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

Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com



Two ways to get to Mars safely: a nuclear fusion rocket is one of them, "someday." - see pp. 7-8

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About Moon Miners' Manifesto - "The Moon - it's not Earth, but it's <u>Earth's</u>!"

- MMM's VISION: "expanding the human economy through off-planet resources"; early heavy reliance on Lunar materials; early use of Mars system and asteroid resources; and 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.
- Moon Miners' Manifesto CLASSICS: The non-time-sensitive articles and editorials of MMM's first twenty years plus have been re-edited, reillustrated, and republished in 23 PDF format volumes, for free downloading from this location: http://www.MoonSociety.org/publications/mmm_classics/
- MMM THEME Issues: 14 collections of articles according to themes:/publications/mmm_themes/
- MMM Glossary: new terms, old terms/new meanings: www.moonsociety.org/publications/m3glossary.html

• MMM retains its editorial independence and serves many groups, each with its own philosophy, agenda, and programs. Sharing MMM may suggest overall satisfaction with themes and treatment, requires no other litmus test.

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• MMM color online downloadable PDF file version option for Moon Society Members using their username and password – do write <u>secretary@moonsociety.org</u> if you need help with your password.

• For additional space news and near-term developments, there is a daily RSS feed space news section on http://www.moonsociety.org. You can also read Ad Astra magazine mailed to National Space Society members. • Milwaukee 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. MLRS serves as the Milwaukee chapter of both The National Space Society and The Moon Society: - http://www.moonsociety.org/chapters/milwaukee/

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

National Space Society 1155 15th Street NW, Suite 500 Washington, DC 20005 (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 chapters 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, Text files, and pdf file attachments or mailed CDs, DVDs, or typed hard copy [short pieces only, less than 1,000 words] to: Moon Miners' Manifesto, c/o Peter Kokh, 1630 N. 32nd Street, Milwaukee, WI 53208-2040

In Focus I Radiation Risk on Trips to Mars and Back - so?

It seems that we will encounter "discouragingly high" radiation en route to Mars and Back.

So what? There will always be a surplus of volunteers to take this risk, people who already have cancer in early stages, people who feel that such an opportunity would be the crowning jewel of their lives no matter what, smokers who look the other way on cancer as it is, etc.

The **risks taken by Columbus, Shackleton and many other explorers through the ages** has been order of magnitudes greater. What we see here in NASA's (and the public's) assessment is a "play-it-safe" "political ti-midity" where we let the lowest common denominator set the rules – a certain path to irrelevance. Political timidity didn't create the world we live in today.

Frontiers have always been created by people who dared the odds, accepted the risk, for the chance at a life that would be more meaningful than the one they left behind. We'd like to think that NASA still has "the right stuff," and is playing it safe in the hopes that there will be a strong reaction "to go ahead anyway." In other words, they want the decision to be made for them. But the public at large is risk averse also. Thus it is up to individuals to dare the risks. See the article on pages 7–8 below.

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Why Plants & Animals must accompany us to the Moon, Mars, & Beyond

Outposts & Settlements should Maximize Green Space

By Peter Kokh

Factual and fictional situations that we owe it to ourselves not to accept as inevitable

- "Star Trek" TV series and films: token vegetation and animals (mostly pets, exo-terrestrial zoo specimens)
- "Soylent Green" http://en.wikipedia.org/wiki/Soylent_Green -a 1973 American science fiction film. It depicts "a dystopian future suffering from pollution, overpopulation, depleted resources, poverty, dying oceans, and a hot climate due to the greenhouse effect. Much of the population survives on processed food rations, includ-ing "soylent green," a green wafer advertised to contain "high-energy plankton" but by implication, probably also from harvested deceased humans.
- "Silent Running" http://en.wikipedia.org/wiki/Silent_Running a 1972 environmentally-themed American science fiction film. "depicts a future in which all plant life on Earth has been made extinct. Only a few specimens have been preserved in enormous, greenhouse-like geodesic domes attached to a fleet of space freighters, just outside the orbit of <u>Saturn</u>. When orders come from Earth to jettison and destroy the domes (with nuclear charges) and return the freighters to commercial service, Lowell rebels and opts instead to save the forests and animals on his ship." (Why the orders were issued is the kicker – Ed.)
- **Common depictions** of future off-Earth settlements (in space, on the Moon, on Mars, etc.) suggest a token minimum of house pets, house plants.

We must foster expanded expectations of "plant & animal rich" off-Earth settlement biospheres

- Modular Biospherics: each residential or activity module equipped with vegetation-based waste water treatment.
- Agriculture integrated into vegetational decor and into home, office, school, work place, and commercial decor.
- Wildlife integrated into plantings, water features,
- Neighborhood cell loop air circulation

• **"Tri-treme" plumbing systems** replacing the 4 millennia-old "monotreme" sewage system from Mohenjo Dara/ At stake is our descendants' vision of what humans are and how we fit into the universe

Yes, this will be orders of magnitude more expensive. But our descendent residents will retain a connection to the world context of our origins. Lose this, and the sense in which we remain "human" will be considerably restricted. We need this connection to plant and animal life. Even now, when computer art and manufactured items dominate our lives and homes and other spaces, we still treasure handmade arts and crafts, home and garden plants, urbanized wildlife, and pets. Doing away with these connections restricts our humanity.

We see all too many science fiction depictions in which those roots, those companion life forms with which we have co-evolved, are at best given token representation. If you are not familiar with the two films cited, I strongly recommend renting them.

Yes, we are discouraged by the results of Biosphere II, but the lessons learned were worth it.

We expected too much. The goal is to "maximize the portion of life support supplied by mini-ecospheres." Even if we must occasionally, even regularly resort to chemical make-up injections, the psychological and personal rewards of living in "as Earthlike" a setting as practical will be considerable both for mental health and for general sense of retaining and engaging the roots of our existence and of our cultural as well as our biological evolution.

This is important both for surface settlements in which individual living and working units are shielded one by one as constructed, and the settlement commons spaces of pressurized walkways, streets, parks, and plazas links all living and working spaces in a growing miniature Earth-like bioplex.

In Lava tubes, where shielding is a given, larger residential town or neighborhood units that provide pressurization, air and water systems, and abundant greenery and compatible wildlife – more along the lines of "space settlements" are possible.

If the goal is to cram as many people as possible into a space by doing away with vegetation and relying only on chemical life support, the quality of life will be a contortion of what it should be, and we can expect the rise of psychosis, crime, and other maladjustments. And we've seen a number of "dystopia" type science fiction films that prophecy the results quite well. Cost be dammed. If we want something livable on the long term, we must replicate "terra" beyond Earth, not just human prisons. NASA's focus on artificial life support must be abandoned.

We will not have room for towering forests. But our "middoor" spaces can be enriched with living walls, dwarf fruit trees, herbs, vegetables, grains, spices, bonsai trees, grasses, ground cover, parks, picnic areas, fish streams and ponds, waterfalls; with butterflies, honey bee, hummingbirds, song birds, squirrels.

Even our compact efficient farm areas can have walkways, rest areas, picnic tables. We need to live in a green context. To live otherwise will lead to a population that does not, cannot understand its own historical context. We cannot be fully human by ourselves taken out of our natural context. We must take that context with us and replant it wherever we go. We have evolved and prospered in a hosting verdant world. We need to continue that relationship. PK

Residents of Lava Tube Settlements May Need Regular Surface Contact

By Peter Kokh

Importance of Exercising and Maintaining Contact with the Moon's Surface

Without planned regular contact with the surface, possible psychosis (fear of the open sky, of the outvac, of the universe at large could develop not only in children, but in some adults. This could lead to unhealthy cults. Some measures that might be considered:

$\sqrt{}$ Children would go on surface excursions from an early age.

• Psychological risk of being cut-off from the lunar surface, from the star-filled heaven, and from Earth

Such "outings" would introduce them to the starry heavens, to Earth as our home world (if they lived on the Moon's nearside or limbs); to the Sun, Mars, and other planets. But they would also learn to appreciate the great variety of scenic vistas out on the Moon's surface.

