric origin. Since this is not magnetically susceptible it might be possible to extract the troilite electrostatically then decompose it with heat or electrolysis. Sulfur will boil off and be trapped in a condensor. **<DD>**

*Data from:
http://www.sps.aero/Key_ComSpace_Articles/LibTech/LIB-006_Lunar_Materials_Utilization.pdf

{Editor's Note: Ever since regulations forced industries burning coal to scrub the sulfur from their exhaust, the price of sulfur has plummeted with the result that much experimentation has been done as to how to make use of this newly cheap versatile element.

Sulfur block, sulfur shingles, and other building material products are now on the market. Sulfur can be crystalline or amorphous and even plastic.

One idea we have looked at is liquid sulfur-impregnated fiberglass. Experiments could be done outdoors or in a ventilated basement. What properties would such a composite have? For what uses might this type of composite lend itself?

With common materials such as wood and plastic being unavailable on the Moon except at stellar prices, this is an area that perhaps deserves some careful experimentation. Early favorable results would push this investigation into industry or university labs.

Anyone interested? Be safe and careful! **<MMM>**

The Moon Society www.moonsociety.org

An international nonprofit 501(c)3 educational and scientific organization formed to further the creation of communities on the Moon involving large scale industrialization and private enterprise

Objectives of the Moon Society

include, but are not limited to:

- Creation of a spacefaring civilization which will establish communities on the Moon
- Promotion of large-scale industrialization and private enterprise on the Moon
- Promotion of interest in the exploration, research, development, and habitation of the Moon, through the media of conferences, the press, library and museum exhibits, and other literary and educational means
- Support, by funding or otherwise, of scholarships, libraries, museums and other means of encouraging the study of the Moon and related technologies
- Stimulation of the advancement and development of applications of space and related technologies and encouragement their entrepreneurial development
- Bringing together persons from government, industry, educational institutions, the press, and other walks of life for the exchange of information about the Moon
- Promoting collaboration between various societies and groups interested in developing & utilizing the Moon.
- Informing the public on matters related to the Moon
- Provision of suitable recognition and honor to indivi-duals and organizations which have contributed to the advancement of the exploration, research, develop-ment, and habitation of the Moon, as well as scientific and technological developments related thereto.

Our Vision says Who We Are

We envision a future in which the free enterprise human economy has expanded to include settlements on the Moon and elsewhere, contributing products and services that will foster a better life for all humanity on Earth and beyond, inspiring our youth, and fostering hope in an open-ended positive future for humankind.

Moon Society Mission

Our Mission is to inspire and involve people everywhere, and from all walks of life, in the effort to create an expanded Earth-Moon economy that will contribute solutions to the major problems that continue to challenge our home world.

Moon Society Strategy

We seek to address these goals through education, outreach to young people and to people in general, contests & competitions, workshops, ground level research and technology experiments, private entrepreneurial ventures, moonbase simulation exercises, tourist centers, and other legitimate means.

Our Full Moon Logo above:

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

Masthead Design: Charles F. Radley, Society Vice-president\

Sharpening Our Vision & Mission Goals

By Peter Kokh, President

July 20, 2009 – We still do not know what direction NASA will be asked to take by the Obama Administration. The anemic Moon program may hobble on. Or, NASA may be redirected to Mars. NASA had already retrenched its goals to a permanent structure that could be revisited, without biological life support or a program to learn how to use on-site materials. We cannot entrust fulfillment of our goals to an Agency without control over its own direction.

An International Lunar Research Park – The International Space Station has been a great success as a cooperative effort by several nations, clearly a model to build upon. We are an International Organization dedicated to the opening of the Lunar Frontier to agencies, corporations, enterprises, and pioneers of all nations. To this end, our efforts are directed to the promotion of an International Lunar Research Park, sketched out in MMM-India Quarterly #2 and in MMM #224 April 2009.

Built, maintained and serviced by international contractors and enterprises, ILRP would provide space for outposts of any nation, and involved universities, this magical mix could easily morph into the 1st settlement.

ILRP would develop building materials processed from moondust and build roads outward to spread our presence on the Moon. Civilians in growing numbers will work there, some indefinitely, the 1st lunar citizens.

International Lunar Analog Research Station Programs – The Society continues to support the growing network of Lunar Analog Research Stations. The research that can be done at these facilities has many directions.

Encouragement of Spin-Up Development of Technologies needed on the Moon – We support a more vigorous technology development program than that of NASA. (1) We identify technologies needed on the Moon, not yet in hand. (2) We brainstorm potentially profitable terrestrial applications. (3) We encouraging entrepreneurs to do the R&D solely for those terrestrial profits. NASA postpones such research as *"not needed now."*

Expanding Our Outreach to Spanish Speakers through our efforts in Chile, Mexico, and Colombia.

Development of updated public outreach materials – supporting our ambitious Vision and Mission Goals.

Financing the opening of the Lunar Frontier – The attempt to develop space resources and frontiers, if left to taxpayers, will ultimately fail. Instead, we must prioritize development of needed technologies that can be supported by the market of terrestrial consumers.

A Preamble to any Moon Treaty Revision – We will lead an effort to identify areas and features of special scenic and geological interest on the Moon in which development should be forbidden or carefully restricted. This should allay fears that humans will spoil the Moon.

The Moon Society needs You! – Please join or renew!

Introducing MMM Theme Issues

In preparation for ISDC 2009, we put together **MMM Classic #20** ahead of schedule so that it could be included in a CD on "MMM's first Twenty Years" which the National Space Society then produced in quantity (1,000) so that a CD could go into the registration packet for each ISDC attendee. You can freely download this issue and all previous classic issues from:

http://www.moonsociety.org/publications/mmm_classics/

Ahead of the game, we decided to launch something new this semi-annual "break" – July – when the MMM editor has a month off. The idea is to collect in PDF volumes all the non-time sensitive articles from the 1st 20 years, on specific themes.

MMM Classic Mars 1 (years 1-10) and **2** (years 11-20) are now online. To download them, go to:

www.moonsociety.org/publications/mmm_themes/

Over time special Classics issues will focus on the following topics, one topic per issue. In cases where there is a lot of material, as with "Mars" there will be 2 or more issues as needed.

- **Lunar Resources & Industries**
- **The Lunar Economy**
- **The Lunar Homestead**
- **Arts & Crafts, Performing Arts**
- **Health, Sports and Exercise**
- **Other Destinations: Mercury, Venus, Ceres, asteroids, Europa, and other Solar System Destinations**

These publications will appear as we find time to put them together. A fringe benefit of organizing all past articles by theme, is that it can serve as preparation for an eventual "MMM the Book." That is a project title, not the book title, which will be determined later.

