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

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

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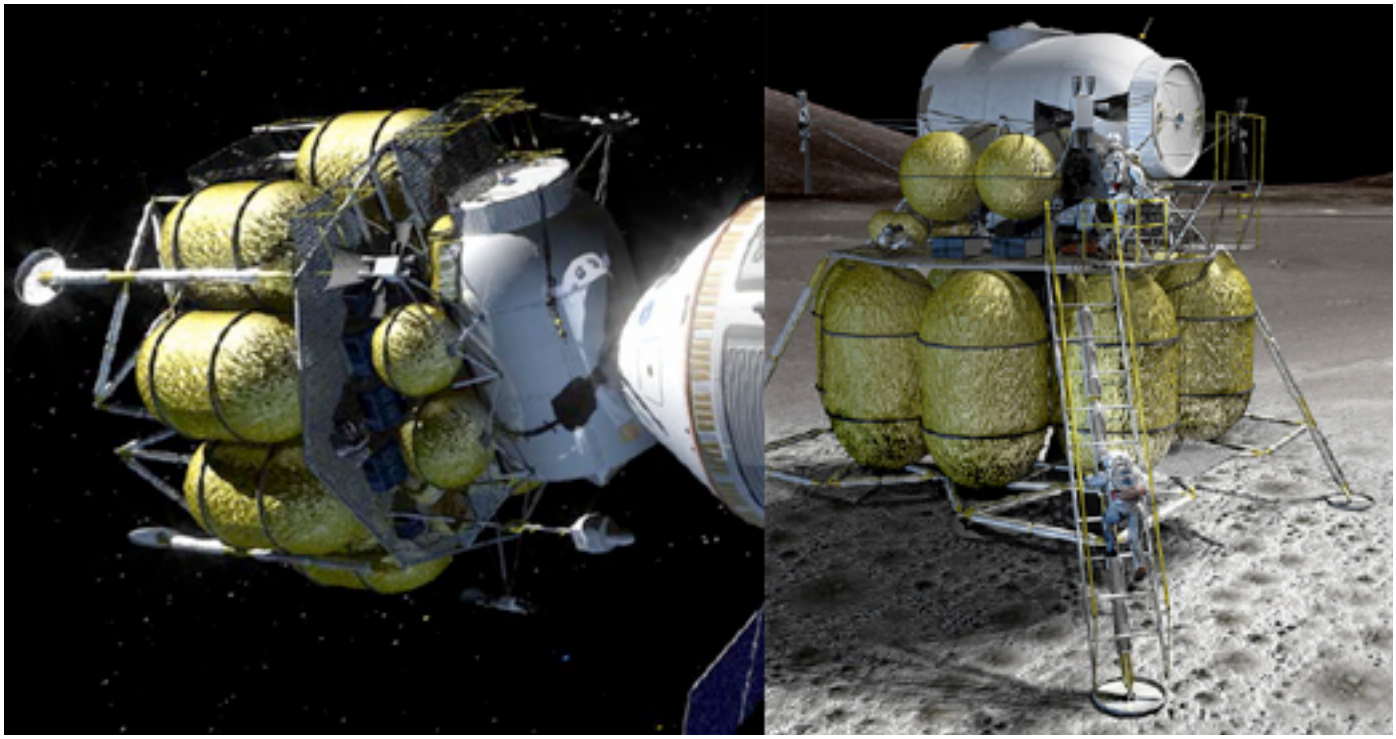


Feature Articles in This Issue

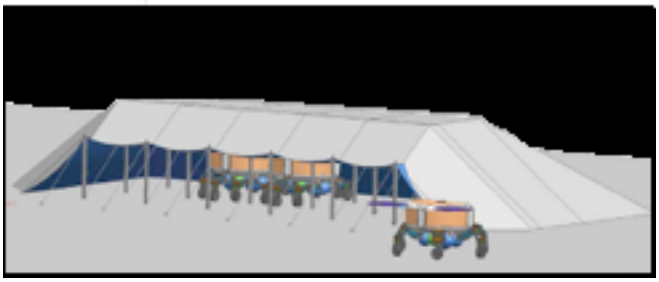
In FOCUS ◎ Moon Lander & Base Design Concepts & ASI Influence

Above: Moon lander concept in AIAA.02.20.07.pdf, John Connally, NASA Lunar Lander Office, www.nasawatch.com

In the NASA Lunar Lander Office concepts study cited above, we were struck by a number of features which, if not borrowed wholesale, seemed to show some brainstorming evolution from ideas first floated in the Artemis Project™ Reference Mission. Indeed, NASA has been aware of the ASI Project since the mid-1990s. >>>

The Concept of the Shielded Shed or Ramada

Another concept, this one mentioned repeatedly in a number of Moon Miners' Manifesto articles, but not part of the Artemis Project™ ideas, that of shielding not individual moonbase modules, but one big ramada (Spanish for sun shading structure) or hanger or shed under which the outpost modules are arrayed, has also found its way into the NASA Moonbase design process. See the illustration at right.



Moon Miners' Manifesto

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

www.Lunar-Reclamation.org/mmm_classics/
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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• **For additional space news** and near-term developments, read ***Ad Astra,*** the magazine of the **National Space Society**, in which we recommend and encourage membership

• **The Lunar Reclamation Society** is an independently incorporated 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, 1620 I Street NW, Suite 615, Washington, DC 2006; Ph: (202) 429-1600 - www.NSS.org

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

• **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.

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

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

√ Mac compatible CD / or typed hard copy must be mailed to:
Moon Miners' Manifesto, c/o Peter Kokh,
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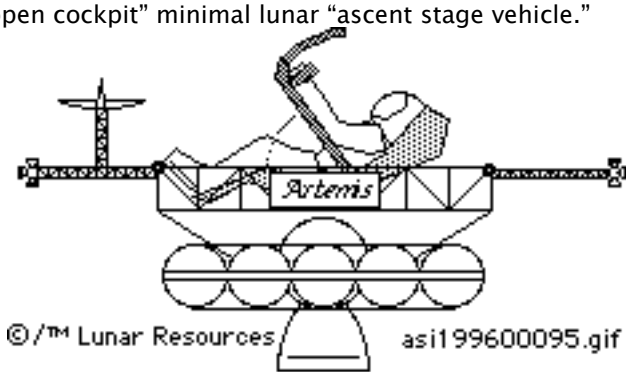
⇒ IN FOCUS Editorial continued from p. 1.

The "Space Motorcycle" was perhaps the key design breakthrough of the Artemis Project™. It was an "open cockpit" minimal lunar "ascent stage vehicle."



Minimizing the ascent vehicle mass in this way allowed the delivery to the Moon's surface of a habitat structure significantly more spacious than the cabin of the Apollo Lunar Module. The "Artemis™ triple SpaceHab would have 5 times the volume of the Apollo LM.

Following this inspiration, the NASA Lunar Lander Office is also seeking to minimize the ascent vehicle, but in a less risqué fashion. The astronauts would return in an airlock, much smaller than the Apollo ascent stage.

I asked Artemis Project™ founder and chief architect Greg Bennett about this: his reply on 09/30/2007:

"That design for the Ascent Stage was all my fault. I reviewed it with Bob Overmyer (who was a retired Shuttle commander at the time, one of the MOL astronauts) and Bob showed it several of the other pilots. They said they'd volunteer to go on the mission just to be able to fly that thing! :)

"This week I saw another Artemisian philosophy heavily propounded by NASA: Leave the lunar transfer vehicle (Orion) on its own in lunar orbit and have the entire crew go to the surface. That's a page right out of the Artemis Data Book! It's very gratifying to think that the Artemis Project work might be having a positive effect on the new lunar missions!" - GRB

Undoubtedly, many members who have been with us since the Artemis Project™ days of the mid-late 1990s may have thought that all this brainstorming on our part had proved to be so much ado about nothing. *Not so!*

Watch the Constellation/Orion Moon Lander Video
www.nasa.gov/externalflash/cev/index_noaccess.html

NASA has adopted the spirit of what we were trying to do, but as always, reinventing everything and making it its own, as it should. Just take a look at the crew module atop the Lunar Lander as depicted on our front page NASA artwork. It is *big, very big,* in comparison to the cramped Apollo LM cabin. According to the NASA study, this cabin will carry a crew of 4 and provide support for 7 days. It has an airlock, not a mere hatch (which involved venting the cabin when opened.) As to volume comparisons, this says it all:

Apollo Lunar Module	6.65m3=235 cu ft
Lunar Surface Access Module (LSAM)	31.8m3=1123 cu ft

That is a volume (and comfort) increase of 478% or nearly five times, just what we were looking at. Nor is this an isolated instance. Many concepts originated by us "enthusiasts" have influenced current NASA thinking. *Let's be aware, and be proud, and keep up the work!* - PK

THINKING OUTSIDE THE MASS FRACTION BOX: 1

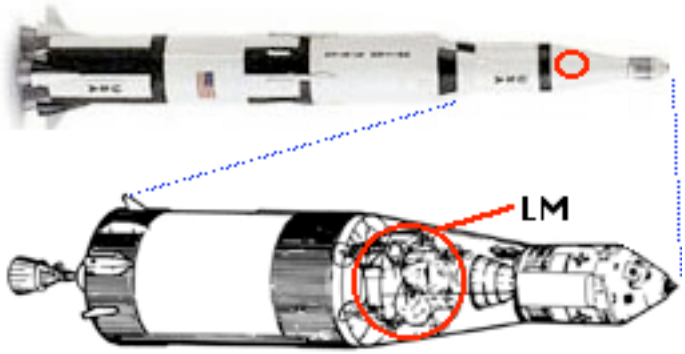
NASA's Lunar Architecture Design Goals are Good, but not quite what we need to Maximize our Lunar Presence Investment

by Peter Kokh

Moon Society Advisor and Videographer Chip Prose has asked me to define the steps we need to take to realize a human presence on the Moon to support a full buildout of an Earth-Moon Economy. Actually, we have talked about most of the elements and steps needed in various articles in MMM through the years.

Thinking within the "Mass Fraction" Box

But it is a very worthwhile endeavor to do the exercise afresh, and with deliberation. We'll make a start with this article, laying out basic concepts to *"really maximize"* the payload delivered to the Moon. This means throwing out the window of the slavishly worshiped law of "mass fraction." According to Wikipedia, "In aerospace engineering, the **mass fraction** is a measure of a vehicle's performance, determined as the portion of the vehicle's mass which does not reach the destination. ... In rockets for a given target orbit, a rocket's mass fraction is the portion of the rocket's pre-launch mass (fully fueled) that does not reach orbit. ... typically around 0.8 to 0.9 [80-90% of the takeoff mass does not reach orbit]" The figure is even more discouraging when we are considering the typical mass fraction deliverable to the lunar surface.

