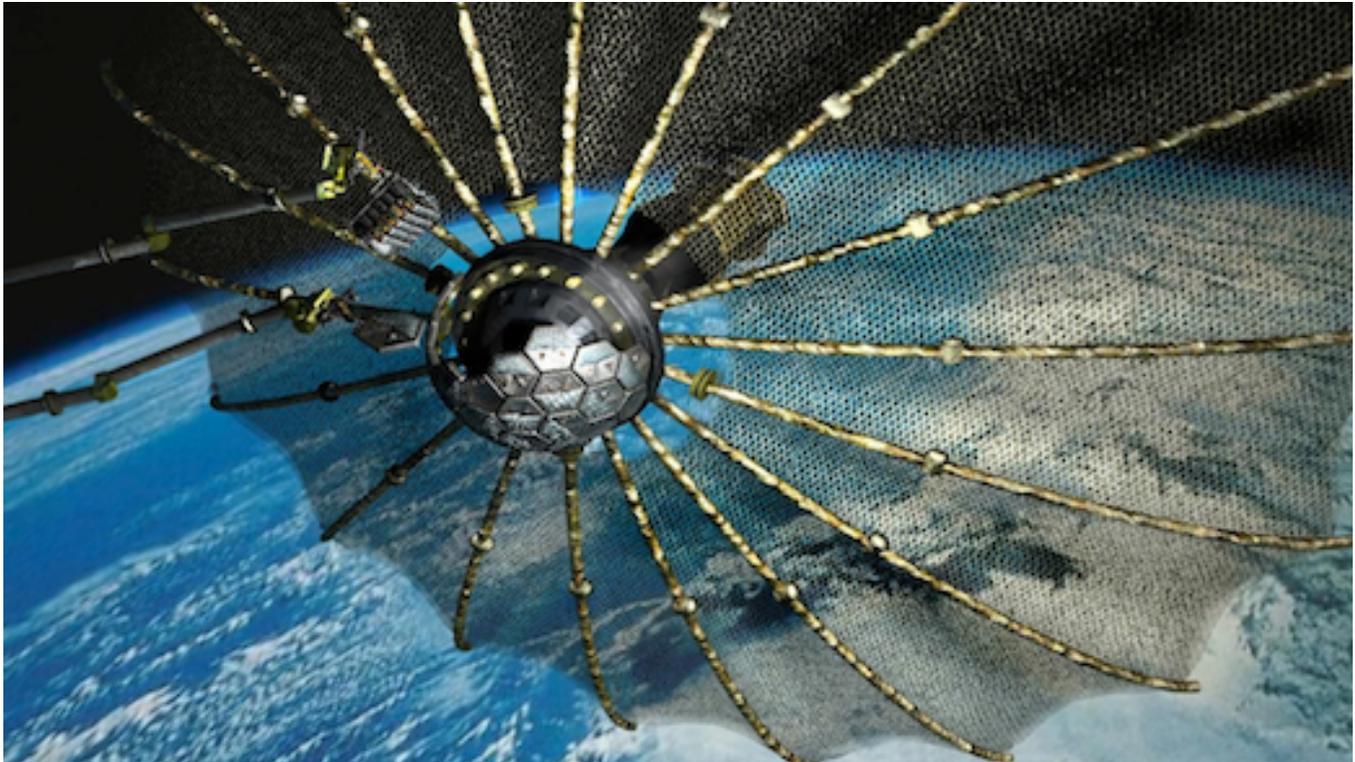


“Towards an Earth-Moon Economy – Developing Off-Planet Resources”

Moon Miners’ Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com



A US Defense Advanced Research Projects Agency satellite scavenging a defunct satellite’s valuable parts. DARPA has \$180 M to test space debris scavenging technologies. The Canadians and Swiss are also working in this area.

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COMET
CRUDE
Waldcattling

“Comatose” Comets might be a better choice than Asteroids pp 7–8

About Moon Miners' Manifesto – “The Moon - it's not Earth, but it's Earth's!”

- **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/](http://www.moonsociety.org/publications/mmm_themes/)
- **MMM Glossary:** new terms, old terms/new meanings: www.moonsociety.org/publications/m3glossary.html
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- **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 membership organization, with 10,000 members and 50 chapters, dedicated to the creation of a spacefaring civilization.
National Space Society 1155 15th Street NW, Suite 500 Washington, DC 20005 (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]:
Moon Miners' Manifesto, c/o Peter Kokh, 1630 N. 32nd Street, Milwaukee, WI 53208-2040

In Focus National Space Society Perennial Identity Crisis

By Peter Kokh, as member of the NSS Board of Advisors

The National Space Society began as the merger of two existing societies: The L5 Society focused on Space Settlement, and the National Space Institute, founded by Wernher von Braun to mobilize public support for NASA. These goals can converge on some projects and issues, and diverge on others. For the L5 Society, exploring and settling space was the ultimate goal: which nation or group of nations did so was secondary. To NSI, only the US-NASA goals and projects mattered.

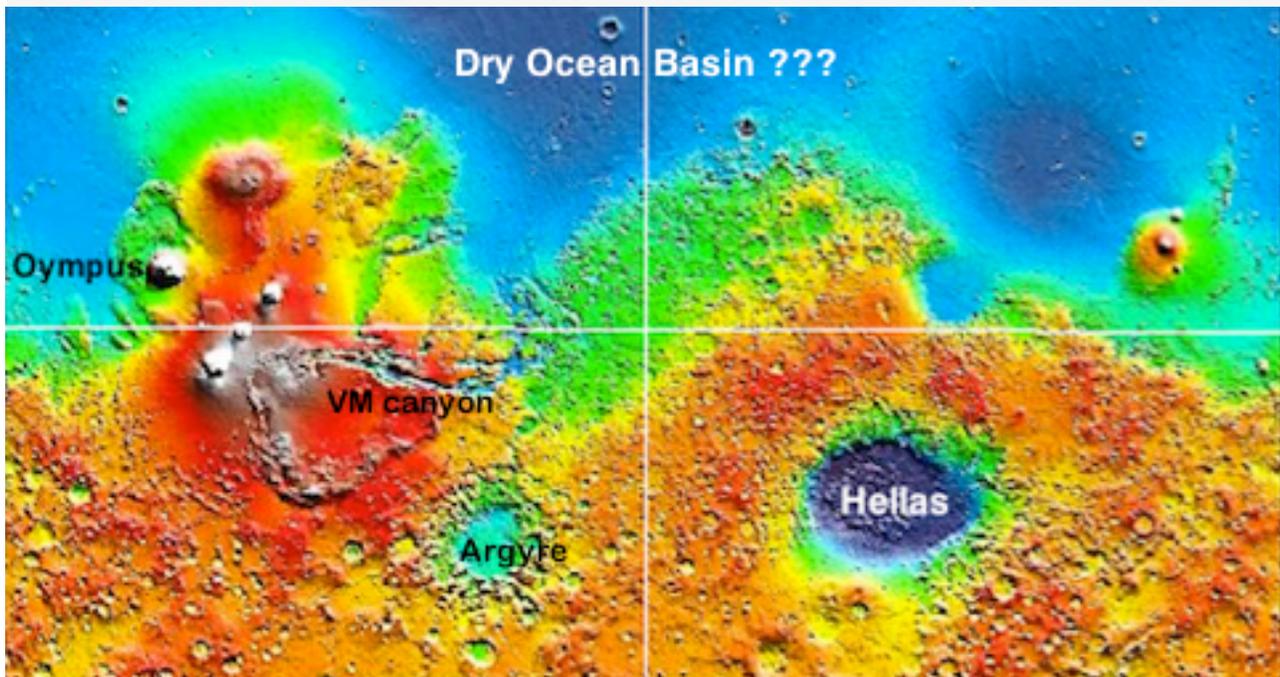
Twenty-seven years after the merger, this identity crisis continues. In a few years L5 leaders rose to the top, but in efforts to strengthen the Society we have taken aboard too many leaders of the NSI mold. At the same time that we are trying to gain international members, a majority of the Board forbade NSS directors from visiting or making overtures to China relevant to space. This was the wrong decision as It is a sell-out of what we should be about. Last year an unofficial NSS delegation went to a conference on Space Solar Power in Beijing, hoping to re-enforce Chinese interest in building solar power satellites instead of continue to pollute its (and our) atmosphere with coal burning pollution. **We share one world, and such a switch is in everybody's interest.**

I speak out as NSS Life member #2 (Wernher von Braun was #1), and as a member of the NSS Board of Advisors. We need to settle this guiding purpose ambiguity once and for all. We have compromised our goals in an effort to take on influential people in our leadership circles. While we do need people with a voice in DC, we don't need this to the point were “we win the world, but lose our immortal soul” doing so. PK

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [/mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

Mars Aviation could Debut in the deep Hellas Basin

By Peter Kokh



Many a flying enthusiast has wondered if we could design aircraft (not balloons, mind you) to fly on Mars. Here are some relevant statistics: http://en.wikipedia.org/wiki/Atmosphere_of_Mars

“The atmospheric pressure on the Martian surface averages **600 pascals (0.087 psi)**, about 0.6% of Earth’s mean sea level pressure of 101.3 kilopascals (14.69 psi)

“It ranges from a low of 30 pascals (0.0044 **psi**) on Olympus Mons’ peak to over **1,155 pascals (0.1675 psi)** in the depths of Hellas Planitia” or 1/87th of Earth sea level pressure

And there you have it. It may well be that it will be in the Hellas Basin, a deep relic of a major asteroid impact, that sustainable manned flight will first be demonstrated on Mars. It will take more capable craft to fly elsewhere on the Red Planet.

