

NSS DC HQ is Moving, Still in DC

02/06/04 1from "Brian Chase" <brianechase@yahoo.com>

NSS is *not* closing its headquarters office, but moving it to a new downtown location that far surpasses the old one -- the new headquarters will be located just 2 blocks north of the White House.

An association management company hopes to provide even better service to members through outsourcing most HQ staff positions, which has the added benefit of reducing overhead expenses, allowing those funds to be invested in real projects and programs to fulfill the NSS mission.

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Thoughts on the Bush's Plan for Mars

by Peter Kokh

- Mars enthusiasts need to give up on Mars Direct (read "not by way of the Moon.") Trying to do Mars without delaying to properly field test equipment and systems on the Moon where rescue, replacement parts etc. are easy, is not bravado or dedication but foolhardiness
- We do need to make sure that the new man-rated exploration vehicles are adequate for the job and that there is a heavy lift cargo version (or a "Shuttle-C")
- right now, there is plenty of time to tweak the Bush Plan *and also to speed it up the timetable!*

The Sundial – First Artwork on Mars?

by Peter Kokh

Bill Nye, the popular "Science Guy" of PBS fame had looked at drawings of the proposed 2001 Mars Polar Lander. His eye was caught by a small square and post used as a test pattern to calibrate the craft's color panoramic camera. His mind's eye transformed it to do double duty as a "sundial." And with the help of others, Including the Planetary Society, Nye's Sundial was aboard Mars Polar Lander. See: MMM # 125 MAY. '99, p 1. "Sundials on Mars & Other Hitchhiker Goodies."

Mars Polar Lander crash-landed on the surface on Dec.2, 1999. No one knows if the sundial survived in recognizable form. But now two duplicates, also created as a Planetary Society project, have made it safely to Mars on the **Spirit** and **Opportunity** rovers, and are used to calibrate Pancam, the panoramic camera on the rovers. Kudos to Bill Nye and the Planetary Society! This is one piece of art that has millions of kids excited.

Roadblocks to an Open Mars Frontier

by Peter Kokh

While many Mars enthusiasts are encouraged by what President Bush has called for, what is omitted from his remarks show need for a more sober appraisal.

- There is currently no commitment to more than one exploratory mission, and that only to a pointless "flyby"
- Any commitment to a permanent outpost is far behind
- A commitment to an outpost with real growth potential is further off yet
- Any agreement to open Mars to settlers is beyond the horizon

How do we tackle this?

- Let government do what it will; it is a start and its money otherwise hard to come by
- *But also* try to get government to do things we can build upon to go to the next step. Each step must be a pregnant one, an enabling one. This is a strategy of "industrious patience"
- Lobby to get governments to allow tag-along industry/enterprise initiatives
- Meanwhile, work hard to get a lunar outpost off on the right foot, each step enabling the next, with industry and enterprise involved, developing local resources, self manufacture of many needs, and development of income-earning exports. This will create a model for the Mars Initiative to follow. - PK

Moon – Mars Project Commonalities

by Peter Kokh

Mars enthusiasts are quick to point out the "positive" differences that, in comparison with the Moon, make Mars "special." Mars has an atmosphere and plenty of volatiles: hydrogen, carbon, and nitrogen that, on the Moon, are orders of magnitude more scarce. Mars also has a more manageable day-night cycle. All true, but in many practical respects, irrelevant.

The atmosphere is thin, less than 1% of Earth normal pressure. We'll need very similar pressurized habitats and facilities on both worlds. More, Mars thin atmosphere offers little protection from cosmic rays, solar ultraviolet, and solar flares. Habitats on Mars will have to have as much shielding as those on the Moon.

On both worlds we will expand first with hybrid rigid inflatable modules, then by modules produced out of locally processed materials.

Life support systems, food production, medical systems, recycling systems will all be the same.

Transport systems to Mars and to the Moon can have many elements in common.

Power? We" need nuclear back-up on both.

Martian Sand Dune Rows

May make ideal Settlement Sites

by Peter Kokh

A different situation than on the Moon:

The Moon's surface is covered with a regolith layer of pulverized rock and rock powder, varying in depth from 2-5 meters, 6-16 feet. This blanket is the result of eons of meteorite bombardment. It comes in handy. Mineralogically it is representative of the crust in general and forms a "pre-mined" sample, making unnecessary either tunnel mines or strip mining. The fine powder effectively traps volatile atoms and particles from the solar wind, a gift of great economic importance. And for human outposts and settlements, regolith is an effective shield against cosmic rays and solar flares, when piled up 2-4 meters over all pressurized modules and structures.

On Mars, however, there is a thin atmosphere. While this is slim protection against larger meteorites, it is enough to protect against smaller incoming debris, which burns up in Mars' atmosphere as it does in Earth's. The result is that Mars' regolith blanket may well be thinner than the Moon's. That in places, the feeble Martian winds have been able to uncover unpulverized bedrock, as is apparent in the area being explored by the Opportunity rover, is anecdotal evidence that the regolith may be thin.

Another question concerns the presence of permafrost and how close to the surface it may be. In short, it may be quite a bit more difficult to scoop up regolith to use as shielding on Mars, as compared with the Moon. To be sure, this is all no more than speculation, on the author's part. But if found to be true, we may have to rethink our options for providing radiation shielding on Mars. This is an important issue, for Mars' atmosphere is not thick enough to offer significant protection from cosmic rays and solar flares. Signing a waiver not to hold the government responsible for radiation damage to one's body or systems, is not the answer. This is nothing to be cavalier about.