Apollo Moon Party #1

A mixed bag of successful events and of big disappointments

By Peter Kokh

The Apollo Moon Party project was born out of our very 1st Town Meeting, held Wednesday, **February 11th** of this year. **See the report on this meeting at:**

http://www.moonsociety.org/reports/frontlines/Frontlines2009-03.html#town

With five months lead-time, our various chapters and outposts began planning special local outreach event in their communities. When all was said and done, we had a mixed bag of successes in Houston, Nashville, and Phoenix, and Sweden, lesser observances in St. Louis, a disappointing cancellation by the IMAX/ Planetarium host in Milwaukee, along with a postponement in Green Bay. Any other parties (Dallas-Ft. Worth, Mexico, Australia, United Kingdom) have not reported. Phoenix photos at: http://www.flickr.com/photos/mjmackowski/page2/

Our greatest single success was the party at the Moon-Mine analog site in central Sweden hosted by member and advisor Niklas Jarvstrat:

"The celebration was a great success, attracting around 200 attendees and very good media coverage. I was quite busy just before start of the event with two TV-teams and one radio reporter interviewing and taking pictures. As we started the sound system, a fuse blew and all was dark for the first speech. Luckily, that was not a PowerPoint presentation and within 30 minutes, the team jury-rigged another cable and there was enough power for my PowerPoint slides. You can download these slides at www.moon-mine.com/press.htm. (In Swedish, this time.) We showed films from the lunar landing on big screen, footprints in regolith (well let's call it regolith simulant), start of the pumping, cutting the ribbon, balloons, invited speakers, and much more. Coffee was available. Thanks to all participating and doing preparation, and also thanks a lot for all good wishes!" – Niklas

Links: http://www.moon-mine.com

http://apps.facebook.com/causes/242474

In addition to local observances, we had hoped to link all those celebrating the event locally in one 24 hour Internet video event, as we dropped in on parties around the world. This was the more difficult project, and those who might have known how to put something like this together were unable to help because of the need to concentrate on income-earning work: understandable!

We had also hoped to serve as a clearing house announcements board for Apollo Anniversary observances outside the Society, and around the world. But it was difficult to ferret out observances by other organizations. The one at NASA-AMES in connection with the Space Frontier Society was probably the "biggie."

According to http://echoesofapollo.com/ the Moon-Bounce radio project was a great success. Check the page above for reports from Switzerland, Tasmania, and Stanford University.

No live 24 round the world video event

However, we were not able to organize the planned 24-hour internet online party visiting one celebration after the other through the time zones. None of us who had the free time to work on this project, had the know-how or experience to set this up. Maybe next time, with more lead time. See the next page!

What we gained

Individual chapters and outposts gained greater recognition in their communities as well as important experience in organizing outreach events. Planning for the Milwaukee event resulted in new exhibits being added to the Outpost's collection, even though the host cancelled us out with three days to go.

The project demonstrated how powerful a source of innovative ideas and projects the Town Meeting could be. The Town Meeting attracts many members, non-members also, who have fresh ideas that may not have occurred to those of us in the Moon Society Leadership.

Thanks to all of you who worked on local Apollo Moon Parties, whether or not they actually came off. The Society deeply appreciates your initiative and energies and dedication.

We look for more member-organized projects in the future. You should know that among the Pro-Space organizations, the Moon Society has the largest percentage of "involved" members. Take a bow! **<MSJ>**

Apollo Moon Party #2

How and Why We Should Try it Again

By Peter Kokh

And this time we will have *more* months to plan *more* carefully! That said, I think we would be making a big mistake, if we tried to do six more Apollo Moon Parties. In 1970-72, the public grew increasingly bored with each new Moon Mission *because so much of each mission seemed to be a rerun at a new location.*

But three more could be just right! *All the odd numbered missions* are especially memorable, Each one suggests special ways of handling an anniversary event:

* A11 - The first!
* **A13 - Near disaster*!* - "Space is worth the risk"**
* A15 - **Lunar Rover Debut** - Manned Lunar Rover design engineering competitions
* A17 - **The last** - Lessons from Apollo missions that mandate that we must return, *to stay!*

About Apollo 13 - "Houston, we have a problem"

> The mission launched on April 11, 1970 at 13:13 CST. Two days later, while the mission was en route to the moon, a fault in the electrical system of one of the Service Module's oxygen tanks produced an explosion, which caused a loss of electrical power and failure of both oxygen tanks. The command module remained functional on its own batteries and oxygen tank, which were only designed to support the vehicle during the last hours of flight. The crew shut down the Command Module and used the Lunar Module as a "lifeboat" during the return trip to Earth. Despite great hardship caused by limited power, loss of cabin heat, and a shortage of potable water, the crew returned safely to Earth, and the mission was soon termed "**a successful failure.**"
>
> - http://en.wikipedia.org/wiki/Apollo_13

The mission ended safely on Saturday April 17, 1970 - The emergency occured on April 13th, 1970. The 40th Anniversary Dates are Sun-Sat, April 11-17, 2010.

www.spacefacts.de/mission/english/apollo-13.htm

Theme: "Space Exploration is worth the cost"

The pioneering of every frontier brought with it many risks. People did die, and in the end it was worth it. None of us who live in the Americas or Australia would be living here, if our ancestors had not embraced deadly risk as an acceptable price for the opportunity to live a more meaningful life building a new frontier: for a chance to start life over fresh, on the ground floor, where all the lead positions were not already taken.

We cannot allow those who have become danger-shy to impose their risk-averse mindset on anyone else! Volunteers have the right to risk their lives for opportunity. This is not an issue to be decided by polls!

Talking Points:

* **The "deadly" Moon**, hostile to life, and how we will meet all the challenges and learn to handle them as if by second nature even as all frontier-pioneering folk before us have done. We might draw a comparison to the "unlivable" home country of the Eskimo and Inuit in the arctic.
* **Perceived drawbacks** and disadvantages are often the key and/or the clue to opportunities: *"if you think something is a disadvantage, you aren't looking at it right."* - this writer's mother to her teenage son.
* **A PowerPoint presentation** on how we can handle each perceived risk to living on the Moon
* **A poll** on the acceptability of risk by age, income, demographics, etc.
* **The Movie Apollo 13,** the Book Apollo 13, patches, other memorabilia
* **Appearances** or video snippets from Jim Lovell and *Apollo 13* actors Tom Hanks, Kevin Bacon, Bill Paxton Gary Sinise, Ed Harris
* **A list of Books and Films about similar heroism** e.g. *Shakleton's Antarctic Adventure* (IMAX) http://main.wgbh.org/imax/shackleton/

L>R: James A. Lovell, Command Module pilot **John L. "Jack" Swigert**, and Lunar Module pilot **Fred W. Haise**

The Apollo 13 Mission Patch

Chapters & Outposts

www.moonsociety.org/chapters/chapter_events.html

Moon Society St. Louis Chapter

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

Contact: Keith Wetzel <kawetzel@swbell.net>

Next meetings – Aug 19th, Sept 16th, Oct 21st

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

July 19th Report – We did not put on our own Apollo Moon Party but did support a talk by Gregg Maryniak (X-Prize org.) at Herbie's (formerly Balaban's) in the Central West End (near the NW corner of Euclid and McPherson) on July 16 at 7 pm. The title of Gregg's talk was "Can Space Exploration Save the Earth?"