They would go on rover excursions; engage in fun surface sports and activities, visit surface communities. They would also see for themselves the surface world that they might otherwise have seen only in cinema, television news, or on the Solar System Internet. They could take fun space hopper trips, go to surface amusement parks and more. They would visit their own settlement's skylight or rille entrances. They would begin to appreciate the greater "context" in which their lava tube mini-world exists.

 $\sqrt{1}$ It will be important for adults to maintain contact with the "outside world" as well, like many city dwellers retain connections to the surrounding countryside. But the difference in culture and experiences between tube dwellers and surface settlement residents may be greater than those between city and country people on Earth.

They can do this on vacations; in temporary service in "out top" works well as job- and continuing education-related assignments. But to avoid a shift to the opposite extreme, viewing their lave tube town as a kind of cult, they should visit other lava tube towns as well as their own. Stressing how the two kinds of communities, surface and in-tube, complement each other and increase personal options, will cultivate a balanced outlook.

- Tube dwellers may visit "country cottages" and other vacation attractions on the surface.
- Some people may have jobs or occupations that have both in tube and out on the surface components. Among these will be those who work in an access tower protruding through a skylight entrance.
- Others may seek recreational outlets on the surface.
- Access to the surface may be improved by adding artificial skylights or elevator shafts at intervals along the tube away from the main access, be it a natural (impact-created) skylight entrance off of a collapsed ("rille") segment.
- There will be some analogy between tube settlements and linear cities and towns here on Earth, such as those in narrow river valley canyons or pinched between a river and mountains. There are many such places on Earth.



Many layered Maria: In Mare Crisium, the many layered lava fill is several kilometers deep. If there are lava tube flows in each layer, there will be a lot of exploring to be done, possibly over many years, even centuries. Any intact tube has been so for over 3.5 billion years. Will we find anything surprising or extraordinary in the early era flows? Possibly not, but this will surely be the subject of many Lunar Science Fiction stories. No similar place on Earth is likely to remain intact for even a million years. Our geology is way too active. What might we find out of the ordinary? Most likely, nothing. It is possible that some tubes in deeper layers may be collapsed by the sheer weight of the layers above. But we won't know until we explore.

But for humor and fun fiction sake, read "**It Came From the Bowels of the Moon**." MMM #210, November 2007, pp. 7–8. <u>http://www.moonsociety.org/humor/afd_news.html#hh</u>

There is a lot (actually 99.99%!) that we do not know about lunar lavatubes, or those on Mars. All we have seen is a few skylights and a few rille entrances, and these from a distance that shows scant detail. We are a long ways from being able to plot lavatube networks. We need to prioritize orbiters equipped to detect and map them, as far-fetched as that seems. We need to send probes down into the few skylights we have found. And eventually, we will have to send future Arne Sagnussen's down to explore them. The future looms endlessly exciting! PK

Exploring Lavatubes on the Moon will not be like exploring Lavatubes on Earth

By Peter Kokh



Above: Oregon L5 exercises 1987-88 Young's Cave c. 5 mi NE of Bend, Oregon http://www.moonsociety.org/images/changing/OregonMoonbase.gif

Moon Society plans: skylight "axel" probe instruments, insect armies, command systems Factors that make terrestrial lavatubes dissimilar to lunar ones

- Terrestrial lava tubes are more irregular in course and in vertical profile in fist and second lava flow layers because they hug a preexisting non-level surface shaped by other occurrences such as mountain building, water carving, impacts, etc. Like river channels formed by water trapped under an ice sheet, that can flow up and over obstacles, this can happen in lavatubes as well, which flow downhill in general, but not necessarily in mid-course.
- On the Moon, we are likely to find irregular tubes near the basin periphery, forming on the basin "benches" and in the earliest basin basement levels
- We are likely to find regular, relatively smooth bottom contours in lava flow layers overlaying a number of previous floods and in maria many lava sheet layers thick
- In terrestrial tubes, we can use buoyant probes to map the tube features from just under the ceiling we can't do this on the Moon where there is no atmosphere "to be lighter than." Where "buoyancy" does not allow mapping from above, bouncing kangaroo probes may, where the floor is flat. Bouncing probes are obviously easier and cheaper But the height and direction of the bounce must be controllable. Can we develop a probe whose bounce height and distance can be altered?
- Drilled holes in the ceiling will take much more effort and expense on the Moon where we will be dealing with ceilings hundreds of feet thick not a few feet thick.
- Terrestrial tubes often have areas where the floor has been "smoothed" by post=formation of sand layers transported by rain and flooding. "Post formation smoothing" of tube floors is most unlikely on the Moon.

Challenges of Lava tube exploration on the Moon

- Insect-like explorer robots might have feet that can change in shape with each step to avoid getting stuck between rocks.
- The "axel" type skylight explorer is a start. All skylights on Earth and on The Moon and Mars will have **talus piles** below. The collapsed material has to go somewhere and smack in the middle of the skylight opening is where.
- Tallus debris slopes will also characterize openings to lavatubes at the beginning of rilles. Adjustable tank type treads may be a solution. They can be lightweight. By making them wide and long, they will be relatively ground-hugging and less likely to fall over sideways or in line of movement.
- Safety in numbers insect armies, platoons, squads will be more successful, some attrition in ranks is to be expected side reporting as well as up-reporting "communist cell style"
- Some tenuous "atmosphere" is to be expected in tubes with no open outlets to the surface, but with gradual loss by attrition through fissures. Such atmosphere is most likely to be lava volatiles, some from radiation. Tubes with skylight or rille openings will have negligible gas.

What it makes sense to simulate and test here on Earth

- Mapping instruments lowered thru a skylight
- Insect army scouts and reporting systems
- Lighting systems
- Freight elevator-limiting modular designs for various purposes ##

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What if some stellar wonder were right in our backyard?

By Peter Kokh

When I was growing up in Milwaukee in the late 1940s and through the 1950s, you could see many more stars in the nighttime urban sky than you can now. However, in 1946, after the war (WW2) was over, I went with my maternal grandparents "up north" to their hometown, Florence, Wisconsin, just across the state line from Iron Mountain, Michigan, and there they bought 2 acres on a dead end road, with an old farm house, and empty fields to the South and East. Years later, in 1969, I bought an old 1955 "house trailer" and put it along the East fence. Every year since 1946, except 1961 (I was in England all year), I have spent time up there. And one of the things I most treasure is the awesome nighttime skies, full of stars, the likes of which a city dweller could only dream.

In a way, except for the Milky Way, Earth's skies, are rather prosaic. This is perhaps fortunate as far as legends and religions go. If that seems a weird statement, consider the impact on early cultures if one of the sights below were near enough to literally "dominate" the heavens, to the point of "being in our face?"



M31 Andromeda 2.6 million light years from us

The Whirlpool Galaxy 23 million light years





Omega Centauri Globular Cluster 16 thousand ly "Double Cluster" – h & χ Persei 7,.5 thousand ly If one of these objects were located at a tenth the distance and thus a hundred times as brilliant, and dominated the sky for part of the year, what would have been the effect on early "prophets?" Would one of these sights be "God?" Or his "angels?" Should we be thankful our skies are just generally magnificent, or "so so?"

Actually, the galaxies relocated a tenth the distance, would still not be that bright. The photos are bright only because of the length of time the film was exposed. As to the Double Cluster, brought much closer, its stars would mix with other bright stars in the background, as is the case with the Big Dipper, most of whose stars belong to a very nearby cluster. The only object above that would be a real "wow" scene would be the large Globular Cluster, Omega Centauri. With nothing comparable elsewhere in the heavens that bright, it could well have shaped religions and cosmologies prior to the invention of the telescope, when we would find many other similar clusters.