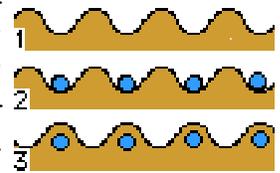
In MMM # 42 FEB '91, p4 Atmosphere Derived Shielding for Lo-REM Martian Shelters, we explored the idea of "mining" Mars' atmosphere for shielding materials. In the article, we suggested dinitrogen pentoxide which is a powder through out the entire thermal range to be found on Mars. It would extract nitrogen and oxygen from Mars air for this purpose. Geoffrey Landis objected, pointing out that this is an explosively unstable compound. But another option is simply to use the carbon, extracted from Mars atmosphere, 97% carbon dioxide, 3% nitrogen by weight, to make graphite powder. In the process, significant amounts of water, other useful compounds and important chemical feed stocks would be by-produced. A major advantage, as pointed out in that article, would be to leave the terrain surrounding the outpost pristine, undisturbed.

On Mars, as on the Moon, we will eventually build settlements, industrial parks, and warehouses in lavatubes which provide built-in structural shielding. But here we are talking about surface outpost options.

On the Moon where regolith covers just about everything, an outpost could be built in the bottom of a rille valley, and regolith pulled down on top of it by raking the valley sides. We might do the same in smaller craters. On Mars, if the regolith layer is thin in comparison, this may be a less attractive option. What can we do?

The dune fields of Mars: a unique structural opportunity:

Mars Global Surveyor has found many dune fields on Mars, areas in which there are neat rows of dunes. [See http://www.msss.com/moc_gallery/m19_m23/full_jpg_map/M20/M2001660.jpg] Some of these dune rows are in large crater bottoms and in inter-crater valleys. Most interesting are the long narrow rows of dunes extending many miles down the bottom of winding valleys or rilles. Whether these valleys were carved by water or lava is immaterial to the point we wish to make. The point is that each dune in a handy pile of regolith powder or sand, and the troughs between each pair of dunes, a logical place to put a habitat row. To cover the habitat with shielding, just pull down one of the dunes on top of it. To expand the outpost, put another habitat row in the next trough, and pull the intervening dune down on top of that one, and so on.



Of course, we will need to use dunefields where the dunes are of useful height and volume to cover what we put in each trough with a layer 2-4 meters thick. The dune fields found on Mars so far, include some that are of just the right range of heights to make this a practical idea.

Questions of stability and preservation:

It is only natural that on Mars, feeble winds will have concentrated most sandy powder in basins and valleys and that dune fields in such terrain are common. Stability, however, is a legitimate question. Dunes on Earth migrate over time. But Mars winds are feeble, and dunes there may migrate much more slowly than on Earth, possibly making them suitable for human use as outlined above.

But quite another question, and a legitimate one, is whether dune fields should be preserved as "geologically special," giving them protection as "national monuments or parks." Clearly we will want to preserve the most outstanding dune fields. But there may be enough such fields, that the use of a few "prosaic" dune fields of "commonplace" character, could be used as settlement sites.

Some areas of Mars, notably the great shield volcanoes, should be laced with lavatubes. Other areas on Mars may not be so blessed. Dunefields may provide a practical shelter option.

<MMM>

In William K. Hartmann's science fiction mystery novel "Mars Underground" page 253 (paperback edition) one of the characters, Phillippe Brach, the resident artist, creates a tree of aluminum branches and delicate foil leaves that, like an aspen, quakes in the Martian breezes. His purpose is to symbolize the hope that the citizens of Mars City have in their future. Why not also faux "tumble weeds" of gossamer construction? Set them out and let the winds take care of their "natural" arrangement!

Wind and Sound

The wind may blow but you won't hear it howl. The air on Mars is probably too thin to carry sound that unaided human ears can hear. So? Supply the hearing aids that will do the trick. Piezoelectronic devices are sufficiently lightweight to transmit a signal to devices within the homestead or other pressurized place that will be amplified into the range of human hearing. You might be able to hear those faux aspen leaves rustle.

So why not also create sufficiently lightweight wind chimes? As with wind chimes on Earth, anything that works, no matter what it looks like, should do the trick. And again piezoelectronics will make it possible for outpost personnel and future settlers to hear and enjoy those pleasant chime sounds, varying with the force of the winds, from within the comfort of their pressurized living spaces.

Mars of Yore, and Lore

If young Mars did bloom with life, the odds are that it was microbial. Yet that doesn't preclude visible microbe colonies or mats as have been found in fossil form on Earth. If we find any, we might "recreate" more of them, detectable in the Mars scapes by their texture and perhaps color.

But more inspiration is to be found in imagination of Percival Lowell of a dying Mars still clinging to life through the engineering feats of its brave and wise inhabitants. Wide corridors of vegetation hugging thousands of miles of canals a network extending from the poles to the water starved temperate and tropical regions of the planet. Landscape architects could playfully create "ruin sections" of canals, now tastefully dry, of course.

And then there are the images, indelible in the minds of those of us who grew up with "Tarzan" legends of the creatures and other denizens of "Barsoom" in the illustrated "John Carter on Mars" series of 11 novels (1911-41) and comic book of Edgar Rice Burroughs, the man also behind the pre-Hollywood Tarzan stories. "Replicas" of the giant six-legged thot steeds, fierce cat-like calots and other critters might someday be found on a Mars in process of humanization. After all, some of us indulge in pink plastic flamingos! And in addition to the creatures of Barsoom, why not some "wrecked" fliers and other vehicles?

Other science fiction novels of Mars may supply further sources of artistic inspiration. Who can tell?

Tourist attractions

How many of all these possibilities will be pursued by individual homesteaders is anyone's guess. Tastes and humor both vary widely in any population, witness the great variety and amount of home gardenscaping and lawn sculptures in our various communities on Earth. But owners and proprietors of commercial properties, while they may also vary greatly, are more likely to have the money to pursue such embellishments in abandon, both as customer draws and as recognizable brand trademarks.