That suggests that in early days, Hellas Basin (badly misnamed a “Planitia”) will be a major tourist destination, at least until more capable craft are able to fly over the length of Valles Marineris at a higher altitude with thinner atmosphere. Hellas will be where we are first able to breed plants that can take root in Mars thin atmosphere. Settlements in Hellas could take the names of “seaports” in Edgar Rice Burroughs novels. **Aanthor**, for example. These settlements will also be the the first “airports.”

So when it comes to choosing a site for a first settlement on Mars, proximity to Hellas Basin will be a plus to take into consideration. Next, would-be settlement sites handy to the “shore” of the “suggestively ocean-like” basin that occupies most of Mars Northern Hemisphere. Flights between settlements along that “altitudinal” “shore” would be possible sooner than at higher altitudes (green, yellow, orange, red.) Roads and railroads could connect low-altitude airports with sites at higher altitudes.

Current high altitude flight record – http://www.nasa.gov/pdf/64317main_helios.pdf



<http://www.nasa.gov/centers/dryden/news/ResearchUpdate/Helios/index.html>

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

“In August, 2001, the lightweight solar–electric aircraft “Helios” (above) reached an **official world record altitude for non–rocket powered aircraft of 96,863 feet** during a maximum–altitude flight, the first of two major flight milestones set for the craft by NASA under ERAST.” The craft was unmanned. Now if we can demonstrate flight at 125,000 ft, manned flight to boot, we’ll be all set!

Achieving manned airflight on Mars, and advancing it to the point where further exploration of Mars and the advance of pioneer civilization on Mars from existing settlements can be advanced by air transportation will be a major milestone, giving pioneers global access to resources. From that point, Martian settlement will advance to some level of self–sufficiency.

We need not wait until we get to Mars. We can further develop Helios–type planes and crafts of alternative designs, here on Earth, until they can fly at ever higher altitudes, and can carry people and cargo. PK

Bold “Inspiration Mars” Project – 2 people skimming over Mars and back

<http://www.inspirationmars.org>–Video Introduction – http://www.youtube.com/watch?v=qc_RycDf6hU

The Mission – Mars presents a challenging, but attainable goal for advancing human experience and knowledge. The plan is to launch a mission that will use **existing space transportation hardware** and further drive technology development. It will generate knowledge, experience and momentum for the next great era of space exploration. It will encourage and embolden people to believe again, in doing the hard things that make our nation great, while inspiring the next generation of explorers to pursue their destiny through STEM education and exploration. Now is the time!

Overview – In 2018, the planets will literally align, offering a unique orbit opportunity to travel to Mars and back to Earth in only 501 days. **Inspiration Mars** would send a two–person crew – a man and a woman – on a historic journey to fly within 100 miles around the Red Planet and return to Earth safely.

Once underway, the crew will keep busy with hours of exercise daily, system maintenance, life support maintenance. As they will be in isolated confined environment for long periods, they must be by temperament resilient, upbeat, happy in face of adversity. The expectation is that the crew of two will be a married couple to provide mutual support and trust and sharing.

The trip home will require highest Earth reentry speed ever. Only existing hardware will be used, so that hardware development cannot delay the launch. All systems must be robust as there will be no way to abort the mission once underway.

The target launch date is January 5, 2018. This exceptionally quick, free–return orbit opportunity occurs twice every 15 years. After 2018, the next opportunity won’t occur again until 2031. The mission will provide a platform for unprecedented science, engineering and education opportunities, using state–of–the–art technologies derived from NASA and the International Space Station. It will be financed primarily through philanthropic donations, with some potential support from government sources.

The Mission – This is a mission that will push back boundaries while taking the world along for the ride. Public participation, inspiration of youth are primary goals. Closing the “inspiration gap,” both for kids and teachers, is primary. The intent is to think large, think beyond what has been done, to demonstrate audacity. Mars presents a challenging, but attainable goal for advancing human experience and knowledge. The plan is to launch a mission that will use **existing space transportation hardware** and further drive technology development. It will generate knowledge, experience and momentum for the next great era of space exploration. It will encourage and embolden people to believe again, in doing the hard things that make our nation great, while inspiring the next generation of explorers to pursue their destiny through STEM education and exploration. Now is the time!

Operations – This mission will be a flyby **passing within 100 miles of the surface of Mars**. Additional maneuvers will be minor course corrections only, using the gravitational influence of Mars to “slingshot” the vehicle onto a return course to Earth.

An inflatable habitat module will be deployed after launch and detached prior to re–entry. The habitat module, possibly a Bigelow Aerospace Inflatable, will be the size of a small Winnebago camper/caravan, 35 cu meters (1,200 cu ft), half filled by supplies which will include 1,360 kg (3,000 lbs) of dehydrated food, recycled urine and stale air in process of being recycled.

NASA will partner in advisory role and in developing of new technologies. **Some subsystems may come from other countries. The money will come from individuals, foundations, movie rights, with Dennis Tito underwriting the first two years of the project.**

An inflatable habitat module will be deployed after launch and detached prior to re-entry.



Left: inflatable module which will be home to the couple for the duration of the flight
Right; its interior size will be comparable to a small Recreational Vehicle or caravan



Technology – Investments to date in human space exploration technologies and operations are converging in time to make such a mission achievable. The mission is being designed based on proven Low-Earth Orbit (LEO) systems and technologies that are available on the market today. We are currently in discussions with many of the leading U.S. commercial aerospace companies to tap into their existing launch engines and vehicles. Environmental and life support operations will be directly derived from International Space Station technologies, which have proven design, development and operational lessons to draw from.

Mission Importance – This mission will generate knowledge, experience and momentum for the next great era of space exploration. It is an unprecedented, long-duration research opportunity that will lead to new, cutting-edge discoveries. It inspires the next generation of explorers to pursue their destiny through STEM [] education.

Rewards & Risks – The beauty of this mission is its simplicity. The flyby architecture lowers risk: ✓ no critical propulsive maneuvers ✓ no entry into Mars’ atmosphere ✓ no rendezvous and docking.

It also represents the shortest duration roundtrip mission to Mars. **The 2018 launch opportunity coincides with the 11-year solar minimum providing the lowest solar radiation exposure.** The next launch opportunity for this mission (2031) will not have the advantage of being at the solar minimum.

There are risks associated with the mission. To be successful, the craft must “thread the needle” both as it passes behind Mars, to get on a path to hit Earth’s atmosphere at just the right angle. The risks and challenges so far identified are well within the scope of our collective experience and can be overcome to achieve a safe and successful mission. The team is steadfastly committed to the safety, health and overall well-being of our crew. They will only fly this mission if we are convinced that it is safe to do.

Role with NASA – Proven LEO systems and technology that NASA and the industry have created will be used to seize this unique, once-in-a-generation opportunity to create public awareness, enthusiasm and momentum for a long-term commitment and vision for space exploration beyond LEO...all the way to Mars.