Moon Society Phoenix Chapter

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

Contact: Craig Porter <portercd@msn.com>

Moon Society Phoenix' next meetings are on
3rd Saturdays: **August 15th, Sept. 19th, Oct. 17th**

July 18th Apollo Moon Party Report: – Below is a link to some photos from our exhibit we at the Arizona Science Center Saturday. The display and the talk Chuck and I gave there and at the Challenger Center was well received by the staff at each institution. – Mike Mackowski –
http://www.flickr.com/photos/mjmackowski/page2/

Moon Society Houston Chapter

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

Contact: Eric Bowen eric@streamlinerschedules.com

Apollo Moon Party Saturday, July 18: "What a party!"

In spite of inclement weather, Fly Me to the MOON! was a HUGE success! Due to thunderstorms in the area the venue was moved indoors, but we still had a Texas-size good time! Houston chapter members manned a booth and passed out star charts, mini coloring books, and Larry Friesen's handouts on "Galileo and the Telescope" and "Newton and Gravity". The star attraction was a set of gravity bricks provided by Peter Kokh and Ken Sweeney Sr.; there was a line of kids and adults waiting to try them out most of the night. We also passed out Moon Society flyers and information; several of the guests attending expressed an interest in the society and its work. The crowd was thick all night; we scarcely had a slow moment from 6:00 to 8:30. The line for hot dogs and chips was daunting; a big thanks to Larry Friesen who brouhgt along a bucket of chicken! We also provided entertainment; a good selection of vintage 1969 music performed by Bandella. They did a great job!

Thanks go out to all the Houston Chapter members; to Ken Sweeney Sr. for providing the gravity bricks; to Larry Friesen for his excellent handouts; to Ken Bowen for providing our new display banner—it looks great! — and to Craig Beasley for helping to man the booth and give the rest of us a much-needed chance to take a break and see some of the show. An event opportunity like this doesn't come around very often, so I'm very grateful to everyone who helped us take advantage of it with a job well done. Thanks again, everyone!

On a much more somber note: It is with great sadness that we report that our chapter treasurer, Ken Sweeney II, passed away very suddenly this past Wednesday, July 15. He was a very active and committed member and was instrumental in the rebirth of the Houston Chapter.

Apollo Moon Party Part 2 —July 20th

On the evening of July 20, 2009, the Houston chapter members met in the meeting room of Coffee Oasis to share a relaxing evening commemorating the 40th anniversary of the First Lunar Landing. There was plenty of food, and we watched the HBO From the Earth to the Moon chapters covering Apollo 9 ("Spider") and Apollo 11 ("Mare Tranquilitatis"). Invitations went out to all the former Houston area members on our mailing list, and we did have several new faces which showed up for the evening. We hope to see you again soon!

===== Moon Society Outposts =====

www.moonsociety.org/chapters/chapter_outpost_map.html

Moon Society Nashville Outpost

Contact: Chuck Schlemm cschlemm@comcast.net

1. Nashville Outpost Apollo 11 anniversary celebration 7/10/09: Chuck Schlemm did a "public astronomy" event at the "Full Moon Pickin' Party" at Warner Park, a monthly outdoor country music concert. I set up a 6" telescope for guests to view Saturn and its moons, several star systems and by night's end, the beautiful rising Moon along side Jupiter and 4 of it's moons.

I gave away "Apollo 11 Moon Pies" after some of the guests viewed the Moon "close up," and told them a little about the Moon Society's efforts to return to the Moon to live and work. I also gave away "International Year of Astronomy" bookmarks and National Science Foundation cards to register to win a Celestron Sky Scout.

2. Nashville Outpost Apollo 11 anniversary celebration 7/16/09: We hosted an Apollo 11 anniversary celebration at the Barnard Seyfert Astronomical Society's monthly meeting, supplying Moon Pies and chocolate chip "Moon rock" cookies for 25 guests. I displayed models of the Saturn V, Lunar Mudule, Command and Service Module, Lunar Rover with astronaut and posters of Ares I and V. Signs stated that this was presented by the Moon Society on the 40th anniversary of the Apollo 11 mission. Web address and society mission description were included. Several guests related their memories of the mission and where they were when they saw the moon walk. One guest was proud to tell his story of how he was a young engineer at that time whom NASA personnel called for some operational information about a pressure valve system on the day of launch and that he gave them the information assuring the valve operation was OK, and that his mother told everyone that her son had given the "GO FOR LAUNCH" for Apollo 11. He was just happy to be a part of this momentous program

I plan another celebration at a combined MS Outpost and Middle Tennessee Space Society NSS chapter meeting 7/24/09. To the Moon, Chuck Schlemm.

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

Electronic MMM (pdf) **$35** Students/Seniors: **$20**
Hardcopy MMM: U.S/Canada **$35** Elsewhere: **$60**
Join/Renew Online - www.MoonSociety.org/register/

Moon Society Mail Box Destinations:

Checks, Money Orders, Membership Questions
Moon Society Membership Services:
PO Box 940825, Plano, TX 75094-0825, USA

Projects, Chapters, Volunteers, Information, etc.
Moon Society Program Services
PO Box 080395, Milwaukee, WI 53208, USA

< End Moon Society Journal Section >

GREAT BROWSING

Inflatable tower could climb to the edge of space
www.newscientist.com/article/mg20227117.000-inflatable-tower-could-climb-to-the-edge-of-space.html

2009 NASA Art Contest Winners
http://www6.cet.edu/copper/2009_winners.php

An uptick for space tourism
http://www.thespacereview.com/article/1390/1

Can **private sector break through in space access?**
http://www.thespacereview.com/article/1388/1

Should India and US cooperate on space solar power?
http://www.thespacereview.com/article/1389/1

Book Review: The New Moon Race
http://www.thespacereview.com/article/1387/1

Why the vision of space colonies has not come true
http://www.thespacereview.com/article/1376/1

"**Space 2.X: The Private Rocket Race Takes Off**"
www.wired.com/wiredscience/2009/06/gallery_spacex

Tickets for Virgin Galactic could drop to $50,000
http://www.travelweekly.co.uk/Articles/2009/06/09/31171/itt-tickets-for-virgin-galactic-could-drop-to-50000.html