Roadside Inns and resorts may lead the way in both directions, transplanting relics of desert areas of Earth and pioneering fresh arts and crafts creativity inspired by the new frontier. Both fake allusions to familiar and vaguely similar frontiers, and fresh expressions of native inspiration will be draws for travelers and tourist. Businesses may also be more likely to field replicas of Barsoomian beasts and vehicles. One can foresee theme parks or indoor gardens à la Barsoom. See MMM #41 DEC '90, p6 "To Inject a Unique Flavor into Martian Settlement Culture, add the Romantic Touch of Old Barsoom"

Earthside Deserts will continue to inspire

One attraction popular for immigrants and their children would be a museum featuring displays of various terrains and cultures of Earth. Those that will strike a chord of familiarity will be portrayals of desert and other extreme environments on the homeworld. The children may find rain forest and maritime displays too unbelievable to be of interest, too irrelevant to their own experience.

In Milwaukee, there is a trio of geodesic domes housing tropical, desert, and temperate zone plants. I once had imagined that on the Moon and Mars, a recreation of the tropical rain forest area would be most fascinating for the pioneers. But as a lets-pretend pioneer, on each visit, I am drawn not to the rich tropic dome, nor to the temperate plants I grew up with, but to the desert home, as probably more in synch with the pioneer experience.

While some will be horrified by the prospects foreseen in this article, most pioneers will need to "hang loose" (old Hawaiian advice) as a matter of psychological survival. What can it hurt? <MMM>

A Barsoom Glossary - Illustrated

People - Places - Things - Culture - Technology
<http://www.erblast.com/abg/>

Do maps of Barsoom and Mars line up?

1440x721 pixel map of Edgar Rice Burrough's Barsoom
http://www.geocities.com/area51/dreamworld/6532/barsoom/maps/barsoom_large.gif

Jetan - Barsoomian Chess

<http://www.erblast.com/abg/jetan.html>

MARSPOrt YELLOW PAGES

INSTRUCTION: MATERIALS SCIENCE, USAGE, AND MASTERY

University of MarsPort Manufacturing Materials Program [MMM] Architectural Materials Program [AMM] Arts & Crafts Masters Program [ACM]

Multi-disciplinary programs in on-world processed materials for manufacturing, architecture, and arts.

Sponsored by the School of Mines & Processing, the School of Architecture, the School of Mars-Appropriate Industrial Design, and the School of Arts.

for more information, visit us on the web at:
marsport.edu.mars/materials_masters.html
1000 Aanthor Way SE, MarsPort
678-8337

MARS ARTS & CRAFTS GUILD: Exo Materials Section: Apprenticeships

You may be qualified for a Guild Apprenticeship in Exo-Materials Mastery. If so, you can apply for available apprenticeships to learn your chosen trade under Masters proficient in various art, craft, and sculpture materials processed here on Mars.

To find out more, visit us online at:
www.mars_acguild.org/apprentice.html
627-8377

MATERIALS PRODUCERS, EXPOSED

Ares Exoplastics

We are producers of synthetic materials from MarsAir-derived chemical feedstocks, formulated to withstand prolonged UV and cosmic ray exposure.

We also manufacture **Faux Desert Creations®**, our own line of limited warrantee test products, sold to alleviate the cost of our continued experimentation and research, in our effort to develop fully exposable exoplastics able to serve as surface building materials.

For a catalog of available materials and their properties, or a catalog of ready to purchase artifacts, or to inquire about employment opportunities in research, testing, production, and sales, visit us at:

online: www.ares-exoplastics.com.mars
phone: 273-7396 -- email: info@ares-exoplastics.com
showroom: 880 Aanthor Way SE, MarsPort

TOURIST ATTRACTIONS, MARSPOrt

A Piece of Old Barsoom

E.R. Burroughs Outdoor Museum

The real Mars is not the Barsoom of novelist Edgar Rice Burroughs. But what can it hurt to pretend!

Transport yourself back to that fictional yesteryear on ancient Mars, to a time of survival and chivalry and heroism. Visit the Avenue of the Quays in ancient Aanthor and the Avenue of the Ancestors in Greater Helium. Behold our recreations of apts, thoats, calots, and other creatures encountered by that first visitor from Earth, John Carter, related in Burroughs novels . published way back in 1911-1941 common Earth era.

The Travel Channel (Earthside cable and satellite service) has called us "the only 5-star tourist trap on Mars." and we're only too proud of that rating, with plans to make our exhibit bigger and better.

Open daily, one hour after sunrise to one hour before sunset
2500 Spaceport Bypass Road, MarsPort
Photo Gallery: www.barsoomonmars.com.mars
More information, Group Visits: **227-7666**

The Dejah Thoris Hotel

Designed inside and out in Barsoomian fashion by famed Mars architect, Tars Carter. Our courteous staff is in full period costume. Our halls are punctuated with niches featuring characters from ERB's novels: green and red men , four-armed tharks, heroes, heroines, villains. Enjoy Barsoom indoors in shirtsleeve comfort.

Open to hotel guests and casual visitors alike.
www.marsport.com.mars/hotels/dejahthoris/
100 Pioneer Square, MarsPort
Information & Reservations: **384-6747**
New Alice Springs

New Old Tucson

A domed "must see" museum of the Old Desert Southwest, complete with a Ghost Town, and a circular nature walk along the edge of the dome with living Earth desert plants on the inside, faux dead plant and animal life and abandoned wagons just outside. Enjoy our one hour guided tour and visit our souvenir shop.

Just across from the MarsPort Botanical Park
1500 Spaceport Bypass Road
www.newoldtucson.com.mars
Visitor Information & Events Hot Line: **682-7663**

The Moon Society



JOURNAL

<http://www.moonsociety.org>

Please make NEWS submissions to KokhMMM@aol.com

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

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

PROJECTS:

The Artemis Project™ <http://www.asi.org/>

- Artemis Reference Mission
- Artemis Data Book

Project LETO™

<http://www.projectleto.org/>

Moon Society DUES include **Moon Miners' Manifesto**

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

Join/Renew Online at

www.moonsociety.org/register/

Or mail check or money order to:

PO Box 940825, Plano, TX 75094-0825, USA

Please send all mail related to Memberships to:

The Moon Society Membership Services

at address above.