Actually, the Northern Lights or Aurora Borealis, has played a significant role in Eskimo/Inuit/Samoyed legends, the swiftly dancing lights with shifting colors seems "mischievous, evil, something to worry about" – but hardly the apparently immutable brilliance of a nearby globular cluster.

But there is another thing to be thankful for – the thick dust clouds which hide our own galactic core, lurking behind them in the constellation Sagittarius. Without the dust clouds, Our "hub" might make an incredibly awesome sight, extraordinary enough to affect legends and myths and early religions. As to the rest of our Milky Way galaxy, as it extends around the heavens 360°, it is too decentralized a sight to attract "worship." PK

NASA: Astronauts face "dangerous" radiation levels on trek to Mars. So?

http://www.theregister.co.uk/2013/05/30/nasa_says_mars_trip_would_exceed_radiation_guidelines/ By Peter Kokh

NASA has released the results of radiation measurements taken during the Mars rover Curiosity's trip to the Red Planet, and the data show **doses received during a such a trip would exceed the space agency's current career limit for astronauts.**

"Given this data and our models that confirm it, we currently would exceed our acceptable limits of 3 per cent excess fatal cancer." That "excess" risk is 3% added to the average fatal-cancer risk, which - depending on a whole host of factors - is around 20-25%.

Findings obtained from Curiosity's Radiation Assessment Detector (RAD), which measured radiation during its trip to Mars raise questions. Radiation that RAD measured came both from the relatively low-level, steady bath of energetic galactic cosmic rays from outside our solar system, and from periodic bursts of intense solar radiation from our Sun's as-yet-unpredictable coronal mass ejections.

There are two basic ways to limit an astronaut's exposure to radiation levels that exceed NASA's guidelines:

- (1) Reduce flight time spent in interplanetary space by speeding up the trip
- (2) Improve the shielding protecting the astronauts in their craft.

Reducing flight times to Mars and Back: Work is underway on improved propulsion systems beyond today's rocketry, but they are most unlikely to be ready in time for NASA's planned mid-2030s Mars mission. They were "in development" decades ago, and research was halted, for sad excuses.

Two basic types of advanced propulsion are in the early development stage: **Solar Electric** propulsion systems and **Nuclear Thermal** rockets. Of these, development of low-thrust, essentially always-on solar electric systems is "more mature." But to cut trip time down significantly, nuclear thermal propulsion would be needed. The problem, of course, is money. Congress is not interested. What's more, to tell the truth, neither is NASA. The agency abandoned the NERVA Nuclear Rocket program begun in 1956 in 1973 – 4 decades ago. So pointing out this option is a bit "cheap" on NASAs part. <u>http://www.daviddarling.info/encyclopedia/N/NERVA.html</u>

Something not to be overlooked in this discussion is that such rockets may help for trips to and from Mars, but will not be nearly fast enough to take humans out to Main Belt Asteroids, or further, to the Moons of Jupiter.

Of the two options, it should be clear that shielding, not speed, is the answer. We do not say that, however, to discourage research on faster rocket technologies. But we need Congress to "pick" the shielding option.

http://www.space.com/21337-advanced-spacecraft-propulsion-concepts-images.html

A Hull is not just to hold air anymore!

Better Shielding: First, let us say that electromagnetic shielding, which would seem to be ideal, is even further "out there" than Nuclear Thermal engines. The "Near Term Option" on which we need to spend what little money may be available is to advance designs already out there for some decades now, to put the crew in the center of the vehicle and surround that cabin area with everything else. A thick inflatable hull will be superior to a thin aluminum one.

The tactic that the **Inspiration Mars project** proposes to use is to surround the crew cabin with tanks holding both fresh and waste water, food and other hydrogen-rich commodities. Polyethylene "stuffing" could be added in all interstices to complete the shield. The results of the NASA study, instead of discouraging this project, should motivate them to do an even better job of designing this "**shielding surround**."

Now this mission is longer than a one way flight to Mars, even longer than both parts of a round trip: 501 days. But the chosen couple will be married, probably in their 50s, without dependents. For "the trip of a lifetime" the radiation risk incurred will be a bargain. Do not those who choose to smoke incur an even greater risk?

For Mars-bound astronauts and explorers, we have been nagging "illustrators" and outpost concept "architects" for years not to overlook the need to shield human habitat and activity structures on Mars (or the Moon) as Mars' atmosphere is too thin to offer much protection, the Moon has no atmosphere at all, and neither world is protected by the equivalent of our Van Allen Belt. The illustrations of the proposed **MarsOne** first "permanent" human settlement on Mars are especially ridiculous in this light.

But let's get back to NASA's statement. It appears that NASA feels it has to follow public opinion, instead of taking the lead to change that opinion. To people who are **dis**interested in Mars, it makes no sense to to take such a risk. But to those who have a deep interest in extending the human diaspora to include Mars, such a risk is quite acceptable. After all, would Columbus have set out across the Atlantic into unknown territory if he were risk averse? Does NASA need to play the cautious coward, in the hopes that public response will be to "go ahead?" Surely, there will be no shortage of volunteers. Soldiers enlist and go to war facing far far greater risks than this. Coal miners take greater risks just to make a living and feed their families. It is a shame that the subject even comes up. For many of us, the rewards of personal achievement in such missions would smash any risks like a bugs on an auto windshield.

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Since December 1986

We will go to Mars, and beyond. Radiation is just another danger we will learn to live with. PK



Above: http://www.lenr-forum.com/showthread.php?540-Space-travel-Active-radiation-shielding-in-space http://www.exploremars.org/why-we-can't-send-humans-to-mars-yet-and-how-we'll-fix-that www.engadget.com/2013/03/03/inspiration-mars-mission-will-use-human-waste-for-radiation-shield/ Below: Diagram of the cross-section of the Inspiration Mars Crew Vehicle http://i.dailymail.co.uk/i/pix/2013/03/04/article-0-186D45D4000005DC-873_634x491.jpg

The choice is clear: radiation protection, not speed, is the answer. Why?, Because Mars, relatively nearby, is only the first stop to human exploration and settlement of the entire solar system. We need to be safe on long journeys! **NASA should purchase a Bigelow Module,** outfit it with radiation detectors, put it in L4 or L5 well-beyond the Van Allen Belts, where it will not need station-keeping. If a thicker wall is indicated, an inflatable inner bladder can be filled with polyethylene foam. and retested. We need to design ships that can be safe for multiple year journeys – <u>as well as</u> faster transportation systems. PK

Collaboration at the 2013 International Space Development Conf.

By David Dunlop

The 2013 ISDC provided another example of the NSS, Moon Society and OpenLuna working together to put on the two day Lunar track at ISDC. David Dunlop and Al Anzaldua were Co-Chairs of the Lunar Track.

The first day programming was focused on the topic of exploration of lunar lava tubes with a program of lunar scientists including Dr. Heather Smith, NASA AMES, our Science Committee Chair, Dr. Pamela Clark, Catholic University and NASA Goddard, Dr. Penelope Boston of the National Cave and Karst Research Institute and New Mexico Tech, Dr. Aaron Parness of JPL, the participation of staff from the Lunar Mapping and Modeling Portal at JPL and Paul Graham of OpenLuna. Also included were presentations byTeam Stellar GLXP. We were deeply honored to have a presentation at the lunar by Apollo 11 Astronaut Buzz Aldrin who is also on the NSS Board of Governors.

The second day focused on cislunar economic development with presentations by Ken Murphy of the Moon Society, Al Anzaldua of the Moon Society, Dr. Dan Lester of University of Texas Austin, Dr. David Schrunk, Dr. Andrew Barton of the X-Prize Foundation about the GLXP, Dr. Suresh Naik of the ISS and Mitul Dikshit of ISS, and Dave Dunlop of the NSS and an additional presentation by Paul

Graham of OpenLuna.

Another challenge was to utilize the GoToMeeting technology in order to provide remote presentations to the meeting in San Diego that would otherwise not have been possible due to the sequestration of NASA travel funds for many presenters. This provided experience with a blended model of conference organization and participation.