Disney adapts Edgar Rice Burroughs book series
http://blogs.coventrytelegraph.net/thegeekfiles/2009/06/how-will-disney-bring-john-car.html

Make a Paper Model of LR2O
http://lro.gsfc.nasa.gov/images/LRO_PaperModel.pdf

New Instrument Could Detect Water Deep Underground On Mars
www.marsdaily.com/reports/New_Instrument_Could_Detect_Water_Deep_Underground_On_Mars_999.html

Shuttle Program Manager on Cheaper Moon Travel
http://www.dailytech.com/NASA+Shuttle+Program+Manager+Proposes+Cheaper+Moon+Travel+/article15569.htm

Japan Shooting For Space-Based Solar Power
http://www.nni.nikkei.co.jp/e/fr/tnks/Nni20090627D27JFF04.htm

Missions to the Moon (blog)
http://missionstothemoon.blogspot.com/

The Debate over Ares I
http://www.nasawatch.com/archives/2009/07/farewell_ares_1.html

http://www.airliners.net/aviation-forums/military/read.main/109097/

36 upcoming scifi movies you may not know about
http://denofgeek.com/movies/263379/36_upcoming_scifi_movies_you_might_not_know_about.html

Planetary Society Member Poll Results
(How they can interpret this as a mandate to drop the Moon in favor of Mars is beyond understanding)
http://planetary.org/special/telljim/survey09_results.html

Book Review: Moon Landing
http://www.washingtonpost.com/wp-dyn/content/article/2009/07/14/AR2009071403465.html

Structural Design of a Lunar Habitat
http://coewww.rutgers.edu/~benaroya/publications/Ruess%20et%20al%20ASCE%20JAE.pdf

Book Review: The New Moon Race
http://www.thespacereview.com/article/1387/1

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

LRO-LCROSS Animation
http://www.space.com/common/media/video/player.php?videoRef=SP_0906112_LRO-animation

Slate TV – If Man Walked on the Moon Today
http://slatev.com/player.html?id=30020544001

National Geographic living on the Moon – trailer
http://channel.nationalgeographic.com/series/naked-science/4253/Overview?#tab-Videos/06893_00

We Choose the Moon
http://www.wechoosethemoon.org/

Video on Gerard O'Neill and his Ideas
http://www.youtube.com/watch?v=e14LDWt-Q1k

"Clarke's Law"

New ideas pass through three stages:
* Stage 1: "It can't be done."
* Stage 2: "It probably can be done, but it's not worth doing."
* Stage 3: "I knew it was a good idea all along!"

Help us put MMM in a Library near You!

Whether you are a member of an NSS Chapter or of a Moon Society Chapter or Outpost, or a Moon Society member at large, you all get Moon Miners' Manifesto as a membership benefit.

A library subscription to a library in your community will help spread the word, whether about local or national or international Moon-focused programs and projects.

For chapters and outposts such subscriptions will be good advertising for your local efforts.

For Moon Society members, as all copies of MMM include the Moon Society Journal centerfold section, community library or school library copies of MMM will help grow name recognition and invite readers to join.

As membership services are not involved, the cheapest way we can do this is by submitting these subscriptions directly to the publisher at a cost-minus rate of $10 a year, available for libraries only.

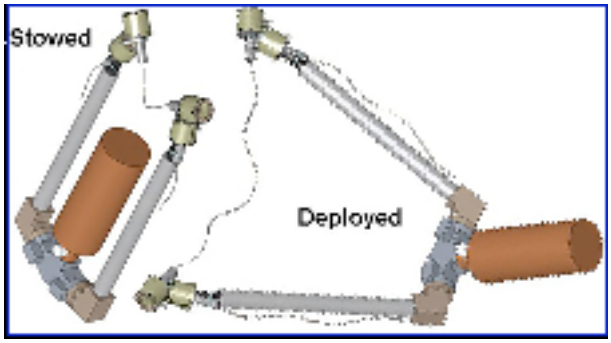
How to participate in this program

- Send *by postal mail only*
- Your check of money order for $10.00/per year
- With the complete name and address of the Library,
- Made out to

"Lunar Reclamation Society"
Attn: Library Subscriptions
PO Box 2102
Milwaukee, WI 53102

MMM PHOTO GALLERY

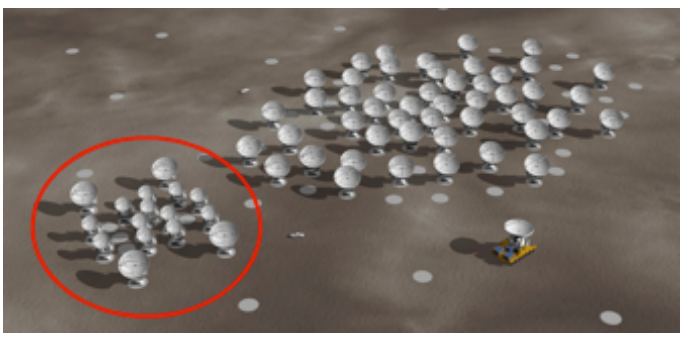
Happy 40th to Apollo 11 and Crew!



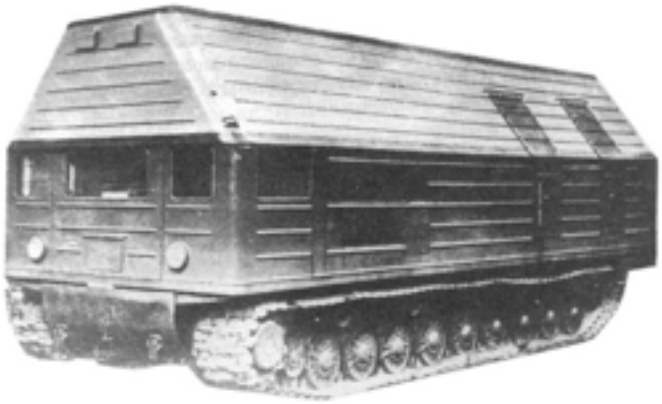
Mars Time Domain Electromagnetic Sounder (MTDEM), to use induction to detect groundwater up to 5 km deep. – Ball Aerospace. [Stowed L; Deployed R] The inductive principle of the MTDEM is distinct from the wavelike, surface-penetrating radars MARSIS and SHARAD orbiting Mars. The system deploys a 200-meter loop with less than 6 kilograms mass and could detect groundwater at depths up to 5 kilometers (3 miles).