Moon Society Submits Response to Bush Moon/Mars Committee

Press Release prepared by Board Member Michael Mealing

Plano, TX, March 5, 2004 -- The Moon Society submitted position papers today [below this Press Release] concerning the implementation of the President's new space vision and the role that the Moon plays in that vision to the Aldridge Commission. The Society stressed the importance of clarity about just why humans should return to the Moon, and how it should be done in a sustainable way.

As the commission emphasizes, it is that sustainability that is the most important factor in the long term success of the President's vision. If a return to the Moon is to provide the fullest possible support for a Mars exploration venture, the Moon's resources must be developed in a way that defrays lunar operations costs by providing an ever-growing portion of the needs of base personnel, by developing exports to minimize net costs of imports, and by manufacturing items needed to support the Mars missions.

The Society also reiterates its established position that private enterprise be as heavily involved as possible, both in direct support of governmental projects and in indirect ways, at private initiative, to develop lunar resources for profit. These profit motivated initiatives may include providing abundant clean energy for Earth's power needs, supporting tourism to and on the Moon, and providing spacecraft refueling services for the satellite industry. Such efforts will minimize the costs of government funded projects by creating consumer driven economies of scale.

The Society also submitted a proposal for the role that lunar observatories and other resources could play in either the recovery of the Hubble Space Telescope or in the development of follow on observatories. The lunar surface offers a much cleaner environment than low earth orbit: lunar orbital mechanics keeps the area clear of dust and debris, the lunar surface is seismically quiet, and the lunar far-side provides one of the best locations for radio astronomy.

The submissions can be found at

<http://www.moonsociety.org>

Position Papers prepared by Board Member Peter Kokh

"The Moon: Why and How we Should Return"

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

[whitepapers/moonreturn_positionpaper.htm](http://www.moonsociety.org/whitepapers/moonreturn_positionpaper.htm)

"The Hubble Space Telescope and the Future of Space-Based Astronomy in the Light of a Return to the Moon"

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

[whitepapers/hubble_positionpaper.htm](http://www.moonsociety.org/whitepapers/hubble_positionpaper.htm) 

Lunar Photo of the Day

<http://www.lpod.org>

Lunar Photo of the Day - About [TEXT]

<http://www.lpod.org/LPOD-About.htm>

The Moon is the brightest and most fascinating object in the night sky. With constantly changing solar illumination and more than 11,000 craters visible in a small telescope, the Moon offers endless diversion for all who look. And yet, many professional and amateur astronomers regard the Moon only as an unshielded light that washes out the faint diffuse glow from nebulae and galaxies.

Well, tough - the Moon exists. The Moon has faithfully circled the Earth for 4.5 billion years, and records the ancient history of this part of the solar system. The Moon was the destination for the most audacious journey in human history, and will be settled by Americans, Chinese, Japanese and other humans during this century. The Moon is the past and future for Earthlings, and we all need to learn more about it.

In December 2003, as members of the lunar-observing@yahoogroups.com complemented each other on the high quality images being produced, one active member, Anthony Ayiomamitis of Greece, stated that there were so many great images that there ought to be a Lunar Picture of the Day. This suggestion immediately attracted favorable response. Charles Wood, a former NASA scientist who had studied the Moon and writes a monthly lunar column for Sky & Telescope, proposed starting the LPOD as an adjunct to his NASA-funded site www.observingsky.org.

Within days Wood and Ayiomamitis were designing the layout for LPOD, programming the web site, selecting images for the first week's features, and writing captions. And acquiring the www.lpod.org URL! LPOD starts Jan 1, 2004 - now we wait to see if the rest becomes history!

LPOD is based on the very successful Astronomy Picture of the Day, which contains a wonderful picture and brief caption each day with links for further information. APOD is viewed by millions of people around the world. It has sparked a wider interest in astronomy and the new understanding that comes with the beautiful images. APOD has spawned an Earth-POD and a somewhat different Mars-POD. All of these PODs provide an easy and quick way for astronomers - both amateur and professional - and the general public to stay in touch with emerging science and be awed by the beauty of the cosmos.

LPOD has a smaller canvas than the entire universe, but it concerns the most visible and most accessible part of the extra-terrestrial universe. Some might question if there is enough material, both visual and scientific, to support a daily LPOD. We believe the answer is a resounding YES! There are hundreds of thousands to millions

spacecraft images, from Ranger and Luna to Apollo, Clementine and Lunar Prospector. Earth-based observers have drawn many thousands of sketches and maps during the nearly 400 years following Galileo and Harriot. And since the advent of lunar photography in the 1850s, uncounted photos have been acquired. Also, there are books, scientists, astronauts, telescopes and spacecraft that have been critical to our learning about the Moon - they deserve LPODs too!

Rather than being a mere collection of lunar images, LPOD strives to be an educational resource. Every image is accompanied by a description that ideally refers to visible details to offer a bite-size morsel of understanding. But we don't forget the non-scientific impacts of the Moon on our lives. The Moon is beautiful, especially seen against a terrestrial landscape, and has inspired legions of poets, painters, lovers and science-fiction writers. All are grist for LPOD!

We hope you enjoy and contribute to LPOD!

Charles A. Wood, Author & Editor

Anthony Ayiomamitis, Webmaster

A service of: ObservingTheSky.Org

Yahoo Groups: lunar-observing

<http://groups.yahoo.com/group/lunar-observing/>

Moon Society members who'd like to improve on their knowledge of "Lunar Geography" or Selenology, have lot's of options. You can just pick up a lunar atlas and study it, and/or a globe of the Moon. Joining the Yahoo Group above is something you might want to consider.