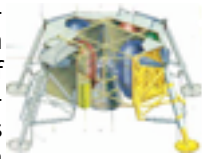


The goal, adopted by NASA, to design the landing craft in such a way as to maximize delivered payload, is excellent. According to the Connally Study:

- minimize ascent module mass
- minimize descent module mass
- maximize landed "payload" mass
- simplify interfaces
- move functions across interfaces when it makes sense

Thus, as we have seen in our editorial report above, by use of a minimal ascent vehicle, NASA can land a much more spacious crew cabin. But this is still a sample of thinking within the Mass Fraction Box.

Thinking *outside* the "Mass Fraction" Box, Part 1



When you think of it, the payload "landed to remain on the Moon" in the Apollo missions consisted only of the descent stage, and assorted equipment left behind. Not much! NASA's new "space-motorcycle"-inspired plan will allow leaving the spacious crew cabin behind. That's a big step, but still within the "Mass Fraction Box."

Our first article on "Thinking outside the "Mass Fraction Box" was "**Essays in 'M': Marshall MacLuhan: "Medium is the Messa**ge" in MMM #6, June 1987. This is republished in MMM Classic #1 - download from:
www.moonsociety.org/publications/mmm_classics/

In this article, we pointed out that the most common flaw in thinking within the "mass fraction box" was to assume without question that no part of the vehicle itself could be reassigned as "payload." We illustrate the possibilities by offering an alternate configuration for the Space Shuttle Orbiter. I urge you to download that volume cited above, if only to get this point across.

Here we are talking about delivery to the lunar surface. In that context, our quest to cheat the "mass fraction" rules drives us to *make sure that everything that we have paid precious fuel to land on the Moon, and which will not depart on the ascent vehicle, is something that has more than temporary usefulness:* that includes every part of the landing platform mass:

- fuel tanks & descent engine & • vernier rockets
- cargo hold & • unloading equipment
- leg struts & • foot pads, • etc.

There are several approaches and types of solutions for this design challenge:

- The item can be reused as is. for example, the bulk of the descent platform, minus engines and fuel tanks, might be reused as a platform for a telescope
- The item's design could be tweaked to enable it to serve some different application, whether similar or quite different, for example, landing struts could be assembled in line to use as an antenna mast, or alternatively to serve as part of a space frame for a canopy shed
- Perhaps part of the descent stage equipment could be designed as a mobile chassis for the crew cabin, either to taxi the cabin to its installation site, or to turn the cabin into a pressurized lunar surface bus.
- The item could be forged of a material that would be invaluable on the Moon, such as lead, copper, brass, or stainless steel; some components, for example shipping stuffs, could be made of reusable plastics, or compressed biodegradables rich in nutrients scarce in lunar regolith

You get the idea. See "Stowaway Imports," in MMM # 65, May 1993, republished in MMM Classics #7, downloadable from web address above.

We would be delighted to see the NASA Moon Lander Office adopt these design goals also. This is not a new philosophy. Poor people are known to use all parts of a slaughtered pig "except the squeal!" NASA should and must adopt a "we are poor" posture, in the sense that the agency will never get all the money it might want and must learn to make do with what it gets. And to do that successfully, means not to cut this and that, that's a petulant knee jerk reaction, but to exercise maximum resourcefulness. Use everything twice!

Note that our subtitle *at left* reads: "Thinking outside the "Mass Fraction" Box, **Part 1**" We hinted in our reference to the article from MMM #6, that the launch vehicle itself, *and every stage of it,* can be redesigned to add *more* to what lands on the Moon and **contributes to the buildup of the lunar outpost/settlement.** We'll leave you with that thought until next time. **MMM>**

[Guest Essay]

No, Earth is not Enough!

By Paul Swift <pswift@shaw.ca>
Calgary, Alberta, Canada

An Alberta Morning

This morning as I walked to work I perceived that everything was pink. No, my eyes weren't bloodshot; the sun was about to rise above the horizon but had not yet done so. The clouds to the east were long streaky things, originating somewhere beyond the horizon and sweeping upwards to the right and across my field of vision, yellowy where the sun was about to broach the surface and a musky pink or peach color as they stretched overhead, like a cat extending in length during its morning yawn.

The heavy pink emanating from the static sky transferred itself to everything around me, the gray concrete sidewalk, the darker asphalt roadway, the sides of the buildings, even my clothing. The air itself should have been pink, too, but of course was crystal clear.

Sometimes we space enthusiasts are asked why we want to go out there and experience being on another planet when all we need and want is right here. Why waste all the time and trouble and money to risk our lives getting to somewhere we know little about, save its hostility? Why not luxuriate in what the Earth has to offer, like that magnificent rose-tinted prairie sunrise I witnessed today?

My leanings towards gaining knowledge may not encompass that which is termed scientific. Natural Science I do love, but like all individuals, I tend to narrow my focus on a very few aspects of life. We could go and examine our lists of preferred interests, and yours and mine would, almost by definition of being human, be different. It is true that our own planet is utterly amazing in its breadth and scope of engaging attractions, and that any normal person should be satisfied to seek and gather the multitude of aesthetical, sensory, and spiritual revelations that are all around us.

This Amazing Earth is not enough!

But no, I must respond, it is not enough.

I can walk or drive here and there and take in the scenery and the atmosphere of a place. Or I can fly to some strange and perhaps exotic locale and taste that part of the world, and try to do that as often as the exigencies of life permit, but the rest of the universe is cut off to me. We clever humans have devised bicycles and cars to drive and aircraft to fly, but no device yet that will assist our going 'out there'. If I wish to be amazed at the sight I expect to see approaching Phobos, the inner moon of Mars, I need a man-made vehicle to do that. I do wish to be amazed, so I and you and we had better knuckle down, put the wishing on the back burner, and get to designing and making whatever it takes to get out there.

Yes, we must spend big money!

Yes, Senator Carbunkle, we do intend to spend several hundred billion dollars on getting this to happen, and yes again, it's all so any of us can watch a pink sunrise on Mars or pick your favorite scenario.

Being a foreigner, I should keep my opinions to myself about where the money gets allocated from, but as to where it goes, I think it is fair to all, even the Senator from Porkland, that not one penny need be spent outside of the country if that's the way you choose to go. Every cent goes to your own engineers and scientists, your metalworkers and software architects, the project managers and assistants, the tradesman who fabricate the facilities and equipment on Earth, and to the other hundred thousand people earnestly employed on creating the industry of the future.

Is Change too fast?

Some people are concerned about rapid change. I think it's fair to say that we're in the middle of change, and will be in that state for some time to come. How rapid it is, and to what level we demonstrate concern are open to debate, but another interesting effect is taking place. We ourselves are changing. What we saw as novel fifteen years ago like brick shaped cellphones is now laughable. Now they are compact and ubiquitous. Every second person driving, walking, or eating has a minia-turized communicator welded to their ear. Today's cell phones have video cameras in them, Global Positioning System receivers, email, mp3 players, streaming broad-cast video, address books, schedulers, and alarm remin-ders to brush after every meal.

Technical advances preclude our cultural changes. We get a new toy and our lives rotate on an updated axis. In the western world, or to be more correct, to anyone who can afford the new toys, it's almost a game to see how fast they can keep up with the latest info, communi-cation or entertainment audio video development.

And we are almost at the point of the 80's brick cell phone in space tourism. People are being brought closer to the distant, the exotic, the formerly unattain-able, engaged in close-up on their fifty four inch plasma screens, and they want the real thing. Now several startups are throwing hundreds of millions at designing suborbital ships for the well-heeled, and this will be the complete brick. Just like the cell phone became smaller, cheaper, faster, more reliable and more widespread, the tourist in space will find what they expect to find: beauty, excitement, stimulation, and an experience that can be shared with those who will listen.

How long will it take?

It took a hundred odd years for the average citizen to be able to tour Central Africa with the same level of interest and discovery that Livingston demon-strated in the 1860's. Let's hope it doesn't take quite another hundred to walk on the Moon like the dozen who first did so almost forty years ago.

In a rather surprise move a couple of years back, George bush announced his Vision plan, and now the hardware is being cut for the early phases of that sub-stantial venture. The Space Station will be completed in a few years. The orbiting hotel people are peeping out of their nests, and I suspect Cyrano de Bergerac is consi-dering a comeback.

Even now, and soon

If I overpay some shrewd entrepreneur I can get a week's training as a fighter pilot and get to soar to over eighty thousand feet in a Mig-29. The X-Prize has been won; both the X-Prize people and NASA are being innovative in offering prize money for the next of several plateaus, and those who would take on the challenge have my deep respect. All of this indicates to me that someone in the not too distant future will in fact be able to view a Martian moonrise and enjoy what I suspect will be a very moving spectacle.

The 'not too distant' future is still a few decades away. But as our culture has adapted quickly to cell phones and instant messaging, as we approach those decades, our space entrepreneurs and governments will have accomplished tasks in near Earth space and in the solar system that will make those in generations to come not only take it in their stride, but expect it.

A personal frontier journeys

When I was a bit younger my profession was that of helicopter pilot. For about fourteen years I followed that interest and it took me to some phenomenal places and afforded me the opportunity to meet some engaging folks. These are the people who populate our own frontiers. All my flying except for a little forest fire fighting was in the northern parts of the Canadian provinces, the Yukon and Northwest Territories, and the Arctic. Here the surveyors, geologists, biologists, and the bug people come to find out what makes this part of the world tick. Ok, entomologists.

The campsites and living conditions were sometimes a little crude but we were all in the same boat. This was all before satellite communication and GPS and the widespread use of computers and cell phones. We had no newspapers and no AM or FM radio that worked, but the camps usually had some contact with the outside world by single sideband or shortwave radio. We worked with what we had.

Primarily, what was at hand then and basically unchanged even until today was the helicopter. It was a three dimensional relocation device. There was never any question of making a trek or traverse across the forbidding terrain when the purpose was to ***be*** somewhere to check it out. Often a team would be positioned at a starting point with the arrangement to pick them up at a place they would work along to in the course of their sampling or mapping. As the operator of the 3-D relocator (the helicopter) it was my responsibility to ensure the safe return of the crews to base camp every day, and to do so for months on end.

On the lunar and Martian frontiers it will be the same.

On the Moon or on Mars, the same type of activity will occur. These same professionals will perform the work they do best at sites carefully chosen from the available data either before they depart from Earth for the place or once they arrive. With a limited window of opportunity in almost every case, each explorer will want to maximize their field time and cover as much as possible during their stint on the planet. So I can envision a vehicle for use on the Moon and on Mars to fill this role of three dimensional relocator.

Since the atmosphere of Mars is quite thin, about the same as Earth at 110 to 120 thousand feet, in some respects a relatively low speed vehicle could be designed that ignored the effects of atmospheric lift and drag. Such a design would be ideal for the Lunar environment as well, there being no air whatsoever to impinge on a flying structure.

