

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

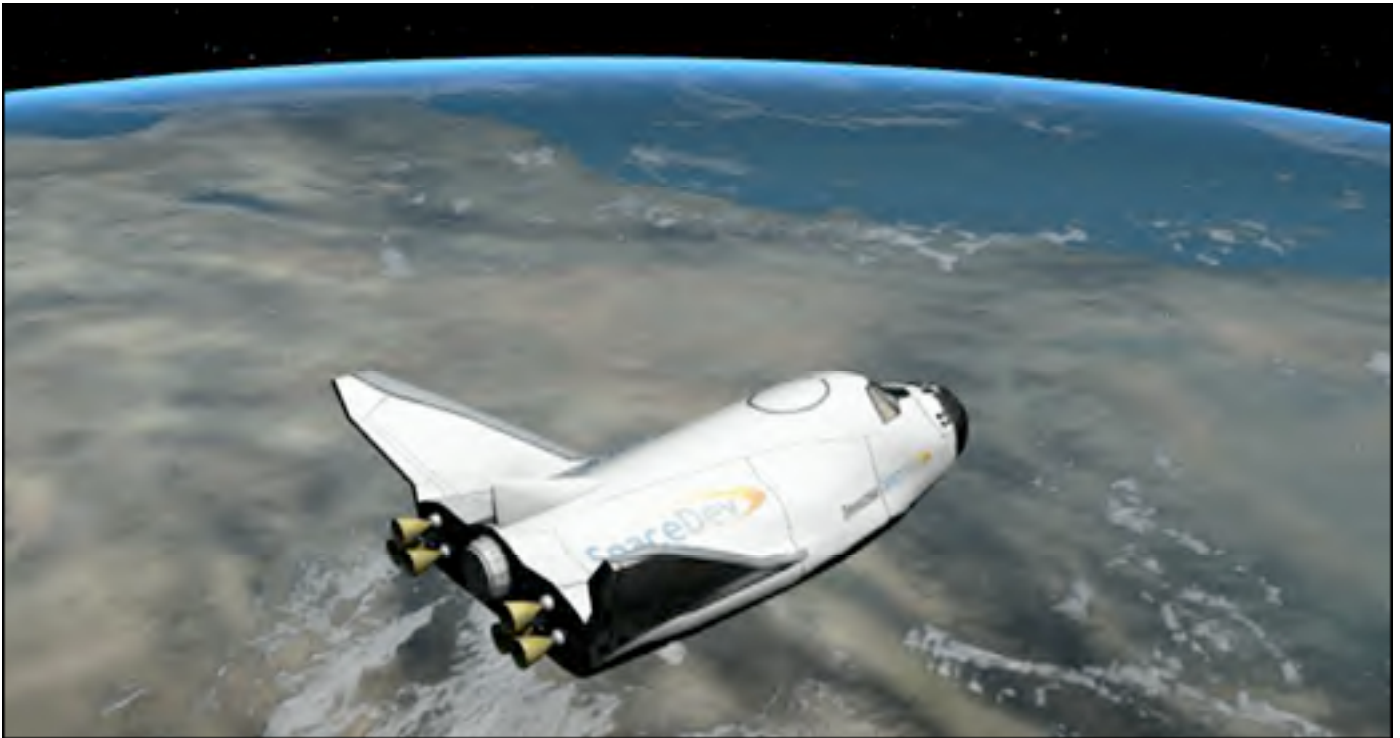
Moon Miners' Manifesto

& The Moon Society Journal

www.MoonMinersManifesto.com

#220

NOVEMBER 2008



Jim Benson † 63 - *May your dreams still soar!*

Feature Articles in This Issue

Lunar Enterprises and Development, Part 4 of 5

Philip R. Harris pp. 3-10

Power Beaming Competition Proposal

David A. Dunlop pp. 17-18

"Skyfields" - a personal essay

Peter Kokh pp. 19-20

Note: this is a *longer 24 page issue* to accommodate a double length semifinal installment of Dr. Harris treatise.

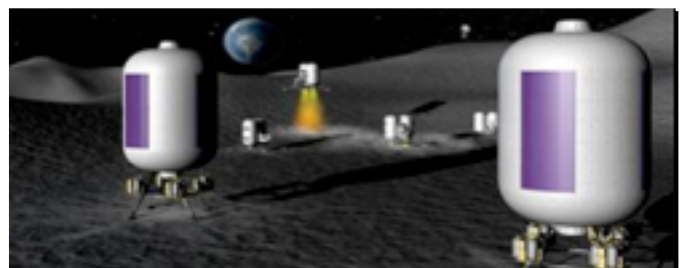
Benson-SpaceDev concept for a lunar station supporting a south polar observatory

One of the many interesting projects undertaken by SpaceDev under Jim Benson, which demanded a high level of innovation and a willingness to rethink everything was the contract with the International Lunar Observatory Association to design a minimal cost man-tended facility that could support continuing telescope operations on the Moon. At right: one concept illustration that would cost a fraction of NASA's SP proposal.

Guest Editorial: Berin Szoka, Space Frontier Foundation, *with permission.* "\$2 Billion Can Buy Real Change in Space—or More of the Same"

Thursday, November 6, 2008 - The Space Frontier Foundation today called on President-elect Barack Obama to use the innovation and drive of American entrepreneurs to "close the Gap" in U.S. human spaceflight after the Space Shuttle is retired in 2010.

President-elect Obama has promised \$2 billion in additional funding for NASA to address the Gap, when the U.S. will be dependent upon Russia's Soyuz for crew access to the International Space Station. => p. 2, col. 2



Moon Miners' Manifesto

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

© 2008, The Lunar Reclamation Society, Inc.

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

www.Lunar-Reclamation.org/mmm_classics/

www.MoonSociety.org/publications/mmm_classics/

• **MMM's VISION:** "expanding the human economy through off-planet resources"; the early era of heavy reliance on Lunar materials; early use of Mars system and asteroidal resources; and establishment of permanent settlements supporting this economy.

• **MMM's MISSION:** to encourage "spin-up" entrepreneurial development of the novel technologies needed and promote the economic-environmental rationale of space and lunar settlement.

• **MMM retains its editorial independence.** MMM serves several groups, each with its own philosophy, agenda, and programs. Participation in this newsletter, while it suggests overall satisfaction with themes and treatment, requires no other litmus test.

[Opinions expressed herein, including editorials, are those of individual writers and not presented as positions or policies of the **National Space Society**, **Lunar Reclamation Society**, or **The Moon Society**. Copyrights remain with the individual writers. Reproduction rights, with credit, are granted to NSS & Moon Society chapter newsletters.]

• **For additional space news** and near-term developments, read *Ad Astra*, the magazine of the **National Space Society**, in which we recommend and encourage membership

• **The Lunar Reclamation Society** is an independently incorporated nonprofit membership organization engaged in public outreach, freely associated with the National Space Society, insofar as LRS goals include those in NSS vision statement. LRS serves as NSS' Milwaukee chapter: www.Lunar-Reclamation.org

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

National Space Society, 1620 I Street NW, Suite 615, Washington, DC 20006; Ph: (202) 429-1600 - www.NSS.org

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

• **NSS 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 or PDF file attachments

√ Mac compatible CD / or typed hard copy must be mailed to:

Moon Miners' Manifesto, c/o Peter Kokh,

1630 N. 32nd Street, Milwaukee WI 53208-2040

• **MMM is mailed 2nd Class:** *Second Class bulk mail is not forwarded.* If you move and rely on forwarding instructions at your former local Post Office, you will not receive your copy. It is the reader's responsibility to inform LRS or whatever other organization through which the reader receives MMM as a membership benefit, of any change in the reader's mailing address.

⇒ In Focus Editorial continued from p. 1.

But two of the options proposed – extending Space Shuttle operations or accelerating the Constellation program – wouldn't reduce the current estimate of a five year gap by much.

"Space leaders are considering three or four options for reducing the Space Gap, but only one reflects the spirit of positive change that Senator Obama campaigned on," said Foundation Chairman Berin Szoka. "According to NASA's own estimates, flying the Shuttle beyond 2010 will cost at least \$2 billion per year, so that only cuts the Gap by one year. And \$2 billion is a drop in the bucket for Constellation, at best helping to address shortfalls that the Congressional Budget Office just predicted will add another 18 months to the Gap."

A third option is being considered by some at NASA, according to published reports: Strip the Orion Crew Exploration Vehicle of the capability to support Lunar exploration, making it simpler and lighter, and supposedly easier to complete sooner.

"This idea is crazy, because it will strand NASA in low Earth orbit, instead of exploring the solar system," said Foundation co-founder Rick Tumlinson. "The whole point of the Vision for Space Exploration was to send NASA's Lewis & Clarks further out into the frontier, to the Moon, Mars, and near-Earth asteroids, while the private sector takes over Earth orbit. Cutting Orion back gives us 'Gemini on steroids', which would be a change for the worse."

"The only option that makes sense is to use President-elect Obama's promised \$2 billion to catalyze as many as five new commercial human spaceflight companies that will compete to close the Gap using the safest, most capable and affordable system they can develop," said Will Watson, Foundation Executive Director.

"Let's not put all our eggs in one basket by pouring even more money into the Shuttle, an old system that's on its last legs, or a controversial new program that's already behind schedule," Watson said. "If we're serious about closing the Gap and about making humanity's presence in space economically sustainable, we need real change in how we put humans in space. Let's use this \$2 billion to stimulate multiple entrepreneurial systems that will not only slash costs, improve safety, and close the Gap, but also help create a whole new space industry with new jobs here in America."

<http://spacefrontier.org/node/26>

Comment by the MMM Editor Peter Kokh

We would not have asked for permission to reprint this piece if we did not personally agree with it. If we do not build our presence in space, and on the Moon and beyond on; commercial space private enterprise, we will be building it on sand. We need to realize that space operations, now supported by tax dollars, can neither expand nor blossom into a true Earth-Moon economy, unless it is financed by business income.

While the people sharing the burden may be the same, there is a big difference between us as disgruntled taxpayers and us as willing consumers of products and services. Space may become as American as Apple Pie, but not if it continues to be socialized space or government space. NASA's good intentions aside, a bureaucracy just cannot "get it." But, "yes, **we can!**" <PK>

LUNAR ENTERPRISES AND DEVELOPMENT

Especially prepared for *Moon Miners Manifesto*.

© Philip R. Harris, 2009 – PhilHarris@aol.com

Installment 4

EXHIBIT 9 – Lunar Industrialization



Exhibit 9 - Lunar Industrialization: Entrepreneurs will discover a variety of commercial endeavors to pursue on the Moon, from building lunar structures and facilities, to mining and manufacturing, to providing goods and services almost beyond our present imagination.

* *Source:* NASA Headquarters.

2. Lunar Administration & Governance

Moving humanity beyond Earth raises serious issues relative to leadership and organization in outer space. These go beyond mere matters of science, technology, legality, and finances. This “giant leap for humankind” is altering the species, especially in terms of biological and cognitive adaptability. Within that context, we may then consider space policies, settlement, and commerce. Governance, especially of space settlements, will shape human futures into an extraterrestrial civilization. Thus thinks Professor Yehezkel Dror, a policy planner and governance expert. As an astute social scientist, he observed: 22

The repercussions of moving into space are largely inconceivable, and efforts to predict them on the basis of a very different past are extremely doubtful. Therefore, applying NASA's experience beyond some technologies to the problem of building a future for women and men beyond Earth offers a much too conservative perspective. Similarly cost-benefit analysis in terms of contemporary economic realities misses the implications of settling human beings outside of Earth on all aspects of thinking and living, individually and collectively. Hence, new social structures are needed, with novel core capacities meeting the requirements of moving humanity into space. This is all the more crucial because space settlement is only one of the extreme changes that add up to a radically novel epoch into which humanity as a whole is inexorably moving, with tremendous potential for better or worse!

Among the characteristics of space governance, Dror suggests that it be

(1) **Global** in scope requiring cooperation among spacefaring nations;

(2) **Inspirational**, with the seeking of knowledge, the search for the new and unknown, the education of the masses as to the necessity of going offworld;

(3) **Long term perspective and persistent**, that requires radically different governance systems which are as democratic as possible;

(4) **Planned in terms of mega-project resources and management**, that may involve generations and innovative methods of financing, as well as learning;

(5) **Positive re-enforcement tools** which allow for human cultural differences, frailties, and abuses, but maintains civilized standards;

(6) **Cognitive abilities in leaders** who are competent in managing large-scale enterprises;

(7) **New rationale that espouses positive, democratic values** for the long-term benefit of humanity and the common good. This will necessitate creating new lunar institutions, leaders, and professionals!

2.1 Background Observations

Previous multinational negotiations relative to United Nations space treaties have recognized the need for some type of international regime to deal with the exploration and development on the Moon. No nation has yet offered a specific proposal as to what this entity might be and do. Some scholars have referred to the possibility of duplicating the Antarctica model in which various countries entered in an international agreement as to their operations in that remote region. Thus, various national outposts or bases were established there, primarily for the purpose of exploration and science. However, under that arrangement, some significant science has been achieved, but little development of the areas resources or population.

Dissatisfied with provisions in the Moon Treaty, which most spacefaring nations have not signed, the space law community would prefer to have the nations actually engaged in lunar enterprises confer and agree on some legal and regulatory institution that would facilitate cooperative lunar development within the global space community.

Various specialists familiar with the challenge have offered thoughtful solutions to this need which becomes more pressing as space agencies from Canada, China, Europe, India, Japan, Russia, and the United States move ahead on a series of lunar missions, culminating in the placement of humans back on the Moon to stay. Until lunar governance and legal matters are resolved, public-private partnerships, venture capital and private equity financing, will be restrained in promoting lunar commercial enterprises.