Nothing beats studying the nearside of the Moon through a telescope, following interesting features day after day as lighting conditions change with the phase. You don't need (or even want) a powerful telescope for Moon-gazing, but something better than a pair of binoculars will help reveal the fascinating detail. There are a number of groups (beside the Yahoo one above) out there to help you get started with sensible recommendations on equipment and sources. Some groups even have thorough observing programs for beginners that will help you explore the great variety of features visible. Among those to contact are:

- ▣ The American Lunar Society
<http://www.americanlunarsociety.org>
- ▣ Your local astronomy club - www2.astronomy.com/astro/SpacePlaces/SpacePlaces.html
- ▣ What's to See Tonight? - www.inconstantmoon.com/
- ▣ Lunar Section of A.L.P.O. [Association of Lunar & Planetary Observers]
<http://www.lpl.arizona.edu/~rhill/alpo/lunar.html>
- ▣ The Lunar Club - www.astroleague.org/al/obsclubs/lunar/lunar1.html



as 10,000 lbs. It has the same payload faring issues as the Proton (though I'm sure Elon would be more than willing to make a 4.5 m faring if asked to, and if we were buying several flights). Each flight would be in four pieces docked together on orbit. The first two would likely be mostly LOX tanks with some connectors and plumbing all able to be automatically docked (or assembled at an LEO staging base), the third would be the crew vehicle or cargo lander along with a last small LOX tank and some plumbing. The last launch would be the transfer stage engine(s) and LH2. Each of these would be about the same cargo or personnel capacity as the Proton based option. Since the assembly is a bit more modular, we can assume the costs of each would go up a bit, say \$35M for cargo landers and \$50M for manned return vehicles.

Transportation costs (without an LEO node) would be \$270M for the 2-man option, and about \$365M for the four man option. This is about the same price as the Proton based option. However, if we are launching 12-16 flights of their Falcon V, SpaceX may well be willing to give us a substantial price break. On the minus side, an LEO node will likely be required, however launching that could actually be much cheaper using the Falcon V if we keep it small and simple. This would lower costs for future missions too, and maybe provide the framework for an orbital fuel depot for future markets.....

Anyhow, that's the basics. Comments? <JAG >



Lavatubes & Blacklight

1/30/04 in response to your email [see MMM #172, FEB '04, p. 7 "Lavatubes by Blacklight Fantasy Excursions"]

No, I don't believe we have tried blacklight in the lavatubes. Recently Cheryl [York] picked up a portable, battery-powered long-wave UV light that we could try out. There also exist field models of short-wave UV lamps that are used to reveal a number of minerals. We don't have one, but they might be rentable. I seem to remember they were a bit pricey.

I would not expect to see much. But you never know until you try. And if we did find glowing mineralization, we would then want to determine if it was intrinsic to the lavatube, or if it was a later addition from water leaching, etc., that we might not expect to find on a less-wet world.

Guess we'll have to pull out the overalls and helmets and do some research!

Bryce Walden < moonbase@comcast.net >

Chapter & Outpost Resources Online

The Moon Society Chapters Coordinator keeps a log (with active links) to resources appropriate for use by Moon Society Chapters and Outposts on the Space Chapters Hub website. This log is online at: www.moonsociety.org/chapters/milwaukee/msmo_output.htm

NOTE: The interesting proposal on pages 11 and 12 comes from Jonathan Goff, leader of the Utah Outpost and founder of the Brigham Young Univ. (Provo, UT) student chapter, dba BYU Space Development Club.

As reported in last month's frontier report, BYU-SDC is working on a hands on engineering project, below

Moon Society Brigham Young U. Outpost dba BYU Space Development Club

<http://www.et.byu.edu/groups/sdc/>
<http://www.et.byu.edu/groups/sdc/projects.html>

On Thursday, February 5th, we discussed many of the current, and near-term markets in suborbital, orbital, and interplanetary space..

The week before we had a short presentation by Danny Farnsworth (Treasurer/Secretary) on Hydroponics and Aeroponics, and applications in space development.

We also worked out a Bill of Material for the Igniter Project. A preliminary Solid Model has been put together ... mostly just the structure so far, as the rest of the design is still in flux at the moment, but it should start giving a general idea of what we're trying to put together:

<http://www.et.byu.edu/groups/sdc/IgniterProject/igniterstructure.jpg>

Basically you have a modular baseplate, and a blast-shield (with a transparent window for observation. The torch igniter will be mounted inside the chamber shown)....

Jonathan Goff
Pres. BYU Space Development Club

SDC Technology Projects

- * Restartable Air/LH2 Torch Igniter
- * Small Air/Isopropyl Alcohol Gas Generator
- * Pintle Injector Demonstrator

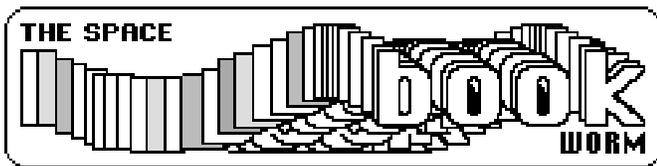
SDC Business Projects

- * Liberty Space Systems

If you have built castles in the air,
your work need not be lost;
that is where they should be.

Now put the foundations under them.

--Henry David Thoreau



The Once and Future Moon

by Paul D. Spudis

Smithsonian Institution Press, 1996, 319 pages
ISBN 1-56098-847-9 (paper); 56098-634-4 (hard)
List \$17.95. Used from Amazon.com \$0.01 +\$3.50 S&H

Review by Arthur P. Smith, Reprinted from
<http://www.asi.org/adb/b/O1/oncefuture.html>

The first half of Paul Spudis' book recapitulates much of the geologic history and information presented in Don Wilhelm's *To a Rocky Moon*, supplemented by data from the 1994 Clementine mission in which Spudis played an important part. The Clementine data is quite interesting and this book presents several intriguing graphics on surface topography and mineral distribution. Clementine provided our best view yet of the South Pole-Aitken basin which descends as much as 12 km below the mean surface - it also discovered the near-perpetually sunlit crater rim in the South Pole region that is tempting as a first lunar base location; the book provides the interesting datum that the temperature at that point is stable and more human-friendly than elsewhere on the Moon's surface, around -30 to -50 degrees Celsius.