Its about how we humans will evolve

But my purpose in this discussion not so much about the specific design of transportation mechanisms, nor even about exactly where and why we might employ them, as it is about the opportunity to see ourselves evolve. Who we are is to a large degree dependent on what tools we have and how large our scope might be. If we have no horses on the prairie and never travel more than a few hundred miles, even from generation to generation, we are different than our fellow human beings who have sailed around the world and encountered peoples and customs strange to their own. The world traveler is different when he or she comes home. They have grown; their perspective is broadened; they are not who they once were.

It is this evolution of perspective that we need. We need it for our self preservation and we need it to become, in some future not all that distant, more than whom we are now. A few of us have ventured into the blackness of that void beyond Earth's close embrace, and some have even walked on the surface of the Moon. Back on Earth, these people today still go to their jobs, take on tasks, wear suits and ties like you and me, and wonder sometimes, I would suppose, if they have really in any way become someone they were not before their great venture. My guess is that they have.

My Aunt Isabel once remarked to me when we were discussing maturity and growing up that she had never in her life actually met any man she considered to be mature. On her scale of what constitutes being 'grown-up' as an adult, I can say now that for sure I'll never get there either. Every day in a hundred ways I know I've said something silly, acted irresponsibly, failed to be brave enough to take certain steps I know I must take, and generally fallen short of being that person I could be. It is a great notion to think that a human being can evolve to be a better representative of this species, and that one of those ways is to be away from here to enlarge our point of view.

I could live on Alpha Centauri for a decade and fight the momraths of Callisto for the right to open a trading post by the gates to the Milky Way, but I know I'd never become that mature person my aunt found so elusive. It may be or never be (who are we kidding?) but one thing is for certain: my scope of operation and grasp of the breadth and depth of the universe would be forever changed, and I would be changed. And it is for that reason alone that this singular idea of being off-planet and of having my perspective altered has captured me.

The science to be done off-planet is prodigious; the aesthetic appeal of off-world landscapes is intriguing; the commerce to be established literally escapes pecuniary definition; but the evolution of each human being who embraces the cosmos is the greatest thing to look forward to. **<PS/MMM>**

* **Paul Swift** is head of the Calgary Space Frontier Society, a member of the Canadian Space Society, and served as Chair of NSS' 1994 International Space Development Conference in Toronto.

Astrogeology in Northern California: from the Great Basin to Modoc Country

By Bob McGown and Dareth Murray

Looking east across the Central Alkali Lake at the Hays Canyon Range through the alkali dust devils creates an almost a Mars-like scene. The desert varnish on the seemingly orientated black rocks strewn around the area make them look like meteorites flung across the dry alkali lake beds in the Great Basin and Surprise Valley.

Located at the extreme North & West end of California, the three alkali lakes in Surprise Valley are dry by late May. The afternoon wind sends twisters of alkali dust hundreds of meters upward, swirling in the dry lake beds and surrounding area.

An unusual crater-like formation on the Hays Canyon Range was investigated as we crossed the causeway over the dry lake bed. The road was dusty and we were surrounded by alkali dust devils. A small sign and a scrawled yellow rock with "Nevada" were the only indications we had left California. This land is reminiscent of the harsh but exotic Alvord Desert as seen from the top of Steens Mountains in Southern Oregon.

Just north of the alkali lakes is year-round Goose Lake. This lake straddles Oregon & California and is where one of the largest meteorites in the world was found – the 1.2 ton Goose Lake Meteorite.

Three hunters discovered it in 1938. A subsequent expedition by Earle G. Lindsey (then director of Chabot Observatory) and H.H. Ninniger (famous meteorite hunter) retrieved the mete-orite and it was taken to be displayed at the Golden Gate International Exposition in 1939. It is an iron octahedrite currently in the meteorite collection housed at the U.S. Natural History Museum in Washington, D.C. An old newspaper article suggests that there were more meteor-ites to be found in that area according to cowboy legends. There was no evidence of any crater associated with this meteorite at Goose Lake. It has been suggested that the Willamette Meteorite was rafted down on a glacier to its final resting place in West Linn, Oregon.

If the Goose Lake Meteorite was carried with glacier erratics and talus, like the Willamette Meteorite, it would mean that it did not fall at Goose Lake at all which would explain why there is no crater. Another possibility is that there is no crater because it fell in the winter in snow drifts which would cushion the fall and not produce a recognizable crater. It has been called the "Marilyn Monroe" of meteorites because of its symmetrical shape and pleasing visual attributes.

Dr. Leni Sinclair and Dan Weaver's farm just outside of Cedarville was our destination. The first thing we did was unload the telescopes (13" & 10" Dobsonian) and the solar Coronado scope. We did some prelimi-nary solar observing. Dr. Sinclair had never seen the sun in a telescope! Later that evening, before the wind picked up and the clouds rolled in, we were able to observe the Moon, Jupiter, Saturn and other night sky objects. Leni takes a look at the sun!

A welcome sight in the village of Cedarville, south of Goose Lake, was a bookstore, lodged within a historic building, one of the first in the valley. We were all amazed, after some conversation, to find that the owner, Michael Sykes, was an eclipse chaser and was planning a trip to see the total solar eclipse next year in Siberia! Not only that, he had been in Goldendale, Washington in 1979 when Bob McGown was there observing the eclipse at the Stonehenge replica. We traded travel and eclipse stories and happily found some more great books for our home library.

An afternoon hike up into the Hays Range from Eagleville showcased the spectacular geology of the area. We hiked up a dusty road leading over the mountains through huge boulders of rock and a canyon with layers of sediment, reminiscent of some we have seen in the Columbia Gorge, from the Ice Age Flood.

We caught a glimpse of an antelope high on the ridge and closer to the road, a small rattlesnake that coiled in alarm. We took a few pictures and quickly let the snake have the bushes! The day grew cooler as clouds piled up against the mountains

One of the highlights of the trip was visiting the Lava Beds National Monument. The Lava Beds lie on the northern slope of the huge shield volcano, Medicine Lake,

which encloses about 72 sq. mi. at an average elevation of 4,500 feet. It is covered with volcanic rock, about 2/3 basaltic lava, which erupted over 11,000 years ago.

This monument has the most lava caves in the continental United States with over 400 located and explored. They range from a few yards in length to the longest, Catacombs Cave, which has 6,900 feet of surveyed passage. Some are complex horizontally with many interconnected branches. Others are vertically complex with many levels. There are ice caves; lava bridges over caves and many caves housing the Townsend long-eared bat. When the bats are home, the caves are closed to the public with horizontal fences locked in place. The bats can fly in and out, but humans are not allowed.

Near the visitor center is a Cave Loop trail, which showcases a variety of caves and makes for a fascinating tour of the different kinds of lava tube caves. The whole system's master tube passes through the Cave Loop area. The Mushpot Cave has a distinctive feature, which was formed when a small amount of lava was ejected from an underlying channel that had developed a lower level roof. It is one of the most developed caves with lights and extensive interpretive signage. The Labyrinth "Branch" of caves has 8 major caves, including the Mushpot. It is a complex series of separate segments of lava tubes with about 3,900 feet of cave passage. The "Garden Bridges" part of the loop is a tangle of branches, parallel tubes and collapses. In about a 2 acre area are entrances to 10 caves and many bridges. As we walked on the floors of these caves, we noticed the two different kinds of lava. Pahoehoe is smooth whereas aa is rough and can be very sharp. These Hawaiian words describe the condition of the lava not its chemistry. Flowing pahoehoe changes to aa gradually as it loses heat and dissolved gasses.

We took a side trip to Mammoth Crater. Lava flowed from Mammoth Crater about 30,000 years ago creating most of the lava tube caves in the monument. The 2 mile trip around the crater (The Big Nasty Trail) proved to be just that, as Leni and Bob hiked to the burnt forest on the back side of the crater, glimpsed a shadow of (perhaps) a mountain lion, took the better part of valor and came back around to the rest of the group.

Skull Cave [photo bottom left] was our final stop, off the main Cave Loop towards the Petroglyphs and Captain Jack's Stronghold, at the extreme north end of the park next to Tule Lake. This huge cave (about 60 feet in diameter) is a segment of a larger system called the Modoc Lava Tube System, 10 miles long. The third level of the cave has perennial ice with only patches exposed. The early discoverer of the caves, J.D. Howard, named this cave for the bones of the creatures that had fallen into it.

This ice is similar to the Arnold Ice Cave in Central Oregon, at Road 18, studied by the Mars Society. The ice sheet in Arnold cave as well as many other ice caves was harvested in the summer for food preservation and refreshment.

Relevance for Moon and Mars

On Mars, ice caves may hold many secrets to the ancient climate of Mars as well as a possible chronological record to the conditions right for life on the red planet.

Lava tubes are a terrestrial analog for subterranean space bases on the Moon and Mars, so we were especially interested in the Modoc terrain. The Oregon L5 Society (National Space Society) had young astronaut training in lava tubes in Central Oregon, as well as the Oregon Moon Base Project. We have also worked on a NASA institute of advanced concepts projects with the Mars society on a biosphere in a lava tube hornito. The Lava Beds National Monument was been the focus of astrobiology studies, lava tube modeling, NASA space base analog studies and Air Force infrared cave detection from high altitudes. Oregon L-5 has studied Lava tube detection on the Moon with IR techniques and gravimeters.

Reflections

As we made our way back to Cedarville, we stopped at Petroglyph Point, a huge extrusion of volcanic tuft. This was once bordered by Tule Lake, but as the climate became drier, the lake retreated. Now it is home to thousands of cliff swallows that make their nests high in the nooks and crannies of the rock. Other birds lodge there too, like kestrels and red-tailed hawks, predators of the small cliff swallow and others.