Legally we need transnational answers to basic questions, such as proprietary rights relative to lunar resources, including who may sell or profit from such; who may issue licenses or permits for lunar mining and other business activities. One possible model suggested by Sadeh, Benaroya, Livingston, and Matula is the U. S. Deep Seabed Hard Minerals Resource Act of 1980. 23 This American Federal legislation establishes an interim regime that provides legal protection of U.S. firms, pending an international agreement on deep-sea mining and resource activities. The professors argue that comparable legislation for lunar commerce is needed until international agreement on lunar resources is achieved. For the latter, these four authors offer an interesting analysis of three possible solutions (govern-

ment, business, and technology models). Then these scholars suggest that dual-use technology deals with lunar projects and technological developments that are so expensive, long-term and large-scale, they require substructuring of the macro venture into smaller and profitable, independent units. To that end, they recommend formation of a Lunar Development Corporation, seemingly modelled somewhat after LEDA which will be discussed in the next section. This public corporation would include teams of management scientists and engineers, finance. Legal and other experts, LDC would ensure that the right technologies, materials, and workers are available when needed to successfully complete lunar projects.

In a previously cited book, *Return to the Moon*, former U. S. Senator and *Apollo* astronaut, Harrison Schmitt devoted a chapter to “Law: Space Resources.” Here the last man on the Moon examines relevant laws and precedents as applied to lunar development. He concludes that the present situation is fraught with serious impact on the private entity’s ability to maintain space operations, especially as related to safety concerns with its personnel, access to capital and customer makes on which business is so dependent. Unfortunately, this knowledgeable scientist, and statesman offers no recommendation as to what kind of international regimen might solve the problems of lunar enterprise.

Sometimes, professional article articles and science fiction precede space realities, giving us insights for future decisions. 24 For example, in his writings, Krafft Ehrlicke, laid out a detailed plan for creating a polyglobal civilization, including a lunar city called *Selenopolis*... In his book, *Welcome to Moonbase*, Ben Bova made a persuasive case on how to establish lunar bases and how to manage as dual economy there with Earth. His scenario envisioned two bases, one founded by Russia on *Mare Nubrium* and another by the United States on *Mare Vaorum*. The latter’s development is illustrated for the period 2015-2018, remarkably similar to what is now underway under the *VSE* plan. It would be operated by Moonbase Inc., made up of stockholders from fifteen nations, plus large multicultural corporations.

Phil Harris’ *Launch Out*, offered a science-based scenario for space enterprise, lunar industrialization, and settlement. His 2010 prognosis for *Selenians* living and working in a future LUNAR WORLD, made up of several areas at the start: a Krafft Ehrlicke Lunar Industrial Park, the Konstantin Tsiolkovsky Educational and Research Center, the under-ground multicultural living communities of Eastasia and Euroamer, as well as the Gerard O’Neill Health and Wellness Center and the Carl Sagan Astronomical Institute.

This macroproject on the Moon would be under the administration of a GLOBAL SPACE TRUST, guided by a civilian, democratic management council of multidisciplinary experts who adhered to the *Declaration of Interdependence for Governance of Space Societies*. The GST Fund to underwrite these costs for an eventual lunar population of 2,000 would include contributions from both the world’s public and private sectors. Further financing would come from the sale of GST/LEDA bonds and an international lottery. In addition to its own spaceport, the Trust would operate four ground-based facilities and services for those in orbit transportation, communication, and supply bases, plus the Unispace Academy located in Hawaii near the East-West Center there, for the training and preparation of all GST spacefarers. All stages of this undertaking on the Moon would be coordinated

through a Lunar Economic Development Authority as described next.

2.2 Lunar Economic Development Authority (LEDA) Proposal 25

To meet the need for an interim regime to develop a twin Earth-Moon economy, the co-founders of United Societies in Space conceived a strategy based on an existing model – the Tennessee Valley Authority and the many port authorities around the world. The entity was called the Lunar Economic Development Authority, and could be a quasi public or private, or combined corporation.²⁵ For those objecting to the term, “authority,” other words could be substituted, such as corporation, council, or foundation. The point is that the global community would create a centralized institution, whether in conjunction with the United Nations or not, to coordinate humanity’s activities on the Moon, thus avoiding overlapping efforts and expenditures. Here are some of the services that LEDA might provide;

- (a) Issue bonds to underwrite lunar enterprises, including a transportation system, a base and an industrial park ...
- (b) Lease surface and mining rights for private or public sector lunar macroprojects and collect fees there from ...
- (c) Coordinate and facilitate international endeavors by space agencies, scientific organizations, and private corporations on the Moon or its vicinity ...
- (d) Provide a lunar administrative structure for oversight supervision of terrestrially sponsored undertakings and communities on the Moon, so as to protect the environment and interests of its owners, humanity ...
- (e) Contract and supervise necessary infrastructure provisions, such as a **lunar transportation system**, a **lunar power system**, and a **lunar personnel deployment system** ...
- (f) Operate a lunar spaceport for all users, possibly with a landing fee to support infrastructure development...
- (g) Act as a clearinghouse of data about lunar information, such as conditions, resources, sites, and programs for future investors, project sponsors, and settlers ...
- (h) Conduct public information, outreach, and development programs on Earth to encourage investments in lunar resource utilization and lunar resettlement.

Rather than depending on the home planet’s taxpayers to finance construction of lunar infrastructure, **LEDA** would underwrite such development through income-producing activities such as outlined above, or by contracting with the world’s financial systems for loans, et al On Earth, ships and airplanes pay for the privilege of sailing or flying into urban ports; it would seem reasonable, then, that spacecraft from both public and private sectors worldwide might also be charged a fee someday by the **LEDA** for the privilege of landing on the Moon. When tourism reaches the lunar surface, such fees could contribute significantly to the lunar economy.

Right now for development purposes, there is no legal or financial mechanism, no less technological infrastructure, for such interplanetary undertakings that provide transnational, global participation. Even those who drafted the 1979 Moon “Treaty” envisioned some type of outer space regime or **authority** to oversee and regulate the “orderly development and exploitation” of extraterrestrial resources. Writing in 1994 on “Lunar Industrialization,” Prof. Haym Benarova of Rutgers University forecasted that such comer-

cialism could employ 3-12% of our population in new jobs, both on the ground and aloft! 26 But he too foresaw the need for some type of Space or Lunar Industrialization Board (but within the U.S. government) to set policy, as well as coordinate and oversee economic, legal, and technical aspects of resource development on the Moon, and later Mars. In that same year, Lubos Perek, a former chief of the UN Outer Space Affairs Division, made a significant case for improving the management of outer space activities. He argued that to manage extraterrestrial resources, a UN International Space Centre (UNISC) needed to be formulated.

Dr. Nathan Goldman: a Houston attorney and author of *American Space Law*, commented: 27

The Lunar Economic Development Authority, similarly, will be structured to create an international regime that would encourage, as well as regulate, (rationalize) the habitation and commerce on the Moon. The LEDA fills in the blanks of incomplete space law with details that can make space available for human development in a very short time.

More recently, Dr George S. Robinson, former associate counsel of the Smithsonian Institution, called for a Declaration of Interdependence between Earthkind and Spacekind, perhaps establishing an International Organization for Spacekind Cultures (IOSC—refer to Appendix A). This space law scholar sees as its purposes to: 28

- (1) Provide an interdisciplinary, international, and transnational body of recognized experts to continuously review interactive relationships between Earth dwellers and spacefarers ...
- (2) Grant international agreements of recognitions and capacity (IARCS) to those space communities that satisfy the requisites for home rule as set by IOSC or something comparable (such as, the proposal of United Societies in Space to found a space Metanation, possibly under UN auspices) ...
- (3) refer case situations of conflict to the International Court of Justice, or a transnational court yet to be founded for this purpose.

The above citations underscore the growing consensus that utilization and development of space resources require creation of a new entity to coordinate global space enterprise and governance, whether within or outside the existing United Nations. 29

Certainly, some institution has to be devised to foster lunar development, preferably one which in scope goes beyond governments sponsorship or even a combination of national space agencies. A **Lunar Economic Development Authority** should be intersectoral, representing the interests of public and private sectors on a planetary scale. It should encourage participation of transnational consortia, whether from universities, corporations, space associations, or agencies. The macrothinking here should go beyond the European Space Agency proposal for an International Lunar Quinquennium meeting every five years to discuss lunar projects (refer to section 7.2.2).

In conclusion, the UN's Outer Space Treaty was ratified by some 90 nations. Today, few states or their commercial entities would seriously consider participating in a venture which was not perceived in accordance with the international agreement. Before returning to the Moon by 2020 under the

Vision for Space Exploration plan, **it is essential for some accord among space agencies and private enterprise as to how we are going to proceed there for the benefit of humanity as a whole.** At least, LEDA is a proposal to spur discussion until some formal concurrence is achieved within the next ten years. 30

2.4 *The Strategy of Space Authorities*

Although the writer believes that to further human enterprise in space, a viable solution to this challenge is to establish **space authorities**, now for the Moon, and eventually for Mars, and other planets, as well as for stations and platforms in orbit, even asteroids. It is a way to use our "interplanetary common" for the benefit of Earthkind in the 21st Century. 31 Then, we would put institutions in place to empower scientists, engineers, entrepreneurs, or settlers to go aloft and utilize space resources. To facilitate living and working in isolated, confined, sensitive environments, like the Moon, the legal and governance prototypes already exist.

For example, the Antarctic Treaty (1958-1961), with its protocols and organizations, as well as the Tennessee Valley Authority. The Antarctic Treaty provides the legal framework for the area south of 60 degrees south latitude on this planet, reserving the region for peaceful purposes and encouraging international cooperation in scientific research there. The other model is the T.V.A., authorized by the U.S. Congress in 1947 with a Board of Governors appointed by the President and confirmed by the U.S. Senate. When it was founded, the United States Government not only donated land and facilities for the new entity, but vested enough sovereignty in the T.V.A. so that it might obtain more land, including by eminent domain. The Authority's objectives were to conserve assets for the benefit of the American public in general, and specifically to provide electric power for the benefit of the people in the region served. To achieve its objectives, in 1948, T.V.A. issued \$50,000,000 (U.S.) worth of bonds @ 3.2% interest rate, secured by a blanket debenture of its assets. Thirty years later these debentures were retired with no defaults, rollovers, or commissions having been paid. Today, the T.V.A. is one of the largest, most successful power producers in the world, a strategy worth emulating if resources on the space frontier are to be transformed for the betterment of the people of "Spaceship Earth."

This type of quasi-governmental **service authority** is a proven, respected, and traditional venue for underwriting and managing both public and private undertakings across jurisdictions and borders. It has been gainfully used to construct terrestrial infrastructure from air and seaports, to building bridges, toll roads and convention centers. Port authorities have been successfully constituted across the U. S. A., from New York to San Diego. The New York Port Authority, for instance, crosses state lines to serve a metropolitan area's transportation needs. NYPA has its internal police force, which can arrest those who fail to comply with state, local, and Authority regulations. The approach is justified because of the size, value, and complexity of port facilities relating to transportation, safety, docking, food spoilage, longshore personnel traditions, and union contracts The new Denver International Airport Authority was also financed by Municipal Airport Revenue Bonds totalling \$275,000,000, but these were government guaranteed

Spaceport Authorities are another example of the same strategy in use internationally from Florida to Australia. Why not adopt a comparable mechanism to finance and promote a **space infrastructure**, which might supplement or replace direct taxation for space exploration and commerce? ... An interesting historical point is that the U. S. Federal Statutes authorizing the inauguration of the U.S. space program, began with a section on Police Authority (42 U.S.C. 2456) with the power for personnel to arrest citizens and bear arms for that purpose; that statute also created the agency that eventually became the National Aeronautics and Space Administration.

Thus, legal precedent exists and might be tested for application in space by the immediate incorporation of a global **Lunar Economic Development Authority**, whether this be accomplished by private enterprise, government, or a combination thereof; whether it be within or without the United Nations, whether it be under national or international law. Should LEDA prove to be successful prototype, then it might be replicated next by the establishment of a **Mars Economic Development Authority (MEDA)**, and the model eventually repeated for the development of orbital stations or cities, other planets or asteroids in our solar system.

There are various scenarios as to how such **space authorities** might come into being within a decade:

- (1) Assuming a **Lunar Economic Development Authority** is the prototype, incorporate it in one or more states or nations. Thus, profit and/or non-profit organizations might combine their strengths to undertake macroprojects on the Moon. There is ample precedent for this among world corporations and foundations seeking to protect the global commons. One scenario is the U.S. Congress provides legislation constituting a **Lunar Economic Development Authority**, essentially to conserve national interests and promote development of the Moon and its resources for the benefit of its citizenry and to cooperate with other nations in this goal. The charter might be similar to that of T.V.A., and possibly some existing space assets might be transferred from NASA or DOD to the new Authority to provide security for the lunar bonds sold for investments on the Moon. **LEDA**, in turn, might legally contract for services from NASA or other federal and state agencies, or from universities and corporation in the private sector at home or abroad. The Communication Satellite Act of 1962 is another precedent for such action, for it established COMSAT to cooperate with other countries to develop an operational satellite system, as well as to provide services on a global scale to others. Given the trend toward "privatization" of public properties, imagine if the assets turned over by the Congress to the new lunar Authority were to be two spaceports now functioning at Cape Canaveral in Florida and Vandenburg AFB in California; both built and paid for by taxpayers could then produce bond revenue and other income flows if operated by **LEDA**!
- (2) Another scenario would form a consortium by spacefaring nations committed to lunar enterprise who sign an international agreement to establish a **Lunar Economic Development Authority**. In this approach, **LEDA** acts on behalf of the participating countries in financing and macromanaging resources on the Moon. The precedent for this already also exists in such agreements as INTELSAT which established a global

satellite communication system signed by governments or their designated public or private telecommunications entities.

- (3) Although any of the above solutions might precipitate desired action toward near-term lunar development, many prefer a strategy whereby spacefaring nations work through the United Nations to found **LEDA**. At the very least, the U.N. would be the logical organization to call a summit conference of spacefaring nations in an attempt to achieve some international consensus on this important matter of humanity's moving offworld!