The Inspiration Mars Foundation has formed a partnership with NASA via a reimbursable Space Act Agreement between Paragon and the Ames Research Center to conduct thermal protection system and technology testing and evaluation. Foundation officials will also seek to tap into NASA's knowledge, experience and technologies to fine-tune and/or develop some of the more challenging elements of this mission, including environmental controls, radiation protection, and human health and productivity plans. PK

Making the Most of an "Inspiration Mars" Mission

By Peter Kokh

First, recklessly dangerous or not, only "Mars to Stay" can succeed, long term

This is one point on which I profoundly disagree with my invaluable colleague David Dunlop. "Mars to Stay" missions, high risk or not, are the only way to escape the "Flags & Footprints" destiny suffered by the Apollo Mission program. With each mission, even if only some of each crew elects to stay behind on Mars, the population on Mars will slowly grow, meaning more and more science and exploration will get done. Science and exploration are goals of any population, not just of explorers. Mars will be explored far more exhaustively by its settlers, than by infrequent noncommittal visitors.

That said, no human mission, especially one in which some or all crew members are determined to stay for an extended duration, should be considered until we have identified sites from which all needed raw materials (water and the major types of minerals) are easily accessible, and a site from which overland access to much of the planet is feasible. Nor should it be launched until atmosphere-mining and 3D printers have accumulated extensive stockpiles of supplies and spare parts: The "yolk sac" approach.

In any population, there are those comfortable enough where they are, to want to take chances as explorers and pioneers. But the reason we are not "all" still in sub-Saharan Africa is because in any population, there are those with talent and ability who nonetheless have difficulty advancing in a society where "all the good slots" are taken. These are the people who pioneer. Those who see "settling Mars" as too risky and liable to tragic failure, can stay at home. But they have no right to insist that others stay home, specifically, those willing to take the chance to pioneer a new frontier where life may be harder but yet more rewarding, also stay home. We are where we are because the restless and thwarted have found outlets in new frontiers.

Indeed, one major world-class city was founded by prisoners who went on to become citizens – of Sydney, Australia. Not all prisoners in for "life" would be willing to be "pardoned to Mars." But some may, boasting those who've had enough of life on Earth and are willing to take the plunge. And if the settlement effort fails? It wouldn't be the first time! The point is that there are people with the "right stuff" and no one else, not so inclined, has the right to shut the door in their face.

Where is the money? Inspiration Mars will be privately funded.

If the funds are not forthcoming from individual donors and corporations, it will not happen. This mission is not a challenge to any other government agency proposed mission. It is likely that foodstuffs and other supplies and equipment will be donated by corporations as a tremendous advertising opportunity. That this mission has a definite date by which it must lift off or wait a generation or more for an equal opportunity (orbit alignments plus low solar activity) will prod potential donors not to hesitate.

Our one big chance to inspire the current generation of young people.

The countdown has begun. If in two years, preparations are not well underway for this mission which "must fly" January 5, 2018 – in less than five years – then it won't fly at all. And that would be a major disappointment. Why? Because this mission has the capacity to gain the attention, support, and involvement of young people – a population now engrossed in smart phones and other electronic = distraction sink holes. If we are going to do international missions such as building an International Lunar Research Park on the Moon, and a first, second, and following human landing missions to Mars, we will need the support of young people who will soon be a significant portion of the electorate.

Yes, this is just a flyby mission. They won't be landing. Neither did Apollo 8, and that mission had a tremendous psychological effect on the public at large in December 1968. Currently, the record distance from Earth humans have ventured is only a quarter of a million miles, still within the Earth-Moon system. This mission will carry humans for the first time out into the Solar System at large, in the area of a hundred million miles, hundreds of times further.

So what can we suggest to make this 2-person swing around Mars both more captivating and more productive?

- **Messages from home** to someone anywhere on Earth could be rerouted via the ship in flight, the price going up with the distance from home, highest just before and after the craft fled behind Mars, then lowering on the way home.
- **Your name on a list of supporters** – unlike names on disk aboard the New Horizons probe bound for Pluto, you would get your signature back, from Mars11 Now that's a souvenir!
- **Advertising from deep space**, out by Mars.
- **Experiments with the increasing time delay** in a conversation between Earth and Marscraft: at what distance does conversation become too-continuous to maintain? How far out is the “colloquipause?”
- **Launch a fireworks display into Mars atmosphere on the nightside**, hopefully visible to the crew, and by delay-telecast to people on Earth.
- Experiments with zero-g games: ping pong, others 3-D sports, and “board games?”
- Zero-g tethered dancing experiments by the couple, to a variety of music
- Display of relative apparent sizes of Earth-Moon and Mars (normal at half way point)
- Milestone ceremonies: a million miles out, 5 million, 10 million, half way, etc.
- Clock that shows time delay, apparent vs. real.
- Earth-Moon, Mars display slowly getting bigger, smaller etc.
- Questions sent, then answered, daily. Posted record thereof;
- Pets brought along from species that have adapted well to zero-g on Skylab, Mir, ISS.
- Plants brought along, that have flourished in zero-g on Mir or ISS
- Individual sleeping bags, and and a sleeping bag for two (assuming the crew is a married couple) with private reports, published summary at end of mission.

Send your activity or experiment suggestions to mmm@moonsociety.org

Also read a pair of articles on the Inspiration Mars project by David Dunlop, one critical, one supportive, in To The Stars International Quarterly, TTSIQ, #3 (April 2013) a free download at: <http://www.moonsociety.org/international/ttsiq/>

Refueling Stations Beyond Low Earth Orbit: The Stage is Set. Mining Asteroids – or Dormant Comets? – Pros & Cons

By Peter Kokh

The Moon, having been formed “hot” is relatively depleted in the volatiles necessary to support life: hydrogen, carbon, and nitrogen. We do now know that the permanently shaded areas of the Lunar Poles harbor comet-derived ices, most likely including water and nitrogen and carbon oxide ices. What we do not know, and what many writers and enthusiasts trivialize, is how difficult it will be to “mine” or “harvest” these precious reserves given the near absolute zero “cryogenic” temperatures. Will the electronics work? If no lubricants will work, will all moving parts require super-magnetic bearings? Any equipment we now have would likely fail in short order. Carefully planned experiments in cryogenic labs here on Earth will be needed before we go through the expense of sending a “Lunar Polar Ice Surveyor/Sampler” to the Moon.

What about the class of asteroids known as “carbonaceous chondrites”?

http://en.wikipedia.org/wiki/Carbonaceous_chondrite

Wikipedia lists 8 classes of carbonaceous chondrites.

“Several groups of carbonaceous chondrites, notably the **CM** and **CI** groups, contain high percentages (3% to 22%) of [water](#),^[2] as well as [organic compounds](#). They are composed mainly of [silicates](#), [oxides](#) and [sulfides](#), while the minerals [olivine](#) and [serpentine](#) are characteristic. The presence of volatile organic chemicals and water indicates that they have not undergone significant heating (>200°C) since they formed, and their compositions are considered to be close to that of the [solar nebula](#) from which the [Solar System](#) condensed.”

Putting aside for the moment, how we would process these ice-enriched rocks, unless we can do this in fully automated and robotic manner, the big hurdle would be the the life support and consumables needed to support human crews in such a recovery project.

But now, NASA, has come up with a brilliant idea: sending a small probe to “capture” or “bag” a small carbonaceous chondrite “astrochunk,” under 8 meters in diameter, and slowly bring it back to Earth space, parking it in an orbit easily accessed by human crews, who can then experiment with various processes to find the most efficient way to harvest the water and other volatiles. NASA thinks it can do this for an estimated \$100 million. And support for such a mission is growing both in the US Congress and among space enthusiasts.