The second (future) half of "The Once and Future Moon" addresses why, how, and when we will return to the Moon. Spudis' experiences with Clementine, and the negative experience with the big-budget NASA-planned Space Exploration Initiative (SEI - the \$500 billion plan to go back to the Moon and beyond) of the early 1990's play an important part here. The book emphasizes a "pay as you go" small-scale approach to getting back. Cutting the cost of going to space is clearly needed - Spudis was perhaps over-optimistic about the DC-X, but mentions several other alternatives that might do just as well, and clearly examines where the current launch costs arise (hint: the energy to get to orbit costs a lot less than all those salaries for human hangers-on). Once we can feasibly do it, getting back to the Moon should proceed in phased steps. First orbiters to do more geological surveying (and provide telecommunication or other services). Then landers which may be capable of scientific research activities (astronomical observatories may be a good early candidate) but also to perform construction, manufacturing, or chemical processing to start the necessary use of in-situ resources. Rovers make sense as a next step, to explore more of the surface at a field-geological scale, and to facilitate construction of various services (energy, roads, etc.) Finally human bases will be needed to perform all those tasks requiring human dexterity, flexibility, and on-site decision-

making, as the lunar infrastructure continues to grow.

Spudis' appendices review the basic lunar facts and missions; most of this is also in Don Wilhelms' book. Spudis also provides a valuable bibliography with commentary on a large selection of books and other materials.

As a shorter book than Wilhelms', this is a good introduction to lunar geology (in the first half) and goes much beyond it in the second half discussing where we go from here. Spudis seems hopeful; read this book. You might almost be convinced that we'll really be back there soon!

another review: <http://otterdad.dynip.com/als/page186.html>



Remarks about Alpha Centauri

In the Moon Miners' Manifesto # 166, June, 2003 "First Alpha Centauri TeleProbe Results," some comments were made about the Alpha Centauri system. While it will likely be quite a long time before humans settle on planets in that system - if indeed Alpha Centauri even has any - the remarks were of sufficient interest to spark a few thoughts of my own.

First, a very minor amendment to the distances between stars A and B. The astronomical data I have been able to find seems to indicate both the maximum and minimum distances between the stars are slightly smaller than the figures given in the article: only 10.75 AU at minimum, instead of 12.4, and around 35 AU at maximum.

However, I don't think this will make huge impediments to climate or life, if any is present. For a planet orbiting either star at a distance that would permit a comfortable climate for us, the light from the other star will add no more than about 1% to the total radiation budget, even at periastron - still less if you are riding a planet orbiting A, since B is quite a bit dimmer.

This might have some effect on the climate, in 80-year cycles. Depending on when you are in the cycle, you might have slightly warmer summers and slightly cooler winters, or at other times, slightly cooler summers and slightly warmer winters. I expect life could adapt to that.

Peter Kokh quite correctly pointed out that this could have huge effects on illumination, even though perhaps not on the heat budget. Nocturnal creatures might have different adaptations from those on Earth. Or their behavior might change, depending on whether the other sun was in the sky mostly during the day or the night during a particular phase of the 80-year cycle. It would be interesting to speculate whether plants would continue to photosynthesize at night, if the other sun were in the sky after the nearer one had set.

Larry Jay Friesen <ljfriesen@ev1.net >

GREAT BROWSING !

Follow the Spirit!

<http://marsrovers.jpl.nasa.gov/gallery/all/spirit.html>

Pursue Opportunity!

<http://marsrovers.jpl.nasa.gov/gallery/all/opportunity.html>

Consortium for the Development of Space Value Networks

<http://www.rocketforge.org/cdsvn/>

Fluorescent Rock Links Page

<http://mywebpages.comcast.net/jtozour/links/links.html>

Lunar Picture of the Day

Bookmark this one!

<http://www.lpod.org>

Where, When ISS is visible in your area

<http://spaceflight.nasa.gov/realdata/sightings/cities/index.cgi>

Save the Apollo LUT [Launch Umbilical Tower]

<http://www.savethelut.org/imgs/s67-50531HR.jpg>
<http://www.petitiononline.com/LUT/petition-sign.html>

The President's Commission on Return to the Moon and on to Mars: The Aldridge Commission, a place to give your input!

<http://www.moontomars.org/>

The Space Shuttle Clickable Map

<http://seds.lpl.arizona.edu/ssa/docs/Space.Shuttle/>

The Shuttle-B, Shuttle Derived Vehicle

<http://www.spacedaily.com/news/oped-03zszs.html>

1989 Mockup of Shuttle C Cargo Pod

www.space.com/images/shuttle_c_031113a_02.jpg
in flight (launch) illustration
www.space.com/images/shuttle_c_031113b_02.jpg

Next Shuttle: Capsule or Space Plane?

http://www.space.com/business/technology/technology/osp_debate_030521.html

Capsule Type Crew Module

http://www.space.com/images/osp_concept3_02_0.jpg

Seeds of Martian Frontier Culture

- ▣ The Natural Mars Palette of salmons, rusts, ochres, tans
- ▣ Mars Time [http://members.aol.com/Tanstaafiz/marspulse_cal2.htm]
 - ▣ The slightly longer Martian Day
 - ▣ The much longer Martian Year
 - ▣ The diverse lengths of the Martian Seasons
- ▣ The 6-40 minute Earth-Mars Radio Time Delay
- ▣ The 25 month wait between Earth-Mars launch windows
- ▣ The very thin, radiation-transparent CO₂ atmosphere
- ▣ The much colder Martian climate
- ▣ The absence of reservoirs of open liquid water
- ▣ The seamless character of Mars' global land surface