Admittedly, the Outer Space Treaty implies that nations which place their citizens into space, such as on the Moon, have a responsibility to exercise some form of control over them. That is relatively easy with a few government-sponsored astronauts living in facilities provided to them by that entity. But what happens with settlers who are many decades in orbit? Further, how can this control be exercised when private citizens gain access to low-cost spacecraft and begin to migrate on their own in ever larger numbers to the lunar surface? It would appear the relevance of this forty-year old Treaty will diminish. Better to have a global consensus and legal provisions in place before the masses move to the Moon and beyond.

The purpose of this Corporation (Lunar Economic Development Authority) shall be to promote the Moon as a place to live and work as a society of peoples and to help create and maintain a consensus governance authority at the venue of the Moon, including its useable orbits, and to educate people on the benefits, burdens, and responsibilities of living and working in space. The Corporation will serve as the agent of humankind in space and at the Moon, as well as the agent for all of the sponsor nations, to develop the Moon for humankind. It is the intended business of the Authority to administer each nation's rights under the *1967 Outer Space Treaty*

---Article III, Articles of Incorporation for the Lunar Economic Development Authority, Inc.

Interestingly, a space policy analyst for the *Washington Dispatch*, Mark Whittington, has written that a **Lunar Exploration and Development Authority** would be helpful in opening up the high frontier. 32 This proposed LEAD has the emphasis on exploration, not economic development as does the above LEDA. He considers such a worthwhile mechanism for carrying out White House Space Transportation Policy (STP). The Administration's committee examining ways to implement its *Vision for Space Exploration* is chaired by an Admiral Craig Steidle. That group is concerned about how to "open space enterprise, markets, and ultimately self-supporting activities," which is also the purpose of this LEAD proposal. This strategy, like the other LEDA, is to encourage commercial development on the Moon, and through that improve the Earth's economy. STP states the government will refrain from activities that have commercial applications, so as to involve the private sector in the design and development of space transportation systems. Whittington maintains that his LEAD offers an innovative way to explore space, one using entrepreneurial and commercial strength of private enterprise.

In that same issue of *Lunar Enterprise Daily*, Anatoly Perminov, head of Russia's Roskosmos, has written that to explore Mars with humans there must be an *International*

Space Station and a Moon base. According to *RIA Novosti*, he believes that *ISS* provides the laboratory for long-duration, microgravity training, and the Moon for Martian environmental simulation studies. He envisions *ISS* as a spaceport for lunar bound spacecraft (<http://rian.ru>).

2.5 Creating Lunar Social Systems

Dr. Ben Finney, when a sociologist at the University of Hawaii, contributed to the NASA publication on *Space Resources*, previously cited in this book (SP.509, 1992). His theme was “Planning for Lunar Base Living,” but his perspective was that of the **social** sciences and systems – that is, creation of a **human** community on the Moon. Perhaps this quotation best summarizes his thesis:

But going back to the Moon presents a social, as well as a technical challenge.

As Krafft Ehrlicke well recognized, in addition to developing low cost spaceflight, methods for processing lunar and other space materials to manufacture, safe and ecologically sound habitats, we also must develop systems of social organization for living in space. The experience of small, isolated groups in highly stressed environments points to the need for developing social systems that will enable people to live and work productively in space. The composition, organization and governance of the first lunar communities will be vital to their success, and ultimately to realising the goal of living permanently in space. We need to start now on a research program directed to developing social systems designed so that people can live safely and productively on the Moon.

That is exactly what Dr. James Grier Miller proposed in applying living systems theory to humanity offworld (refer back to chapter 3.6). Finney, co-editor of *Interstellar Migration and the Human Experience*, cited in our second chapter, offered five recommendations relative to establishing a lunar community of diverse spacefarers:

- _ Use an integrative approach of living systems, one that is multidisciplinary and combines both biological and social science research...
- _ Make this planning of an appropriate lunar social system part of a larger iterative program of learning how to live beyond Earth, whether in orbit, on the Moon or Mars, and other celestial bodies...
- _ Conduct realistic simulations and experiments of space social systems before they are put into operation aloft...
- _ Include self-designed plans by those who actually will have to live on the lunar surface – encourage them to be active participants in this R & D ...
- _ Facilitate planning for lunar community autonomy – while at the start, the lunar dwellers will be very dependent on earthkind for materials, supplies, and equipment, encourage local initiative, especially in the innovative utilization of lunar resources and creation of a culture that is appropriate to the environment and situation up on the Moon. (For instance, NASA has already designed software tools called *SpaceNet* for supplying and tracking needed inventory on the lunar surface, so that the astronauts there will know when to request necessities for re-supply.)

Less and less control and monitoring of the explorers should be exercised, so they become more independent and responsible for their own well being offworld. As their

communities mature, grow in size and competence, spacekind should be encouraged to develop their own solutions and enterprises. One example, is the matter of rules, regulations, and laws – the less such is imposed on these pioneers, the better so they can formulate a governance system appropriate to their experience (e.g., that is how *astrolaw* will emerge). Actually, the goal is to cultivate interdependence between earthkind and spacekind.

3 LUNAR EXPLORATION AND SCIENCE

Human nature is to explore – our mammal ancestors began to do so between 100 and 85 million years back in time, long before the asteroid arrived some 65m years ago. Explore means traveling to an unknown or an unfamiliar place or region for the purposes of discovery. Certainly, that definition fits the seventeen *Apollo* missions, and what is being now undertaken to implement the *VSE* policy to return to the Moon permanently. In the past exploration was under-taken by adventurers, scientists, navigators, and even the military to establish jurisdiction over a territory. Lunar exploration, however, will be lead first by engineers, scientists, and technologists until such time as all those “others” follow.

Given the circumstances of the Moon, lunar explorers will have to be knowledgeable, experts in several fields. Lunar exploration is planetary in scale, seeking information not only about our Solar System, but also the composition and history of our own Earth. Exploration on the Moon is a high technology investment that should produce multiple benefits for humanity. It will affect the aspirations, education, and motivations of future generations of today’s youth, ultimately will involve everyone on the home planet. But the considerable expense and risks in lunar activities demand international cooperation on a level never achieved before in the human family.

The Moon is a natural laboratory of some 38 million kilometers. Study of its geological processes will help us better understand both our Sun, and our Solar System, their evolution and that of our twin sister planet. As our closest and most reach-able neighbor in the universe, the Moon is a test bed for learning new skills and developing new technologies. It is an orbital platform for Earth observation, offering scientists an ideal location for projects in exobiology and radiation biology, lunar ecology and environment, and eventually human physiology and psychology in an isolated, confining environment.

It is also a place for electromagnetic and ionising radiation, and to investigate their biological importance in cosmic and solar radiation. To protect lunar dwellers, it means inventing radiation monitoring, shielding, and solar-flare shelters, as well as health monitoring systems. It also means dealing with moon-dust, composed of half silicon dioxide (rich glass bombarded by meteorites, with the rest mainly iron, calcium, magnesium, olivine, and pyroxene). *Apollo* astronauts reported this fine dust covered their spacesuits and seemed to smell like “gun powder.”

Then there are moonquakes – possibly tidal in origin and some 700 km below the lunar surface; vibrations from meteorite impacts, thermal quakes from the expansion of frigid lunar crust; shallow moonquakes up to 30 km below the lunar surface.

Ah yes, the challenge of living and working on the Moon demands careful synchronization of scientific, tech-

nical, robotic, and human capabilities. The facilitating of synergy among lunar explorers may prove to be our hardest task to accomplish there! But it also an opportunity to live in a world of our own peaceful creation!

3.1 *The Antarctica Model vs. Terraforming*

Presently, there is an international agreement for multinational bases on that continent for the purpose of scientific research. 33 Forty-five Antarctica signatories agreed to suspend territorial claims and disputes there, to forego all military and mining activity, to protect the environment, and to preserve the continent as a “natural reserve, devoted to peace and science.” That experience does provide an analog for humans who will be living and working on the Moon in a somewhat comparable circumstances. 34

Similarly, scientists from one country may wish to establish research outposts on the Moon as they do now in Antarctica. Currently at the latter’s South Pole Station, the United States has built a new habitat with many amenities for 200 occupants. Only about 1,000 people live in this remote land year round, adding another 3,000 during the summer when the weather improves. But while some worthwhile scientific knowledge has been gained under that model, there has been no economic development on that remote, icy continent for the past fifty years! With climate change concerns, some 60 countries are finally planning to spend some \$1.5 billion there, plus 10,000 researchers will visit during this International Polar Year of 2007. Space technology benefits Antarctica in some ways beyond mobile phones – such as GRACE, or the Gravity Recovery and Climate Experiment which measure minute changes in the Earth’s gravity produced by thickening and thinning of the ice sheets.. Yet, the Moon, like Antarctica, might hold the future to life on Earth and possibly beyond.

Humanity wants to do more than science and astronomy on the Moon – we want to industrialize and settle that planet, and use it as a launch pad into the universe. We hope to use the Moon as the first planet for terraforming. 35 As Martyn Fogg explained, our goal should be to engineer planetary environments for the better. This British author argues that alien worlds can be transformed by humans into human-habitable planets, like Earth. That is why Carl Sagan proposed to terraform the planet Venus. Thus, the Moon can become a terra-forming laboratory for Mars and beyond. There are terraforming expertise to be acquired on and under the lunar surface, as we alter the Moon to suit living creatures, but with due regard to preservation of its environmental integrity. New technology applications will have to be created in terms of closed-environment and life-support, plus uncover ways to use local resources to provide sufficient water, power, and communications.

On the 50th anniversary of the first landing on the Moon by our species, 2019 might be an appropriate time to announce the **International Lunar Year of 2019!**

3.2 *Science Role in Lunar Exploration*

John Connolly of NASA’s Johnson Space Center has said, *We are going back to the Moon to relearn the art of exploration.* In that same article, NASA’s Ames Research Center scientist, Chris McKay gave his reasons for science to be involved in that process: 36

_ Science is needed to provide data to make human exploration safer;

_ *The Vision for Space Exploration* needs to be science driven and the science community should shape the lunar choices;

_ Before humans arrive back on the Moon, robotic missions should precede them, especially to collect scientific data and measurements are needed, especially about topography;

_ Robots can provide vital information about lunar hazards, ice, vacuum.

This distinguished planetary scientist seeks a well-connected, well-developed lunar science community that achieves some consensus now in setting forth the science agenda for the Moon. Others, such as engineers, might counter that their knowledge and skills should be given priority. In any event, to succeed within that huge lunar learning laboratory, a multidisciplinary approach will be needed. It will be a combination of many fields of knowledge and skill that will enable lunar settlement by people. The Moon is for more than a place for astrobiology, astrophysics, and astronomy! Assuredly, behavioural scientists and health care experts life science and habitation research will play a critical role in human survival. So will those innovator who develop instruments, like microdosimeters whose sensors measure radiation energy in individual blood cells, thus detecting harmful levels of radiation that may endanger its human population. Scientists at ASRC Aerospace Corporation in the Kennedy Space Center are studying a billion-like electromagnetic shield that would form a protective force field around a habitat. They propose 5-meter inflatable spheres made of strong fabric and coated with a conductor to repel positively and negatively charged ions contained in cosmic and solar radiation, especially dangerous during swift solar storms.

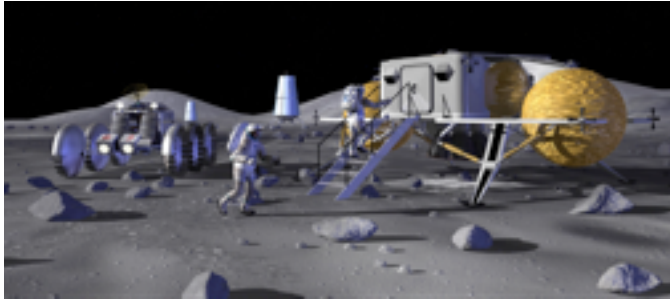
In August 2007, NASA announced these science projects as part of its VSE plans (“Astrophysics-Hitching to the Moon, *The Economist*, August 11th, 2007, p 73):

- 1) Placing a radio telescope on the far side of the Moon to examine the early universe, including the study of large-scale structures, such as galaxies and stars. Such a lunar-based telescope could detect long wavelengths that cannot be observed on Earth because of atmospheric absorption. This device might prove useful to detect extraterrestrial life, to map the stars and exoplanets that circle the stars, and to engage in studies that are almost unimaginable today. Joseph Lazio of the U. S. Office of Naval Research proposes an array of three telescopes, each 500 metres long, whose Y-shaped arms would be covered plastic film and could be rolled out on the surface of the Moon...
- 2) Examination of solar winds, a stream of charged particles ejected from the Sun which interacts with the tenuous lunar atmosphere close to the Moon’s surface. Headed by Michael Collier of the NASA Goddard Space Flights Center, the study will analyse the resulting bombardment, and the low energy x-rays it produces on the lunar surface.
- 3) Wider dispersion of new, more sophisticated lunar reflectors beyond those dropped on the Moon previously by *Apollo* and the Russian *Luna* missions which are clustered around the lunar equator. Such reflectors are used in geophysics and geodesy (e.g., to research how the Moon’s gravitational fields shift of time). Now Stephen Merkowitz of Godard and Douglas Currie of the

University of Maryland want to put improved reflectors spread over the Moon.

No wonder ILEWG has begun to award the “Young Explorers Prize” to innovative youth engaged in space science research (www.esa.int or www.katysat.org/)! And then there are those, like SETI and the National Institute for Discovery Science, who hope lunar exploration will advance the search for extraterrestrial life (www.access.nv.com/nids, or EM: nidstaff@anv.net).

EXHIBIT 10 *LUNAR SHELTERS



Lunar Shelters. After human return to the Moon permanently, the strategy is not only to build more than one base, but to have the lunar surface dotted with scientific instruments and facilities to carry out science and commerce. On its 38 million km, there will be small life support, communication, and equipment storage stations or refuges, possibly like the one depicted above. *Source:* NASA /John Frassanito Associates..