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

Check the following linked reports and videos:

<http://www.space.com/20591-nasa-asteroid-capture-mission-feasibility.html>

<http://www.space.com/20431-nasa-asteroid-capture-mission-funding.html>

<http://www.space.com/20606-nasa-asteroid-capture-mission-images.html>

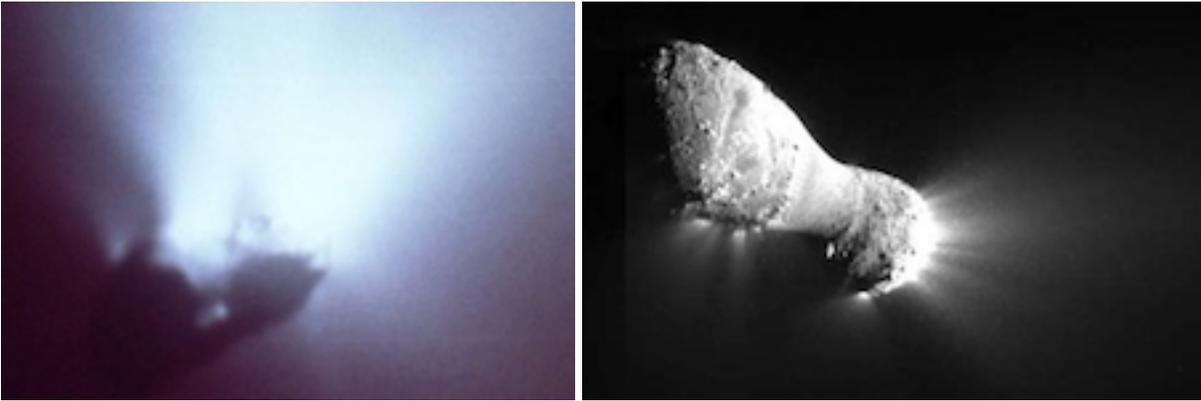
<http://www.space.com/20605-nasa-budget-asteroid-lasso-2014.html>

<http://www.space.com/20601-animation-of-proposed-asteroid-retrieval-mission-video.html>

If this project identifies the most efficient means with the least massive and most automated equipment, we may have found a way to build refueling stations in various inner solar system locations. That could be most helpful in opening up Mars to human endeavors, as well as to support manned missions to Jupiter's moons.

An Overlooked Alternative – Dormant “Comets in a Coma”

While astrochunks with a water/volatile content on the order of 20% are relatively “soaked” in comparison with the Moon (polar permashade reserves excepted), comets are far richer. Now we had always thought of comets as “dirty snowballs.” That conception was smashed when we saw the amazing photographs taken of Comet Halley by the European Space Agency's **Giotto** probe, revolutionizing our picture of what comets are like.



Left: Comet Halley (ESA's Giotto flyby) Right: Comet Hartley 2 (NASA's EPOXI flyby)

These photos show that the bright “tail” does not emanate from the entire surface of the comet, but only from a few active “pores!” Now we know that **comets accumulate slag crusts**, and that the only reason we can see them is that the slowly growing slag layer has not yet plugged every last pore! With each pass into the inner solar system nearer to the sun, the deeper and more extensive this slag crust becomes.

Prior to this discovery it was the common belief that comets continue to outgas, getting ever smaller, until they just waste away to nothing. That is probably not their common fate. Instead **it now seems far likelier that comets eventually suffocate themselves, plug their flashpores and "turn off," retiring into a cocoon of slag that they have gradually spun for themselves, covering a protected bonanza of ices.**

They await a metamorphosis, a butterfly transformation into rich water reservoirs for thirsty "homo circum-solaris." For the vast bulk of the original endowment of dusty ice/snow remains "dormant," undercover, preserved inside. Comets, in general then, do not die. They fall into a deep coma, awaiting some future "resurrection."

The Big Catch

Now, if we could find a dormant comet with a low inclination orbit, and not too far out from Earth's orbit, that would make “THE” Refueling Station. The odds would seem against us. Unlike asteroids which are largely confined to a narrow range above and below the general plane of the Solar System, comets visit us from all directions: not only from highly inclined orbits, but some also from the opposite retrograde direction.

The next step (with the highest priority and urgency!) will be to do a thorough spectrographic, photometric, and radar studies of supposed asteroids in unusual orbits and see if some of them have a common tell tale signature. We suspect this will be the case. If so, they may not be asteroids at all, but dormant comets.

If we have found a tell-tale “signature,” we can then turn our attention back to the vast majority of asteroids with ecliptic-hugging orbits and examine them one by one for the same giveaway quirks in the light they reflect towards us. For some small percentage of dormant comets may be hiding in asteroid-typical orbits.

If we find just one, we may have won the jackpot.

This idea may be new and revolutionary to most readers, and perhaps even to many astronomers and space scientists. But those MMM readers who have been with us from the start will be familiar with it.

Read “**Wildcatting Comet Crude**” in MMM # 35 – May 1990 (23 years ago). This article has been reprinted in our Asteroids Theme Issue:

http://www.moonsociety.org/publications/mmm_themes/mmm_t_asteroids.pdf

This and 14 other theme issues, all in pdf format, can be freely downloaded from

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

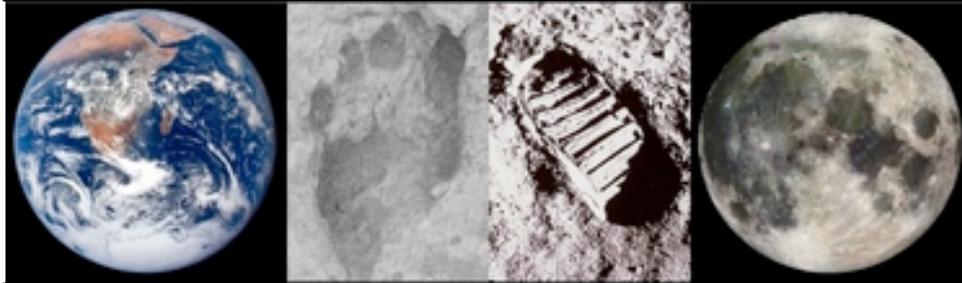
Enjoy!

PK

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

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
industrializa-
tion 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” – www.moonsociety.org/spreadtheword/whowhat.html

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
We need more candidates in the upcoming Society elections

It is once again election time for The Moon Society. This is an annual event, even if officers serve for two year terms, and it is your participation that helps shape the future of our organization.

There are different philosophies on how to approach elections for an organization. Some prefer that carefully groomed and vetted candidates are always put forward to ensure a smooth continuity in the operations of the organization. Others prefer the vibrancy of multiple candidates and the clash of ideas and chaos of uncertain ballots to keep an organization fresh and relevant.

As with most things in the world, the equilibrium lies somewhere in between, and organizations benefit from both new ideas and continuity of existing efforts. Many of the new ideas come from younger members. All of the space organizations are awakening to the need to transition past the generation that grew up on Apollo and has been in charge of our efforts for decades. The Moon Society's leadership now spans three generations, from X to Silent, but we need more younger leaders for the transition we're seeing in society to a greater focus on our Moon's resources. We are positioning The Moon Society as the thought leaders in that regard.

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

The Moon Society – Lunar Frontier Settlement – www.moonsociety.org p.2

If you are in your 20s or 30s, I am calling on you to step up and take charge. You have an opportunity to help shape humanity's future on the Moon, and a solid team to back you up. We have one open seat on the Board of Directors that I'd like to see filled by a new face. But we would like to see 2 or 3 new nominees.

Our Board of Directors needs You to be the Moon leader you always knew you were. If you have been a member for at least one year by August 1st, 2013 you are eligible to stand for election. If you send in a candidate statement by the end of May we will publish an amended ballot in the June issue of MMM. Contact President@MoonSociety.org to get started.

To the Moon!

Ken Murphy

Call for Nominees for Elections 2013 to Moon Society Officer & Board Openings Nominations and Candidate Statements due by email Monday, May 27th

From Moon Society Secretary Peter Kokh secretary@moonsociety.org

It is time once again to begin the annual Moon Society Elections process. Each year, we vote for two of our 4 officers, and in even # years, such as this one, we vote for 2 of our 5 directors, voting for the other 3 in odd# years. Respond to secretary@moonsociety.org if you wish to run for any position.

Two (2) Moon Society offices are up for election or reelection. They are **vice-President**, currently held by Paul Banyai, and **Treasurer**, currently held by Dana Carson. Both may run for reelection.

In addition, the current **Secretary**, Peter Kokh, wishes to retire if there is another candidate.

Three (3) Moon Society Board of Directors positions are open, including

- ✓ one held by Jason Tuttle, who is eligible for reelection
- ✓ one held by Phillip Crume, who was elected last year to fill out the remainder of a position vacated by Bryce Johnson, and who is eligible for reelection, and
- ✓ one held by Al Anzaldua, who is retiring.

Eligibility: Anyone who has been a member of the Society for a **full year as of August 1, 2013** is eligible to run for a board seat or officer position. This year all members with a **membership number of 1673 or lower** are eligible for election. If you are interested but not sure of your eligibility, contact secretary@moonsociety.org

Recommendations: (1) Anyone unable to attend our meetings on a regular basis should not run for office. The Management Committee (officers and directors meeting together) meets online the 1st and 3rd Wednesday evenings monthly, 9–11 pm Eastern, 8–10 pm Central, 7–9 pm Mountain, 6–8 pm Pacific. Times will be earlier in Hawaii and Alaska, Times in the Eastern Hemisphere will be on the following Thursday: wee morning hours in Europe, morning in India, and early afternoon in Australia. Our meetings are held in a private and dedicated chat by room, in the ASI–MOO environment. <http://www.asi.org/adb/09/08/04/moo.html>

Recommendations: (2) Anyone who has not previously served in a Moon Society leadership capacity and who wishes to run, is encouraged to join us in our current meetings, so that you will be up to speed by election day. To gain access to the Management Committee meetings, please send an email to secretary@moonsociety.org so that access (restricted) can be granted. Of course, those who had already served, are welcome to serve again.