New NASA Administrator **Charles Bolden** and Deputy Administrator **Lori Garver**, *one of our own!*

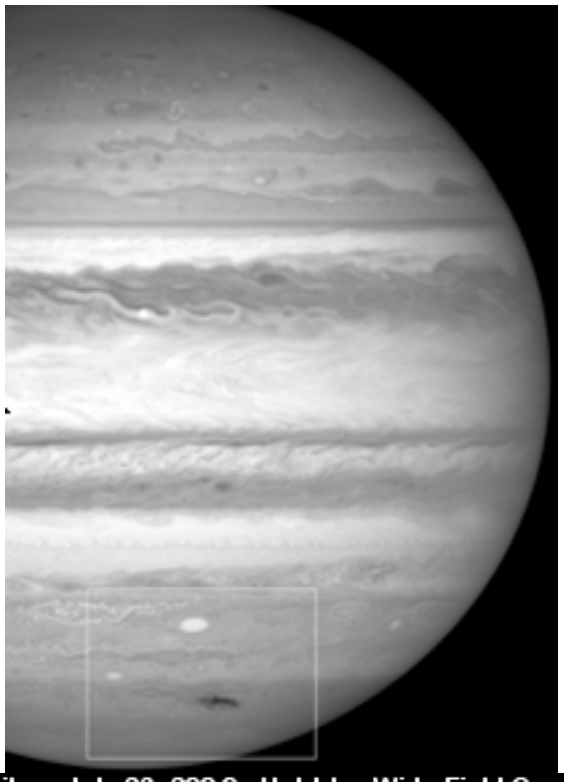
A NASA illustration (date?) of a 7-module outpost consisting with cylinders set in trenches, then covered with the moondust removed in excavation of the trenches

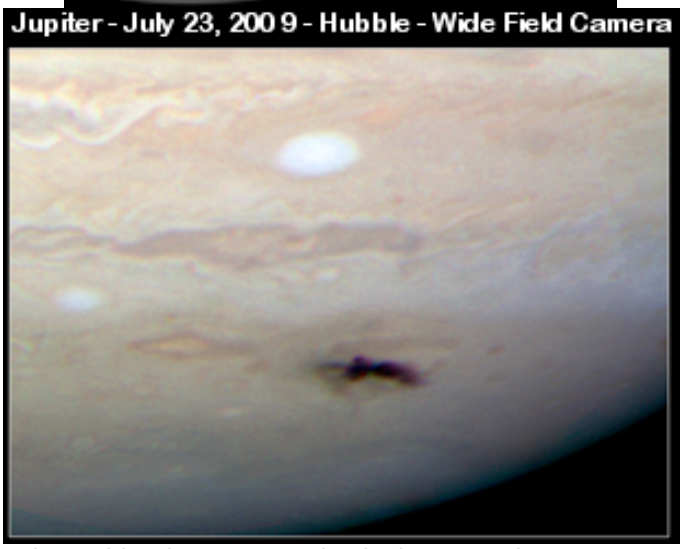


Above: the gigantic radio telescope **ALMA** (**A**tacama **L**arge **M**illimeter/submillimeter **A**rray) in northern Chile.



Russian Mobile Nuclear Plant – suitable for Moon or Mars?
http://englishrussia.com/?p=2355





The visible white spot marks the location where a comet or asteroid recently plunged into Jupiter's very thick atmosphere, first noticed July 19th

MAIL TO MMM

On Tue, 6/9/09, Stuart Scott pssco00@gmail.com
Subject: Dave Dietzler's article in MMM # 225
Building Solar Power Satellites: Alternative Materials

Conceivably, you could cut threads in a titanium bolt with lasers, but Ti is hard to extract and cast and upset and weld... so I predict that we will make nuts and bolts of steel. That won't demand too much carbon. David Heck told me that the aluminum frame of the Space Shuttle is bolted together because Al is hard to weld. Steel bolts of course. So perhaps we will be bolting Mg structures together on the Moon."

There are many alloys of different materials and they have different characteristics. The statement that Ti and Al are hard to weld is not true overall. The structural Al alloys used in aircraft construction are indeed unweldable and cannot be brazed, either. Common aircraft practice is to rivet them. They can also be adhesive bonded. There are some great epoxy products for this and it avoids the stress concentrations associated with the holes that rivets require. Where I worked making radiation detectors, we welded assemblies of aluminum, and titanium using the same sort of TIG procedures that we used for stainless steel, nickel, and Inconel. Magnesium required a submerged arc TIG process, but we welded that easily, also. The alloys we used were chosen not for strength, but for low activation from long term exposure to radiation. That usually meant using alloys that were difficult to machine.

Ti can be machined, we did that regularly, and I see no reason why it cannot be threaded using conventional tooling, although I don't recall having any occasion to try it.

We did have to use some materials that most other people never needed and do not know how to handle. It just turned out that they may require some special care, but can be handled pretty easily once you get the hang of it.

Stuart

Dave Dietzler Replies:
Stuart,

Thanks for the heads up. We won't have much in the way of adhesives on the Moon and free vacuum means we won't need shield gas...unless the molten weld wants to evaporate away on us!!! We don't have much to alloy Al with besides Mg, Si, Mn and Cr on the Moon. We won't have much to alloy Ti with besides Al either. So it all does become confusing...In connection with the Moon i usually think of unalloyed metals. I don't write the most sophisticated articles, that's above my pay grade, and some articles were just emails that Peter plucked...so there's room for improvment. I am CCing your message to Peter and Dave Heck. I hope Dave responds with his wisdom regarding titanium bolts vs steel, and the general use and machining of steel vs. titanium.

We can harvest iron fines and use magma electrolysis to get iron. We can harvest solar wind implated carbon or upport some. We can combine iron and carbon by the simple blister steel, also called crucible or cementation process...Titanium will require electrostatic ilmenite extraction from regolith, reduction with hot hydrogen gas, roasting the iron out of the particles of TiO2 fused with iron, then using FFC cells to get titanium. The FFC cells will require upported CaCl2 flux and graphite electrodes...To the best of my knowledge the electrodes won't burn up-but i could be wrong. Eventually we will get calcium from regolith and chlorine from volcanic glass on the Moon to make CaCl2 flux. So iron and steel making look lots easier. As for aluminum....oh brother....what a hassle...but we will produce enough for electrical wires at least.

Thanks,
Dave Dietzler pioneer137@yahoo.com

Another Lunar Analog Outpost Proposal
This One from India

MMM News Sources

It should come as no surprise to anyone who has been watching the rise of general pubic enthusiasm in India for the Chandrayaan-1 probe now in orbit around the Moon, the announcement of a second Chandrayaan mission to include a lunar rover, talk of India sending probes to Mars, and the announcement that India will begin its own Manned Space Program with its own 2-person capsule and launchers, that India has the Moon Bug. Readers who have been taking advantage of the free download of the first 3 issues of MMM-India Quarterly http://www.moonsociety.org/India/mmm-india/ will have noticed a set of articles in M3IQ #3 just released that India consider putting together its own Lunar Analog Research Station Program.