4. Lunar Settlement & Industrialization

Lunar enterprise will reach the Moon through contractors who will build the initial infrastructure there for science, settlement, and industrialization. Some of these “technauts” and their robots will be sent by big aerospace corporations, and others by start-up companies, like Bigelow Aerospace with their inflatable buildings. As a case in point, consider the matter of constructing a lunar base, such as the one depicted in Exhibit 3. This was a proposal of Lockheed Missiles & Space Company, Inc., in cooperation with Bechtel and Science Applications International Corporation. The artist’s conception is based on assumptions that it will serve as a permanent center for scientific, industrial, and mining operations. Capable of expansion, the first stage begins as a lunar outpost with the following features:

- _ Living, working, and recreational facilities to support a crew ranging from 20 to 30 people.
- _ Greenhouses designed to recycle life-support air and water supplies while supplementing food requirements.
- _ Shielded plant growth facilities to assure an adequate seedling population for the greenhouses if a crop fails.
- _ Utility workshops that enable technicians to repair and maintain equipment in a shirt-sleeves environment.
- _ Burial of the outpost or base in lunar soil for added protection against hazardous solar-flare radiation.

This is an example of innovative, macroengineering planning for early 21st century lunar development by three private corporations ahead of the curve. Now consider answers to these practical questions:

(a) Who would operate and pay for the lunar transportation system to get to and from the Moon?

(b) Who is the customer/s and how is this huge enterprise going to be paid for?

(c) Under whose authority is this base to be built? That is, assuming the proponents could raise the money for this endeavor, how do private companies get international permission to use the Moon for this purpose?

(d) If and when such an outpost and/or base became functional, whether it is by private or public or combined initiative, who or what supervises or manages this operation?

In trying to answer these critical questions, remember that under existing space treaties, the U.S.A. and NASA on its own would not seem to have the power to authorize, or even to contract for such development. Right now, Article II of the UN’s Outer Space Treaty (1967) would seem to preclude it:

Outer space, including the Moon and other Celestial Bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

Former astronaut and U.S. Senator, Harrison H. Schmitt, has written: *The mandate of an international regime would complicate private commercial development of lunar efforts. The Moon Treaty is not needed to further the development and use of lunar resources for the benefit of humankind – including the extraction of lunar helium-3 for terrestrial fusion power.* Now chairing NASA’s Advisory Council, there would be many space lawyers who would challenge that scientist’s Interpretation, particularly with reference to the original Outer Space Treaty. (Refer back to chapter 9.4.)

For decades, NASA has invested in numerous conferences on lunar activities and facilities, and published many documents on the subject with detailed plans. For example, a classic written in 1979 under the direction of Dr. Gerard K. O’Neil was *Space Resources and Space Settlements* (SP-428). Then in 1985, its Lunar and Planetary Institute released, *Lunar Bases and Space Activities in the 21st Century* edited by Dr. W. W. Mendell. In 1988, the Office of Exploration sent another annual report to the NASA Administrator, *Beyond Earth’s Boundaries – Human Exploration of the Solar System in the 21st Century*.

Again in 1992, the Agency issued five volumes entitled *Space Resources* (SP-509) centered on strategic planning for a lunar base, edited by Drs. Mary Fae and David S. McKay with Michael B. Duke. Then in 1996, NASA issued Technical Memorandum 4747 on *Lunar Limb Observatory – An Incremental Plan for Utilization, Exploration, and Settlement of the Moon* authored by Paul D. Lowman of its Goddard Space Flight. These are all remarkable and valuable documentation representing extensive scholarly research by aeronautical experts. The last mentioned provides unique insights on five stages of lunar exploration:

- (1) Site selection and certification;
- (2) Emplacement of a robotic lunar observatory;
- (3) Opposite limb missions or seven automated launch and observation missions to various locations on the lunar surface;
- (4) Lunar base establishment.;
- (5) Permanent human settlement on the Moon.

Such lunar historical publications should be the basis of all current strategic planning about returning to the Moon in the next decade by both the public and private sectors. But

how many present NASA engineers and scientists engaged in planning to implement the *Vision of Space Exploration* are even familiar with such research? Do we ignore history as we reinvent the wheel?

In January 2007, NASA held a press conference on its preliminary lunar base plans, so as to insure crew survival and reusability. The main strategy seemingly will be to pick a primary base site, and then plan for sending to the Moon both cargo and manned missions in the next decade. Lunar experts favoring the South Pole location, Paul Lowman, David Schunk, and others urge Malapert Mountain as this site over the alternative, Shackleton Crater. The exploration emphasis will be on crew safety, both in vehicles and backup spacecraft for rescue missions, if necessary. For astronauts return to the lunar surface to stay in an environment without atmosphere, these are some of detailed matters being worked on today by lunar strategists and designers:

- _ Designing a less costly, space transportation system of reusable spacecraft, capable of launching large payloads to the Moon and back on a regular schedule...
- _ Building a lunar spaceport near the outpost site for landing and liftoffs
- _ Sequence, type, and storage of cargo from an autonomous lander before humans actually arrive...
- _ Unloading procedures and equipment (e.g., a crane) to remove cargo from the landers...
- _ Excavation equipment to dig holes and cover the "hab" units with protective shielding...
- _ Developing cryogenic propellant depots for lunar surface, orbit, and LEO...
- _ Designing lunar-based power and energy systems...
- _ Designing various infrastructure for the Moon, possibly inflatables, such as storage warehouses...
- _ Creating a lunar transportation system to move personnel, equipment, propellant, et al.

And this is just a sampling of the type of planning that has to go into a macroproject of this scope! No wonder one newspaper editorial called it "the costly frontier" – yes, it will be expensive until the return on this huge investment begins to be realized. (Check out this website:

www.lunarbase.rutgers.edu/index.php.)

REFERENCES

18. Dror, Y. "Governance for a Human Future in Space," in *Beyond Earth – The Future of Humans in Space*, edited by Krone, B, Morris, L. and Cox, K., Burlington ON., Canada: Apogee Space Book, 2006, pp. 41-45. In same volume, also refer to S. E. Bell and D. L. Strongin's "Evolutionary Psychology and Its Implications for Humans in Space," pp. 78-83 ... P. J. Werbos, "Strategic Thinking for Space Settlements," p.23...T. L. Matula and K. A. Loveland "Lunar Commercial Development for Space Exploration," p. 29...F. Hsu and R. Duffey :Managing Risks on the Space Frontier," p. 30.
23. Sadeh, E., Benaroya, H., Livingston, D. and Matula, T. "Private-Public Models for Lunar Development," *Proceedings of the International Lunar Conference, 2003/International Lunar Exploration Working Group 5*, edited by Steve Durst, et al. San Diego, CA: UNIVELT/American Astronautical Society, Vol. 108, 2004, pp. 349–357. In this same volume, refer to E. C. Magelssse, and E. Sadeh's "Political Feasibility of Lunar Base Mission Scenarios," pp. 359-369....H. L. Starlife's "Property Rights in Space," pp. 407-411.
24. Ehrlicke, E. A. "The Anthology of Astronautics," *Astronautica*, Vol. 2:4, Nov. 1957...."Lunar Industrialization and Settlement – Birth of a Polyglobal Civilization - the final chapter of *Lunar Bases and Space Activities of the 21st Century* edited by W.W. Mendell. Houston, TX: Lunar and Planetary Institute, pp. 731-756....Bova, B, *Welcome to*

Moonbase. New York, NY: Ballantine Books, 1987...Harris, P. R. *Launch Out: A Science-Based Novel About Space Enterprise, Lunar Industrialization and Settlement*. West Conshohocken, PA: Infinity Publishing, 2003 (www.buybooksontheweb.com).

25. O'Donnell, D. J. and Harris, P.R., "Legal Strategies for a Lunar Economic Development Authority," *Annals of Air and Space Law*, 1996, pp. 121-139 (published by the Institute and Centre of Air & Space Law, McGill University – www.isalw.ca)...Harris, P. R. and O'Donnell, D. J. "Creating New Social Institutions to Develop Business from Space," *48th International Astronautical Congress Proceedings*, Turin, Italy, October 5-10, 1997, #IAA-97-IAA.3.1.01 (published by the International Aeronautical Federation, 3-5 Tue Mario-Nikis, 75015, Paris, France)...O'Donnell, D. J. "International Space Development Corporation," *Space Governance*, Vol. 9, 2003, pp. 16-18 (published by United Societies in Space, Inc., 499 South Larkspur Dr. Castlerock, CO 80104, USA).
26. Benaroya, H. "Lunar Industrialization," *Journal of Practical Applications in Space*, Vol.VI:1, Fall 1994, pp. 85-94.... Petek, L. "Management in Outer Space," *Space Policy*, Vol. 10:3, August 1994, pp. 189-198.
27. Goldman, N. C. "A Lawyer's Perspective on the USIS Strategies for Metanation and the Lunar Economic Development Authority," *Space Governance*, Vol. 3:1, July 1996, pp. 16-17, 34....Smith, M. L. "The Compliance with International Space Law of the LEDA Proposal," *Space Governance*, Vol. 4:1, January 1997, pp.16-19.
28. Robinson, G, S, "Natural Law and a Declaration of Humankind Interdependence," *Space Governance*, Vol. 2: 2; 1995, June and December issues.
29. O'Donnell, D. J. "Overcoming Barriers to Space Travel," *Space Policy*, Vol. 10:4, Nov. 1994, pp. 252...Harris, P. R. "A Case for Lunar Development and Investment," *Space Policy*, Vol. 10:4, August 1994, pp. 187-188.
30. The Lunar Economic Development Authority strategy was inaugurated by Attorney Declan O'Donnell and Management/Space Psychologist, Dr. Philip Harris, and in 1997 was incorporated in the State of Colorado. In 1998, Dr. Michael Duke was elected LEDA president with Dr. Brad Blair as Chairman of the Board; both are now at the Colorado School of Mines....In 2000, LEDA issued a private memorandum relative to "LEDA Development Bonds." In this document, the purpose explained as a movement to maintain a private enterprise paradigm in both space governance and lunar development. For further information, contact Attorney O'Donnell (EM: djobs@quest.net).
31. Cleveland, H. *Birth of a New World Order: An Open Moment for International Leadership*. San Francisco, CA: Jossey-Bass Publishing, 1993.
32. Whittington, M. "Lunar Exploration and Development Authority (LEAD) Would Help Open Space Frontier." *Washington Dispatch* article summarized in *Lunar Enterprise Daily*, Vol.5: 59, March 30, 2005, p. 1. "Briefing Antarctic Science – To Coldly Go," *The Economist*, March 31st, 2007, pp. 85-87
34. Harrison, A. A., Clearwater, Y.A., and McKay, C. P. (eds.) *From Antarctica to Outer Space*. New York, NY: Springer-Verlag, 1991.
35. Fogg, M. J. *Terraforming: Engineering Planetary Environments*. New York, NY: SAE Press, 1995.
36. David, L. "Back to the Moon: Uniting Science and Exploration," www.space.com/scienceastronomy/060516, May 16, 2007, 5 pp...."Moon-Based Instruments Could Change How We See Earth," www.space.com/business/technology/070116.

In next month's issue of *Moon Miners' Manifesto*, we will conclude this paper by Phillip Harris, written specifically for publication in this newsletter.



</MMM>



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



Objectives of the Moon Society

include, but are not limited to:

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

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

Moon Society Mission

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

Moon Society Strategy

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

Our Full Moon Logo above:

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

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

November 7, 2008 - *Introducing*

Moonbeams [Cover, p. 13 LR]

The Moon Society's new Sci-Fi publication

The Role of Space-Future Fiction
in Advancing Moon Society Goals

The Historic Role of Science Fiction

Science-Fiction has long played a strong role in fostering an interest in Space Exploration, Settlement, and Travel. As far back as the earliest days of NASA and the Apollo program, many NASA personnel and future astronauts have admitted that their individual early interest in space was awakened, and/or nourished by exciting and positive visions of what could be the greater world of our future. Arthur Clarke and Robert Heinlein are just two of the many classic authors frequently cited.

Of course, not all science-fiction tales paint positive pictures. There has always been some with dark, forbidding scenarios. There have always been those with a "say it ain't so" attitude towards the "restrictions" of Physics. There have always been those more engrossed in fantasy and magic rather than reality. It is only natural that the story reflects the personality of the writer.

When the Artemis Society and Artemis Project™ were launched at the World Science Fiction Convention in Winnipeg, Manitoba, Canada in 1994, part of the game plan was to launch a new science-fact science-fiction magazine *Artemis*, which would contain positive, realistic stories about our future in space, as a way of attracting new members to the Society. Eight quarterly issues were published before the plug was pulled. Successful entries to the crowded world of News stand paper publications are difficult. If you don't quickly attract enough sales, the News stands don't keep putting you on their racks.

Warned of such obstacles, a plan by the future President of the Moon Society, Peter Kokh, to introduce a rag to be named "PSSST!" for "Plausible Solar System Settlement Tales" at a new science-fiction convention in Milwaukee, Wisconsin, "First Contact" that same fall, September 1994, was shelved.

Through the years, a number of short science-fiction pieces have been submitted to Moon Miners' Manifesto, and MMM has published a few. Every year in the April issue, MMM has published a page of World Space News stories from the AFD News Agency. And ever year, we've hooked some readers who failed to notice the tag line at the end of the page, printed upside down:

MMM'S 21ST Happy April Fool's Day News

Our secret? Simple. "Tell them what they want to hear!"

Now it is time to revisit the idea. This time we are looking at electronic publication, in pdf file version only.

The Moon Society Journal - Free Enterprise on the Moon

Moonbeams, cont.

Hardcopy publication could come later. In the past, as MMM has been a hardcopy publication, all fiction pieces have been published by the MMM publisher, The Lunar Reclamation Society, the Milwaukee/SE Wisconsin chapter of the National Space Society.