Peter Kokh built a model of a lunar lavatube for the ISDC and OpenLuna also had a booth supported by Debbie Wilkinson and other OpenLuna members in the conference display room. The Lunar track was well attended.

We anticipate making recorded sessions of the Lunar track available on the Moon Society web-site. DD

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Since December 1986

THE MOON SOCIETY - LUNAR FRONTIER SETTLEMENT - WWW.MOONSOCIETY.ORG

From Africa to the Moon, the Human Epic, told in footprints, Continues to the Stars!



Our Goal is Communities on the Moon involving large scale industrialization and private enterprise.

The Moon Society Journal Section (pages 9–12) About the Moon Society

Objectives of the Moon Society include, but are not limited to:

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

Our Vision says it all - "Who We Are and What We Do" - <u>www.moonsociety.org/spreadtheword/whowhat.html</u>

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

Moon Society Mission

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

Moon Society Strategy

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

Interested in having input? Any member may ask to join the Leadership Committee and attend our Management Committee meetings held twice monthly. You may even express opinions. Decisions are often made by consensus, so this input has value. Write president@moonsociety.org

From Moon Society President 📥 Ken Murphy

Space is a weird place right now, but ...! - Moon Day in DFW

Space is in a weird place right now. While great strides are being made in defining a new path to space that places greater reliance on private companies and industry, the media remains largely clueless, and NASA continues to flounder in its search for a new direction for the government space program.

Recently, I had the opportunity to organize a large space celebration in North Texas called Moon Day. This event taps all of the space and STEM-related resources in the D/FW metroplex to put up displays for a day, coupled with classes and lectures, an art show, and more. This event was attended by over 1200 visitors over the course of July 20th, and was considered a success by everyone involved.

One of our newer chapters, the Greater Fort Worth Moon Society, had a large display that included our Lava Tube display, our power-beaming display, a model Moon base, and a variety of handout literature.

The Moon Society – Lunar Frontier Settlement – <u>www.moonsociety.org</u> p.2

Across the aisle was Dallas Mars Society. Their display featured a remote-control rover in a simulated Mars-scape, a Mars Society banner, and Mars Society handout literature. They also included Mars Society info bro-chures in the Lunar Sample Bags we hand out to the kids.

This highlighted to me the importance of our next step in getting our administrative house in order – getting an updated set of outreach materials prepared for The Moon Society. We need updated membership brochures printed up and distributed to chapters. We need info postcards that can be circulated at space events. And banners that chapters can use at outreach events. TMS has the resources to create these materials; we need members who want to shape the message to join the Communications Committee and to be involved in the preparation of these materials.

Another important administrative change that TMS needs to undertake is the creation of an editorial team to assist Peter with Moon Miners' Manifesto. MMM has been a personal project of Peter's for two and a half decades, and we'd like to get Peter focused on the preparation of the Moon Miners' Manifesto book incorporating all the best of the huge amount of content found in the MMM archives.

To free up Peter's time, we need an editorial team to help transition MMM into a permanent institution and continue its tradition as a thought leader in Lunar development.

We also need folks to start putting together a Kickstarter campaign to run a Lunar Lava Tube field exercise, using the materials from our last two ISDC tracks.

One thing that became clear at Moon Day is that there is a hunger for information about space activities that is unmet by current sources, be they media or schools. This gap in information is something we can exploit to both create a more informed citizenry regarding the Moon, as well as position The Moon Society as the go-to place for Moon information.

Will you help us get there?

-Communications Committee - contact Philip at pcrume.moonsociety@gmail.com

-Editorial Team - contact Peter at KokhMMM@aol.com

-Kickstarter project - contact Ken at President@moonsociety.org

NSS Sacramento Forges its own "Space Policy Guidelines"

We print this here as an example for other space chapters looking for a guideline for outreach efforts

http://www.ad6uy.com/sac-15/ Contact josephanddonna@earthlink.net

We, a consensus of the members of the Sacramento L-5 Society, local Chapter of the National Space Society, endorse the NSS Vision:

"People living and working in thriving communities beyond the Earth, and the use of the vast resources of space for the dramatic betterment of humanity".

To implement that vision, we urge support of the following positions:

- Extoll the Benefits of the Space Program
- Expand Space Related Education
- Support Non-Profit Space Development
- Work towards Standardized Space Property Rights
- Define the Roles of NASA and the Private Sector
- Broaden Political Support
- > The U.S. space program has always more than paid its own way, both with tangible and intangible benefits to the country. However, over the last 20 years the space program's budget has decreased as a percentage of the federal budget, reaching a record low of less than 0.5% this year. Properly addressed and funded, implementation of the NSS Vision would create prosperity and jobs in vast profusion across the globe. Accordingly, we feel that informing the populace of these many potential benefits and how they may be gained by adequate funding is of paramount importance to the implementation of the NSS Vision.

Tangible benefits

- Enhance national security
- Development of long-lasting, good-paying jobs in private industry, R&D, space tourism, and education
- Develop/maintain useful satellite technology (communication, GPS, weather, mapping, environmental observation and monitoring, information distribution, etcetera)
- Create many useful spin-offs (see http://spinoff.nasa.gov/index.html for examples)
- Tap into space-based mineral and energy resources
- Protect the planet from space debris
- Ensure the survival of the human race in the event of a human or cosmic catastrophe

The Moon Society – Lunar Frontier Settlement – <u>www.moonsociety.org</u> p. 3

Intangible benefits

- Educating and inspiring the young
- Creating ambition and optimism for the future and spurring innovation and creativity
- Expanding the boundaries of human knowledge
- Uniting us as a species: When a U.S. astronaut first stepped out onto the surface of the moon, the whole world rejoiced
- We call for the NSS to strongly support expanding space-related education.
 - Expand astronomy and STEM (Science, Technical, Engineering, Math) curriculums in schools
 - Develop a new curriculum dedicated to the history of human space exploration
 - Increase space-related educational programming on TV and media
 - Introduce the foundations of STEM and space education at an early age
 - Increase space-related hands-on learning.
- > We call for establishing a nonprofit space development clearinghouse as a support platform for ongoing objective analysis of proposed space development technologies. The clearinghouse would operate in an "open-source" manner, with all data, analysis, and simulation tools available to anyone who wants to independently verify and/or correct others' conclusions. All contents, including ranking of alternatives, would be constantly updated as new data becomes available. The clearinghouse would become a reputable "advisory board" for decisionmakers and all major players involved in space-related development, and specifically would work in conjunction with and "feed" specialized crowd-source funding operations, whether for-profit or nonprofit.
- > Colonization and utilization of space and space resources will depend on the standardization of property and asset rights in space. We believe it is essential that the governments sponsoring the development of space resources share the opportunity for using these resources with the world at large as well as with those private individuals and companies who take risks in the development of those resources.
- > As a means of increasing budgetary efficiency, NASA should focus on space science and on long-term solutions of hard problems and enabling technologies, such as protection from radiation during space flight, developing processes for Moon/Mars/asteroid mining and in-situ resource utilization, and long term R&D on advanced propulsion technologies and space transportation infrastructure. At the same time, NASA should increase its support of and collaboration with private space industry. Private industry should become more responsible for exploring and developing new launch capabilities and services for increasingly cheap access to LEO and beyond as well as investing in large-scale commercial projects, such as space tourism and mining in space. Besides advancing the cause of space settlement, these private industry projects would create many well-paid private sector jobs and earn billions of dollars for the country through an expanded tax base, technology transfer payments, and income from the granting of outer space mineral rights. That increased revenue could be used to fund an expansion of the space development program in general and future space missions in particular.
- > Besides advancing the cause of space settlement, these private industry projects would create many well-paid private sector jobs and earn billions of dollars for the country through an expanded tax base, technology transfer payments, and income from the granting of outer space mineral rights. That increased revenue could be used to fund an expansion of the space development program in general and future space missions in particular.
- > Finally, we contend that the space program has become too much of a political hostage, which is bad for the space program, for the country, and for the world. If we are to create a sustained commitment to space development, it is essential to find effective ways to cooperate politically. To this end, we believe it's time to formulate and insist on a long term national strategy on space that is agreed to by both major political parties and not subject to the vagaries of whichever political party happens to be in power. Accordingly, we call for the introduction of a bill supported by both parties that would guarantee an enhanced, sustained, generational commitment to space development.