The geometric patterned petroglphys themselves have been covered with modern-day graffiti in some cases. It is thought that the oldest petroglphys were made by the Modoc tribes coming in canoes to the edge of the bluff, over the Tule Lake about 4,500 years ago. We were reminded of the Modoc War of 1872-1873, in which Captain Jack, leader of the Modocs, held off the U.S. Cavalry for 5 months, hiding in the lava tubes nearby the lake. The Stronghold was a labyrinth within a set of adjacent tumuli. This still wild country holds many tales, both ancient and more recent. Only a few hours from "civilization" this stark and beautiful land reminds us of our rich planetary heritage. **<BM/DM>**

[Bob McGown, a member of the talented Oregon L5 team in the Greater Portland (Oregon) area, has contributed a number of articles to MMM through the years, finding inspiration in the most interesting geology of the Pacific Northwest with implications for Moon and Mars. Bob and Dareth and cat Frosty graciously hosted me on my visit to the Oregon L5 chapter earlier this year. - PK]

EXTENDING THE "VIRTUAL" DAYSPAN

15.75 d | 15.75 d > 24.6 d | 4.9

to 5/6ths of the lunar day/night cycle at a high latitude Lunar Outpost

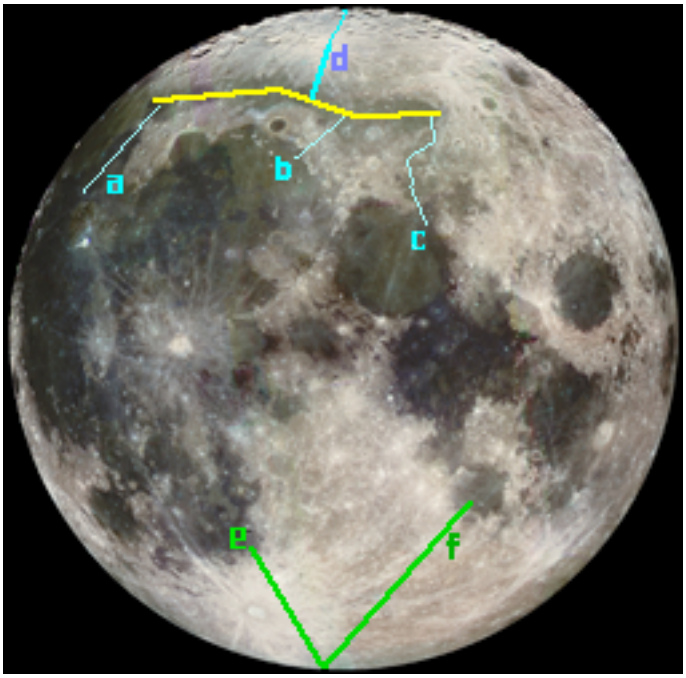
while making a major start on a global surface transportation-communications-power grid

by Peter Kokh

If it is fortuitous that there is a peak or crater crest at the Moon's South Pole that receives sunlight 70% of the time, *it is equally fortuitous* that just 600 some miles south of the North Pole, there is a long smooth mare stretching 1,300 miles East-West (at that latitude, some 120°) – **Mare Frigoris** – The Sea of Cold.

Placing Solar Power Stations at either end of Mare Frigoris would effectively extend the amount of time that full power was available to any outpost along the length of this grid to a full 5/6th of the lunar cycle, which is tantamount to having the services of the Sun for 84% of the time. *That trumps the situation at the South Pole.* And it has the enormous fringe benefit of putting in place the start of an extensive nearside transportation-communications-power grid interconnecting the nearside mareplex.

If we truly want a global presence, then with all due respect to the overwhelming majority of Lunar authorities on the South Pole bandwagon, Mare Frigoris may be the better place to start. See the map below.



KEY: at top, is sketched the path of the East-West power grid through **Mare Frigoris**, roughly 60° north latitude, spanning 120° and 1,300 miles or 2,100 km. Shown are *easy terrain routes* southward: **a** through Sinus Roris (Bay of Dew) into western Oceanus Procellarum (Ocean of Storms); **b** through the Alpine Valley into Mare Imbrium (Sea of Rains); **c** through Lacus Mortis (Lake of Death into Mare Serenitatis (Sea of Serenity). **d** the short traverse to the north pole, some 600 miles or 1,000 kilometers *as compared to* the long traverses from the South Pole to the nearest mare coasts, **e** Mare Nubium (Sea of Clouds) 1,100 miles or 1760 km, and **f** Mare Nectaris (Sea of Nectar) 1,340 miles or 2,150 km. From the north coast of Mare Frigoris, it should be necessary to traverse only half the distance to the North Pole to encounter craters of 20 km in diameter or more where the southern portion of the crater floors are permanently shaded cold traps, possibly harboring ice deposits. For more on this assertion, see:

www.psrd.hawaii.edu/June03/lunarShadows.html

We reported on this in MMM #167, August 2003, p. 4, "Mare Frigoris Base Site Looking Better: Ice at the Moon's Poles Extends to Lower Latitudes than Expected"

How it would work

First, we would select a location for our initial outpost at the best "junction" site to allow the easiest cross-highland traverse to the North Pole. From that point we would lay down power transmission cables, trenching them into the regolith, both westerly into northern Sinus Roris to about 75° west, 55° north, and then easterly through Mare Frigoris to about 47° east, 57° north. Say for example our "junction" site main outpost was at 30° west, 64° north, just east of crater Fontenelle, the sun would rise over "Eastpoint" east some 77° or about 6.5 days before sunrise at North Junction. An expandable solar array grid at Eastpoint would begins supplying North Junction with power from that point. At the opposite end of the grid, Westpoint, some 45° west of North Junction, a similar solar array farm would supply North Junction with power for 3.7 days after local sundown. This would virtually increase the length of available "full dayspan power" another 10.2 days for a total of 24.6 days or over 84% of the lunar dayspan-nightspan cycle. The period for which power would have to be stored, would shrink to just 4.8 days as compared to well over 8 days at theSouth Pole.

The key is how close to the pole this grid would be. The same length of grid that at 60° N spans 120° East-West, would, at the equator, span only 62° – the amount of coverage increases with the degree length, not the mile length. In contrast, the best you could do in the southern hemisphere would be to set up an E-W grid through Mare Humorum (Sea of Moisture) and Mare Nubium (with some difficult terrain in between) that spanned some 700 miles (1,100 km) or 37° at an average latitude of only 23° south, providing dayspan-level power for 60% of the time, or 17.8 days. Someday, an equatorial grid through the nearside mareplex would provide full dayspan level power for 91% of the time, leaving a nightspan-level gap of less than 3 days.

"Extra" Costs of this E-W Power Grid

Of course, creation of the grid would require

a) two extra solar power farms, and
b) 1,300 miles of power transmission cable, and
c) the equipment needed to lay and trench the cable.

All the same, this scenario allows us a better chance to start our lunar adventure right, headed towards global occupancy and global access to resources. It puts the outpost where it needs to be, along a mare/highland coast. In contrast, the South Polar gambit risks becoming a dead end *for the sake of convenience.* **<MMM>**

The Moon Society

J O U R N A L

http://www.MoonSociety.org

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

Please make NEWS submissions to KokhMMM@aol.com

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

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

PROJECTS: www.MoonSociety.org/projects/

Moonbase Simulations - Lunarpedia wiki

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

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

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

Mail Box Destinations:

□ **Checks, money orders, membership questions**
Moon Society Membership Services:
PO Box 940825, Plano, TX 75094-0825, USA :

□ **Projects, chapters, volunteers, information, etc.**
Moon Society Program Services
PO Box 080395, Milwaukee, WI 53208, USA

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

Fifty Years since Sputnik!
Lessons for Moon Society Strategy

from Society President, Peter Kokh

Perhaps to most members, the launching of the first Earth satellite, Sputnik, on October 4, 1957 is just something out of history books. But to me, it was quite different, I would turn twenty in another two months, and I remember the feat and the hoopla, alarm, and consternation it caused. But i don't want to talk about that.

For me, it was an event long awaited. That the USSR launched it made no difference to me. Humanity was on the road to space! In the aftermath of World War II I watched with great interest as we experimented with German V-2s, then built new rockets of our own design. I remember when we got one to ascend 60 miles!

Sputnik II carried Laika, a German Shepherd, and demonstrated that zero-G was not fatal. Satellites became bigger and flew higher. Less than 15 months later, Luna 1 became the first craft to escape Earth's gravity and fly past the Moon. Nine months later Luna 2 reached the Moon's surface. Then, on April 12, 1962, not yet 4 years after Sputnik, Yuri Gagarin became the first man in space, orbiting once before landing. Two months to the day earlier, the Russians had launched Venera 1 the first interplanetary probe, this one to Venus. Five months to the day later, John F. Kennedy committed us to manned Moon landings. We had opened the door to our new home! *The pace was breathtaking!*

I reasoned that if it took two years from Sputnik I to Luna 2, then from the first man in orbit to the first man on the Moon should take two years, and humans should be Venus bound a year after that. Well, it was more complicated than that and it didn't take long to realize that. All the same, we proceeded deliberately on the Mercury, Gemini and Apollo programs, and we landed on the Moon not quite 12 years after Sputnik I.

And then came Nixon. disdaining space because Kennedy had pushed, and the last three Apollo missions, already budgeted, were canceled. What really happened?

We had gone for the wrong reasons, but we are all glad that we did go. We failed to build the case for the public and Congress. NASA tried, sending NASA a full report on the three Lunar energy scenarios: solar power satellites built with lunar materials, Lunar solar power arrays beaming power to Earth by relays, and Helium-3. *That was in the late seventies, thirty years ago.* But Congress said that it did not want to hear the word 'Moon." Chastened, NASA to this day does not speak of those energy scenarios.

But we have to make the case for going to the Moon, not on the basis of trivia like spinoffs, nor on the basis of education benefits, but *on the grounds that returning to the Moon is essential* if we want to *really* make progress on Earth's two most stubborn and intertwined problems: dirty energy generation and environmental degradation. Only this will silence the giggles.

Like it or not, the environmentalists are our logical allies. It will take some convincing, but those enthusiasts who have nothing good to say about environmentalists may be part of the problem. *Get over it!*

People on an island would be stupid not to fish in the sea. Earth is an island. Space is our sea. We would be stupid not to fish in it. We need to make this case! >>>

[President's Editorial Continued]

The fatal trap, selling the "ladder" one "rung" at a time

It is my very firm belief that Space Enthusiasts themselves bear as much of the blame as anyone else for the three decades plus of inaction sine Apollo 17 returned from the Moon late in 1972. Our grandiose plans for Space Colonies (Settlements, as we now call them), very large structures providing artificial gravity through rotation, and housing thousands, even millions of people each, created a profound sense of disbelief. We reasoned that such colonies were needed to house the construction workers who would build solar power satellites out of lunar materials. The trouble was that our emphasis was on how we would live in space, maximizing living conditions to make them more attractive (and less believable).

As we realized that the public "wasn't having any" we regrouped. We have to sell the ladder one humble rung at a time, space enthusiast leaders proclaimed, so we forgot about talking about solar power satellites and lunar resources and concentrated on selling a Space Station. That was the one most fatal decision we made. Why? Because if you sell the ladder one rung at a time, the function of any rung that makes it lead to the next rung is lost. By Space Station, we meant a Space Depot, in equatorial orbit, designed as an assembly, staging, and refueling station on the way to the Moon and beyond.

What we got, and deserved, was something else, a station in a high inclination orbit designed primarily to study Earth. We were lucky to get that much. Only Clinton's last minute gamble to pitch the station not as a scientific end in itself but as a way to keep the Russians out of mischief, saved it in Congress. The ISS clearly dominates "yo-yo" space, to orbit to reflect on Earth.