The Moon Society has now begun publishing fiction!

Peter Kokh produced a draft edition, and in response, Charles Leshar, a Moon Society Phoenix member from Chandler, AZ, and author of the lead piece in the first issue of Moonbeams, volunteered to take it over, recasting the draft edition that is now published. Charles has been writing science fiction for several years. The editor's email address will be

moonbeams@moonsociety.org

Easy Free Access

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

Moonbeams issues are freely accessible, without the need to use a Moon Society username and password. The function of Moonbeams is both to expand the vision of our own members, and to draw interested visitors into the Society. If you download an issue of Moonbeams, you may freely circulate it to others, either by sending them the above address or by sending an issue as a pdf file attachment. Indeed, we encourage you to do so!

Publication Frequency

As we kick off this publication, we make no promise of how often future issues will appear. The short answer is "*whenever we have enough good material to make a good publication, and have the time to edit it.*" We'll see what happens! We *hope* to put it out quarterly.

Submissions

- Readers are welcome to submit short pieces, limit 5,000 words.
- As Moonbeams produces no revenue stream, authors will not be compensated, and retain full rights for republication elsewhere
- Submissions should be in electronic form: MS Word, Text files, or pdf format. Handwritten, typed, and printed submissions *that need to be keyed in* will not be considered.
- As yet, we have no specific guidelines as to what is acceptable. But
 - * We do want submissions to stick to accepted physics: no faster than light warp drives, no worm holes, no time travel, no transporters a la Star Trek.
 - * No magic, no fantasy – we want *science* fiction!
 - * No social or political or religious diatribes – if you have axes to grind, do it somewhere else! You may, however have your characters observe new social and political customs, so long as you are not disrespectful of those beliefs that readers may hold.
 - * Just give us a good story that illustrates the positive possibilities of the near future.
 - * Of course, stories that alert us to possible dangers and pitfalls will be considered. There will be catastrophes and setbacks in the future, after all!
 - * The subtitle "*Plausible Solar System Settlement Tales*" indicates that stories anywhere in the Solar System (new boundaries well beyond Neptune!) are in our range. Thus the near future on the Moon is not the only setting for your stories.
- * Short fact pieces on science and technology issues will be considered

* You do not have to be a Moon Society member to submit.

Advertising in Moonbeams?

* The idea of advertising has not yet come up. Publications with low initial circulation are not attractive markets for advertisers unless the rates are very low.

* "Exchange Links?" – If your link is clearly space topic related, and would be seen by persons likely to be interested in the goals of the Moon Society, we may consider that. But even with space related links, we reserve the right to say no! For example, if you are selling land on the Moon, Mars, or Vesta, land to which you do not have title, "No!"

* These guidelines are subject to review and will be adjusted as we go along.

Help wanted:

- Spreaders of the word! Tell potential readers, and potential contributors as well!
- Fiction Writers, of course!
- Artists and Illustrators
- Cartoonists
- Assistant Editors, for example of the Science & Technology Department
- If you have something other than fiction writing talent that you think we might be interested in, do let us know.

Hey, download the first issue and let us know what you think. Remember, it's a first effort, so go easy on us!

www.moonsociety.org/publications/fiction/Moonbeams1.1.pdf

Postscript: Many of you may wonder if there are available copies of any of the eight issues of **Artemis Magazine** We don't have an answer as yet. Maybe next month. The old site, <http://www.lrcpubs.com/artemismagazine.html> -- <http://www.lrcpubs.com/> was let go, so don't look. We are contacting the former editor. The merchandise outlet for the Artemis Society, Lunar Traders, has also bit the dust, but the proprietor may have leftover stock.

Things Afoot:

Reports from busy Society Leaders

Our ever busy Vice-president, **Charles F. Radley**, has been trying to reestablish contact and active collaboration with **The Planetary Society of Youth (TPSY)** – the largest student space organization in India. With the successful launch of Chandrayaan-1 moon mission, space excitement, and pride, is at an all time high in India, a complex, history- and culture-rich country where English is the universal language of education.

Meanwhile, our Public Relations manager, **James A. Rogers**, is exploring a hook up with FOGE (Federation of Galactic Explorers) and its game **MoonBaseOne**. "The initial version allows you to compete in two adventures aimed at mining the lunar regolith to find minerals, build mining robots, and meet some really cool characters."

Both overtures are efforts to acquaint more young people with the Moon Society.

Meanwhile, **David A. Dunlop** attended the **ILEWG International Conference on the Exploration and Utilization of the Moon**, in Orlando, FL, Oct. 28-31.

MMM Editor Peter Kokh is working on a new **MMM-India Quarterly** (free access pdf file only.)

Moon Society Applauds Successful Launch of Chandrayaan-1 and India's Initiation into the exclusive Lunar Club

By Society President, Peter Kokh

That said, *my remarks below are personal ones, not necessarily reflecting those of other Society leaders and members.* This is more editorial than commentary.

It all began in 1961, as a 2-nation cold war rivalry to prove whose technological prowess was the superior: that of the U.S. or that of the U.S.S.R. The winning point scored by the U.S., we just up and quit what we had started with so much excitement.

A pause, a long, too long pause. But the seeds were sown. The science done in the Apollo period did answer some questions, and, as answers always do, raised far more and deeper questions as we began to realize how little we really knew.

Scientists all around the world wanted to know more. But dreams of visionaries, who saw how the Moon could be industrially and economically integrated into a greater Earth-Moon economy, while most of those at home remained unconvinced, infected others abroad with their scenarios. India and Japan see lunar "resources" as essential to their economic progress, specifically as needed to build affordable solar power satellites to keep their industrializing economies growing full steam.

While unfortunately, most of our politicians, of either party, have no such vision, the embers from the fire we started are still glowing, and mankind's future in space, whether we in the USA choose to be a part of it or prefer to watch ourselves become a has-been player, that future integration of space into the economy of a human sphere of which Earth is only the seed core, seems certain. Timely action is essential.

First Japan, then China, now India have joined the Lunar Club. Other nations are watching. There are some in the United Kingdom, Germany, Italy, and elsewhere who do not want to be left behind. Given our domestic identity crisis, it bodes well that the Moon will become an international scene of exploration and development.

The danger, of course, is the precedent set by the Antarctic Treaty, whose renewal we personally opposed. We *do* need to adopt a regime that protects much of the Moon of special geological or scenic interest from development, *while opening less sensitive areas* to resource utilization.

While tourists are welcome in Antarctica, some would put a stop to this. We need to find a viable balance between exploratory research and commercial development on both "continents," our 7th and 8th. Individual and corporate greed notwithstanding, we firmly believe that an acceptable compromise can, and must be made.

NASA, perhaps understandably discouraged by lack of budgetary support, has downsized its lunar goals to a point that they no longer resemble the aspirations of George W. Bush's original "Moon, Mars, and Beyond" initiative, toned down to the "Vision for Space Exploration" and now being toned down again.

We designed a dead-end sterile space station and are in the process of doing so with a less than worthless "visitable" Moonbase. Perhaps, like Rome did, we have lost our way. One can ask if that is the fate of a less than poorly educated democracy. Science education

is under serious attack as if the "clues in nature" were not *also* the "book of God."

At this writing, Chandrayaan-1 is not yet in lunar orbit, its science mission not yet begun. We hold our breath in expectation, as this is a capable mission and we stand to learn much from its findings. One of the key, perhaps *the* key instrument aboard, the Mineralogy Mapper, is an American contribution, as is the Miniature Synthetic Aperture Radar. It is in our interests that India's space ambitions are encouraged by major success here. Why, because Indian leaders have the vision of solar power satellites constructed with lunar materials as powering the future growth of India's economy, a vision shared by precious few in our equally ignorant Parties.

China's ambitions are also clear. The Chinese name for China means "the Middle Kingdom." That is, China sees itself as the keystone nation of Earth's future.

India, growing population-wise much faster, will overtake China as Earth's most populous country. With a more free society, and cultural roots just as deep and complex, the 21st Century could just as easily become the Indian Century as the Chinese one, while we in this country let individual and corporate greed undo all that our forefathers have worked so hard to create.

India may soon be on the Moon's surface as it has entered into a joint agreement with Russia to field a moon rover within three years. There is excitement in India, like there used to be here. Old-timers remember.

While we debate if the Moon is worth returning to, others leave no doubt that humans will return, and do so to stay, whether America loses its way or not. From a "Terran" perspective, that is reassuring.

As I say, these are my thoughts alone. That said, the Society does indeed congratulate India on its initial achievement, and we hope this helps light a fire under the dense, ostrich-heads in both U.S. political parties.

As members with a stake in our future on the Moon, we need to hold up India's achievements and its motivations and aspirations as evidence that we may be losing our way, and need badly to see that Space is not a frill, but a necessity, both for our economic wellbeing and for the future prosperity of our country.

Make no mistake. Those abroad are taking heed. Not just the citizens of India, but citizens of all countries are learning fast that the prosperity and open-ended aspirations for the future, which seemed to be an especially American characteristic, belong to everyone.

Should we lose our way, we can take solace in that "our one shiny Camelot moment," did succeed in getting something started that would endure. Even should we make the politically timid and ignorant choice to drop the ball, we are assured of being a footnote in the history of human expansion towards the stars.

We are all now being plunged into an unwanted "learning experience," as our increasingly interconnected world economy seems to be losing its momentum and confidence. We are left to hope for the best, while fearing the worst. Will space be a victim? Or will space help point "the way out" to a better future ahead? It is in our interest to *choose* the latter, and to *encourage* others to share that vision. *If you have never seen it, do go out and rent "The Shape of Things to Come"*, a 1936 science fiction classic written in a similar crisis of self-confidence, as "progress" was being cast as the villain: many parallels with our situation today. Take hope! <PK>

The Moon Society Chapters & Outposts Frontier Report

Chapters & Outposts

Moon Society St. Louis Chapter

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

Contact: Keith Wetzel kawetzel@swbell.net

Meetings 2nd Thursday monthly, Buder Branch Library
4401 S. Hampton, in the basement conference room

Next meetings Nov. 13th, Dec. 11th, Jan 8th

Archon 32 Oct. 3-5, Collinsville, IL: Our chapter did fairly well, but somehow I didn't get a photo of our "fan table". Dave Heck and I gave presentations and following us was Joe Rauscher of NSS. He gave a presentation on Solar Power Satellites. -- From Robert Perry

Moon Society Phoenix Chapter

<http://www.moonsochphx.blogspot.com/>

Contact: Craig Porter portercd@msn.com

Meeting the 3rd Saturday of the month

Moon Society Phoenix' next meetings are on
Saturdays Nov. 15th, Dec. 20th, Jan 17th

At the new Borders Book Store, 1361 S. Alma School Rd. and Southern, Mesa, AZ 3 PM. - 2 blocks from Bookmans (becoming a Coffee Shop) where we had been meeting,

We'll try this for a few months and see how it goes. As our meetings will be announced in the Borders' Newsletter, we hope others visiting the store will learn about us and drop in. That could help us grow more!

Moon Society Houston Chapter

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

Contact: Eric Bowen eric@streamlinerschedules.com

Next Meeting Place & time: Monday, Dec 1, 7pm

Park Place Regional Library, 8145 Park Place, just east of the Gulf Freeway at the Broadway/Park Place exit.

On Sept 19th, member Larry J. Friesen was elected to be an Associate Fellow of the American Institute of the Aeronautics and Astronautics (AIAA) - Kudos, Larry!

College of the Menominee Nation* Student/Campus Chapter

Contacts: Dan B. Hawk hawkd_0212@menominee.edu

David A. Dunlop dunlop712@yahoo.com

Meeting some Friday afternoons at the College of the Menominee Nation, 2733 South Ridge Rd, Green Bay, WI

* Formerly, the Green Bay, WI Outpost

Moon Society DUES with Moon Miners' Manifesto

Electronic MMM (pdf) \$35 Students/Seniors: \$20

Hardcopy MMM: U.S./Canada \$35 Elsewhere: \$60

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

Moon Society Mail Box Destinations:

Checks, Money Orders, Membership Questions

Moon Society [Membership Services](#):

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

Projects, Chapters, Volunteers, and Information

Moon Society [Program Services](#).

PO Box 080395, Milwaukee, WI 53208

Bay Area Moon Society Outpost

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

Contact: Henry Cates hcate2@pacbell.net

Moon Society Tucson Outpost

Contact: Ben Nault bnault@comcast.net

Moon Society Longview Outpost

Contact: James A. Rogers jarogers2001@aim.com

Moon Society DC Metro Outpost

Contact: Fred Hills Fredhills7@aol.com

Milwaukee Outpost (MSMO)

http://www.moonsociety.org/chapters/milwaukee/msmo_output.htm

Contact: Peter Kokh kokhmmm@aol.com

See Map: http://www.moonsociety.org/chapters/chapter_outpost_map.html

Currently, in the US, we have 3 regular chapters,
1 Student/Campus Chapter, and 5 Outposts.

Why not start a Moon Society Outpost in Your area?

All it takes is one person - you!

Write: chapters-coordinator@moonsociety.org

Get ideas from: <http://nsschapters.org/hub/>

Moon Society Chapter Photo Gallery



Peter Kokh at the Moon Society Milwaukee Outpost Headquarters - *I wish!*

This painted concrete wall depicting the northern hemisphere of the Moon is at the Potawatomi Casino in Milwaukee, WI where Peter lives. Maybe Peter should work on an affiliation? (\$\$\$\$)

For news of our NSS Partner Chapters in Portland, Milwaukee, Minneapolis/St. Paul, see p. 21ff.