At least 2 new persons are needed! As we have no incumbent in two board positions, so we need at least two new candidate! Of course, anyone is welcome to run against any incumbent. In total there are 6 positions open. And if we have some contests this year, that will liven things up!

To all members not running for office: All members are welcome to give input on matters of any kind that pertain to Society goals and directions, projects and programs, the website or newsletter. Do feel free at any time to send an email to secretary@moonsociety.org sharing with us your concerns, opinions, and suggestions. We enjoy hearing from you, and are encouraged by your taking interest in this way.

Any incumbent eligible for reelection who chooses not to run again, should also so inform the secretary.

Candidates and their statements will appear in the June issue, MMM #266.

Accordingly, **nominations are due May 27th along with a candidate statement** (250 words maximum) stating what you bring to the office in question, background, and so on. **As a rule, candidates nominate themselves.** Nominations by others should be sent to secretary@moonsociety.org early enough to be passed on to the member being nominated, giving him or her the option to accept or decline.

Ballots will be tallied August 1st and the election result published in the MMM #267 August issue, with seats taken at the August 7th meeting.

PK, Secretary

Incentives for Joint Memberships in Chapter and National Organization

A big problem for most chapters is maintaining joint local–national memberships. As the local in–person meetings are more satisfying, many once national members drop out. Each chapter or outpost should **discuss incentives to retain dual memberships**, be they a break in local dues, discount coupons for this or that, or ... well lets hear your suggestions. Other chapters will be interested in what works for you!

Case 1 NSS Chapters: One thing is for sure, the one–time first year \$10 rebate for new NSS members recruited by chapters is woefully short. National members who retain chapter membership should get a break in national dues and vice versa: local members who retain membership in the national should get a break in local dues.

Case 2 Moon Society Chapters: Here we are starting from scratch. There never have been any incentives for members of Moon Society Chapters to become or remain members of the Moon Society itself. **Lets fix this!**

To kick off discussion, here are a few ideas

- **Once a year, take in a meeting of another regional chapter** (if you have a “neighboring” sister chapter!” – **preparation for the visit by both visiting and visited chapter leaders, and comparing notes during the visit, will work to invigorate and re–enthuse both chapters** – If your chapters is not blessed with another chapter being at easy round trip travel distance, consider visiting an area chapter of another organization (NSS, Mars Society, etc.)
 - Learn what works well for other chapters
 - Show them what works well for you
 - Bring goodies along: food, exhibits, books, presentation about your chapter events in the past year
 - Plan a joint field trip or event
- **Extend invitations to regional and national organization leaders** to attend one of your meetings, with the regional or national representative making a presentation followed by a discussion of how your local chapter can support the goals and efforts of the national organization.
- **Be sure to read the NSS Philadelphia (PASA) news at the end of this and every MMM – for inspiration!**

Chapter Projects: Help Classify Images from Lunar Reconnaissance Orbiter



<https://www.zooniverse.org/project/moonzoo> – <http://www.moonzoo.org>

Explore the surface of the Moon

We hope to study the lunar surface in unprecedented detail. Thanks to the help of the Moon Zoo community we have already visually classified 3,450,547 images from NASA's Lunar Reconnaissance Orbiter (LRO). Already 780,000 people worldwide are involved.

Real Science Online

The Zooniverse and the suite of projects it contains is produced, maintained and developed by the Citizen Science Alliance. The member institutions of the CSA work with many academic and other partners around the world to produce projects that use the efforts and ability of volunteers to help scientists and researchers deal with the flood of data that confronts them.

Welcome to the Moon

With your help, we hope to study the lunar surface in unprecedented detail.

Read and Listen to the Tutorial at <http://www.moonzoo.org/about>

Zooniverse supports several other astronomy focused citizen projects including

- **Exploring the surface of Mars** (southern polar region) https://www.zooniverse.org/project/planet_four
- Finding planets around stars** <https://www.zooniverse.org/project/planethunters>

Make this a Chapter Project

If one or more members of your chapter or outpost are involved in a Zooniverse project, this activity can get you in doors at local schools and astronomy clubs, and help attract members. ###

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

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

March **Chapters & Outposts** 2012

ORGANIZING “OUTPOSTS”

Bay Area Moon Society, CA Outpost – South San Francisco Bay – <http://www.moonsociety.org/chapters/bams/>
Contact: Henry Cates hcate2@pacbell.net Meeting the 1st Tuesday of the Month at Henry's home

Moon Society Milwaukee Outpost (MSMO) – http://www.moonsociety.org/chapters/milwaukee/msmo_aboutus.htm

Contact: Peter Kokh kokhmmm@aol.com – http://www.moonsociety.org/chapters/milwaukee/msmo_output.htm

Report on April 13th Meeting: Attendance was low at our first “Yuri's Night Party” held the next afternoon as part of our regular meeting. But we all enjoyed a video series DVD: www.history.com/shows/how-the-earth-was-made/

ORGANIZED CHAPTERS

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

Contact: Robert Perry surfer_bob@charter.net – Meetings 3rd Wed monthly at Buder Branch Library, 4401 S. Hampton, in the basement conference room – Next meetings – MAY 16 – JUNE 19 – JULY 17

April 17th Meeting Report: David Heck, Karl Strassman, Mark Rhode, Dave Dietzler, Tom Kulmann, Rufus Anderson, and Bob Perry were present. David brought a color coded topographic map of the lunar south pole with the very large Aitkin Basin being quite obvious. He gave a brief overview of the plans of the Shackleton Energy Company – Shackleton Crater is very nearly center at the south pole so some part of it is very nearly always in sunshine. We discussed using that power to collect regolith, and how to keep any valuable volatiles from escaping during the process? The lunar axis is tipped relative to the plane of Earth's orbit about the sun, so sunlight streams nearly perpendicular to the moon's axis. There are craters at the poles deep enough that much of their interiors never receive direct sunshine. Those areas are close the background temperature of the universe, a little warmer than four degrees Kelvin, colder than Pluto. Solar wind gasses condense in those cold traps and will take billions of years to sublime into the near vacuum of the lunar environment. Ice mining will not be easy but it will be done.

Then we watched "Meteor," a PBS documentary about the fireball that exploded over Chelyabinsk on Feb. 15, 2013. Bob mentioned that one night he realized that he had seen a fireball by noticing that he had a shadow and when he turned to see the source, he watched it break into two about equal pieces that each tracked about 10° before fading out – they did not seem to disintegrate. Tom mentioned that he has seen many meteors and a few fireballs that exploded and "loved the ones that left a smoke trail." Tom demoed a skyview program/robot telescope service www.slooh.com/create_your_account.php for which he had signed up. Mark launched one of his smart phone apps. It knew where it was pointed and let the user know what he should see in the sky.

Moon Society Phoenix Chapter - <http://www.msphx.org> – Contacts: Craig Porter portercd@msn.com Meeting the 3rd Saturdays of the month at Denny's, 4403 South Rural Road, Tempe. Next meeting – MAY 18 – JUNE 15

The Saturday, April 20 trip to Biosphere 2 was cancelled. Originally we envisioned renting a tour bus to go to Biosphere and the Pima Air and Space Museum. Poor response made it uneconomical to hire a bus, so we scaled it back to a car pool to the Biosphere 2 facility. But as the week went on and into early Saturday, it came down to Chuck Leshner and myself and our spouses as the only people interesting in going. So we decided to cancel the trip for now until we can actually make it a group outing. (Note that if you sent in a check it will be returned to you.)

This was disappointing. A main reason we attempted an excursion was the difficulty in getting people to come out to meetings. We had some discussions among the membership and decided an outing might be of more interest and Biosphere 2 kept coming up. So we gave it a shot and the result was not much different.

Our initial concept that included the Pima Museum was admitted lengthy and not inexpensive and perhaps that put some folks off. Saturdays may be just too precious time-wise. But there is never going to be a perfect time to do some sort of excursion that meets everyone's schedule. Maybe a closer, shorter, cheaper trip (an ASU space science lab, for example) would attract more people. An on-line virtual tour of some place is not the same experience as getting on a bus with 20 like minded friends, seeing some place interesting with your own eyes, and then having a meal together. The on-line experience doesn't replicate that at all.