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<http://otterdad.dynip.com/als/page105.html>

This project was designed for those who want to move beyond the simple observing stages. In completing the Certificate, you will observe not just 'craters and maria', but also sinuous rilles and volcanoes, flooded craters and secondary craters, arcuate rilles and mare ridges. Further, you will come to understand just how these features formed, and what they tell us about the history of the moon. In short, this project will produce competent observers, who are qualified to teach others about the wonders of the moon. May you enjoy the learning and the hunt. --Eric Douglass

To earn the ALS Study and Observing Certificate one must complete the following steps:

1. Read the article "Geologic Processes On The Moon" [<http://otterdad.dynip.com/als/page3.html>]
2. Complete an 'open book' test over the article "Geologic Processes On The Moon" (note: not a difficult test; designed to ensure that the article was read). Passing score occurs at 80% correct answers.
3. Observe a list of objects [www.lunar-reclamation.org/observation_list.htm], and keep a log of what was seen. Only 90% of these objects need be observed to complete this requirement.
4. Mail both the test and a copy of your log, along with a check for \$8 (processing fee) to:

Eric Douglass < ejdftd@mindspring.com >
10326 Tarleton Dr.
Mechanicsville, VA 23116

Your certificate will be mailed to you within 4 weeks of arrival in my hands.

Why We Must Defend Hubble

by Robert Zubrin, President, Mars Society, Feb. 1, 2004

<http://www.marssociety.org/news/2004/0202.asp>

Last week, the Steering Committee of the Mars Society released a statement supporting the new Bush space initiative, but taking strong exception to the decision by NASA Administrator O'Keefe to cancel all future Space Shuttle missions to the Hubble Space Telescope, including SM4, the nearly-ready-to-go flight that would have installed the new Cosmic Origins Spectrograph and Widefield Camera 3 instruments.

Since the release of that statement, I have received many communications congratulating the Mars Society for this stand, which several in the non-Mars science community characterized with words such as "unexpected but very welcome." A few space advocates, however, have questioned why those whose primary concern is to further the human exploration and settlement of space should fight to save an astronomy project.

The answer to this is straightforward. We must defend Hubble because the abortion of the Hubble program is a crime against science. Furthermore, the grounds given for deserting Hubble are irrational, and constitute a form of moral cowardice that if accepted as the basis of space policy, would absolutely prevent any human missions to the Moon, Mars, or anywhere else.

These points are explained in greater detail below.

1. A Crime Against Science: The HST is, as explained in more detail in the appended talking points, the most productive scientific program in human history. It has revolutionized astronomy, and made discoveries that have caused us to radically revise our concept of the nature of the universe. It is emblematic of our society's commitment to the search for truth. If you support that commitment - and we do - then you must defend Hubble.
2. Deserting Hubble is Irrational: Giving up on Hubble makes no sense. Given the commitment to continue flying the Shuttle program through 2010, adding the two Shuttle flights required to upgrade Hubble and then reboost it to make it operational through 2015 would only add about 1% to the Shuttle program's cost, while increasing its science return by several orders of magnitude. The safety argument given by Mr. O'Keefe for canceling Shuttle flights to Hubble while allowing them to ISS is also without rational basis. It is true that when flying to the ISS, the crew has a safe-haven on orbit, which is not available to Hubble flights. However Hubble missions leave the Cape flying east-southeast, while launches to ISS go northeast. Thus in the event of a launch abort, Hubble missions can ditch in warm tropical waters while ISS flights must come down in the frigid North Atlantic, where the crew's chances for survival would be much less.

Furthermore, because ISS flights take off with much heavier payloads than Hubble flights, they require full functionality of all three engines for nearly 100 seconds longer than Hubble missions if they are to perform an abort-to-orbit. This makes landing in the drink on ISS missions considerably more likely. Finally, NASA calculations show that the danger of fatal impacts by micrometeors and orbital debris to be over 60% greater on ISS missions than Hubble missions. If we put this information together with the fact that only two Shuttle missions are needed to make Hubble operational for another decade, while over 20 are needed to complete the ISS, it is apparent that Mr. O'Keefe's assessment that the Hubble program poses greater risk than the ISS program is irrational.

3. Hubble Desertion Prevents Human Exploration: Desertion of Hubble discredits the human spaceflight program because Hubble is the one example to-date wherein the human spaceflight program can show more science return per dollar than robotic spacecraft. For example, Hubble, including its four Shuttle support missions to date, has cost about twice as much as the Galileo probe to Jupiter, but it has produced at least a hundred times the science return. Fleeing from Hubble is fleeing from the human spaceflight's program primary scientific accomplishment. The cost of retreat is much worse than that, because the space agency is now proposing to begin a program of human exploration to the Moon and Mars. Yet it is patently obvious that a human mission to the Moon or Mars cannot be done at a lower level of risk than the Shuttle mission to the Hubble. So, if we don't have the guts to go to Hubble, we are not going to the Moon, Mars, or anywhere else. And if we are not going to engage in human interplanetary travel, then the primary rationale for the Space Station program -- learning about the effects of long-duration spaceflight on human physiology -- loses its foundation as well.

In the face of massive public outrage about his decision, Administrator O'Keefe has agreed to allow it to be reviewed by Columbia Accident Investigation Board Chairman Admiral Hal Gehman. Hopefully Gehman will rectify the situation. But if he does not, then Congress will have to act. They will have to take action, because ultimately the question of whether we rise to the challenge of the Hubble upgrade mission is not one of the technicalities of Shuttle flight safety, but of societal values.

If humans are to explore space, cowardice is not an option. It's not a matter of ignoring risks, but of facing them, and knowing the odds, bravely putting it on the line to do what has to be done. This is the human quality known as courage. It has been the primary requirement for every significant achievement of humanity to date, and it will be the spirit necessary if we are to go to Mars. <RZ>



The Lunar Reclamation Society, Inc.