< End Moon Society Journal Section >

GREAT BROWSTING

New "full-spectrum" solar collector material

<http://researchnews.osu.edu/archive/fullspect.htm>

New moon rover concepts tested in Arizona

<http://www.marstoday.com/news/viewsr.html?pid=29610>

Top 10 Cool Moon Facts

http://www.space.com/scienceastronomy/top_10_cool_moon_facts-10.html

Falcon 1 launch 1st big step since SpaceShipOne

<http://www.thespacereview.com/article/1222/1>

Solving problems on Earth key to space resources

<http://www.thespacereview.com/article/1220/1>

A Lunar Exploration "Authority" vs. Competition

<http://www.thespacereview.com/article/1219/1>

Limited power of Presidents on Space Policy

<http://www.thespacereview.com/article/1218/1>

Business on the ISS beyond space tourism

<http://www.thespacereview.com/article/1226/1>

Space exploration at a crossroad (part 1)

<http://www.thespacereview.com/article/1225/1>

Space exploration at a crossroad (part 2)

<http://www.thespacereview.com/article/1227/1>

Review: Solar Sails (missions and uses)

<http://www.thespacereview.com/article/1223/1>

New path to space: India and China enter the game

<http://www.thespacereview.com/article/1231/1>

When will rocket racing take off?

<http://www.thespacereview.com/article/1230/1>

Fannie Mae, Freddie Mac, & space commercialization

<http://www.thespacereview.com/article/1229/1>

New launch vehicles, same old problems

<http://www.thespacereview.com/article/1234/1>

The Sputnik Singularity

<http://www.thespacereview.com/article/1233/1>

Why so many believe that there was no Moon race

<http://www.thespacereview.com/article/1232/1>

SpaceX proposes \$80M 1-3 tonne lunar cargo lander

www.flightglobal.com/articles/2008/10/02/316680/spacex-offers-nasa-80-million-lunar-cargo-lander-service.html

Is NASA's Ares Launcher doomed?

www.orlandosentinel.com/news/space/orl-ares2608oct26_0_561055.story

Putin promises 200 B Rubles for Russian Space

http://www.kommersant.com/p-13423/r_527/Roscosmos_space_program/

The Ancient Rains of Mars

http://www.marsdaily.com/reports/The_Ancient_Rains_of_Mars_999.html

Mystery of Mars S Polar Ice Cap displacement solved

http://www.marsdaily.com/reports/Mars_Polar_Cap_Mystery_Solved_999.html

"Unbelievably large" Liquid Mirror Lunar Telescopes

http://science.nasa.gov/headlines/y2008/09oct_liquidmirror.htm

Messenger's 2nd flyby of Mercury sees new terrain

http://messenger.jhuapl.edu/mer_flyby2.html

GREAT SPACE VIDEOS

MOON COLONY VIDEOS – The Moon Society

30 plus thought-provoking videos, produced for the Moon Society by Chip Proser (Celestial Mechanics, Inc.) can be found at.

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

or at:

<http://www.mooncolony.tv/>

<http://www.stickymedia.com/>

ASSORTED SPACE VIDEOS

Virgin Galactic, XCor Tourist Flight Previews

http://www.space.com/common/media/video.php?videoRef=Virgin_galactic

<http://www.space.com/common/media/video.php?videoRef=080327-xcor>

Hunting for ET: virtual visit to Allen Telescope Array

<http://www.seti.org/Page.aspx?pid=331>

Chandrayaan-1 launch video

<http://in.reuters.com/news/video?videoId=92594&videoChannel=101>

Why we should go to the Moon (slide show)

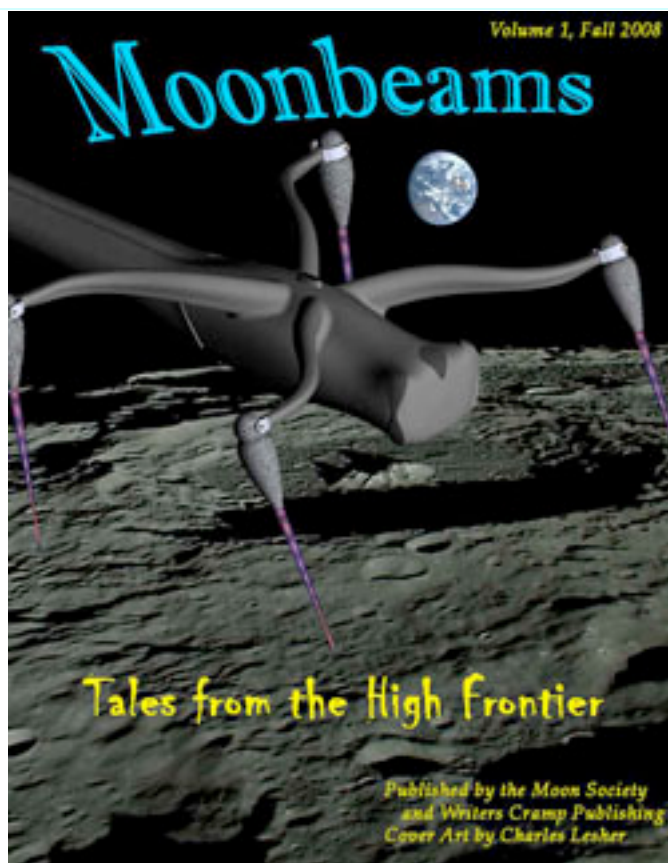
<http://www.slideshare.net/skytland/why-the-moon-presentation/>

Reindustrializing – Space Infrastructure – *great!*

<http://www.youtube.com/watch?v=MBnJLPpGIGQ>

Sagan reads from Pale Blue Dot – The Moon

www.youtube.com/watch?v=ADU4qfD_sQ&feature=related



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

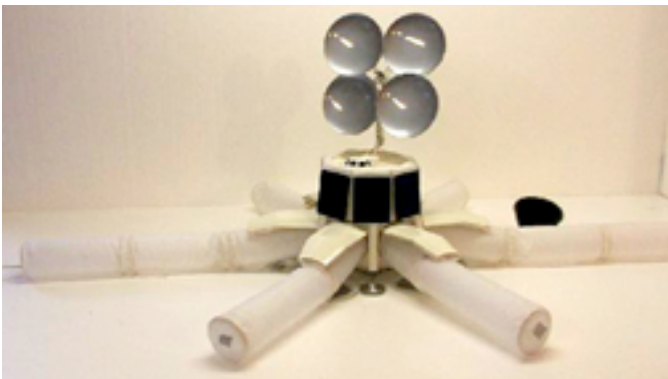
First Issue – Free Download (pdf)

Published by The Moon Society

MMM PHOTO GALLERY



India's powerful PSLV Polar Satellite Launch Vehicle boosted Chandrayaan-1 Moon Probe.



This all-in-one fully functioning Moonbase has six telescoping arms, some of which include the unfolding Green Houses pictured on page 18, col. 2. A fully functioning model was displayed at ISDC 2007 in Dallas, and is the brainchild of Phil Sadler, a veteran of 13 winters at the Amundsen-Scott Station at the South Pole, where his Food Growth Chamber (systems supplied by the U-AZ Closed Environment Agricultural Center (CEAC) produces two salads a day for the crew of 75.



www.space.com/news/081024-rocketracing-spacetourism.html

Move over Virgin Galactic! A Rocket Racers - Armadillo Aerospace team hopes to provide a clear 360° view to future space tourists in the near future.



The Allen Telescope Array (Radio) in Northern California, run by the SETI Institute, hopes to discover ET, and go where Arecibo has never gone before in the search for ET



Earthset on the Moon - photo-shoot by Kagyua probe



Move over NASA meatball. This is the new logo of the India Space Research Organization, proud parent of the Chandrayaan-1 Moon probe launched October 22 and its PSLV launcher. India is planning a moon-rover in 2011 with Russia.

A Power Beaming Competition Proposal

First Draft October 11, 2008 David A. Dunlop,
Director Project Development, Moon Society

Goals: Develop a competition funded by either NASA under the New Centennial Competition Program or DOD under their competition authority or a combined initiative that will:

- 1 Advance the state of power beaming technology along the space solar power technology road map being developed by the AFRL,
- 2 Provide a practical demonstration of the utility of this technology that is informative, appealing to the public, and policy makers, 3 Attract the participation of student engineering teams sponsored by leading universities.

Background:

The NSSO report on Space Based Solar power generated a broad response from the space advocacy community. A coalition of 14 organizations was formed to focus attention and efforts to advance a program to provide energy beamed from space-based sources such as solar power satellites.

In October of 2008 the AFRL hosted a workshop in Orlando to assess the state of space solar power technologies, create a development road map, and define technology metrics for the short term (< 5 years), mid-term (between 5 and 10 years), and long term (> 10 years) as a means of guiding potential investments in these technologies

The Moon Society, the Spaceward Foundation, and the National Space Society as members of the Space Solar Power Coalition were represented at the AFRL workshop on the state of space solar power technology. Subsequent to the workshop I agreed to draft a competition proposal for consideration of the Moon Society, SpaceWard Foundation, and NSS and as something for presentation to both the AFRL and NASA Centennial Program that would address the above-mentioned goals as a follow on effort to the Workshop

It is the purpose of this draft to create a structure that can be critiqued and improved from those with a variety of perspectives and expertise so that this suggested competition can be funded, serve the interests of the research and development communities by providing practical demonstrations of technology, and provide a stimulus to encourage those entering academic engineering programs and the aerospace workforce

Proposal # 1 Laser Beamed Power to Ground Rover

Both military and civilian applications have been identified for a ground rover with a power supply delivered by laser. Mobile ground rovers would have military utility in monitoring the defensive perimeter of forward military bases. On the Moon both NASA and JAXA have identified rovers supplied by a laser power beam as an enabling technology that is useful in exploring the cold traps on the lunar polar regions

The Space Elevator Competition is an early demonstration of laser power beaming technology over the relatively short distances that characterize suspended tethers at present. A Short term objective (<5 years) on the solar power technology road map could be the demonstration of useful laser power delivery in the 5, 10, and 15 kilometer range to a mobile ground platform consistent with the metrics for short term research and development

We propose a competition to provide a demonstration of laser power beaming to a mobile platform in the lunar analog conditions of Antarctica. We suggest a two-stage competition

Stage One:

In stage one US university teams would compete to demonstrate laser power beaming in the US to a mobile platform beginning at the 5 km distance. The winners of this competition (The top Three Teams) would then proceed to Stage Two. As technical objectives are met then distances can be increased

Stage Two:

The finalists would be funded to demonstrate their powered rovers under the Antarctic conditions adjacent to the McMurdo base at the South Pole where there are adjacent mountains that provide an lunar analog to power beaming from a crater rim down to a rover exploring the crater interior

Additional Considerations:

The requirements for a demonstration range at both Stage One and Stage Two are an essential precondition for this proposed competition. They may be met by use of certain Federal facilities

Stage One:

A Stage One demonstration initiative is very close to the requirements of a military ground rover. Use of Federal facilities in US territory may make many of the development issues (at first blush) manageable, practical, and cost feasible. Getting the completion up and running for the first two or three years on US soil as would be a credible development path as a Stage One only competition. From an organizational perspective this would seem prudent.

It might be the case that the Space Port America site in New Mexico or another site close to the existing Space Elevator competition might be feasible involving the White Sands missile range. Military range facilities in California near Edwards Air Force Base are another consideration with close proximity to both affordable transportation and media coverage. A list of additional issues have been identified for later expansion an exploration

Identification of potential Test Range facilities as

Federal installations: (DOD, NASA, DOE, Dept Interior)

Terrain and operational requirements: Elevated terrain with a down range beaming potential of 5, 10, 15 miles

It might also be the case that a mountain top astronomical observatory campus might have both the elevation, powerful supply and isolated down range characteristics necessary for a day time operation posing no operational problems for those observing at night time. Sites in Arizona, Texas and Hawaii come to mind

Power supply FCC & ITU requirements and regulation Supervision, Physical Security, Safety & Risk Management Transportation costs and accessibility, logistics Budget Development

Stage Two:

Stage Two presents a considerable jump in organizational and management issues. The U.S. Antarctic Program is overseen by the National Science Foundation. The McMurdo Base is supported by a NAVY run logistics chain. The costs of operating a Stage Two competition program in Antarctica might be an order of magnitude greater than at US territory in the lower 48 states for example based Stage One effort

The Antarctic Base is already a testbed for space robotic technologies so what is exceptional about this proposal is the cost differential from Stage One

We are convinced that the interested generated by the Antarctic demonstration will resonate with both the public as well as the student community. This initiative must generate interest, excitement, and credible institutional participation to be worthwhile in its productive impact on technology development and engineering education, and workforce development. Site characteristics include: Elevated terrain with a beaming potential of 5, 10, 15 miles proximate to McMurdo Power supply FCC & ITU requirements and regulation Supervision, Physical Security, Safety & Risk Management Transportation costs, accessibility, logistics Budget Development

Development Justification Considerations:

The efforts to develop such a competitions are substantial. It is also clear that such efforts are considerably greater at stage two in an Antarctic Environment. It is also clear that the relative costs of technology development via the use of a competition in analog environments are much below space based demonstration initiatives.

Alternative Arctic Analogs:

Other arctic analog options for a Stage Two might also exist such as those on Devon Island, Canada operated by the Canadian Space Agency and the Mars Society. Thule Air Force Base in Greenland might also be an optional location

Such arctic options also introduce the possibility of working cooperatively with international partners such as CSA, ESA, JAXA, or Roscosmos in broadening the competition by putting up prize money and sponsoring teams from their countries and hosting a demonstration site. Svalbard Island, Norway also comes to mind as a potential site. Potential sites might be provided by Russia.

Stage Two potential collaborations and sponsorship might also be facilitated by discussing them in the context of the International Lunar Exploration Working Group at the upcoming International Conference on the Exploration and Utilization of the Moon in late October 2008 in Titusville, Florida which I plan to attend

Mobile rovers are a key enabling technologies in both surface exploration and identification of lunar situ resources. The Space Resources Roundtable Organization is also a co-sponsor of the ICEUM Conference and therefore would logically have a stake in seeing this technology advance.