Now, Pradeep Mohandas, formerly President of SEDS India, and a new Moon Society member already on the leaders@moonsociety.org mailing list, is taking this suggestion and running with it. Mohandas wants to build broad support for such a program before jumping the gun, looking for a site, designing a station, and finding funds to make it real. He wants to build a Moon Society chapter network in India first, and start a number of student design contests and engineering competitions in an effort to build a broad base of support for such an effort. To us, this seems like a solid plan and a wise way to get from here to there.

In the cited M3IQ issue #3, we pointed out that India has a good number of potential sites both in the Rajasthan desert area and in rain-shadow mountain valleys in the north where the Himalayan foothills begin. As to experience, some readers may be surprised to know that India has been operating its own station in Antarctica since 1981. A first station was abandoned after a new one was built nearby in an ice-free rocky "oasis" on the coast of Antarctica due south of Africa. Maitri station houses 25 scientists and logistics support personnel in the summer, about half that number over winter. This is not only experience applicable to a lunar analog station, but to a real lunar outpost as well. ###

Above: India's **Maitri Station** in Antarctica

COMET OR ASTEROID STRIKES JUPITER

http://hubblesite.org/newscenter/archive/releases/2009/23/full/

[See photos on previous page]

First noticed on July 19th, there is a new large white spot in Jupiter's southern hemisphere, twice as wide as the United States – Jupiter itself is 11 times as large as Earth in diameter, 120 times in surface area. As luck would have it, Hubble's Wide Angle Camera had just been fixed and has joined scores of terrestrial telescopes in observing the resultant local chaos.

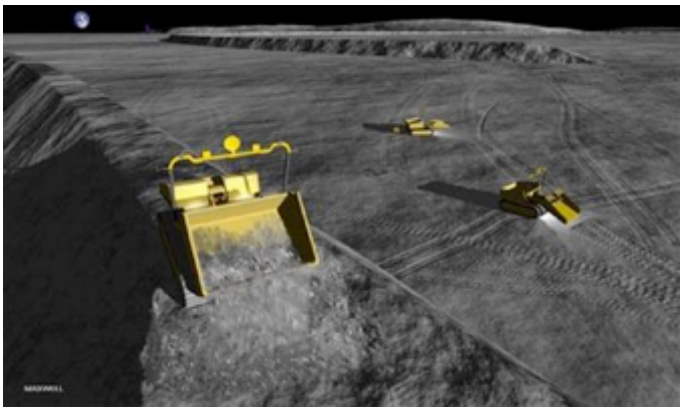
"MY MOON"

http://mymoon.lpi.usra.edu/

Along comes a special new website dedicated to the Moon, helping you find out anything you've been curious about, answering your questions, and more than whatever you always "just wanted." As Ben Huset of the Twin Cities writes, this site is "very 2.0" as in Web 2.0. Full of the very latest in web capabilities and gimmicks.

Give it a whirl. Indeed there is rotating lunar globe that begs exploration. I don't know who at the Lunar & Planetary Institute in Houston worked on this, but they sure had a lot of fun. You can click on any point on the surface and drag it so that you are over one of the poles instead of the equator.

Robo-Bulldozers Grade Moon Spaceport



NASA wants to build a polar outpost on the Moon starting in 2020, and one of the most promising ways to get that done is by using ***robo-Tonka trucks*** supplied by **Astrobotic Technology** and researchers from Carnegie Mellon University. The lunar robo-dozers would be charged with fleshing out a landing pad and launch site for rockets and other spacecraft.

http://astrobotictechnology.com/wp-content/uploads/2009/Astrobotic%20MoonDigger%20Report.pdf

The results of the work on the robo-Tonka trucks and robo-dozers were presented July 24th, in Washington, D.C., at a NASA Lunar Surface Systems conference

http://www.nasa.gov/exploration/library/lss_systems_concepts_workshop

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!

2009 LRS OFFICERS | BOARD* | Contact Information

PRES. / MMM Editor – *Peter Kokh **NSS**
< kokhmmm@aol.com > 414-342-0705
VICE-PRES. Doug Armstrong **NSS** 414-273-1126
SECRETARY – *James Schroeter **NSS**
< James_Schroeter@excite.com> . 414-333-3679
TREAS./ Database – *Robert Bialecki
<bobriverwest@yahoo.com>..... 414-372-9613

LRS News

• **Our Proposed "Apollo Moon Party" event**, commemeorating the 40th anniversary of the first Moon landing, was to be a manned exhibit at the Soref Dome IMAX/ Planetarium, was rejected by the IMAX Exhibits Committee on the grounds that "we needed too much space." Given that we had specifically indicated that we could trim our exhibits to the space available, and given that they decided to put up their own Apollo 40th exhibits, this seems to be yet another case of "not invented here" syndrome, an attitude with which we had gotten familiar with on the part of previous directors at the formerly adjacent Discovery World Museum. The Pros do not want amateur assistance. It's that simple.

It is becoming increasingly difficult to pin down outreach opportunities and places willing to host us, and /or already scheduled events on which we could piggyback, a tactic that guarantees "traffic."

• **Peter Kokh asked to help design Lunar Analog Station in Chile:** Peter has been solicited to help design the proposed Moon/Mars Atacama Research Station in northern Chile. You can check out the Google Group for this – http://groups.google.com/group/moonmars He may be going down to Chile in the process, courtesy of Chile's Air Force, which is backing the effort.

We are on Summer Break

LRS Upcoming Events

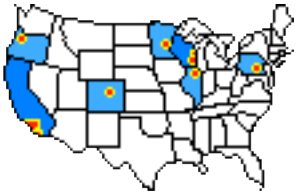
Saturday: September 12th, 1-4 pm

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

Reports:

- The Moon/Mars Atacama Research Station Project;
- The International Lunar Research Park Concept;
- Apollo Moon Party 1 report, prospects for Party 2;
- World Space Week, October, 4-11th

Review: "The Moon" movie
DVD: TBD



News & Events of NSS' Nine "MMM" Chapters

Space Chapter HUB Website:
http://nsschapters.org/hub/

WISCONSIN

Sheboygan Space Society
728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376 (h) <willf@tcei.com>
SSS Sec. Harald Schenk <hschenk@charter.net>
>>> **DUES:** "SSS" c/o B. P. Knier
22608 County Line Rd, Elkhart Lake WI 53020
http://www.tcei.com/sss/
We meet the 3rd Thurs even # months 7-9pm
At The Stoelting House in Kiel, WI
• **Next Meetings: Aug 21st - Oct 16th**

OREGON

Oregon L5 Society

P.O. Box 86, Oregon City, OR 97045

voice mail / (503) 655-6189 -- FAX (503)-251-9901
[http://www.OregonL5.org/]

Allen G. Taylor <allen.taylor@ieee.org>
Bryce Walden <moonbase@comcast.net>
(LBRT - Oregon Moonbase) moonbase@comcast.net
* **Meetings 3rd Sat. each month at 2 p.m.**
Bourne Plaza, 1441 SE 122nd, Portland, downstairs
• **Next Meetings: August 15th, Sept. 19th, Oct. 17th**

Chicago Space Frontier L5

610 West 47th Place, Chicago, IL 60609

INFORMATION: Larry Ahearn: 773/373-0349

A team of members from the three Chicago area chapters is working hard to organize next years's **2010 International Space Development Conference**. The core group involved has the Chicago ISDC of 1989, arguably the biggest and best ever, under their belt.