So all the years we concentrated on the Station, now close to three decades, have brought us no closer to the Moon. We sold the rung as an end in itself, not as part of a ladder, to avoid the "giggle factor." Well, the giggles are on us. Don't blame Congress, or the President, but the leaders of the Space Movement for a fatal strategic move. But wait a minute. Let's not waste time blaming anyone. Let's move on! Let's get back on target! Let's return to selling the dream!

Selling the Dream

We have to stop timidly pitching "spinoffs" and other trivia dribble. We must concentrate on the heart of the matter.

Earth is going to hell in a hand basket!
And only accessing Space Resources can make substantial progress in tackling Earth's two most stubborn and intertwined problems: dirty energy generation and environmental degradation.

Green is in right now, and t at long last the public is focused on those two intertwined problems, but also, unfortunately, on small stopgap measures, some to be undertaken by governments working together, some by concerned individuals. Now is our chance to make the case that the only long term *effective* solution is abundant clean energy from space. We live on an island. Space is our sea. The coconuts and pineapples are not enough. We must now fish in the surrounding sea. If we fail to sell this idea, we can hang it all up! **<PK>**

The Moon Society: Looking Ahead to ISDC 2008 - Washington, DC

May 29-June 1, 2008 (1 week *after* Memorial Day)
Capital Hilton - http://isdc.nss.org/

At ISDC 2005, also held in Washington, across the Potomac in Arlington, the Moon Society signed an historic affiliation agreement with the National Space Society. It makes sense for us to piggyback our own annual national meeting on NSS' International Space Development Conference. However, we did not attend in force the 2006 event Los Angeles.

But we did gear up to have a major presence at ISDC 2007 in Dallas. Director of Project Development President Dave Dunlop and Peter Kokh co-chaired the Moon track and invited some great speakers who sparked considerable interest. We did not achieve all our goals in Dallas, especially recruitment wise. But we did videotape interviews with some fifteen significant persons. The Moon Colony Videos are the result. See:

www.moonsociety.org/video/ or mooncolony.tv

Dave has already been making contacts for next years event, but until the ISDC committee makes its Call for Papers and outlines its Tracks, we can but prepare.

For Dallas, we arranged for a Moon Society Suite, as a place society members, visitors and guests could hang out and chat. As it turned out, that kind of activity was minimal, but the suite proved to be essential for videotaping, so the add cost of the suite upgrade was surely worth it.

We also had ideas of a Moon Society Town Meeting during ISDC. To tell the truth, there is simply too much going on, all the time, to make such a meeting feasible. None the less, members did gather in the suite to visit and chat.

We know now what worked and what didn't work in Dallas. With those lessons in mind, we are open to suggestions from members of what kinds of things we could do in Washington that would promote the Moon Society and its projects effectively.

A significant portion of our membership lives within a day's driving distance of DC so we hope for a good turnout. You can visit NASA Headquarters and the Smithsonian Air&Space Museum. DC is a beautiful city, so if you have never been there, this may be the excuse to get acquainted. Why not put it on your calendar? Me? I signed up already!

If you can't make it, keep the ISDC in mind for the future. It is held in a different city every year. See the web address above for the list of past ISDCs. See the address below for more information or to sign up:

http://isdc.nss.org/2008/

The ISDC has historically always been a "big tent" conference open to participation and cosponsorship of other groups. It is a great event at which to meet movers and shakers and others who like yourself, may be looking for a way to make a difference, to find a job in the field, or to start a space relevant enterprise. You will find yourself welcome and among friends.

See you there!

AngusBay.org

by Peter Kokh

AngusBay.org is a new arena for members of the Moon Society and of the old Artemis Society, in which they can post appropriate artwork, illustrations, graphics, articles, and discussion threads as well as create simulations of lunar settlements and environments.

This page is hosted on the Moon Society server. But all of the posting and activity areas linked to on this page, will have to be on other servers, to be determined, *if they require special software to create and maintain, and/or if they require more than minimal bandwidth*. The exception will be a dedicated chat/discussion area, open 24/7/365 on ASI-MOO. After logging on, go "[North] to ASI Committee and Project Team Hallway."

The ASI-MOO was designed in the mid 1990s to include places to post graphics and simulations of what Lunar Settlements in general and Luna City in particular might look like. Today, much more powerful simulation environments are available.

IF there is enough interest shown, but not before that, we could endeavor to purchase a simulation plot, to be called "Angus Bay" on the Second Life server. NASA Ames and the International Museum of Spaceflight, as well as the Oregon L5 Research team are using this environment. We expect that the Oregon L5 Research Team will help us get set up.You can read the letter from Oregon L5 Colab participant Bryce Walden at:

www.moonsociety.org/Angus Bay/about_secondlife.html

Open Source as the way to go

With the Artemis Society site now evidently fossilized, unfortunately, it is time to move on. The proprietary character of much on the Artemis Society site has been a significant obstacle to bringing it new life.

AngusBay.org, in contrast, will be a set of open-source environments, insisted on by the creators of Second Life and enthusiastically embraced by NASA, as well as the new Moon Society wiki, Lunarpedia.org. Open Source is a far more effective way to create anything than would be a proprietary one. It is about ideas, not money.

Stay tuned and take the lead

Meanwhile, *please do send us your ideas* as to what you would like to see on AngusBay.org and what you would like to do and/or participate in. AngusBay.org will grow with your input, or it will die a dream!

Write us at kokhmmm@aol.com - about your suggestions and thoughts. AngusBay.org, if it takes off, will need a webmaster and others with web expertise to develop and maintain the various activity areas on other servers that will be linked to from this page.

Right now, AngusBay.net is only a webpage and a dream. Whether it takes off or flops is not up to us.

AngusBay.org - online

You can get there by using the above address, a virtual domain name, or by going to the real locatiion:

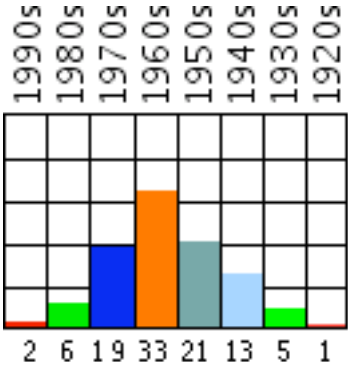
www.moonsociety.org/angusbay/index.html

Age Distribution of Society Members

by Peter Kokh

It is important to the Society to know which parts of the general population it is reaching, and where it needs to do a better job. An analysis of our database shows the following:

2% born in the 1990s
6% born in the 1980s
19% born in the 1970s
33% born in the 1960s
21% born in the 1950s
13% born in the 1940s
5% born in the 1930s
1% born in the 1920s



Caveats: - Some 8% of our members have left the date of birth line empty. And amusingly, the database automatically lists their birth date as January 1, 1900, a default date, making them 107 years old plus! Perhaps we should name them and throw them a party. *Just kidding*

There are also a suspicious number listed as being born December 31, 1969, at least two of whom I know to be considerably older. Or perhaps they are just prematurely gray and wrinkled!

I did not count either of these two groups, 10% of the membership, in the above age distribution.

Salient data:

- The number of persons of retirement age is about 8%
- The number under twenty is about 6%

The results, in general, are about what we would expect. with the largest group born in the 1960s, and 65% of our members born between 1950 and 1980.

Oh yes, the percentage of women is less than 5%. Why? Is it that women seem less interested in space? In contrast, the percentage of women in science fiction circles is much, much higher. But that constituency seems dominated by science fantasy these days, and not so much into what we might call "hard, calculator-based science fiction.

Yet, many articles in MMM should be of interest to women: how the pioneers will live and make themselves at home; decor options for Lunans; and more.

We need to tailor our pitch to reach more women, but especially more young people in general, and several options to do that are now in development.

But we would be wise to court people of retirement age as well, for the simple reason that some of them might have appreciable discretionary spare time to put to the service of the Society in one form or another. For example, the Society President is retired and could not possibly give as much time to the Society and to MMM if he were not. If you are retired and would like to do more for the Society, write us at kokhmmm@aol.com

Of course, we need to reach more people period. Our new Moon Colony Videos are designed to do that. If you have ideas of how to improve our pitch and tailor it to various groups, please share that with us.

Meanwhile, much is afoot, and we expect that you will notice that in the comonths. **<MSJ>**

MEMBER SPOTLIGHT

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

by Moon Society President, Peter Kokh

In last month's issue, we wrote about the great work Henry Cate, a Moon Society member in San Jose, CA, has done in creating and promoting his "Carnival of Space" blog project. See MMM #208, page 16. A few months earlier, we wrote about member Manny Pimenta's awesome software product, Lunar Explorer, in MMM #203, page 11. You will find a link to this great product in the right hand menu column of the Society front page.

Well, it occurs to me that a lot of members are doing something special and that perhaps we should highlight some of these efforts in a column in these Moon Society Journal Pages. It toook me no time at all to come up with a short list of a dozen who deserve the spotlight.

But perhaps many members do things quietly on their own and we don't know about it. If you do anything positive on behalf of the Society, or of the space effortt at large, tell us. Don't "hide your light under a basket!" Your example may be just what it takes to motivate another to use his/her own talents, energies, and resources to push our goals.

Spotlight on Clark Lindsey - www.hobbyspace.com

Clark joined Artemis Society International way back in the summer of 1995 shortly after I did. Eight years ago, concerned about the few magazines that served the many millions of people who say they are intrested in space, and noticing these rags suggested too few ways for people to indulge their interst as a hobby or pasttime and realizing that the Internet might be a good way to reach them, he founded hobbyspace.com.

You have only to brouse through the headings and subtopics in the left hand menu column to see how thoroughly he has found niches tailor made for just about anyone interested in some facet or space to induolge their interests and exercise their abilities.

I know a number of people for whom HobbySpace is their place to start when they have time to catch up with what's going on, especially, in their area of interest. The main headings are Space Tech, Space Culture, Other Activities, Resources, Link Lists, Weblogs, Features, and Site Info.

Clark does have a number of on topic ads, tastefully confined to his right hand coloumn, . At the bottom of this column his HobbySpace "Tenets" are spelled out.

- The development of space will only be successful when the general public becomes directly involved.
- Incremental, step-by-small-step development can achieve permanent human settlement.
- Private, commercial entrepreneurial enterprises can make most of these steps.
- Small, niche markets can be sufficient to support those companies.

Do your self a favor and check out HobbySpace. And thanks, Clark, for your devotion to this effort, for all these years! **<MSJ>**

Introducing our new email newsletter

Moon Society *Frontlines*

Want to sign up? *Simply go to:*

http://list-manage.com/subscribe.phtml?id=0006e65d5b

Chapters & Outposts

Bay Area Moon Society

Meeting **4th** Thurs. montlhly at Henry Cates' in San Jose
Contact: Henry Cates <hcate2@pacbell.net>

Moon Society St. Louis

http://www.moonsociety.org/chapters/stlouis/
Meeting the **3rd** Wed. monthly at Buder Branch Library
4401 S. Hampton, in the basement conference room
Contact: Keith Wetzel <kawetzel@swbell.net>

Moon Society Phoenix

Graduating from Outpost to Chapter!
http://www.moonsocphx.blogspot.com/

Contact: Craig Porter <portercd@msn.com>

Our next opportunity is Arizona State U. Earth and Space Exploration Day by the School of Earth and Space Exploration on November 3, 2007 from 9-3pm.