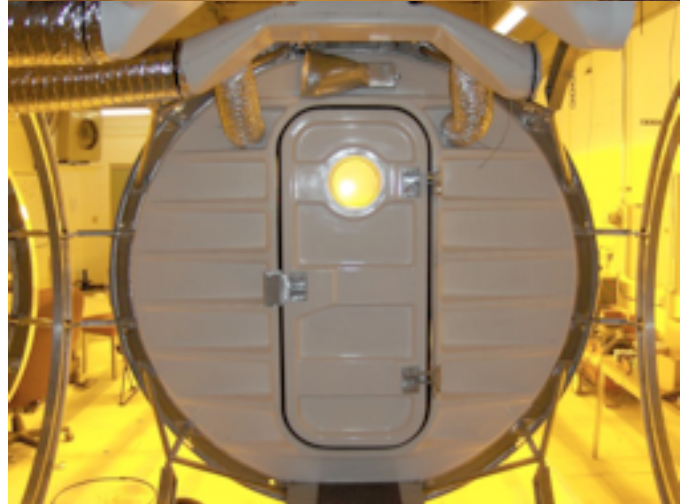
I am suggesting the cost barriers represented by the Arctic and Antarctic options may be lowered by sharing costs internationally. I also believe that the impact of the competition would be greatly enhanced. Laser power beaming under Arctic and Antarctic conditions can be clearly demonstrated to have relevance to the problems of lunar cold traps but also as near term tools in polar operations. They offer not only benefits to those working to develop laser power beaming but also to those that wish to advance human-robotic synergies such as the NASA's RATS program

These connections and collaborations of course multiply the complexity of developing this proposed competition but with commensurate potential for drawing financial and logistical support, public interest and education, and the participation of university engineering programs from around the world. <DAD>

Lunar Greenhouse Project Advances

From Phil Sadler, Sadler Machine Co.,

A CEAC (U-AZ Closed Environment Agricultural Center
"We have the Lunar GH ready for seedlings and we plan to get started this week. We have a video that we still need to edit of it pulling out, it collapsed to about 4' long. Anyway, we are starting to get this on line."



Editor: "Amazing!" Remember that NASA has halted all advanced biological-assisted life support research. Our hopes lie with the CEAC-AZ team who are keeping the dream of real space settlement alive. See illustration page 16, bottom Col 1. Several of the above units would be included in the unfolding arms of this all-in-one base

"SKYFIELDS"

By Peter Kokh, from my cottage outside Florence, WI, near Iron Mountain in Michigan's Upper Peninsula ("Occupied Wisconsin" as I have always thought of it)

I don't ever recall writing something like this for MMM, but there is a time for everything. When I was 8 in 1946, I went along with my maternal grandparents to visit their hometown of Florence with a view to buying vacation property. They found two acres, surrounded by farmland at the time – now new forest on one side planted by birds and squirrels and wind – *on a dead-end country road*. I am always amused when friends who have never been here put down the location because it is *not on a river or lake* where you can have the benefits of more bugs, more crowding, more noise and more taxes. Here instead we have just peace and quiet with scarcely a half dozen cars going by all day. In the sixty-two years since, I have not failed to get up here at least once a summer except in 1961 when I was in England all year.

Geologically, this is an interesting area on the edge of the Laurentian Shield, the ancient heart of North America, where all over the place little waterfalls carry brooks and streams over this edge onto the newer sedimentary-glacial part of the continent to the south. Hiking into hidden waterfalls with my dogs has been a decades old pastime. Thirty years ago I found one on a county map that only a few old timers knew about. I set out to find it and parked as close as I could get at the end of a sandy road. After walking this way and that for two and a half hours I finally found it. I made it back to the car, went back to town and bought a can of yellow spray paint then drove back to the end of the road. This time having found the shortcut, I marked trees at 30 foot intervals. Today there is a nice trail and many people have seen what to me back then was a very private spectacle. I tell this story to locals, ending with "now, as Paul Harvey would say, you know the rest of the story."

It is here that I realized that there is a difference between beauty and awe, the beauty of life which strives to impose order, the awesomeness of the geological terrain which could care less about the life that learns to thrive on it. It is this combination of beauty and awe which touches the soul most deeply. Are the heavens only awesome? Or is life pervasive, imposing beauty? The "planned" faux geology of space settlements is too dishonest for me, proud to be a "planetary chauvinist."

Well it was beginning to look as if 2008 was going to be the second year since 1946 that I would not make it up here. No car, high car rental prices, high gasoline! Why I could fly from Milwaukee to Los Angeles and back for the cost of renting a car to come here for a weekend! But then as the 2008 summer season started to recede into memory, on the last day of October, I had a break. A friend of mine was going to Atlanta, and if he picked me up so that I could drive him to the airport, pick him back up on his flight home, and took care of his little aging Schnauzer Mitzi while he was gone, I could use his car. The temptation was too great and with a combination of guilt and joy, after dropping my friend at the airport, I picked up Mitzi and we headed north.

I have such a nice cozy place, an old 8'x30' 1955 house trailer set on a foundation twice as wide, with two more rooms and a conventional roof that I had designed and had built for a song in the mid-70s. The trailer I had found and had put there in 1969. For almost 40 years I

have enjoyed the solitude in the northern woods under star spangled skies. Above my cottage sofa is a plaque I designed that proclaims "**these are** the good old days," in defiance of my grandmother's insistent claim that "**those were** the good old days."

Mitzi loved it as do all my friends, amazed at how much better peace and quiet with only the squirrels to scold you for intruding on *their* property, how much better that is than being on a lake or river!

Mitzi and I only stayed one night. It was not worth opening up only to close up in the morning. But this night the skies were incredible – not quite as unbelievable as the moonless skies in SC Utah at the Mars Desert Research Station, a hundred miles from the nearest town of size, but almost. Mitzi and I took a walk down the asphalt unlit road with nothing but the stars to light our way. Dogs do not imagine bears or goblins or monsters laying in wait along the roadside at night, and having strolled down this car-less road many a time at night with my dogs, I have lost all such fear as well.

This night the Milky Way was out in all its glory. I was walking toward Perseus and Cassiopeia. For a while I thought I was looking at Andromeda (the great M31 spiral galaxy 2-3 million light years away) which I've seen many times in those northern dark skies. Tonight it looked as big as my thumb extended at arm's length. But then, to my embarrassment, I spotted the V of Hydra and knew that I had been looking at the Pleiades all the time. Oh well, by any name it was wondrous. Actually, except for Andromeda here in the north and the Magellenic Clouds in southern skies, all we see by the naked eye lies within our own Galaxy – vast and wondrous enough!

The big dipper was below Polaris, but at 47 degrees north you could clearly see all of it above the trees. The summer triangle was obvious with Deneb, Vega and Altair, the latter two pointing to Fomalhaut, a dimmer star that still dominated the south. If you ever read the "Star Kings" (alternate title "Beyond the Moon") a 1950s galactic soap opera better than Star Wars, by Edmond Hamilton, you will remember Fomalhaut as a key kingdom in the galactic alliance.

As a boy of 9 during the great 1947 Flying Saucer scare, I used to hope one such celestial vehicle would land in those fields and whisk me away to see the wondrous sights of more advanced worlds. And through the years, many an MMM article has been started or finished here, or on the way here or on the way home.

I have always been puzzled that there are so many astronomers, amateur and professional, who can study the stars and never feel sucked up by them, never feel the need to go out there, to meet the stars half way, to look at them from the other side, that is from somewhere else looking this way. I always loved the stars and that is why I always wanted to go out there among them. As the King (Yul Brunner) would say in Rogers and Hammerstein's The King and I, "it is a puzzlement." By and large, astronomy clubs are as fallow as recruiting grounds as are science-fiction conventions. Go figure!

I named my little hideaway Elm Vue, because on the far side of these fields stood a tall solitary gigantic elm, long since the victim of Dutch Elm Disease and lightning. Were I to rechristen my sanctuary today, it would be as "Skyfields," for while, true, this place is not on a riverbank or lakeshore, it is on a beach that opens up to the sun and cloud-ruled sky by day and to the Milky Way and Northern Lights by night. Others can have their rivers and lakes. I have the Universe!

Statement from President-Elect Barack Obama on India's Launch of Chandrayaan-1 Moon Mission

<http://www.spaceref.com/news/viewpr.html?pid=26772>

October 22, 2008

"With India's launch of its first unmanned lunar spacecraft following closely on the heels of China's first spacewalk, we are reminded just how urgently the United States must revitalize its space program if we are to remain the undisputed leader in space, science, and technology.

"My comprehensive plan to revitalize the space program and close the gap between the Space Shuttle's retirement and its next-generation replacement includes \$2 billion more for NASA – but more money alone is not enough. We must not only retain our space workforce so that we don't let other countries surpass our technical capabilities; we must train new scientists and engineers for the next generation. My comprehensive space policy focuses on reaching new frontiers through *human* space exploration, tapping the ingenuity of our commercial space entrepreneurs, fostering a broad research agenda to break new ground on the world's leading scientific discoveries, and engaging students through educational programs that excite them about space and science.

"As a child, I remember sitting on my grandfather's shoulders and watching the Apollo astronauts return from a splashdown to Hickam Air Force Base, dreaming of where they had been. It inspired my imagination and gave me confidence in what we as Americans could achieve. It's time for a space program that inspires our children again. As President, I will lead our space program boldly into the 21st Century – so when my daughters, and all our children, look up to the skies, they see *Americans* leading the way into the deepest reaches of our solar system." <BO>

Editor's comments:

While Obama did not go into specifics, the general tone is rather reassuring, especially as far as unmanned space "exploration" goes, but also *manned* space operations – see bold italics above.

Here is where we come in:

Now we have to bring him up to speed on space resources and development possibilities. This should not be surprising, as our leadership in space has become inseparable from American pride.

Space is not an "entitlement" area, but a growth area for our economy even as other "infrastructure" needs would be. Space spending could be a major part of our economic recovery. We can hope he sees this.

After his inauguration, you can send the new president your opinions stressing the importance of continued manned space operations, the establishment of a permanent and growing presence on the Moon and of the opening of a human frontier -- another "basket" on Mars, and the need to open space operations to private enterprise at comments@whitehouse.gov <PK>

"The human race shouldn't have all its eggs in one basket, or on one planet. Let's hope we can avoid dropping the basket until we have spread the load."

-- Stephen Hawking

Someday people will be on the farside of the Moon. If they have crystal clear visors that catch no glare, they will see the Milky Way as no one can see it on Earth, not from Northern Wisconsin, not from SC Utah, not even in the middle of a six-month night in the heart of Antarctica. With no atmosphere, no haze, no clouds, no wind, one might see stars down to the 7th and even the 8th magnitude. Hundreds of stars, at any rate, to each one we can see in the ever fewer Dark Sky areas left on Earth. In the cities, one sees only a few hundred of the brighter ones at best. Is it any wonder that our young people don't get hooked on the heavens! Why they can't see them any more! But thank heavens for the Moon. It is the clearly round globe of the Moon that lets us visualize other planets in our own system and perhaps around most of the solitary (non binary) stars in the galaxy.

As a young man, I fancied myself employed by a Farside observatory, Earth forever out-of-sight, out-of-mind. I've always had a bit of a monastic streak. I'd be dedicated to studying the heavens, and especially listening for whispers from the stars, intelligent ones.

But I hear them now anyway. Nature never does anything once, you know. Some people have a dogmatic or emotional need to believe we are alone and misweigh or misinterpret every shred of evidence accordingly. But "they," our counterparts must be everywhere -- granted too far apart in both space and time to be contemporary neighbors, though all averages include exceptions.

But it is enough to know they are there, that however different we may be physiologically or culturally, we all share the same creative condition. We are born, we struggle to make sense of it all, we die. I look out there and say "Hi all of you," knowing that in all corners of the universe others are looking up, realizing this very commonality as well, and saying "hi" in return. Who needs words? Who needs messages? Who needs proof? Meanwhile we all give glory to the wondrous creative forces that have brought us into being and nourished us to the point where we are aware of one another even if only in such a mystical way.

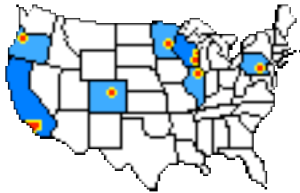
Everywhere, life must be hard, full of hardships and tribulations, joys and suffering, but eminently worth the struggle. And are we not all, wherever and whoever we are, made of stardust? stardust from brighter stars that have lived fast and hot and strewn their fusion dust into the void to become the stuff of planets and plants and creatures? *Of stardust thou art and to the stars thous shalt return.* Well, maybe not literally. But even if not, it is difficult to look up at these spangled skies and not feel that you have returned to them, and to celebrate life with all who share it whenever, wherever, however.

In the omniverse, we all give praise.

I hope you enjoyed this little essay, this brief exposure to some of the things that have shaped my vision. Maybe some of these thoughts will nourish your own contemplations of the wondrous world we live in and the unknown wonders of the worlds we live among. In everything, down to the slug, the cockroach, the dandelion, there is wonder – and up to the clouds, the stars and beyond. Feed the wonder in your soul. There is so much nourishment out there with which to do so.

And remember, life here is all too short! Absorb all you can and expand your soul with whatever you can, for *these are the good old days!*

10/31/2008 <PK>



**News & Events
of NSS
"MMM" Chapters**

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



**Lunar
Reclamation
Society, Inc.**
P.O. Box 2102
Milwaukee
WI 53201

www.lunar-reclamation.org

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

2008 LRS OFFICERS | BOARD* | Contact Information

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

LRS News

● **October 11th meeting:** Bob Bialecki brought along a DVD episode from the "Mars Rising" series that stressed the need for artificial gravity and radiation protection for crews en route to Mars and back.

LRS Upcoming Events - November/December

Saturdays: November 15th, December 13th, 1-4 pm
LRS Meeting, Mayfair Mall, Garden Suites Room G110
AGENDA: www.lunar-reclamation.org/page4.htm

November 15th

Bob Bialecki will bring a 2nd Mars Rising series DVD

December 13th - Everyone Welcome!