We can expect another blockbuster. **Mark your calendars now** for **Memorial Day Weekend 2010, May 27-31st**. Reserve those dates and register early for the best price.

MINNESOTA

Minnesota Space Frontier Society
c/o Dave Buth 433 South 7th St. #1808
Minneapolis, MN 55415
Tom Greenwalt (w) 763-784-6244 (h) 763-442-6015
David Buth (w) (612) 333-1872, (h) (763) 536-1237
Email: tomg@mnsfs.org
[www.mnsfs.org/]

Calendar: MN SFS 2009 Past & upcoming chapter events
www.freemars.org/mnfan/MNSFS/2009-12-Review/

• Aug 11th, 2009	MN SFS Meeting
• Aug 21-23rd,2009	NorthWoods Star Fest http://www.cvastro.org/
• August 25th, 2009	STS-128 Display
• Sept 8th, 2009	MN SFS Meeting
• Sept 19th, 2009	MN SFS Quarterly Event?

√ Ben's Pix from MAS Campout with the Stars, July 24-26 http://freemars.org/mnfan/MAS/2009-07-CWTS/index.html

CALIFORNIA

San Diego Space Society
http://sandiegospace.org/

info@sandiegospace.org - events@sdspace.org

Quarterly Newsletter: ***The Bussard Scoop***
Meeting the 2nd Sunday monthly
September 13th - October 11th

• **Next Meeting: September 13th** 2:30 to 4:30 pm. Serra Mesa Branch Library, 9005 Aero Dr, San Diego. Join us for the September general meeting of the San Diego Space Society. Dr. David Schrunk of the San Diego Moon Society will give a lecture on the Planet Moon Project, which portrays a vision to transform the Moon into an inhabited sister planet of the Earth in the 21st century.

DrSchrunk is lead author of "The Moon: Resources, Future Development and Settlement" (2007), which has been praised as "a handbook describing what must be done to return to the Moon, build permanent bases, and use them as a springboard for economic development".

• Photo from Our Apollo Launch Party on August 2nd: http://sandiegospace.org/wp-content/uploads/2009/07/launch-picnic-canopy-300x225.jpg

Other Upcoming Events

August 13th: * **Space Elevator Conference** (all day)
sandiegospace.org/2009/06/29/space-elevator-conference/
August 20th: * **Julian Starfest II** (all day)
http://sandiegospace.org/2009/05/22/julian-starfest-ii/
September 4th: * **40 Years - Race to the Moon**: A Celebration with Space Legends (5:00 pm)
http://sandiegospace.org/2009/05/22/40-years-race-to-the-moon-a-celebration-with-space-legends/

PENNSYLVANIA

Philadelphia Area Space Alliance
928 Clinton Street, Philadelphia, 19107

c/o Earl Bennett, earlisat@verizon.net
856/261-8032 (H), 215/698-2600 (W)

Mitch Gordon 215/625-0670 mfgordon@excite.com

[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: Saturday, September 19th - Earl Bennett.

The PASA Report for July 2009: We have not set meetings for the next few months as we have been focusing on upcoming events now completed. By tradition, we try to hold our August meeting at "the shore" even though this is not always successful. If we do have one it will be posted on our website by Larry, our webmaster. Then, for September, Saturday, the 19th, Liberty One Food Court 1-3 pm. Look for our table display.

Activity notes: Earl was invited to The Franklin Institute to give a talk about the Moon in the past, in Galileo's time, and the near future when we go there. Since the children had heard lots about Galileo and his development of the telescope, I focused on his work at the Venice Naval Arsenal and his willingness to experimentally verify, or refute, what was academically accepted. His work on the practical needs of naval commerce and warfare taught him that the accepted theory, that shape determined whether something would float, was wrong. I did a simple demonstration of different shapes and a low density randomly shaped object to show the principal. I then related it, not to lunar exploration, but our future visits to moons in the outer solar system with watery interiors and hydrocarbon seas. I came back to the Moon at the end with the upcoming LCROSS impact in late August. My invitation to talk was for The Discovery Camp given by the Institute. See the fi.edu site for more on these.

On July 19th, Derrick Pitts, Chief Astronomer of the Franklin Institute, invited our group, through the efforts of Mitch Gordon, to celebrated the fortieth anniversary of the Apollo Eleven Moon Landing. Due to circumstances, Mitch, Earl, and Dennis Pearson were the only members of our group able to attend this event. Our limited number did not reduce the fun of being there. It was a beautiful day and we had a triple threat, or treat, in our displays: Mitch brought his space exploration articles book that he has developed to use for talking points. He also used several of our other talking point displays to augment the book. Dennis brought historical material from the Apollo Moon Landing period including the official Apollo Eleven press kit, an educational package, for science teachers, on the program, and several displays he has developed. His talks included why we should go to the Moon again and what's in it for us. And I took the middle space. I covered Lunar Lava Tubes and why we would use them, how we could get power from space or even the Moon, and a number of science and space questions. I had the Lava Tube display, a large solar panel, and a number of magazines and classic books. I caught the interest of our host, Derrick Pitts, with The AMSAT Journal. Not only was he a ham operator, but he was also a member of the Amateur Satellite Corporation! Space has been both a vocation and avocation with him. We thank him for the invitation to present to the public.

Back to the people at the event: there where a large number of American and foreign born guests at the Institute and much interest in our topics. I know that Mitch had a lot of people who liked the idea of eventually making Mars a second home for us and Dennis gave a good account of what we may again achieve with Apollo like hardware (the new Orion system and new launch capabilities). I fielded questions brought on by my talk of the need for sheltering from the raw output of the Sun (" what's an Ion?" from an eleven year old) and environmental questions about radioactive waste disposal, such as into the Sun (by a San Francisco surfing environmentalist).