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Milwaukee
WI 53201

www.lunar-reclamation.org

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

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Carol Nelson 414-466-2081
(* Board Members, & Ken Paul < kenpaul@cape-mac.org >

LRS NEWS

• **February 14th Meeting Report:** On the agenda: the Bush Moon Mars Plan [www.moontomars.org] and our new position paper (PK): "The Moon: Why and How we Should Return" [www.lunar-reclamation.org/moonreturn_positionpaper.htm], and the Save the Hubble campaign [www.savethehubble.org] Also the May ISDC and August Mars Conv.ention in Chicago

LRS MARCH & APRIL Events

 **Saturday, MAR. 13 th, APR 10th, 1-4 pm**

LRS Meeting, Mayfair Mall, Garden Suites Room G110

• **March AGENDA:** Review of LRS' new position paper: "The Hubble Space Telescope and the Future of Space-Based Astronomy in the Light of a Return to the Moon"; Updates on ISDC in Oklahoma City, Memorial Day Weekend & Mars Soc. Conv. in August in Chicago

• **April AGENDA:** TBD

Collaborating Milwaukee Area Space Groups

Wisconsin Mars Society c/o Matthew Giovanelli
7133 West Wells Street, Milwaukee, WI 53213
414-774-8952 - marsmatt@wi.rr.com
<http://chapters.marssociety.org/usa/wi/>
WMS usually meets at address above on 3rd Sat. 1pm

**SOLAR SYSTEM
AMBASSADORS**



www.jpl.nasa.gov/ambassador/

Michelle Baker
Princeton/Philadelphia
chaos@cybernet.net

Bill Higgins
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higgins@fina.gov

Harold Schenk
Sheboygan, WI
hschenk@excel.net

Bill Hensley
Kenosha, WI
hensley@acronet.net

U.S. CHAPTERS



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

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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/]

MEETNGS: 3rd Saturday of the month from 1-4 pm
at the: **St. Anthony Park Library's Meeting Room**
2245 Como Ave. St. Paul, MN

- **Pics from the Opportunity Landing party on Jan 24th at Jim's:**
www.freemars.org/mnfan/mnsfs/MER-B-Landing-Party/
- **MNSFS makes its own Mars Rover model:**
www.freemars.org/mnfan/mnsfs/Big-MER-Model/
- **Pics from Ken Crosswell's "Magnificent Mars" talk Feb 10th**
www.freemars.org/mnfan/MN-Planetarium/Ken-Crosswell-Mars-talk/

WISCONSIN



Sheboygan Space Society

728 Center St., Kiel WI 54042-1034

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

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

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

- We now meet the 3rd Thursday of the month at 7-9pm
March 18th: UW-Sheboygan, Sheboygan Room 120A
April 15th: Stoelting House, Kiel
May 20th: UW-Sheboygan, Sheboygan Room 120A

OREGON



Oregon L5 Society, Inc.

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@attbi.com>

(LBRT - Oregon Moonbase) moonbase@attbi.com

- Meetings 3rd Sat. each month at 2 p.m.

Bourne Plaza, 1441 SE 122nd, Portland, downstairs

NEXT MEETINGS: MAR 20th, APR 17th

CALIFORNIA



OASIS: Organization for the Advancement of Space Industrialization and Settlement

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

Events Hotline/Answering Machine: (310) 364-2290

Odyssey Ed: Craig Ward - cew@acm.org

E-mail: oasis-leaders@netcom.com

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

Odyssey Newsletter Online

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

Regular Meeting 3 pm 3rd Sat. each month

Microcosm, 401 Coral Circle, El Segundo.

Information: OASIS Hotline, 310/364-2290

- MAR 20th, 3:00 p.m. -- OASIS Monthly Business Meeting, location TBD.
- APR 17th, 3:00 p.m. -- OASIS Monthly Business Meeting, location TBD.

Meeting, location TBD.

Recurring Events

- Fridays - "Mike Hodel's Hour 25" webcast. The world of science fact/fiction: interviews, news, radio dramas, artists, writers, stories, reviews. www.hour25online.com/

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.triipod.com/>]

- PASA regular business luncheon/formal meeting from 1-3 pm, the 3rd Saturday of every month at the Liberty One food court on the second level, 16th and S. Market. Go toward the windows on the 17th street side and go left. Look for table sign. Parking at Liberty One on 17th St.

Meeting Dates: March 20th, April 18th (Sunday) - Call Earl or Mitch 215-625-0670 to verify all meeting

- Meeting Notes: We had modest attendance with an appearance by Dennis Pearson from Allentown who combined a business trip with our meeting. He talked of his visit to the I.S.D.C. in San Jose in May. The Space Elevator talk by Michael Laine was of particular interest to Dennis. Mr. Laine has founded a company to work on the concept; Liftport (liftport.com) after previously being a participant in studies for N.A.S.A. as part of another company. Dennis gave some details on things like favorable locations which included the Horse Latitudes (off of South America ~ 200 miles west of the Galapagos Islands). There are almost no winds in this region and so is almost ideal. Dennis also mentioned using a launch ramp system that another organization was working on: you basically accelerate the vehicle on a "track" (enclosed or open depending on the design) with magnetic levitation and get up to a speed where the vehicle "falls of the Earth". The advantage is that the craft is accelerated in the thick atmosphere by a prime mover type engine that you don,t have to lift with you. Dennis also reported that there will be an event in Bethlehem in June that may include a display of Moon Rocks (the real ones) and which would include someone certified to show them. Contact Dennis about this, especially if you are certified, at dpearson@enter.net.

Dottie Kurtz reported on several publications including a special National Geographic issue entitled Space. This issue was so popular that it was in the second printing

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Send proper dues to address in chapter news section

=> for those outside participating chapter areas <=

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



Moon Miners' MANIFESTO

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