Our Phoenix Outpost is ready to take the next step and apply for Chapter Certificate. This is great news! New member Chuck Lesher is working on a chapter website to complement Craig Porter's blog site.

To help celebratet and torecognize the chapter pioneers for their efforts, Society Director of Project Development David Dunlop and Society President Peter Kokh are looking at a possible visit to the new Phoenix chapter in January 2008. Stay tuned.

Chapter & Outpost Tools

MOON COLONY VIDEOS

Society Outposts & Chapters are advised to make maximum use of the great promotional videos that have been, and are still being turned out by Chip Proser's Celestial Mechanics. To add to those he had already produced, he has introduced two dozen plus new short videos using videotaped interview material from ISDC 2007 in Dallas, where 15 movers & shakers were interviewed in the Moon Society Suite.

You can access these videos at either:
www.moonsociety.org/video/ or www.mooncolony.tv

Chip is working on putting these videos on a DVD in order to make them easier to use for promoting the work of the Society. They are great and very upbeat. Just what we need to get peoples' attention!

GREAT BROWSING !

Student experiment tether to deorbit 'Fotino'
http://www.msnbc.msn.com/id/20759120/

After participation offer rebuff by NASA, Russian plans its own moonbase, 2027-2032
http://www.cbc.ca/technology/story/2007/08/31/science-russia-moon.html

ESA calling for volunteers for Mars 500 simulation
http://spaceflight.esa.int/users/index.cfm?act=default.page&level=16&page=2203

Bigelow Fast-Tracks Manned Sundancer craft
http://www.space.com/businesstechnology/061122_bigelow_sundancer.html

Hydrogen Peroxide (H2O2) based life on Mars?
www.marstoday.com/news/viewpr.html?pid=23325

A Russian Lunar Klipper?
www.airspacemag.com/issues/2007/september/lunar_clipper.php

Malaysia's Angkasawan (astronaut) Program
http:www.angkasawan.com.my

13 mg Program Takes Google Earth Up to the Sky
http://earth.google.com

New *Space Lifestyle* Magazine
http://www.newforks.net/

Finishing the Space Station: the Home Stretch
http://www.thespacereview.com/article/956/1

Euro-Aerospace versus American Tinerers
http://www.thespacereview.com/article/955/1

Building the Case for Space Solar Power
http://space.alglobus.net/papers/ssp.html

What is a Space Settlement?
www.nss.org/settlement/calendar/resources.htm

NASA is recruiting new group of Astronauts
www.space.com/news/070918_nasa_newastros.html

Aerospaceguide.net - Space Projects & Info
http://www.aerospaceguide.net/index.htm

Tide of opinion shifts to a Drier, not Wetter Mars
www.sciencemag.org/cgi/content/full/317/5845/1673?etoc

NASA, Google bringing more of the Moon to Earth New higher-resolution images, maps & multimedia
http://www.pcworld.com/printable/article/id,137366/printable.html

The Asian Moon Race
http://rawstory.com/news/afp/Asian_spacefarers_race_for_the_moon_09252007.html

Mike Griffin on the "Space Economy"
http://www.thespacereview.com/article/962/1

Heinlein's influence on Hollywood
http://www.thespacereview.com/article/961/1

Case for Withdrawing from the Space Treaty
http://www.thespacereview.com/article/961/1

Carnegie Mellon U. to enter Google X-Prize Contest
http://www.tgdaily.com/content/view/33978/113

GREAT SPACE VIDEOS !

MOON COLONY VIDEOS - The Moon Society

Paul Spudis: Vision for Space Exploration 1
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1203071887

Paul Spudis Vision for Space Exploration 2
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1200843495

Buzz Aldrin ona Chinese Moon
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1111464742

Buzz Aldrin on Asteroid Danger
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid979073671

Rusty Schweickart on Asteroid Danger
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid595136449

Gaia Selene DVD Preview
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid715980765

Burt Rutan at ISDC 2007 in Dallas
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid537018605

Rick Tumlinson Part 1
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1214062915

Rick Tumlinson Part 2
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1213979244

Rick Tumlinson Part 3
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1213915636

Rick Tumlinson Part 4
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1213854010

Rick Tumlinson Part 5
http://link.brightcove.com/services/link/bcpid537086541/bclid537026504/bctid1213887569

VIDEOS FROM OTHER SOURCES

Moon 2:0 Join the Revolution (Google X-Prize)
(1) www.youtube.com/watch?v=9K4zosGUMBw&eurl=http%3A%2F%2Fdiscoveryenterprise%2Eblogspot%2Ecom%2F2007%2F09%2Fnew%2Dmoon%2Drace%2Ehtml

(2) http://www.googlelunarxprize.org/lunar/competition/moon-2-0-rollout-video

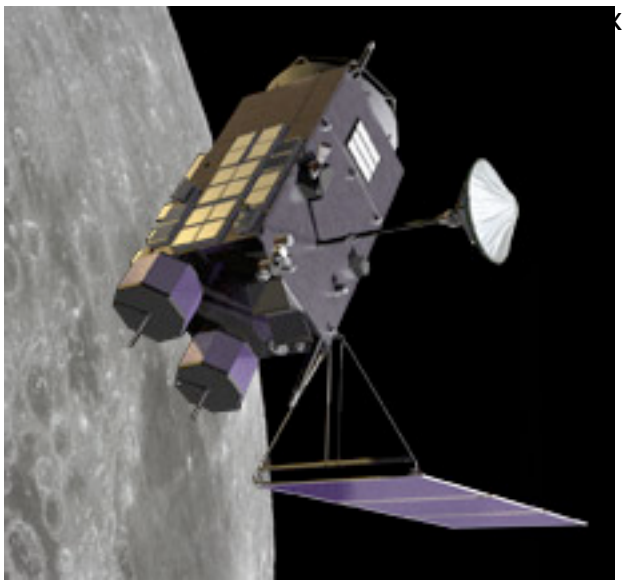
Kaguya (Selene) Promotional Video (19:42 min)
www.jaxa.jp/countdown/f13/live/promotion_e.html

Dawn mission to Vesta and Ceres
www.jpl.nasa.gov/videos/dawn/dawn20070626/

Constellation/Orion Space Vehicle Video
www.jaxa.jp/countdown/f13/live/promotion_e.html
www.nasa.gov/externalflash/cev/index_noaccess.html

MMM PHOTO GALLERY

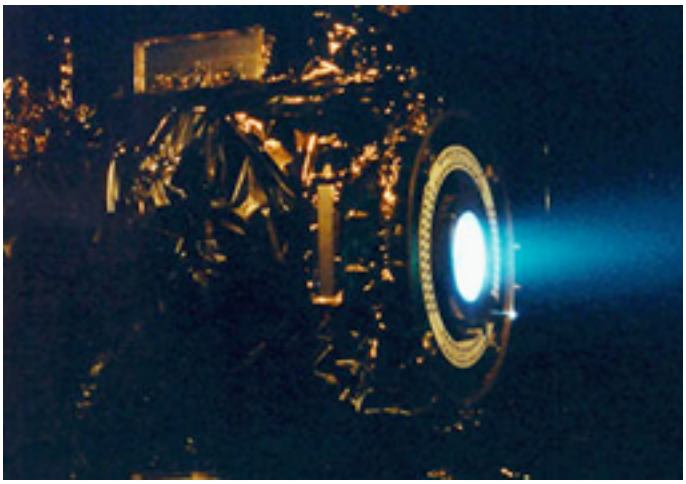
KAGUYA



Launched towards the Moon – 9/14/2007

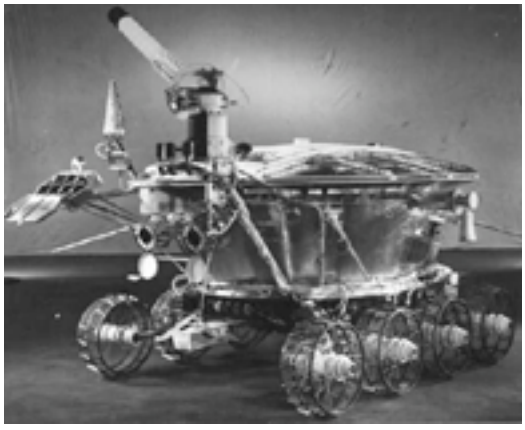
Vesta/Ceres-bound Dawn Probe in the Clean Room
The probe was successfully launched September 27th

Carnegie-Mellon University's Scarab Rover
http://www.tgdaily.com/content/view/33978/113



Dawn's ion engine will consume just 15 gallons (57 liters) of Xenon fuel to reach cruising speed to Vesta!

The very first robotic lunar rover was **Lunokhod 1** (USSR) which landed in Mare Imbium on Nov. 12, 1970. Tele-operated from Earth, it lasted 11 days before going dead.



It came from Vesta [ESA/NASA]
Or so we believe. Many meteorites have the same basaltic (frozen lava) spectrographic signature as does Vesta.

Massive Kaguya (Selene) probe on way to the Moon

September 15, 2007 Yesterday, JAXA, the Japan Space Agency, had another significant success. The massive 3 ton Kaguya probe, carrying two subsatellites, was successfully into a complex set of trajectories which will bring it into lunar orbit by October 3rd.

Kaguya is the first of the "Lunar Decade" salvo of International lunar missions. China is set to follow later this year with Chang'e 1, India plans to launch its Chandrayaan-1 early next year, followed by NASA's Lunar Reconnaissance Orbiter and its piggyback Lunar CRater Observation and Sensing Satellite (LCROSS). If all goes well, 2007 and 2008 will see the greatest amount of lunar activity since the Apollo Moon program ended with the return of Apollo 17 in December, 1972, 35 years earlier. All of these new probes are designed to fill in critical gaps in the knowledge we now have of the Moon, helping all four nations better plan manned landings in the 2020s.

The most recent lunar probe, SMART-1, as had its predecessors, Clementine and Lunar Prospector, had already given us much new information about the Moon. One used to hear the shallow witticism about the Moon, "been there, done that." It is obvious that lunar scientists behind these recent and upcoming probes do not share that attitude. We continue to learn more about the Moon, and our picture of it becomes more complex, captivating, and, for the prospects of permanent human presence and settlement, more promising.

Japan is not a newcomer to planetary space. In 1985, Japan launched two comet probes, Sakigake and Suisei to comet Halley; in 1990 Hiten/Muses A/Hagoromo (failed subsatellite) into a lunar trajectory; in 1998 Nozomi which failed to reach Mars; and finally in 2003-2006 Hayabusa to asteroid Itokawa. While the success of the Sample Return part of this mission is still in doubt, the encounter with Itokawa itself was an astounding feat.