There was also a sad note: the man we all listened to during the Apollo missions, Walter Cronkite, passed away just before the weekend. So some of the guest shared memories on listening to him as Neil Armstrong and Buzz Aldrin made history.

And on another event at the Institute: thanks to a generous gift from Derrick Pitts we had free entry to the Galileo Exhibit and the Star Trek exhibit as well as the Museum as a whole. I opted for the Galileo exhibit, as did Dennis, and enjoyed the displays of ancient instruments as well as the explanatory displays that where in addition to the historic exhibit. What was looking through the early telescopes like? You can find out at this special exhibit. And the telescope Galileo used? It is positioned away from the wall displays and could actually be missed! Here till early September.

Our next public events, at minimum, will be International Space Day, in October, and The Philcon Science Fiction Convention in November. We will try to bring more to the Space Day event: I was unsuccessful in my attempt to work with some people at the Institute for July presentations but now have the right contact to bring in a speaker or two. Space Day will be at the Franklin Institute and is well attended.

Meeting notes for June: The June meeting was busy, with contributions from Dennis Pearson on his visit to the I.S.D.C. in Florida. He built a traveling display on the new Moon exploration initiative with material he gathered there and had it for our July event. He is one of our active members: at one point he considered taking on the job of Head of the Chapters Assembly of N.S.S. since Tom Horowitz, who has the job, might not have taken it. The upshot is that Dennis is now considering running for the job next year. And if that's not enough, he also signed on for the job of Space Ambassador for an organization made up of Virgin Galactic, Nastar (a local company), and

Zero Gravity Inc. You get points for public presentations and the grand prize, based on a points system, is a ride on Space Ship Two! This is not just wishful thinking for Dennis: he has tried riding a centrifuge at 4.6 gee. Mitch asked about simulated gravity and we discussed that point again. He, Mitch is writing a story and wants to be correct on how big a vehicle he would need to simulate this and why.

We had a second guest, Janice, who talked about a program in New Jersey that received a grant for a project wherein children where being taught to create soil using regolith simulant. Unfortunately the chief research of the project died and the project was put under a cloud due to spending after that happened.

We had a good general discussion due to some of the things Dennis had heard at the I.S.D.C. including the observation that President Obama is pro space but not on humans in space at this time. This from Buzz Aldrin: Barney Frank was brought up as getting in the way of going to the Moon and Mars. He says one or the other, not both. At least he's saying, "Go"! Dennis also heard that people are talking to the President to persuade him to support human exploration. I suspect that national health care may be getting more attention now (July). Hank Smith pointed out that Manned Space Exploration is being marginalized by republicans. Why is not clear. We also discussed the Apollo Village concept, as previously reported in Ad Astra.

Hank is looking for ideas for Philcon this year and is considering having a dinosaur panel again and an update on black holes. And now we have a Space Ambassador to speak!

Mitch is working on a revised business card and is planning to pay our card creator, Larry, to produce it. Mitch will also look into paying any money we may owe Moon Miners.

Post meeting, Earl received The Amsat Journal, which included the second installment of the series on the history of amateur satellite development. There is also a report on progress on Suit Sats electronics suite. Ironically, I must note that the suit that was to be used has been removed from the station to provide storage for something else. This may mean the electronics will be attached to some other free flying structure. In the same issue is a piece on how Owen and Richard Gariott, both hams who have are astronauts, where a major attraction at the national hamfest held yearly at Dayton Ohio. And lots more, but for next month

Submitted by Earl Bennett

COLORADO

Denver Space Society
(formerly Front Range L5 Society)
1 Cherry Hills Farm Drive
Englewood, CO 80113
http://www.angelfire.com/space/frl5/

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

Monthly Meetings, every 1st Monday, 7 PM

Englewood Public Library, Englewood, CO 80110
1000 Englewood Parkway
First Floor of the Englewood Civic Center - **Map:**
www.mapquest.com/maps/1000+Englewood+Parkway+Englewood+CO/

Meetings: Tues. Aug. 3rd - Sept. 7th - Oct. 5th

CALIFORNIA

OASIS: Organization for the **A**dvancement of **S**pace **I**ndustrialization and **S**ettlement
Greater Los Angeles Chapter of NSS
P.O. Box 1231, Redondo Beach, CA 90278

Events Hotline/Answering Machine:(310) 364-2290
Odyssey Ed: Kat Tanaka - odyssey_editor@yahoo.com
http://www.oasis-nss.org/wordpress/
oasis@oasis-nss.org
Odyssey Newsletter Online
http://www.oasis-nss.org/articles.html

- **Next Meetings: August 15th, Sept. 19th, Oct. 17th**
- **Sat. July 18th OASIS Board Meeting; annual Potluck Picnic - Time? Place? Check website.**

- **Saturday, August 15, 3 PM -** OASIS Board Meeting, Home of Steve Bartlett and Tina Beychok, 7108 East Peabody, Long Beach, CA 90808
- **Saturday, August 29, 3 PM** - OASIS LECTURE SERIES, Location TBD - "Ringside with Cassini," by Trina Ray (JPL) Attendance is free and open to the public. This event is not library-sponsored.
- **Saturday, October 3 -** Peter Eisenhardt of the Jet Propulsion Lab will present a talk on the Wide Field Infrared Survey Explorer (WISE). - http://wise.ssl.berkeley.edu/
- **Saturday, November 15**, 3:00 PM - OASIS Board Meeting, Home of Steve Bartlett & Tina Beychok, 7108 East Peabody Street, Long Beach, CA 90808

Special Event: Oct. 2, 2008 **Free Lecture On NASA's Phoenix Mission** at 5:31 am
What: "The Phoenix Mission: NASA's Martian Polar Expedition"
When: 2:15 PM Saturday, 4 October 2008
Carson Public Library, 151 E Carson St, Carson, CA

Come hear what scientists are learning about Mars. Their operation of NASA's Phoenix Lander have made them virtual explorers in the Martian Arctic. With a robotic arm they've dug into the frozen surface, then delivered the scrapings to a portable laboratory whose tests can tell whether life might survive there. They've seen what this bit of Mars is made from — down to soil particles scanned by an onboard microscope and up to panoramic vistas from stereoscopic cameras. With those same cameras and other sensors, scientists are keeping a Martian weather watch — useful information for planning actual human expeditions.

Dr. Leslie Tamppari is the Phoenix Mission's Project Scientist at NASA's Jet Propulsion Laboratory (JPL). She is a graduate of the University of Arizona and received her PhD from UCLA. At JPL she previously worked as the Deputy Project Scientist for the Mars Science Laboratory (launches 2009) and an Investigation Scientist for the Photoplarimeter / Radiometer (PPR) experiment on the Galileo mission to Jupiter. She decided to become a planetary scientist while working as a JPL intern during Voyager 2's flyby of Neptune.

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