Moving on and looking ahead, our next monthly meeting is scheduled for Saturday May 18. I have a conflict that day and will not be available, and we don't have a program yet. I'm open to ideas or volunteers to pull something together. We welcome comments and ideas for future meetings and excursions. Thanks, Mike Mackowski

Clear Lake NSS/Moon Society Chapter (Houston) – <http://www.moonsociety.org/chapters/houston/>

Contact: Eric Bowen eric@streamlinerschedules.com – Our next regular meetings will be in the conference room of the Bay Area Community Center in Clear Lake Park at 7:00 pm the evening of Monday, May 13th and June 15th.

GREAT BROWSING LINKS

SPACE STATIONS + COMMERCIAL SPACE

<http://www.space.com/20006-deep-space-missions-private-companies.html>
<http://www.space.com/20444-nasa-deep-space-station-skylab2.html>
<http://www.space.com/20499-dark-matter-space-station-ams.html>
<http://www.space.com/20737-space-station-spacewalk-photos-expedition35.html>
<http://www.space.com/20712-private-antares-rocket-launch-success.html>
<http://moonandback.com/2013/01/13/ride-along-view-of-spacex-grasshopper/>
<http://www.space.com/73-orion-capsule>
<http://arstechnica.com/science/2013/04/how-nasa-brought-the-monstrous-f-1-moon-rocket-back-to-life/>
A commercial launch site for Space-X in Texas? – www.thespacereview.com/article/2271/1
A commercial approach for human space exploration. <http://www.thespacereview.com/article/2278/1>
SpaceShipTwo: Payload Users Guide www.virgingalactic.com/uploads/VG_Web_PayloadUsersGuide_20130103.pdf

MOON

<http://www.space.com/20439-moon-asteroid-vesta-violent-history.html>
<http://www.space.com/20628-private-moon-missions-golden-spike-photos.html>

MARS

<http://www.space.com/20434-buzz-aldrin-mars-mission-book.html>
<http://www.space.com/20446-valles-marineris.html>
<http://www.space.com/20680-mars-one-colony-astronaut-selection.html>
<http://prafulla.net/graphics/photography/mind-blowing-artistic-rendering-of-mars-by-dutchman-kees-veenenbos/>
<http://www.dailymail.co.uk/sciencetech/article-2287777/Mars-mission-couple-coat-spacecraft-walls-POO-p-rotect-cosmic-rays.html>
<http://www.space.com/20669-mars-rover-curiosity-top-discoveries.html>
<http://www.space.com/20775-mars-life-search-manned-missions.html>

ASTEROIDS + COMETS

<http://www.space.com/20260-comet-ison-nasa-campaign.html>
<http://www.space.com/20591-nasa-asteroid-capture-mission-feasibility.html>
<http://www.space.com/20431-nasa-asteroid-capture-mission-funding.html>
<http://www.space.com/20606-nasa-asteroid-capture-mission-images.html>
<http://www.space.com/20605-nasa-budget-asteroid-lasso-2014.html>
<http://www.space.com/20601-animation-of-proposed-asteroid-retrieval-mission-video.html>
http://en.wikipedia.org/wiki/2013_Russian_meteor_event
<http://www.space.com/19656-comet-ison-nasa-spacecraft-photos.html>
http://www.spacedaily.com/reports/Beer_Cans_For_Deep_Space_999.html
http://www.spacedaily.com/reports/More_Treasures_from_Asteroids_999.html

OTHER PLANETS + MOONS

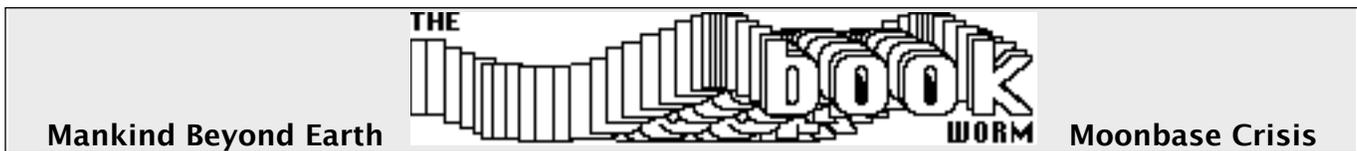
<http://www.space.com/20528-jupiter-moon-io-volcanoes-location.html>
Saturn's "turned around" moon Dione – www.space.com/20481-dione-moon.html

ASTRONOMY + ASTROBIOLOGICALS

<http://www.space.com/20080-nasa-trajectory-website-interplanetary-missions.html>
<http://www.space.com/20753-antares-rocket-test-flight-launches-from-wallops-video.html>
<http://www.space.com/20542-darkened-cities-night-sky-photos.html>
<http://www.space.com/20566-exoplanet-debate-astrobiology-nasa-part-2.html>
<http://www.space.com/20571-nasa-mit-google-to-examine-life-in-outer-space.html>
 1. <http://www.space.com/20495-exoplanet-debate-astrobiology-nasa.html>
 2. <http://www.space.com/20566-exoplanet-debate-astrobiology-nasa-part-2.html>
 3. <http://www.space.com/20627-alien-planet-debate-habitability.html>

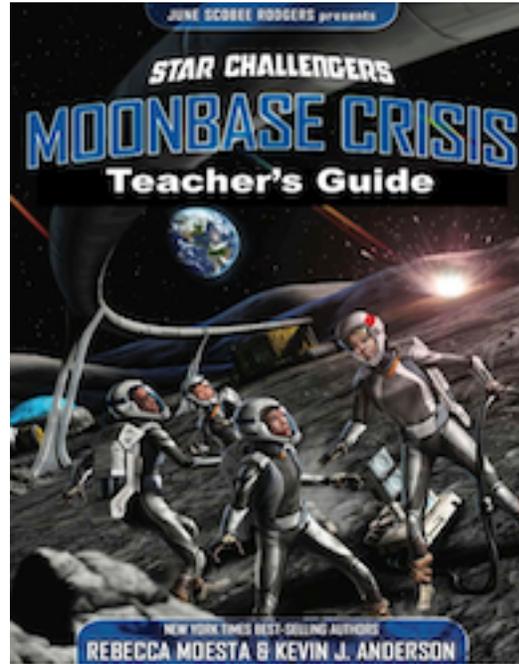
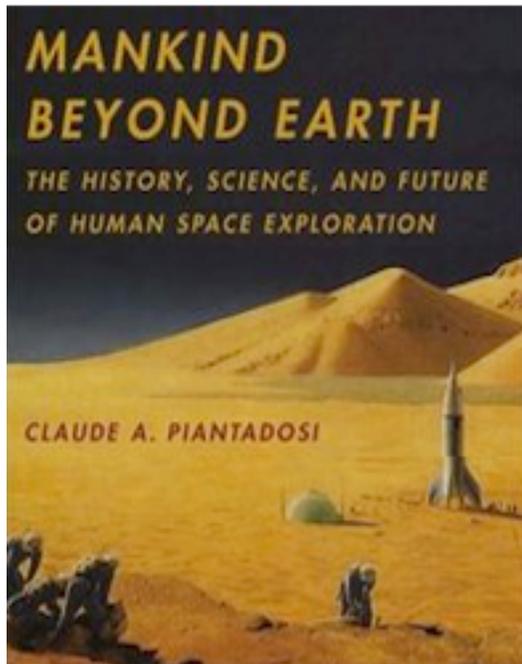
EDUCATION + OUTREACH + MEDIA

<http://www.space.com/20500-mars-moon-mission-student-challenge.html>
NASA seeks "coders" to help Robonaut 2 on ISS "see better"
http://www.nbcnews.com/id/51407519/ns/technology_and_science-space/#.UV924L-0Lww



Mankind Beyond Earth

Moonbase Crisis



“Mankind Beyond Earth” by Claude A. Piantadosi: **Review by Jeff Foust** www.thespacereview.com/article/2268/1

Human spaceflight is among the most difficult challenges we attempt, which means the rationale for doing so must be strong. Jeff Foust reviews a book that attempts to provide a historical and scientific basis for human spaceflight while also detailing the issues that make it so challenging.