MMM Congratulates NSS Sacramento for this effort! ###

Note; Moon Society Chairman of the Board Philip Crume responded to the National Research Council's call for papers on Human Spaceflight. The title of his paper is:

"Using a US government human spaceflight program to support space commerce"

So that you can read it, we have put Philip's paper online at: http://www.moonsociety.org/publications/papers/human_spaceflight_crume.pdf Our hats of to Philip!

eFor past articles, Visit <u>http://www.moonsociety.org/publications/mmm_classics/</u> or /mmm_themes/

The Moon Society – Lunar Frontier Settlement – www.moonsociety.org p. 4

March Chapters & Outposts 2012

ORGANIZED CHAPTERS

Moon Society St. Louis Chapter - http://www.moonsociety.org/chapters/stlouis/

Contact: Robert Perry <u>surfer_bob@charter.net</u> – **Meetings 2nd Wed** (Note change) monthly at Buder Branch Library, 4401 S. Hampton, in the basement conference room – **Next meetings – AUG 14 – SEP 11 – OCT 9**

Christine Nobbe was on The Space Show Sunday, July 14th, We discussed space education and outreach. June 8th meeting notes: Present were Chris Nobbe, Dabney Tolson, Dave Deitzler, Bob Perry, Tom Kullman, Keith Wetzel, Karl Strasmann, Mark Rode, and Rufus Anderson attending. We used Rufus's projector and Karl's laptop to watch "The Command Module" segment of the "Moon Machines" DVD. Recommended. Dabney passed around his recently purchased copy of "Moon Base" by Ben Bova, science fact and science fiction writer and former president of NSS. Chris used her iPhone to search Amazon for the availability of a copy for herself. That led to a discussion of the internet and the future. Karl, Dave and Mark had gone to a recent meeting of the St. Louis Astronomical Society where the invited speaker talked about the far future of the universe, dark energy, and the accelerating expansion of the universe. In an email exchange following the meeting, several of us decided to go to their next meeting where the speaker will discuss exoplanets. Since we missed booking the library meeting room our next meeting is TBD, most likely the patio of the St. Louis Bread Company restaurant, just a few block from the library.

July 10th meeting notes: This month we met at the St. Louis Bread Company restaurant at 6607 Chippewa, a few blocks from the Bruder Branch Library, with Rufus Anderson, Karl Strassman, Mark Rode, Dave Dietzler and Bob Perry attending. We enjoyed good meals and wide ranging conversations.

One topic was transportation. The infrastructure for hydrogen fuel for cars is a long way away. Electric cars may or may not use hydrogen/oxygen fuel cells. If we go to all-electric cars, the the power grid will have to be able to handle high speed charging demands. Nanobatteries are a possibility – Mark had read about the theoretical possibility that a one cubic foot nanobattery could store enough power to drive a SUV 1000 miles on one charge, with regenerative breaking, of course. Energy density would be 50,000 X over standard lithium ion batteries. The lithium ion batteries in hybrid cars are getting expensive since China raised prices. Their price for platinum and osmium is over \$1000/ounce so asteroid mining may come sooner to meet the demand. Also, a fair percentage of asteroid impacts on the Moon were at low energy, not all of the impactor was vaporized per a recent NASA study.

The possibility of lunar mining for helium 3 was discussed – Dave mentioned the International Thermonuclear Experimental Reactor in France. \$20 billion has been put into this, mostly by the US. First plasma is expected in 2018. The reactor will amass 10,000 tons and generate 500 MW thermal. It is considered to be the next step to a commercial fusion reactor...they've also talked about a project called DEMO in the 2030s that will be the first demonstration of a commercial reactor...they will burn deuterium and tritium.

Considering high energy levels, matter may be described by it's thermal energy – solid, liquid, gas, plasma. Karl searched on the internet for how hot can something get. <see www.pbs.org/wgbh/nova/zero/hot.html Another topic, "The 125 questions that need to be answered by scientists." String theory, the multiverse, dark energy, dark matter . . . well, those are for later meetings.

Clear Lake NSS/Moon Society Chapter (Houston) - http://www.moonsociety.org/chapters/houston/ Contact: Eric Bowen eric@streamlinerschedules.com - We will hold our next regular meeting in the conference room of the Bay Area Community Center in Clear Lake Park at 7:00 in the evening of Monday, JUN . Everyone welcome.

NSS/Moon Society Phoenix Chapter - <u>http://nssphoenix.wordpress.com</u>/ - c/o Mike Mackowski. Meeting **3rd Saturdays monthly at HSGP Community Center, Mesa**, 627 W. Rio Salado Parkway, Aug 17, Sept 21

July meeting Notes: We had about 17 attendees to hear our speaker, Dr. Samuel Lawrence. He is a Co-Investigator on the Lunar Reconnaissance Orbiter Camera Science Team, a Faculty Research Associate at Arizona State University and is an expert in both the geochemistry of planetary materials and planetary remote sensing. In addition to his continuing contributions to the success of the LRO mission, Dr. Lawrence currently has active research programs to define optimal targets and payloads for future precursor lunar exploration, investigate the geochemistry of Apollo samples, advance fundamental spectroscopic theory, and accurately determine asteroid composition. He gave a great talk on the latest images from the Moon, took a lot of questions, and was very happy to speak to a friendly, knowledgeable audience. Links to some of the material presented and other LRO resources may be found at our website, http://nssphoenix.wordpress.com.

We are still working on a topic for the August 17 meeting. We are considering a field trip to a lava tube near Flagstaff this fall, possibly to include other space related attractions in the area.

Greater Fort Worth Space Chapter c/o Patricia Ferguson tricia3718@gmail.com







Marshall Mike Moondust and the Sinister Selenian Subterfuge [MMM Fiction by George von Mond]

MISSED PREVIOUS INSTALLMENTS? The whole series is now online, Chapters I-VIII (1-8): http://www.moonsociety.org/publications/fiction/MMMSSS.pdf

Chapter IX:

Marshall Mile Moondust sighed as he watched the thin rope slowly coil into a pile at his feet. The Earthers had of course betrayed him, which he had anticipated. He snickered to himself as he assessed his situation. He had ample oxygen for the climb back up, so he decided to take some time to explore the base of the fissure, something he was pretty sure the Lunar Adventure Club had yet to do.

He carefully worked his way through the narrow crevasse, his headlamps occasionally crossing traces of hoarfrost. As he proceeded, he noticed a faint vibration through the soles of his boots. Now that was odd, and spurred him more quickly onwards. Soon, he noticed traces of what appeared to be rock falls and soon stumbled upon a large pile of scree. Glancing upwards, he noticed a small, regular opening in the side of the fissure. One-sixth gravity made for an easy climb, and Mike quickly found himself in a small chamber. The roof was angled downward to the center, and appeared to be some kind of giant inlet into the room. The far wall was solid, but appeared well-worn and used. The floor bore the marks of scrapes, all in the direction he'd just come.

As best Mike could guess, this was some kind of detritus disposal unit that used the fissure as a convenient and hidden landfill. What agency might be behind such a contraption was unknown, but Mike had his suspicions.

If it was a machine, it would need servicing, so Mike started looking around the walls for an access port. Eventually he found one, barely distinguishable from the wall. The controls were hidden under a plate, and Mike quickly noticed that the controls would alert someone if the door was activated. He pulled out a small screwdriver and opened the control pad. Tracing the circuitry, he looked for a way to signal a component failure that would mask the opening of the door. There! He jammed his screwdriver into the board, causing sparks to shoot out and quick puff of smoke that quickly dissipated. Remounting the control panel, Mike then worked the manual mechanism for the door.