Kaguya's ambitious science program (1 year mission)

Before reaching its planned 100 km high orbit, Kaguya will release the relay satellite and then the VRAD satellite at 2,400 and 800 kilometers (1,500 and 500 miles), respectively. By the use these subsatellites it will release as a relay, Kaguya hopes to accomplish the first live-time gravity mapping of the lunar farside. For lack of such live-time relays, we have not been able to map the gravity field of the lunar farside to date.

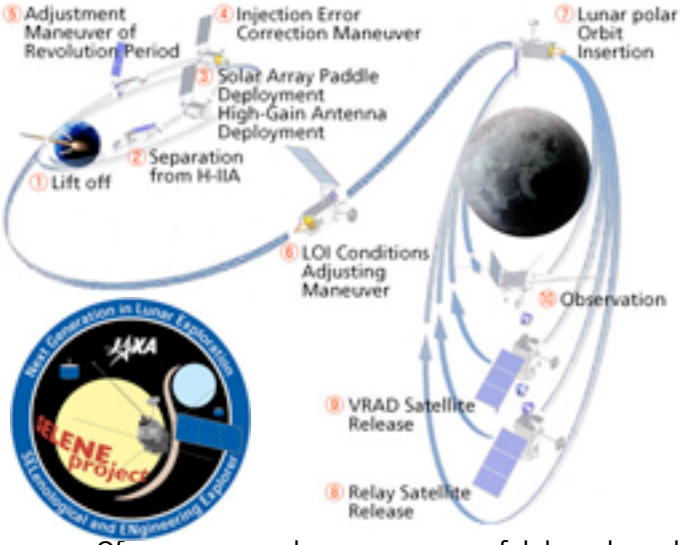
Kaguya's 15 instruments will also study the composition and topography of the lunar surface with doiwn to 10 m resolution, mapping the lunar magnetic field and plasmasphere. Kaguya's observations may shed further light on the origin of the Moon as a companion of Earth.

Kaguya will be able to study the impact of the Sun on the Earth by observing both auroras of the North and South Poles at the same time from the Moon.

Kaguya mission timeline:

Event	Date/Time UTC
Adjustment Maneuver of Orbit Period	Sept. 19, 00:46
LOI Conditions Adjusting Maneuver	Sept. 30, 18:56
Lunar Polar Orbit Insertion (LOI)	Oct. 3, 21:01
Relay Satellite Release	Oct. 9, 00:46
VRAD Satellite Release	Oct. 14, 05:37
Science observations begin	Oct. 21, 10:27

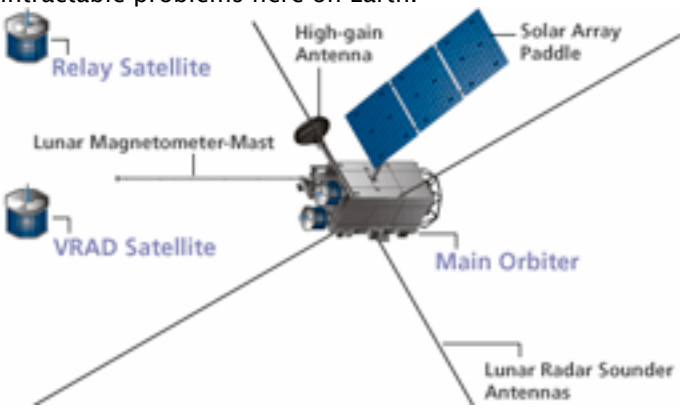
in a circular polar orbit 100 km (62 mi) above the surface



Of course, as always, a successful launch and insertion into its initial trajectory, does not guarantee a successful mission for any probe. The Moon Society and the Lunar Community in general, will be watching closely. We wish NAXA a fully successful mission.

A lot is at stake. For those of us who live in a country where plans are always tentative because they are subject to fickle political processes, we are encouraged by the efforts of our fellow spacefaring nations. No matter what happens to the politically fragile Vision for Space Exploration, thanks to Japan, India, China and NASA's own now uncancelable Lunar Reconnaissance Orbiter, we are guaranteed a fascinating and encouraging few years.

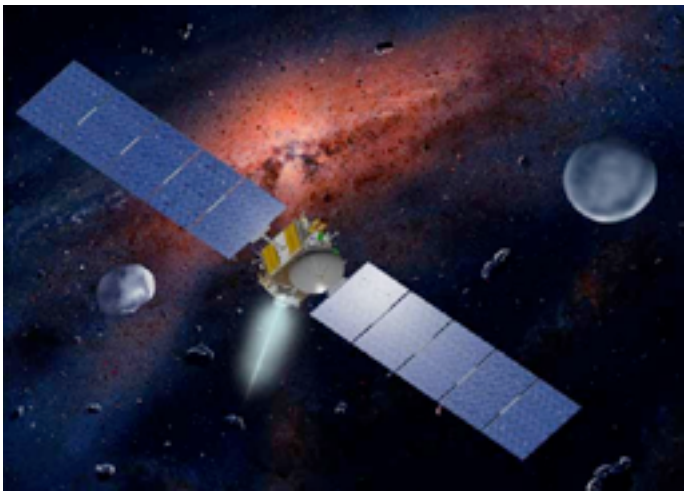
The results of these probes will heighten global interest in Moon, not only as an object of scientific curiosity, but as a source of resources with which to tackle seemingly intractable problems here on Earth.



At 3,000 kg, 6,600 pounds, Kaguya is the most massive scientific payload ever launched to the Moon. Compare these weights: Lunar Prospector 158 kg; Clementine 227 kg: SMART-1 367 kg; Lunar Reconnaissance Orbiter 2180 kg (with LCROSS 880 kg hitchhiker = 2,360 kg; Chang'e-1 2350 kg; Chandrayaan-1 523 kg. #

Dawn Probe on its way to Vesta, Ceres

With a successful launch September 27th



Above: With its wide solar arrays extended, Dawn is about as long as a tractor-trailer at 19.7 meters (65 feet)

MMM Special Report – from multiple sources

The Launch

Dawn rocketed skyward Septembeer 27, 2007 from Cape Canaveral Air Force Station, Fla., Pad 17B, on a Delta II Heavy 2925H-9.5 with a Star 48 upper stage

The Craft

Dawn started out weighing 1,217.7 kilograms (2,684.6 pounds) but 35% of that is the Xenon fuel which proples the 3 thrusters. The craft is 1.64 m (5.4 ft) long, 1.27 m (4.2 ft) wide and 1.77 ms (5.8 ft) high. High-gain antenna is 1.52 m (5 ft) in diameter. When deployed, its solar array is 20 m (65 ft) long tip to tip

The Engines

Dawn uses an ion engine, pioneered in space by the SMART-1 lunar orbiter. This provides low acceleration at high thrust over very long periods of time and allows a leisurely approach to its asteroid targets without requiring high delta-V decelerations to go into orbit and allow Dawn to be the first craft to orbit two different worlds in succession. The craft can go from "0-60 mph" in four days! It is estimated that the thrusters will operate for a total of 2,000 days, 5.5 years!

The Targets: Two very different Worlds

Vesta appears to be all rock (silicate metal oxides) and seems to have been in a number of major collisions. Parts of its surface appear to be basaltic which indicates melting, probably from the heat of a radioactive isotope of aluminum. Many meteorites found on Earth share the same spectrographic characteristics.

Ceres is not only much bigger than Vesta, but it is quite round, earning its recent reclassification to "dwarf planet," the only such body in the asteroid belt. It appears to have a considerable percentage of ice, and may have a subsurface ocean, and possibly a tenuous permanent atmosphere. Its day-night cycle is 9.08 hours long. Its surface area is considerable and to call it Texas-sized, a reference to its diameter, is outrageously misleading. Ceres has a Surface area of 3,160,000 km2 (1,219,000 mi2) which is slightly larger than either of:

- □ U.S. east of the plains states (not incl. Dakotas-Texas)
- □ U.S. west of the plains states (not incl. Dakotas-Texas)
- □ All the Canadian provinces of Manitoba, Saskatchewan, Alberta, British Columbia, *and* the Alaska panhandle.
- □ Queensland plus Northern Territory (in Australia)
- □ All the Moon's nearside seas together except the Ocean of Storms, O. Procellarum

In short, enough surface area in which to get lost.

The Targets: Locations and Distance from the Sun

Vesta orbits an average of 2.35 times as far from the Sun as Earth, Ceres 2.77 times. To provide the same amount of power as a 1x1 meter solar panel on Earth, a panel would have to be 2.35 meters on a side on Vesta (5.5 sq. m.) and 2.77 meters on a side on Ceres (7.7 sq. m.) Solar energy is doable on both worlds. See:
http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=Vesta;orb=1
http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=Ceres;orb=1

The Timetable

Mars flyby: February 2009
Vesta rendezvous: October 2011 - May 2012
Ceres rendezvous: February 2015 - July 2015

The Instruments

Flying one and the same set of instruments to both worlds is a key part of the strategy to understand their striking differences. These include (1) a visible camera, (2) a visible and infrared mapping spectrometer, and (3) a gamma ray and neutron spectrometer. In addition, radiometric and optical navigation data will provide data relating to the gravity field and thus bulk properties and internal structure of both worlds.

Three Priority scientific goals:

1. To capture the earliest moments in the origin of the solar system. Both are likely to have formed in the 1st 10 million years after the birth of the solar system, whereas we think Mars and Earth are thought to have formed 20 and 30 million years later, respectively.
2. Scientists hope that Dawn will shed light on the nature of the building blocks from which the asteroids, and the solar system in general, formed.
3. Given that Ceres and Vesta are so different, learning more about how they evolved should provide insights into the factors that control solar system evolution.

Significance of Ceres: If the Lunar Frontier is to become truly viable in the long term, we must develop markets both for lunar exports and as cheaper sources of critical materials that are in short supply on the Moon. This will eventually lead humans beyond the Moon, Near Earth Asteroids, and Mars into the main Asteroid Belt and beyond. Ceres by virtue of its size, position, and makeup could well become the *gateway to the Outer Solar System*. Its pioneers will develop materials and equipment that are hardy and perform well in "cryo" temperature range. We will need that technology to venture out to Callisto, Ganymede, and Europa in the Jovian system, and beyond.

Ceres has a synchronous orbit 486 mi. or 782 km above its equator -- elevator anyone? A space settlement with artificial Earth or Lunar level gravity would be possible. Ceres own gravity is 1/6th that of the Moon's or 3% that of Earth's. Will that be enough to prevent blood from pooling as it does in Earth orbit?

Significance of Vesta: How Vesta's basaltic maria formed will give us another model to hold in contrast to what we learn about mare formation on the Moon. Will Vesta's maria have even larger intact lavatubes?