“Star Challengers: Moonbase Crisis” by Rebecca Moesta and Kevin J. Anderson. **Review by Ken Murphy**

Published in 2010 by the Challenger Centers for Space Science Education, it weighs in at 180 pages of story plus supplemental materials. No errors noted.

While the story involves a group of youngsters, it focuses on JJ (Jenny June) Wren and her brother Dyl (Dylan), who work through a Moonbase exercise at their local Challenger Center. They have a great time, and are surprised when they get an invite to a special session at the Center with a few other select participants. They are joined by Park Song-Ye and Elton King, with the mysterious Commander Zota directing their mission. After a briefing, the group receives a message from Moonbase Magellan giving them background on the facility, then they're off to suit up. After walking through the "airlock", they find themselves...on the Moon.

There, they work to help the short-handed base catch up on their work, under the guidance of the Chief, Noor Ansari. slowly, it dawns on them that...hold up, wait a minute – they are on the Moon! Whilst there, they run through the usual gauntlet of challenges and crises that mature them as individuals and bring them together as a team. They also uncover a mystery that threatens not just the Moonbase, but also all of humanity.

The first in a series (followed by Star Challengers: Space Station Crisis), the novel was created in part to serve as inspiration for youngsters to pursue careers in STEM (Science/Technology/Engineering/Math) fields. A Teacher Guide was developed to accompany the text for use in classrooms. In all it was a well-rounded educational effort, although the STEM elements could have been fleshed out a bit more in the storyline.

Nevertheless, it doesn't seem to have been a big hit with audiences, and may not have seen much visibility outside of the Challenger Centers network. This may be in part due to the plot device of having aliens as the "existential threat" element of the story. There are ample examples of space- and Moon-based juveniles that are able to develop suspense and excitement without the use of (as of now) fantastical elements like aliens. This led to the denouement feeling a bit more like a deflation.

Overall, the technical elements are accurate (Mr. Anderson has an impressive co-authorship oeuvre in the science fiction genre) and the story moves at a brisk pace. Ms. Moesta has a strong background in franchise fiction, and that does come across a bit in the book. A focused reader can easily knock it out in an afternoon.

It's a journeyman effort with noble intentions. and does get bonus points for the good Teacher's Guide, but in the end it doesn't quite stack up when compared with other recent titles. We'll go with a 3/4 Moon rating. ###

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)



Marshall Mike Moondust and the Sinister Selenian Subterfuge

[MMM Fiction by George von Mond]

Chapter VIII:

"Help! I've fallen and I can't get up! yelled the newbie, panicking as he saw the whirling blades of death of the rotating slusher-bucket whisk moving inexorably towards him.

"Steven Sinn," the undercover name of Lunar Guard Marshall Mike Moondust, took in the scene and quickly scuttled over to the flailing Frankie, grabbing him by the wrist and dragging him out of the path of the whisk before anyone else had even moved. He helped the panting Frankie to his feet.

"Better be a bit more carefully out there, buddy," said Steven as he checked over the other's suit for damage or leaks. While modern spacesuits were quite robust, the need for caution and vigilance was inculcated into every Moon-born citizen. "Suit looks fine."

"Thanks, Steve-o" said Frankie. "I thought I was going to get shredded out there."

"You would have been," said Steven, "Luckily you've got a Loonie on your team. No one else would have been fast enough."

"Sinn! came barking over the common frequency. "Report to the Director's office at once!

Soon thereafter, 'Steven' found himself standing in front of the desk of Director DeGlacis of the Archaea Mines. He had to work hard to not adopt his usual military comportment.

"Steven Sinn. I understand you put yourself at risk to rescue a careless worker?"

"Yes Director, but..."

"Mr. Sinn, the pit is where we cull the weak from the strong. By rescuing your careless colleague you are actually putting everyone else at risk of harm from his carelessness. I realize that you Loonies put a lot more value on human life, Mr. Sinn, but frankly I come from a planet busting at the seams with disposable people."

"It won't happen again, Director"

"Darn right it won't happen again, because I'm moving you out of the pit. We've got some surveying work being done on the south range. I'm going to assign you as a gofer for that team. Your familiarity with the Moon's surface should be useful out there. Report to Francis Blair, our chief mineralogist, for instructions."

"Understood, Director."

Twenty-four hours later, Marshall Moondust found himself in a cramped mobile facility patterned after the ancient MoLab designs, staring into the deepest chocolate brown face he had ever seen on the Moon. "Mr. Sinn, welcome to my dark side of the Moon," boomed the mineralogist's deep voice. "I look forward to your help in uncovering new SWIE fields to dig up and turn into profit!

"I'm looking forward to it also, sir. It should be a lot more interesting than pushing rocks in the pit."

"Oh it is, Steve" replied the scientist. "Can I call you Steve? Please, call me Francis. We're very informal out here in the backside of nowhere."

Steve is fine," replied Mike.

"There's so much interesting geology out here," continued Francis. "The maps we have now are good, but we're finding so much interesting stuff that doesn't show up on them. This afternoon we're going to be searching a cleft that we stumbled upon that doesn't appear on any map. We always find the most interesting hoarfrost in those."

"Hoarfrost?" asked Mike?

"That's what we call the stuff. We know that there is some formation of hydroxyls on the Lunar surface at the lower latitudes, with a tendency to migrate towards the poles over time. When there are openings into shadowed

areas like clefts or lava tubes, some of those molecules will get trapped in there. Given a couple billion years to work with a small amount can accumulate. The problem is collecting it. Any energy introduced into the environment can disturb and vaporize those volatiles, destroying the science."

"Sounds like quite the challenge," responded Mike. "How do you do it?"

"Ah, that's the secret sauce," answered Francis. "Get suited up, we're headed outside. The cleft is about 100 meters from here."

Outside, Mike surveyed the desolate Lunar landscape. This was one of the oldest parts of the Moon, and the craters everywhere showed it. Bombarded over billions of years, it was a jumble of holes and boulders that created a chaotically illuminated terrain. While Mike and his fellow Selenians were known for their long walkabouts on the Lunar surface, rarely did anyone venture this far from the infrastructure slowly blossoming across the face of the Moon. Shelter from Solar storms was the biggest concern, although this was the Solar minimum season at the moment.

At the cleft, the scientist and his team set up a tripod to lower equipment and personnel into the inky depths. Crystals of some sort sparkled in Mike's spotlight as he gazed into pit. Overshadowed by a large boulder, the cleft was invisible to orbital satellites.

"Steven, as the rookie on the team, why don't you go down first?" stated Francis. "Our initial scans show a small ledge about 40 meters down, and then the cleft fissures in two about 70 meters down. We want you to set up some anchor points at the ledge, and then proceed into the opening on the right to find a spot we can set up shop."

"Got it," replied Mike as he started lowering himself into the Stygian depths. Just as described, he found a small ledge where he drove some spikes and lighting units into the wall before proceeding further down. Above him, he could see lights dancing around as his teammates started lowering themselves into the depths.

He proceeded as directed, and started exploring the right passage. The ancient fracture in the rock from some unknown impact aeons ago angled down steeply, with no bottom in sight, and soon he was beyond the view of the first ledge. Down below, he saw what looked like a level area and headed towards it. Soon, he found firm ground under his feet. Above him, the fissure yawned into the darkness, the result of an ancient impact so strong it had literally cracked the crust of the Moon. To either side the crack continued. Wherever he shone his light he could see faint crystals that disappeared as soon as he looked at them. He radioed his situation to his teammates, and then headed right to see what lay in that direction.

As he did so, he felt a faint tugging at his line. Turning around, he could see the line drifting down to fall into a pile at his feet. Betrayed! He was trapped 200 meters under the surface of the Moon!

Tune in next month as Marshall Mike Moondust faces his most death-defying challenge yet, and uncovers the secret of the Sinister Selenian Subterfuge!