Inside the small airlock he quickly scanned around for the exit and eased through it into a dark hallway roughly hewn out of the rock. On a hunch, he started moving down the corridor away from the general direction of the fissure. His monitors indicated a pressurized environment, so he cracked his faceplate for a sniff. While stale, the air held the familiar Moon smell of gunpowder and ozone. Questions poured through his mind as he carefully moved down the hall. Who had put this here? What was beyond the far end of the hall? Like a good Lunar lawman, he began gathering clues and evidence.

The dark corridor was roughly hewn. The access hatch at the far end was also wired into the central electrical system, so he couldn't pull the failed sensor trick again. There was a small ventilation outlet above the door, but far too small for his suit.

A flicker of light caught his eye, and he saw that the control panel was being activated. Someone was coming through! Mike quickly jumped to the ventilation outlet and positioned himself above the door with a tenuous grip on the outlet cover. He quietly blessed Selene for her much lower gravity that made such gymnastics possible.

Two technicians entered through the door and proceeded down the hallway to the far end. Behind them, Mike swung quietly down and peeked out the door. It was clear!

He hurried out onto a railed ledge that stretched into the distance on either side. In front of him was the largest cavern he had ever seen on the Moon, with pipes and conduits running all over the place. Stunned by size of it, he stepped to the railing to look down onto the main floor.

What does Marshall Moondust see in the cavern? Who created this secret lair? Find out next month as the secrets of the Sinister Selenian Subterfuge are revealed! ###

GREAT BROWSING LINKS

SPACE STATIONS + COMMERCIAL SPACE http://www.space.com/20635-private-moon-mission-golden-spike.html NASA seeks coders to help Robonaut 2 on ISS "see better" First flight 4-29-2014 http://www.nbcnews.com/id/51407519/ns/technology_and_science-space/#.UV924L-0Lww A commercial launch site for Space-X in Texas? - www.thespacereview.com/article/2271/1 http://arstechnica.com/science/2013/04/how-nasa-brought-the-monstrous-f-1-moon-rocket-back-to-life/ http://www.space.com/20869-spaceshiptwo-first-rocket-test-photos.html - 1st flight 4-29-2014 http://www.space.com/21370-space-diving-suit.html http://www.universetoday.com/102289/revolutionary-new-space-diving-suit-will-rival-anything-youve-eve r-seen-in-the-movies/#ixzz2UnlBqyQ3 http://www.space.com/21185-new-rocket-fuel-helps-nasa-go-green.html http://www.orbital.com/SpaceLaunch/Antares/ http://www.space.com/20708-antares-rocket-5-surprising-facts.html http://www.space.com/20526-antares-rocket-cygnus-spacecraft-explained.html (images) http://www.space.com/15252-photos-antares-rocket-cygnus-spaceship-orbital-sciences.html http://www.space.com/21208-dream-chaser-space-plane-testing.html http://www.space.com/15366-dream-chaser-private-space-plane-infographic.html http://www.space.com/21386-spacex-reusable-rockets-cost.html http://www.space.com/20782-spacex-grasshopper-rocket-photos.html http://www.space.com/20917-tiny-satellites-space-sails.html http://www.esa.int/Our Activities/Human Spaceflight/Bedrest studies http://www.esa.int/Our_Activities/Human_Spaceflight/ATV/Full_tank_please http://www.space.com/20658-3d-printer-international-space-station-2014.html http://www.space.com/21308-3d-printing-nasa-space-food.html http://www.space.com/21509-china-shenzhou10-crew-launch.html http://www.space.com/21844-canadian-astronaut-chris-hadfield-book.html

moon

http://www.space.com/20865-soviet-moon-rover-lunokhod-laser.html http://www.space.com/21197-moon-crash-meteor-impact-explosion.html http://www.space.com/21306-moon-craters-asteroid-impacts.html www.space-travel.com/reports/NASAs_GRAIL_Mission_Solves_Mystery_of_Moons_Surface_Gravity_999.html

MARS

http://www.space.com/21064-**nasa-donated-spy-telescope-mars.**html http://www.space.com/2075-**mars-life-search-manned-missions.**html http://www.space.com/20775-**mars-life-search-manned-missions.**html http://www.theregister.co.uk/2013/05/30/**nasa_says_mars_trip_would_exceed_radiation_guidelines**/ http://spaceinimages.esa.int/**Images**/2013/07/**Olympus_Mons_**context http://www.space.com/21960-**life-on-mars-search-technology-infographic.**html

ASTEROIDS + COMETS

Planetary Resources Co: http://www.youtube.com/watch?v=h5fwjsOOGm4 http://www.nasa.gov/home/hqnews/2013/may/HQ_13-157_WISE_Asteroid_Families.html http://www.space.com/20636-private-asteroid-space-telescope-b612.html http://news.nationalgeographic.com/news/2013/04/130410-asteroid-recovery-nasa-space-budget-science/ http://www.space.com/20817-asteroid-mining-satellite-test-flight.html http://www.space.com/21333-asteroid-nuke-spacecraft-mission.html

OTHER PLANETS + MOONS

http://www.space.com/21346-venus-water-earth-sun-explained.html http://phys.org/news/2013-04-herschel-links-jupiter-comet-impact.html http://www.space.com/20785-jupiter-moon-europa-interior.html Review of the new Sci-Fi film "Europa Report" http://www.thespacereview.com/article/2320/1 http://www.space.com/20727-iapetus-moon.html http://www.spacedaily.com/reports/NASA_Team_Investigates_Complex_Chemistry_At_Titan_999.html http://www.space.com/21482-saturn-moon-dione-subsurface-ocean.html

NSS Chapters that share Moon Miners' Manifesto



Space Chapter HUB Webiste: http://nsschapters.org/hub/ Feature Page: Project Menus Unlimited http://nsschapters.org/hub/projects.htm

WISCONSIN



MLRS - Milwaukee Lunar Reclamation Society

PO Box 2101, Milwaukee, WI 53201 - www.moonsociety.org/chapters/milwaukee/

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

PRESIDENT/MMM EDITOR • Peter Kokh NSS 414-342-0705 - kokhmmm@aol.com

VICE-PRESIDENT Doug Armstrong NSS (414) 273-1126 SECRETARY - Charlotte Dupree NSS (262) 675-0941 ardupree@charter.net

• James Schroeter (414) 333-3679 - james schroeter@vahoo.com

TREASURER/Database - • Robert Bialecki (414) 372-9613 - bobriverwest@vahoo.com

Meeting place changes for some dates: For some dates this year only, our regular meeting place (Mayfair Mall Garden Suites East G110) will be unavailable.October 12, and November 9 we will meet down the hall in room **G150.** This is because of a temporary problem, and will not be the case in following years.