Pre-Holiday Potluck & Classic Sci-Fi Film

- **Joint event** of LRS and the Wisconsin Mars Society with former members and NSS members invited
- **Exhibits:** The Moon Society Solar Power Beaming demo
- **Pot luck** 1-2 pm: no guidelines, bring something to share, home made or purchased, hot or cold, solid or liquid, your choice.

LRS News continued

Our Dec 13th Feature Film 2-4 pm

MOON ZERO TWO

(1969) A space salvage expert and his partner become involved with a group of criminals intent on hijacking a small asteroid made of sapphire and crashing it into the moon for later recovery.

Stars: James Olson, Catherine Schell (Space 1999), Warren Mitchell - member Peter Wember says it's good.

COLORADO

Denver Space Society
(FKA The Front Range L5 Society)

**1 Cherry Hills Farm Drive
Englewood, CO 80113**

<http://www.angelfire.com/space/frl5/>

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

Monthly Meetings, every 2nd Monday, 7 PM
Next: November 10th, December 8th, January 12th
Englewood Public Library, Englewood, CO 80110
1000 Englewood Parkway, First Floor Civic Center

OREGON



Oregon L5 Society

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

voice mail / (503) 655-6189 -- FAX (503)-251-9901

<http://www.OregonL5.org/>

Allen G. Taylor allen.taylor@ieee.org

Bryce Walden moonbase@comcast.net

(LBRT - Oregon Moonbase) moonbase@comcast.net

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

Bourne Plaza, 1441 SE 122nd, Portland, downstairs

Nov 15 - Dec 20 - Jan 17

WISCONSIN



Sheboygan Space Society

728 Center St., Kiel WI 54042-1034

c/o Will Foerster 920-894-2376/h astrowill@tcei.com

SSS Sec. Harald Schenk hschenk@charter.net

>>> **DUES:** "SSS" c/o B. P. Knier

22608 County Line Rd, Elkhart Lake WI 53020

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

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

Nov 20th - UW-Sheboygan, Sheboygan, @room 6101

Dec 18th - The Stoelting House, Kiel

Jan 15th - UW-Sheboygan, Sheboygan, @room 6101

ILLINOIS**Chicago Space Frontier L5****610 West 47th Place, Chicago, IL 60609**Larry Ahearn 773/373-0349 LDAhearn@aol.com**MINNESOTA**
Minnesota Space Frontier Society
c/o Dave Buth 433 South 7th St. #1808
Minneapolis, MN 55415

David Buth (w) (612) 333-1872, (h) (612) 529-9871

Email: info@mnsfs.orgwww.mnsfs.org/**MN SFS News & Pictures****Ben's FallCon 2008 Photos**<http://freemars.org/mnfan/MCBA/FallCon/2008/>**October Meeting Pix**<http://freemars.org/mnfan/MAS/2008-10-Oct-Meeting/>**ValleyCon 32 Pix**<http://freemars.org/mnfan/ValleyCon/2008/>**Chapter Elections: Sat., Nov 15, 7pm, @ Craig Rostals**433 S. 7th, #1808 [punch 090 at Security Door]**PENNSYLVANIA**
Philadelphia Area Space Alliance
PO Box 1715, Philadelphia, PA 19105
c/o Earl Bennett, EarlBennett@erols.com
215/633-0878 (H)
<http://pasa01.tripod.com/>
<http://phillypasa.blogspot.com>

● **PASA regular business luncheon/formal meeting 1-3 pm, the 3rd Saturday of every month** at the **Liberty One food court** on the second level, **16th and S. Market**. Go toward the windows on the 17th street side and go *left*. Look for table sign. Parking at Liberty One on 17th St. Call Earl/Mitch 215-625-0670 to verify all meetings.

Next Meetings: For November we are meeting at The Crown Plaza in Cherry Hill N.J. at the Philcon Science Fiction Convention. We may meet for lunch on the 23rd. This could be changed to a supper meeting on the 22nd as our members wish.- **Regular spot: Dec 20 - Jan 17.**

October 18th Meeting notes and ideas: during the summer our activities were minimal but we did discuss

various events. Outside of our group there were several major space stories including the launch of several Chinese astronauts, the orbiting of two American private astronauts, and the roll out of Space Ship Two during the summer. We have met and talked of our travels and plans to attend various events, primarily the activities of Hank Smith and Dorothy Kurtz and Larry (the Web master). Michell and I traveled to the Baltimore Science Museum in August and highly recommend it as a destination and a source of ideas.

An ongoing discussion I have been having with Bill Pillegi, a friend interested in technology and space, has been brought up at the meetings in connection with thought experiments about doing the job the X-Prize is about: landing a device on the Moon that will travel a given distance (500 yards at minimum) and doing a particular set of imaging tasks and sending the images to the web. We have discussed the landing part in some detail, throwing out ideas about how to brake the craft to a non destructive landing. Everything was in play and Bill is quite imaginative in engineering terms. We even considered a modified airbag/kids punching bag system! This was predicated on not paying the weight penalty (and possible failure mode) of a rocket deceleration stage to remove the rovers delta V. The talk, also shared with meeting attendees at PASA meetings, extended to another critical area: the orbital transfer ("lunar transfer orbit" I think) and how this could happen. As noted in Ad Astra for Summer 2008, the contest runs till 2014. Also noted, in Moon Miners, the first prize may be won before then and a scientific or other payload should be on board to make your launch worthwhile. A few launch vendors have offered "at cost " launches so that will help, and we have a communications network that can reach the Moon already: the Ham Radio Moon Bounce communicators. This project, The X-Prize could really bring the public in as space supporters.

In the reading area, we have Doty's Dimensions, the journal of Dorothy and Larry's' travels, with the opening of The Intrepid Museum coming on November 8. She will probably report on this soon in her publication. We also have Hank Smith giving us the latest Philcon flyer and bookmark: Guest of Honor will be Tim Powers, Principal Speaker, John Picacio, Artist G.O.H., and Scott Christian Sava, Special Guest. This is November 21-32. Also, in connection with the science fiction community, PSFS will have Derrick Pitts, Chief Astronomer of The Franklin (formerly The Franklin Institute) as there December Speaker. Check PSFS.org for details. Michelle Baker sent us a timeline article from The Houston Chronicle on " 50 Years of Exploration" on the achievements (and tragedies) of NASA during this period and who was President at the time. She also attended the AARP convention in September and found a strong NASA presence at the event. Mitch Gordon brought in several articles, including his editorials on Philadelphia, and material from both Ad Astra and The Futurist with material on returning to the Moon, during the summer issues, in both.

Earl Bennett brought material from Nuts and Volts on Paul H. Verhages' Near Space articles, Analog Science Fiction and Facts November fact article, by Thomas A. Easton, " The 3D Trainwreck: How 3D Printing will shake up manufacturing" which outlines recent capabilities that many people can now afford in production of objects by computer controlled desk top machines. When we go to other planets more advanced

versions of these machines will help us reduce the inventory we have to carry or will allow us to make small items from native materials. See article.

The December issue has "Green Nanotechnology" by Richard A. Lovett. At first glance it doesn't seem space related but on explaining one application of cellulose, scaffolding to support bone and tissue regrowth on Earth, one of our attendees immediately pointed out the possible use for people who have been decalcified during long term no gravity/ low gravity missions. Another technology, nano particle tagging, could be used in cancer cell spotting for removal. In keeping with this materials science mini theme, the October NASA Tech Briefs has a brief description of the largest assembly of Carbon Nanotubes to date: it is the size of a blanket (with someone laying next to it for scale) from Nanocomp Technologies of Concord Mass. The founder of the company, David Lashmore, Joe Brown, invented the process for making single wall carbon nanotubes. More on this companies work, and this whole field, will be at the 2008 NASA Tech Briefs National Nano Engineering Conference November 12 and 13 at the Boston Colonnade Hotel in Boston. Registration is via techbriefs.com/nano

The last two reading material sources are: The AMSAT Journal for July/ August with several articles on technical topics, but more importantly is some details on problems and changes that are happening: Rich Hambly, the group's President, who has apologized to the membership on a relationship problem earlier in the year that resulted in problems between the engineering staff and the management of the organization. This should be corrected by the time this sees print. Another change was in the direction of the educational effort: Dr. H. Paul Shuch will no longer be creating The Orbital Classroom series as Education Director. The group is going to create The AMSAT Institute to do outreach in this area. The minutes of last years board of directors meeting are also in this July/ August issue

And finally on the reading front: the recent Wired magazine has an article on real amateur rocket scientists. That is, they build and launch real, big rockets out in the desert near White Sands Proving Grounds. These "Rocketheads" have reached 20 miles and are aiming for orbital flight in 2012! Many of these are Silicon Valley alumni and have the tech capabilities to make this a reality. I do not have the issue available but would recommend checking the publication for this and other great reports.

Activities recently and the Future: We where invited to present at the Franklin for International Space Week in early October. Our tables where mobbed for the whole time we where there and we came up with a complimentary plan for using the two tables and space available: Mitch Gordon did the Mars landings and our successes in the Apollo era as well as using his "scrap book" of great covers from Ad Astra and The Futurist for inspirational pictures to go with his talking points

We shared the Space Bricks and the talk on the Solar Sail display I built. I had the Lunar Lava Tube display and several other displays on small satellites, such as the Cubesat model and discussed the X-Prize race coming up as well as the possible extension to that for science experiments Lots of literature too!

Next is Philcon and we hope to have a table there. Our friend H. Paul Shuch will probably be at Philcon as a "Filk Singer", a fun sing along.

On a future project: Mitch and I are beginning to work out what will be needed for a Bernal Sphere Display. This will be for the spring of 2009. It will be hard to do, especially without one of the members of the Baker Bennett product development team.

Report submitted by Earl Bennett, President, PASA

CALIFORNIA



OASIS: Organization for the Advancement of Space Industrialization and Settlement

Greater Los Angeles Chapter of NSS
P.O. Box 1231, Redondo Beach, CA 90278

Creating a space-faring civilization with communities beyond Earth through education, political action, and chapter projects.

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

<http://www.oasis-nss.org/wordpress/oasis@oasis-nss.org>

Odyssey Newsletter Online

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

Regular Meeting 3 pm 3rd Sat. each month
Next Meetings Oct 18 - Nov 15 - Dec 20 - Jan 17
Information: OASIS Hotline, 310/364-2290; website.

Saturday, November 15, 2008 - 3:00 pm

OASIS Board Meeting at the home of Steve Bartlett & Tina Beychok, 7108 East Peabody Street, Long Beach

Saturday, December 13, 3:00 pm OASIS Board Meeting, **potluck holiday party to follow at 6:30 PM**
Home of Bob Gounley & Paula Del Fosse, 1738 La Paz Road, Altadena, CA 91001

Monthly Star Parties

LAAS (Los Angeles Astronomical Society maintains an active calendar of Public Star Parties in front of Griffith Observatory Satellite.

We do this on average, once a month, and add additional activities, whenever special events occur. We arrange the regular calendar a year in advance with the observatory staff, and respond to unplanned surprises as we can.

Griffith Observatory
2800 East Observatory Road
Los Angeles, CA 90027

Email outreach@laas.org

http://www.laas.org/Events_StarParties-Public.htm

LosCon 2008 - Nov 28-30th

<http://www.lodvon.org/35/index.html>

OASIS will be providing kids space programming, hosting a room party, and a fan table. Volunteers needed to help email us at convention_liaison@oasis-nss.org

NAME _____



STREET _____

CITY/ST/ZIP _____

PHONE#S _____

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

Moon Society dues include *Moon Miners' Manifesto*
Electronic MMM (pdf) \$35 Students/Seniors: \$20
Hardcopy MMM: U.S. & Canada \$35 - Elsewhere: \$60
P.O. Box 940825, Plano, TX 75094-0825, USA

 **INDEX to #220 NOV 2008** 

- p 1. Guest Editorial: Berin Szoka: \$2 Billion Can Buy Real Change in Space - Or More of the Same
- p 3. Lunar Enterprises and Development Part 4 of 5, Philip R. Harris
- p 11. Moon Society Journal: Introducing *Moonbeams*
- p 12. Society Leader Activities
- p 13. Chandrayaan-1 launches successfully
- p 14. Moon Society Chapters & Outposts Report
- p 15. Browsing Links; Video Links
- p 16. MMM Photo Gallery
- p 17. Power Beaming Competition Proposal, D.Dunlop
- p 18. Lunar Greenhouse Project Progress, P. Sadler
- p 19. "Skyfields," a personal essay, P. Kokh
- p 20. Pres-Elect Barack Obama Statement on Space
- p 21. LRS News; MMM NSS Chapters News

Moon Miners' MANIFESTO

Lunar Reclamation Society Inc.
PO Box 2102, Milwaukee WI 53201-2102

Address Service Requested

==> Mail Carrier, Time Sensitive Material <==

Member Dues -- MMM Subscriptions:

Send proper dues to address in chapter news section

==> For those outside participating chapter areas <==

- \$12 USA MMM Subscriptions; • US \$22 Canada;
 - US \$50 Surface Mail Outside North America
- Payable to "LRS", PO Box 2102, Milwaukee WI 53201

CHICAGO SPACE FRONTIER L5

- \$15 annual dues

LUNAR RECLAMATION SOC. (NSS-Milwaukee)

- \$12 low "one rate"

MINNESOTA SPACE FRONTIER SOCIETY

- \$25 Regular Dues

OREGON L5 SOCIETY

- \$25 for all members

O.A.S.I.S. L5 (Los Angeles)

- \$28 Supporter level dues with MMM

PHILADELPHIA AREA SPACE ALLIANCE

- Annual dues for all with MMM \$25, due in March or \$6 times each quarter before the next March

SHEBOYGAN SPACE SOCIETY (WI)

- \$15 regular, • \$10 student,
- \$1/extra family member

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



Please renew promptly so as not to miss an issue