MISSED PREVIOUS INSTALLMENTS? The whole series is now online, up to the latest issue at:

<http://www.moonsociety.org/publications/fiction/MMMSSS.pdf>

GREAT SPACE VIDEOS

<http://www.space.com/20477-evolution-of-spiral-galaxy-arms-simulated-using-supercomputer-video.html>

<http://www.space.com/20471-new-coding-for-robonaut-2-called-for-in-nasa-contest-video.html>

<http://www.space.com/20497-mars-wind-flaps-curiosity-s-parachute-video.html>

<http://www.space.com/20641-ancient-mars-had-thicker-atmosphere-curiosity-finds-video.html>

<http://www.space.com/20496-ams-data-delivered-with-amazing-accuracy-video.html>

<http://www.space.com/20525-jupiter-moon-s-volcanic-plume-seen-by-spacecraft-video.html> (Io)

<http://www.space.com/20510-tom-cruise-wants-to-fly-sub-orbital-on-virgin-galactic-video.html>

<http://www.space.com/20552-nasa-considers-plan-to-lasso-an-asteroid-for-study-video.html>

<http://www.space.com/20601-animation-of-proposed-asteroid-retrieval-mission-video.html>

<http://www.space.com/20551-nasa-s-sextant-mission-to-navigate-by-neutron-stars-video.html>

<http://www.space.com/20616-astronaut-space-life-video-guide.html>

<http://www.space.com/19373-planetary-resources-unveils-asteroid-hunting-arkyd-telescope-video.html>

<http://www.space.com/10751-kepler-reveals-amazing-amount-planets-habitable.html>

Planetary Resources Co: <http://www.youtube.com/watch?v=h5fwjsOOGm4>

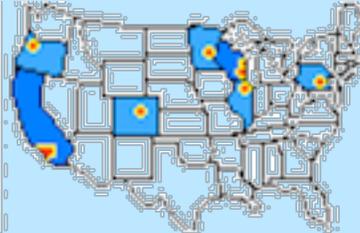
Golden Spike: http://www.youtube.com/watch?v=Z_SrR1Y4m8s

Comet Ison: http://science.nasa.gov/science-news/science-at-nasa/2013/18jan_cometison/

The Storytelling of Science: http://www.youtube.com/watch?v=_J4QPz52Sfo

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or http://www.moonsociety.org/publications/mmm_themes/

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 grdupree@charter.net

• James Schroeter (414) 333-3679 – james_schroeter@yahoo.com

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

Meeting place changes for 2 dates: For October 12 and November 9, our regular meeting place (Mayfair Mall Garden Suites East G110) will be unavailable and we will meet down the hall in room G150.

✓ Our first “Yuri’s Night Party” was held the “afternoon after” as part of our regular meeting. Attendance was low but we all enjoyed a DVD brought by Bob Bialecki, www.history.com/shows/how-the-earth-was-made/

WISCONSIN



SSS – Sheboygan Space Society

728 Center St. Kiel, WI 54042-1034 – www.sheboyganspacesociety.org

c/o Will Foerster 920-894-2376 (h) astrowill@frontier.com

SSS Sec. Harald Schenk hschenk@charter.net

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 Thursday, even # months

NEXT MEETINGS: JUN 20 - AUG 15 - OCT 17 - DEC 14 (SAT in Milwaukee)

CALIFORNIA



OASIS: Organization for the Advancement of Space Industrialization & 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 odyssey_editor@yahoo.com
<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 MAY 18 – JUN 15 – JUL 20

SAT MAY 18th 1:00 pm OASIS Board Meeting – STEM International Science Center, 101 S. La Brea, Inglewood
 Followed 3:00 pm (same location) OASIS Lecture Series – free: Space Education in South Africa, Hildreth Walker.

SAT MAY 18th 2:00–9:45 pm – Public Star Party Griffith Observatory, 2800 E. Observatory Road, Los Angeles

For past articles, Visit http://www.moonsociety.org/publications/mmm_classics/ or [mmm_themes/](http://www.moonsociety.org/publications/mmm_themes/)

CALIFORNIA



SSDS – San Diego Space Society

8690 Aero Drive, Suite 115, #77, San Diego, CA 92123 – <http://sandiegospace.org>

We held our 2nd “SpaceUp” March 23–24th – <http://sandiegospace.org/events/spaceup-san-diego-2013/>
San Diego is also hosting the (NSS) International Space Development Conference, May 23-27.

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 1st Thursdays
Englewood Public Library, Englewood, CO 80110 – 1000 Englewood Parkway, First Floor Civic Center

NEXT MEETINGS: JUN 6 – JUL ? – AUG 1 – SEP 5 – OCT 3 – NOV 7 – DEC 5

ILLINOIS



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

In conjunction with the Illinois North Shore (Chicago North Suburban) chapter and NSS Chicago Society for Space Studies, we held a free public program on Sunday, April 28th, at the Winnetka Public Library, 11:30–1:00 pm

“The ‘NewSpace’ Frontier” – An Update on all the New Space Programs”

The program included news updates on these non-NASA companies and projects: Armadillo Aerospace (“STIG B” reusable Vertical Takeoff & Landing), Bigelow Aerospace (inflatable space habitats), Blue Origin (“New Shepherd” suborbital and VTOL), and suborbital), Mojave Air and Space Port, Moon Express (lunar landers), NASTAR (space-flight training), Orbital Sciences (“Antares”), Planetary Resources (asteroid mining), Reaction Engines (“Skylon” spaceplane, runway to orbit), Scaled Composites (“Spaceship Two” and X-Prize winner “Spaceship One”), Sierra Nevada (“Dream Chaser” to orbit), Space Adventures (space tourism, from Zero G suborbital to orbital to lunar), Spaceport America, SpaceX (Elon Musk, “Dragon” capsules to ISS, “Falcon 1” and “Falcon Heavy”), Virgin Galactic (“Spaceship Two” tourism), XCor Aerospace (“Lynx” suborbital). **Special thanks to Jeffrey G. Liss and Jim Plaxco.** Next lecture is **Sunday, July 21**, on the anniversary of the 1st moon landing, **“What’s Next for NASA.”**

MINNESOTA

MSFS: Minnesota Space Frontier Society – <http://www.mnsfs.org>

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

MNSFS NEWS – We celebrated **Yuri's Night** on Friday, April 12th, starting 7:00 pm, at the St. Petersburg Restaurant and Vodka Bar, 3610 France Avenue North, Robbinsdale, MN 55422. Ben's pictures from last year's Yuri's Night Party are online at <http://freemars.org/mnfan/MNSFS/2012-04-Yuris-Night/>

OREGON

ORL5 – Oregon L5 Society – <http://www.OregonL5.org>

PO Box 86, Oregon City, OR 97045

(LBRT – Oregon Moonbase) moonbase@comcast.net

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

Shari's Restaurant in the Oregon City Shopping Center in Oregon City, Oregon.

Regular Meeting 3 pm 3rd SAT monthly – MAY 18 – JUN 15 – JUL 20



NSS-PASA: NSS Philadelphia Area Space Alliance – 928 Clinton Street, Philadelphia, PA, 19107

c/o Earl Bennett, Earlisat@verizon.net - 856/261-8032 (h), 215/698-2600 (w)

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

PASA Report for April:

We had a great time at the Science Carnival on Saturday, April 20th in Philadelphia.



Thanks to great outreach activities by Mitch Gordon, and, Frank O'Brien, with myself and Rich Bowers and Hank Smith fielding many general questions, we had a crowd almost continually.

Frank also did public outreach on Astronomy Night, April 26th.



Our next event will be next weekend, Saturday, May 4th, at The New Jersey State Museum.

Our next meeting will be at Liberty One from 1 to 3pm on Saturday, May 11th (at the Food Court).

Note to all Chapters, NSS and Moon Society: PASA, Philadelphia Area Space Alliance, is a model to follow.

The "Alliance:" If you have back issues of MMM, turn to the second last page or so on each issue and you will see a substantial "PASA Report" month after month. If you read these reports, you will notice that they have hit on a **winning formula**. First they are home to Metro area members of many space organizations: National Space Society, Planetary Society, Mars Society, Moon Society, Space Frontier Foundation, AMSAT, and I am sure I missed one or two. This gives the chapter enviable depth.

Event Opportunities: They have a number of assets: Philcon and other area and regional science fiction conventions, local science fairs, astronomy night, events at area space museums etc. and take advantage of opportunities in neighboring areas, for example in Trenton and Camden, New Jersey.

A winning Meeting Plan: At their meetings, members representing the various organizations each give a report, plus there are reports on articles in various publications, and they have an annual list of outreach opportunities.

Of course, as in many organizations that endure, a lot is thanks to one individual who coordinates everything and writes the monthly report, Earl Bennett – This section of the PASA report, by the MMM Editor.

Moon Miners' MANIFESTO
 Milwaukee Lunar Reclamation Society, Inc.
 PO Box 2102, Milwaukee, WI 53201-2102

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- MINNESOTA SPACE FRONTIER SOCIETY • \$25 Regular Dues
- OREGON L5 SOCIETY • \$25 for all members
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 - Annual dues with MMM \$25, due March or \$6 per quarter before the next March
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