 \sqrt{MSOE} (Milwaukee School of Engineering) students had an entry in NASA's Lunabotics Mining Competition https://www.facebook.com/photo.php?fbid=10151646511724183&set=a.10151646507594183.1073741827.792 <u>94804182&type=3&permPage=1</u>

WISCONSIN



SSS - Sheboygan Space Society

728 Center St. Kiel, WI 54042-1034 - www.sheboyganspacesociety.org c/o Will Foerster 920-894-1344 (h) astrowill@frontier.com SSS Sec./Tres. c/o B.Pat Knier dcnpatknier@gmail.org DUES: "SSS" c/o B. P. Knier, 22608 County Line Rd, Elkhart Lake WI 53020 Meetings are at The Stoelting House, 309 Indian Hill, Kiel WI 53042 - 3rd Thurs even # months NEXT MEETINGS: AUG 15 - OCT 17 - DEC 14 (SAT in Milwaukee)

CALIFORNIA



SSDS - San Diego Space Society 8690 Aero Drive, Suite 115, #77, San Diego, CA 92123 - http://sandiegospace.org

MMM congratulates the San Diego Space Society on a splendid (and profitable) International Space Development Conference, May 23-27 Next year Los Angeles ISDC 2014, Then Toronto, Canada ISDC 2015

CALIFORNIA



OASIS: Organization for the Advancement of Space Industrializtion & Settlement Greater Los Angeles Chapter of the National Space Society PO Box 1231, Redondo Beach, CA 90278

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

Regular Meeting 3 pm 3rd SAT monthly AUG 17 - SEP 21 - OCT 19 - NOV 18 - DEC 21

OASIS NEWS AND EVENTS

August 17, 3 pm - OASIS Board Meeting, Home of Gareth Powell and Lisa Kaspin-Powell. 3206 Summertime Lane, Culver City, CA 90230

Sept. 21, 3 pm - OASIS Board Meeting, Home of Craig and Karin Ward, 1914 Condon Ave., Redondo Beach, CA

COLORADO



DSS: Denver Space Society fka Front Range L5 1 Cerry Hills Farm Drive, Englewood, CO 80133

Eric Boethin 303–781–0800 eric@boethin.com – Monthly Meetings 6:00 PM on 1at Thursdays Englewood Public Library, Englewood, CO 80110 – 1000 Englewood Parkway, First Floor Civic Center NEXT MEETINGS: SEP 5 – OCT 3 – NOV 7 – DEC 5

ILLINOIS



CSFL5: Chicago Space Frontier L5 - 610 West 47th Place, Chicago, IL 60609

MINNESOTA



MSFS: Minnesota Space Frontier Society - <u>http://www.mnsfs.org</u> c/o Dave Buth, 433 South 7th St. #1808, Minneapolis, MN 55415

We were present at the Convergence Sci Fi Con July 3–6, and at the Volunteer Party on the 20th. MAS Next Meeting, August 1st at Fairview Community Center, 7 9 pm Speaker: Dr. Calvin Alexander – U. Minnesota Topic: Studies of Meteorites in the Soudan Mine as compared with Mars

OREGON



ORL5 – Oregon L5 Society – <u>http://www.OregonL5.org</u> PO Box 86, Oregon City, OR 97045

(LBRT - Oregon Moonbase) moonbase@comcast.net

Visit Us in Second Life" http://slurl.com/secondlife/National%20Space%20Society/128/151/1261

Click to join

https://login.yahoo.com/config/login_verify2?.intl=us&.src=ygrp&.done=http%3a//tech.groups.yahoo.com%2Fgro up%2FNSS_in_Second_Life%2Fjoin.

Meetings 3rd Sat. each month at 2 p.m. - Big Dog Coffee, 107 Molalla Avenue, Oregon City, Oregon Regular Meeting 3 pm 3rd SAT monthly - AUG 17 - SEP 21 - OCT 19 - NOV 18 - DEC 21

PENNSYLVANIA



NSS-PASA: NSS Philadelphia Area Space Alliance - 928 Clinton Street, Philadephia, PA, 19107 c/o Earl Bennett, <u>Earlisat@verizon.net</u> - 856/261-8032 (h), 215/698-2600 (w)

http://pasa01.tripod.com/ - http://phillypasa.blogspot.com

June Meeting notes: We had a good turn out and a number of us showed up with a gift: Science Magazine had a promotional mailing that a number of us brought with us. This May issue included a number of interesting space related, high level, articles that included : Mr Borucki's Lonely Road to the Light (this is the guy who made Kepler possible) and what it took to get this instrument launched and the data recovery systems assembled. This homage is part of the theme of the issue: Exoplanets. There is a very good set of articles on the subject. This would make the cover price of \$10 worth while this issue. Then there's: "3D Reconstruction of the Source and Scale of Buried Young Flood Channels on Mars". It is about finding out about the various events that happened on Mars to create flood channels where water carved out the Marte Vallis in the Elysium Planitia region. The source of the water (lots of water) was either the Athabasca Valles outflow channel, or, from the Cerbeus Fossae (now buried). The data used to find the buried structures that are now fully or partially buried structures that where carved billions of years ago for some, hundreds of millions for others. The SHARAD instrument, Shallow Radar, was the sounding tool on the Mars Reconnaissance Orbiter that gathered the data. Multiple researchers and references all around. And a myriad of other reports, articles, editorials, and, book reviews on a wide range of scientific and science related topics. See: www.sciencemag.org about the publication and subscriptions. Janice of our group is a subscriber, and, Michelle and I get the News version. We thank the American Association for the Advancement of Science for the gifts.

Our first report was from Larry on our web activities and the amount of interest in our activities as reflected in site visits. I suspect that several recent very nice references to our chapter by Peter Kokh is at least partly responsible for this. But it is the fact that we do things and that we report on what we have done (or are considering) that makes our reports, that Larry publishes, good reading. Larry is the one who has created our web presence and, along with Dorothy, and, several other of our people, have been the providers of added content for our group. Currently: Larry is working with Charity Blossom (.org) to set things up for people to donate to NSSPASA to fund upcoming public outreach activities and special projects that we could try. See Mitch, below, as an example of what we could use the funding for.

Dorothy brought material on events on The Intrepid events with "Exploring Space" beginning on July 10. Ticket prices are \$25 and \$16 for adults and "youth". This includes entry to the Space Shuttle Pavilion. There are also guided tours of The Intrepid through December, and, between July 25 and 28, Space Fest! Lots of cool space stuff and Astronauts! Lots of continuing programs at the A.N.S. and the Hall of Science during the summer. Then, in September, the Hall will host The World Maker Faire 2013. Fun Science and its' application for the whole family.

We had a side bar as Mitch started his report about members having identification buttons that would let people know who (as NSSPASA members) they are talking to. We may do this and Mitch has a contact at nancybuttons.com. His talk began with what we could use the donation money for: models of the L-5 and Bernal Sphere Habitats, an S.P.S., and other inspiring space development structures. He also is working on an outreach activity in the University City area which would be different from the transport hub event he is also working on. The University event would be in the fall (near the Philcon SciFi convention?). His book collection has a new addition that others may like:" Space Stations" by Roger D. Launius. It has some great designs going back to the early 1900s and includes versions where the external tanks where to be used. It was on sale at the Barnes and Noble book stores. Mitch also brought notice for the July 19 to21 World Future Society annual event in Chicago this year. The pamphlet is rather extensive.

Hank reported that the Philcon convention is still happening in New Jersey this year and next at least. He will try bringing in a science oriented group that he has discovered in our area. We also discussed the Balticon Science fiction convention, which Hank is interested in, and the science tracks that are usually very good. Although Wallace, Dorothy, and, Larry attended they did not find as much interesting talks to attend in that area as usual. Note: Michelle and I considered attending also but found that the presentation information was not available before the event started and so did not attend. Maybe next year for all of us.

Janice brought the May 31 issue of Science with "Radiation Will Make Astronauts Trips to Mars Even Riskier" This report included a refined radiation assessment of 662 milliseverts for the average dosage over the whole flight out and back. This is an increase of several percent. More shielding could reduce this but it raises the craft mass and consequent system mass significantly.

Michael Stewart attended and asked if any of the local colleges and universities are working on a CubeSat (small satellite) project. I pointed out that I am a member of AMSAT and am interested in this possibility as well. I

had the most recent issue of "The AMSAT Journal" for March/April 2013. This publication has had much on the CubeSat and other satellites that hams have, or are, building. The inventors of the concept where several ham university professors. I thought that Drexel University might have a program and said so (on researching this I found that Drexel had worked on satellite elements but not a CubeSat). We will check further and report what we find. In the meantime I have supplied several references to Michael on simulators that AMSAT members, who include educators as well as scientists and engineers, that where being built for public outreach and education. This would be another great project to give students a personal connection to space exploration (o.k., off the soap box).