Congratulations to JPL and NASA! </**MMM**>

Lunar Reclamation Society, Inc.

P.O. Box 2102
Milwaukee
WI 53201

www.lunar-reclamation.org

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

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TREAS./ Database – *Robert Bialecki 414-372-9613
Newsletter Mailing – Carol Nelson 414-466-2081

LRS News

• **Peter & Dave meet with UW students**: On Sept. 26, Dave Dunlop (the arranger) and Peter met with some 19 students from all branches of Engineering for a special class on Communications Skills, talking to them about the place of the Moon in our future and possible places for their skills in that development. We had hoped to interest them in taking on some space-related student project, but without faculty support, that won't happen.

• **MMM arriving earlier:** You may notice we are starting to get the newsletter in the month it is for. The speedup in publishing and delivery comes from the excellent services of our printing service in Sarasota, Florida.

• **We will have a display & table at:** *It Came from Lake Michigan,* a new media Sci-Fi/Horror Genre convention at State Fair Park Youth Center, Oct. 26-28. Info: follow the links at: www.lunar-reclamation.org/page4.htm

• **"In the Shadow of the Moon"** played at the Downer October 1-7th. We did not know about it until the 4th!

LRS Upcoming Events – September, October

Saturday, October 13th, 1-4 pm

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

Peter will talk about his trip to Calgary to visit the Calgary Space Workers, and update us on the Kaguya moon probe and Dawn probe to Vesta and Ceres, and upcoming Chinese Lunar Orbiter launch. Plans for our Display and Info table at "It Came From Lake Michigan." There will be some videos to watch.

Saturday, November 13th, 1-4 pm

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

Our Annual Christmas Party will be at the same location and time on Saturday, December 8th.

MMM 8 NSS Chapters Strong

NSS Chapter Events

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

Oregon L5 Society

P.O. Box 86, Oregon City, OR 97045
voice mail / (503) 655-6189 -- FAX (503)-251-9901
[http://www.OregonL5.org/]

Allen G. Taylor <allen.taylor@ieee.org>
Bryce Walden <moonbase@comcast.net>
(LBRT – Oregon Moonbase) moonbase@comcast.net

Meetings 3rd Sat. each month at 2 p.m.
Acme Coffee & Gifts at Washington and 14th Street
in downtown Oregon City – ***new location!***
OCT 20 – NOV 17 – DEC 15

Chicago Space Frontier L5

610 West 47th Place, Chicago, IL 60609

INFORMATION: Larry Ahearn: 773/373-0349

WISCONSIN

Sheboygan Space Society

728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376 (h) <willf@tcei.com>
SSS Sec. Harald Schenk <hschenk@charter.net>

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

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

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

OCT 18: The Stoelting House, **Kiel**
NOV 15: UW-Sheboygan, Room 6101, **Sheboygan**
DEC 20 The Stoelting House, **Kiel**

MINNESOTA

Minnesota Space Frontier Society

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

Tom Greenwalt (w) 763-784-6244 (h) 763-442-6015
David Buth (w) (612) 333-1872, (h) (763) 536-1237
Email: tomg@mnsfs.org

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

PENNSYLVANIA

Philadelphia Area Space Alliance

PO Box 1715, Philadelphia, PA 19105

c/o Earl Bennett, EarlBennett@erols.com
215/633-0878 (H), 610/640-2345(W)

[http://pasa01.tripod.com/]
[http://www.phillypasa.blogspot.com/]

PASA regular business luncheon/formal meeting 1-3 pm, the **3rd Saturday of every month** at the **Liberty One food court** on the second level, **16th and S. Market.** Go toward the windows on the 17th street side and go *left*. Look for table sign. Parking at Liberty One on 17th St. The November meeting will be at the Sheraton Philadelphia Center City at 17th and Race Streets. In December we are back at the Food Court. Call Earl/Mitch 215-625-0670 to verify all meetings.

Next Meetings: OCT 20 - NOV 17 - DEC 15

September 15th Meeting Notes: we had an informative gathering with Hank Smith talking on his science fiction event travel plans and the 2008 ISDC which will be held in Washington DC. He,ll have lots of company, as this is a "day trip" from our area (two hours each way). Before this late late spring event, Memorial Day weekend 2008. Hank, and other members, will likely go Balticon which has an excellent science track. But Hank will also go to conventions on Gothic Horror and other topics as well

Mitch Gordon has secured our place at the Franklin Institute and we will bring a few demo items for this public outreach event. He will try to bring material for the National Space Society part of the promotion of this group that carries out public outreach to politicians (the famous "March Storm" events) as well as promoting local space exploration and colonization outreach at movie openings and other events that Mitch is often our lead for. He'll also provide talking points and advocate for The World Future Society. And lastly he also brought the September Popular Mechanics with a time line of space activities starting with a few thin lines, the Sputniks, through a fluctuating grassland up to the present. This should be available on line also

Larry, our webmaster, brought web news on our site and blog, and his contribution to our Cubesat Display. this is a label that describes the reason for the models, the 50th anniversary of Sputniks launch, and gives our groups web information. In addition Larry gave us a tour of our web information with his most recent changes Go Larry! Dotty talked of an upcoming theatrical event that she and Larry would attend when our Franklin Institute outreach would occur.

However a funny think happened on the road to Broadway. Er, off Broadway. And now they will have time to be with us! Earl did not bring much new material but reprised the display that we are building. Michelle Baker has done a major part of the work to make this project come to fruition and I acknowledge this to the members at the meeting. The result is: 51 mock ups of the Cubesat Picosatellites with The label produced by Larry (at Michelle's' request) on one side,contact information on AMSAT and the Cubesat organization respectively. The other two faces have something that Michelle came up with that give the audience a chance to show there knowledge (and jog the memory!) about space events: one face has a date and the other events from that year. If they guess right they win the Cube! This will be our primary display for older visitors, and we will have the Space Bricks for "hands on" experience. Due to our other activity the Technical Report is abbreviated: In this months issue of Wired Magazine (October) is a short article on Google's' Moon Exploration Challenge

There are a few pictures of the Moon, including ground shots, and a graphic showing the various requirements and problems to be overcome to win. The vehicle will have a primary function of returning pictures, that can be shown on the Web, and do other things to meet the goals

The prize is not a lot of money: the quoted amount is $20 million. As readers of this publication know a circumlunar flight will cost 100 million per ticket, so the amount is secondary. Just to have produced a vehicle and send it on the Lunar Inject part of the trip would be an achievement. This will be an X Prize contest and was in fact put forth by Peter Diamandis at an event at Google's headquarters in March, 2007.I suspect more will be available via Google. The article was by Spencer Reiss, a contributing editor.

Also post meeting: from Analog Magazine for December 2007, " Finding Planemos" by Kevin Walsh on the attempts that will be made, in the near future, to find objects below Brown Dwarf size that could be in our intra-stellar neighborhood. There are great difficulties in trying this with current tools due to the low emission levels of the objects (even Jupiter size emitters) unless an instrument is placed in space. This will be possible for some of these objects when The Wide Field Infrared Survey Explorer begins operation after its launch in 2009

Mr. Welsh points out that exploring this "empty" region will give us a better grasp on what will be needed for interstellar travel. He gives the example of finding and

traveling to an object at 5000 AU

(almost a light month away) as a way of testing our technology and examining the medium outside our solar system. We'll have to look up sometimes from the local projects, such as Google's Race To The Moon, for what later generations (or ourselves with life extension) will be trying. And much more, of course

Submitted by Earl Bennett.

COLORADO

Front Range L5 Society

[Greater Denver North]

1 Cherry Hills Farm Drive
Englewood, CO 80113
http://www.angelfire.com/space/frl5/

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

Meeting monthly, every 1st Friday, 7 PM

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

Next meeting: **Colorado Space Day 2007**
Saturday, October 20th 9am-5pm

A day long event celebrating spaceflight and exploration.
University Of Denver Chamberlain Observatory
2930 East Warren, Denver , Colorado

Speakers And Information Tables

This event will by followed by an open house and telescope viewing at the observatory held by the Denver Astronomical Society. All events are free and open to all. For more information, call Bill Nelson at 303 330 2888.

Event Schedule:

9:00-10:00 am Speaker TBD
10:30-11:30 am Speaker TBD
12:00- 1:00 pm Speaker TBD
1:30- 2:30 pm Speaker TBD
3:00- 4:00 pm Speaker Brian Enke Mars Society.
4:00- 5:00 pm Speaker TBD
5:00 pm An Observatory open house and telescope viewing by the Denver Astronomical Society.

Who won the Space Race?

"Here are a list of Russian space firsts just so you know that they really did give us a run for our money.

From Richard Godwin, Apogee Books

- 1st artificial satellite
- 1st man in space
- 1st woman in space
- 1st multi manned vehicle
- 1st two manned vehicles in orbit at the same time
- 1st impact of the moon
- 1st images of the far side of the moon
- 1st soft landing on the moon
- 1st object to go into solar orbit
- 1st soft landing on Mars
- 1st soft landing on Venus
- 1st recovery from orbit
- 1st space walk
- 1st space station...

As you can see a very impressive list of space firsts that cannot just be dismissed out of hand.

Let's hope that together the next 50 years amounts to as many exciting achievements in space as the first 50 years have been. *NOSTROVIA!*

CALIFORNIA

OASIS

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

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

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

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

Regular Meeting 3 pm 3rd Sat. each month
Microcosm, 401 Coral Circle, El Segundo.
• June18 th - July 16th - August 20th

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

Upcoming Events

- **Oct 20, 3:00 p.m.** -- OASIS Monthly Business Meeting at the home of Craig and Karin Ward, 1914 Condon Avenue, Redondo Beach. Call the *OASIS Hotline,* 310/364-2290, for more information.
- **Nov 17, 3:00 p.m.** -- OASIS Monthly Business Meeting at the home of Steve Bartlett and Tina Beychok, 7108 East Peabody St, Long Beach. Call the OASIS Hotline for more information: 310/364-2290
- **Dec 1, *Time TBD*** -- OASIS presentation on the Mars **Phoenix** mission [http://phoenix.lpl.arizona.edu/] Long Beach Public Library, Los Altos Branch, 5614 Britton Drive, Long Beach. **Return to this page for updates on the start time.** Call the *OASIS Hotline,* 310/364-2290, for more information. *This event is not library sponsored.*
- **Dec 15, 3:00 p.m.** -- OASIS Monthly Business Meeting, at the home of Bob and Paula Gounley, 1738 La Paz Rd. Altadena. Call the *OASIS Hotline,* 310/364-2290, for more information.

Looking Ahead

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

Recuring Events

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

NAME _____

STREET _____

CITY/ST/ZIP _____

PHONE#S _____

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

Moon Society dues include *Moon Miners'Manifesto*

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