Earl brought a number of recent publications and the aforementioned AMSATt Journal. A somewhat larger satellite is described in that issue that is bigger than the FunCube craft (that should be in orbit now): this is a European design that has several partners that will create this 40 kg (~ 88lbs.) device. It will be large compared to the Cubesat designs: 33*33*66 cm (the CubeSats are typically 10*10*10 cm. It will have an advanced telescope as part of its' payload and will use amateur frequencies for signaling and will act as a relay for ham signals as well. See "AMSAT-UK to Provide ESEO Satellite Payload" Lots more interesting ham oriented geek stuff.

On a more sobering note for space exploration hopefuls: in the April 20 issue of Science News is the feature: "Missing the Target: Prospects for Laser Fusion Look Increasingly Dim" by Andrew Grant ("Ignition Failed is actual title of report starting on page 26). This report details some of the problems we have run into in our at-tempts to build a practical inertial confinement fusion (the stuff literally fuses because it can,t get away from the pressor beams driving it from all sides). It turns out that several processes are at work to prevent the material from being driven to a high enough density and temperature to allow fusion to happen. See the article on the problems. Magnetic compression and some of its' problems are also mentioned. We may need those solar powered orbital lasers to drive the lightsails and remotely powered ion drive craft.

And, still on the theme of satellites and spacecraft: from Wired Magazine in July we have "The Watchers" by David Samuels. There is a mix of historical information (including the invention of the CubeSat concept), the potential public snd financial benefits of excellent satellite images for the rest of us non-government types. Traveling from great idea past the pitfalls of the government agencies and affiliates who want to control what we see and how much it should cost is described. The satellites themselves are built with mostly off the shelf assemblies that the company doing the project, Skybox, can integrate without having to invent and design huge amounts of technology (the software to make this work is the primary part that they create). Seeing potential problems from entrenched interests they have cleverly partnered with some of the aerospace and defense companies that could use some of the data and would have an interest in having the company succeed. A "we all win" scenario. The plan is to use a number of space imagers for global coverage from relatively low orbits and gather data, available due to the good optics and low height, and make that data available for purchase. See the article and the company, and Wireds, website on this complex enterprise. Earl Bennett

Meeting locations and times; We meet at the **Liberty One Food Court from 1 to 3 p.m**. Our next meeting will be August 10th and September 14th at this **16**th **and Market Street** location.

July Meeting notes: Several of us have brought publications with interesting material in it, we hope, for the others in our group to peruse. This happens before and during meetings, but, seldom distracts from the main discussions. On to reports.

Larry gave us the six months of web visits and where they came from. There where a number of peaks that Larry and I discussed with the members. These may be people looking at our meeting notes but this is only speculation on my part. Larry also brought word about the Charity Blossom link we have been discussing for several months. The link to donate to us has not been activated as yet. In other related web news: there was a question from Janice on using the Google "Meet Up Groups" contact system. The idea is to bring in people from other groups, that find us through Meet Up, into contact with our members who would be in a Meet Up group of our people. If the different members of our group who where part of the discussion are correct, individuals from our group can be the contacts in the Meet Up forum they create. Several of us have volunteered to try this and Larry will also investigate. And Hank said that he was already connected to a Meet Up group. This may help get us going quickly as far as contacts are concerned. Go people!

Dorothy brought reports on activities in our area at the Franklin Institute, at the Fels Planetarium: "To Space and Back" and, also at the Institute, "Space Junk." She also brought "Five Common Misconceptions about NASA" including that NASA was shut down after the Shuttle stopped flying! This from the Huf Post website for 7/10/13 (Lauren Lyons byline). And then there was the fabulous articles in "Metropolis" magazine for April. There are several reports on using 3D printers to create artistic pieces ranging from clothing to buildings'. Some things are mundane, but, they are examples of the range of possible materials that could be used to create the same object. Very good magazine you should look up at metropolismag.com. Very nice, Dorothy!

Hank brought us the most recent version of the Philcon Convention flyer: Author Allen Steele was principal speaker (he has a fiction piece about Mars in the October 2013 Analog) with Artist G.O.H. Charles Vess. No report on a P.S.F.S. meeting this month.

We had some interesting news, and lots of talk, from subjects brought up by Rich Bowers, our 1970s president: Rich pointed out that Israel is planning to launch a Lunar Rover! This may be to try to win the Google Lunar X-Prize! That would be something really different. I have no other information on whether this might actually be a system being developed at the Tel Aviv University or other educational organization. I don't believe that nations are allowed to win the prize (see the X-Prize website rules section).

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Rich says the rover would carry the Israeli flag. This should be interesting, as was the other idea Rich brought up, and Mitch supported: a new, larger, space habitat model. He had started talking with members of a NW Philadelphia model making club (member Paul Keefe Jr about habitat models and there construction and availability. It turned out that Mitch had also been involved in this effort and had found the group.

At first I threw out a high number for possible cost (\$1000) for a large model similar to the Bernal Sphere Habitat model from the 1970s shown to Congress. The new model would show the outside <u>and</u> inside of the habitat and would include buildings and tiny people (hopefully). That price tag prompted talk about alternative designs that would work as displays and yet not cost the arm and a leg that an accurate, possibly 3D printed design, might cost. Rich came up with a novel design that could make the major structural element, the shell, low cost and easy to display system: a cylinder with side extensions. This might be found at a hardware store or industrial supplier. This revelation was followed by talk of how to simulate the interior, with tiny architectural models initially, and then, from Janice, the possibility of using images from the Google Maps catalog to create the illusion of the habitat interior. This might be possible, especially if a "Rama" type interior, with a circular river around the inner circumference, was contemplated. More when our people exchange ideas during this month and later. I should note that Rich created a pictorial illustration so we could all examine his vision of the design. Great work, Rich (and Mitch)!

Mitch brought material from the World Future Society including the July/August issue that includes: "Rocketing to Mars with Fusion Power". The work is being done at The University of Washington Plasma Dynamics Lab. He is working on a fall public event with SEPTA, our public transport system, and will contact The Franklin Institute about fall events. He is also going to talk with the University City district institutions about an outreach event there as well. Go, Mitch!

Janice brought Science Magazine, a July issue, that included a report on NASA studying an exploratory trip, by astronauts, to an asteroid that could be directly examined by a science team of geologists and materials scientists (my speculation as to composition) to see if a practical way can be developed to move them safely. There was talk on how such a project might harm, by fund shifting, other initiatives. And there is congressional brinkmanship too. Maybe the 2014 Congress will move forward on this.

And Earl brought a number of publications for member examination, including the October issue of Analog that Hank and Wallace examined carefully, but will limit this report to the new satellites that are being launched in the near future: there are several lists from The AMSAT Journal, QST, and a report from Tech Briefs on some recent experimental systems that NASA tried. The upcoming launches include The Funsat from the U.K. version of AMSAT: this should be up by the time you read this. There are 17 in total with many connected to education and experimental goals: the Funcube is both an amateur radio transponder and a tool for educational outreach via the Funcubes' associated education network. BEESat 2/3 are for research on using sensors and gyros for precise orientation, and high speed data links (up to a Mb/sec) and are university sponsored.And the A1ST,from a different university, will examine the Earths' geomagnetic field.

Then there is CubeBug-1 which initially designed to test elements of the crafts design for later use by other spacecraft builders that includes universities and research labs (after this is done the Cubesat will be repurposed for amateur radio data. Many of the other satellites, of cubesat dimensions, are for ham radio purposes with secondary use for other interests, but, there where also three satellites from NASA, called Phonesats, that used Smart Phone technology to perform the functions normally handled by special purpose hardware. The satellites used a version of the Android operating system for control and housekeeping functions. See the Amsat and QST journals for May/June and July respectively, and, the July issue of Tech Briefs (which I have to renew. Great "spin off" for us) for more on the Phonesats. There should be reports on this mission from NASA.

And lastly, for spacecraft: Science News had a last page report called "Postcards from Voyager" about the work of Suzanne Dobbs who uses Voyager data to examine the conditions at the edge of the Solar System. This is a nice report and includes a sidebar on several other probes and what has become of the. July 13,2013 issue.

And much more, but for a different report! Earl Bennett NSSPASA.

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