



SearchLites

Vol. 18 No. 1, Winter 2012

The Quarterly Newsletter of The SETI League, Inc.

Offices:

433 Liberty Street
PO Box 555
Little Ferry NJ
07643 USA

Phone:

(201) 641-1770

Facsimile:

(201) 641-1771

Email:

info@setileague.org

Web:

www.setileague.org

President/Registered Agent:

Richard Factor

Secretary/Treasurer:

A. Heather Wood

Executive Director Emeritus:

H. Paul Shuch, Ph.D.

Trustee:

Martin Schreiber, CPA

Advisory Board:

Anthony Agnello
Greg Bear
Paul Davies, Ph.D.
Robert S. Dixon, Ph.D.
Frank D. Drake, Ph.D.
Claudio Maccone, Ph.D.
Clifford Stoll, Ph.D.

SearchLites, ISSN 1096-5599, is the Quarterly Newsletter of **The SETI League, Inc.**, a membership-supported, non-profit [501(c)(3)], educational and scientific corporation, dedicated to the electromagnetic Search for Extra-Terrestrial Intelligence. SETI League, Dr. SETI, and the above logo are all registered service marks of The SETI League, Inc. Entire contents copyright © 2012 by The SETI League, Inc. Permission is hereby granted for reproduction in whole or in part, provided credit is given. **All opinions expressed are those of the individual contributors.**

Up the Sky Without a Shuttle by H. Paul Shuch, Executive Director Emeritus

Those of us of a certain generation (and I'm afraid that includes most members of The SETI League) can recall with pride the glory days of the Space Race, when in the US, NASA represented humankind's boldest hopes. This was a time of Giant Leaps, when the agency was replete with brave astronauts, gifted scientists, brilliant engineers, powerful rockets, limitless dreams -- and a sizeable budget. It seemed as though we could accomplish the impossible -- and, in a way, we did.

Those days are, if not gone forever, at least rapidly fading into dim memory. Today, NASA is an agency with a space mission, but no ticket to ride. Does the end of the Shuttle era mean the end of the dream?

I hope not. Over the past half-century, we on Planet Earth have made halting strides away from ideological competition, toward global cooperation. The International Space Station, though still a work in progress, has shown us what can be accomplished when we put nationalism aside in favor of human progress. The fact that American astronauts are dependent upon our Russian neighbors to hitch a ride there, though an embarrassment to those who think in terms of a once-great spacefaring nation, speaks to our newfound status as a spacefaring world.

Still, here we are without a re-usable launch vehicle. At the very least, it's one small step backward.

Not that the Shuttle ever achieved its promise of being a re-usable launch vehicle. At best, it was a re-manufacturable one. Parts of it would return from a mission, get wheeled into the chop shop, and (months and millions later) re-emerge with little more in common with its previous iteration than a pile of bricks and a name. But, at least, it gave the illusion of an ongoing human spaceflight program. That illusion was shattered with the final landing of the last operational shuttle.

And what has all this to do with SETI, the electromagnetic Search for Extra-Terrestrial Intelligence? More than you might think. Recall that when Congress terminated NASA's modestly funded SETI effort in 1993, many of us thought that was the end of the line. We were wrong, of course. Privatization of SETI kept the dream and the mission alive (though at a more measured pace) for the past two decades, and continues to do so today. So may the privatization of human spaceflight keep a different dream alive in a post-Shuttle era.

Richard Branson's Virgin Galactic venture, its Burt Rutan designed *SpaceShip Two* soon to carry passengers into sub-orbital flights, is admittedly a far cry from a Space Shuttle, and is wholly incapable of attaining orbital velocity. It is, however, a truly reusable space vehicle, one which can be turned around and re-launched in a matter of days, not months. I have little doubt that true orbital vehicles will follow (and, in fact, may be already waiting in the wings), ushering in a new era of access to space -- propelled as much by the profit motive as by hybrid rocket motors.

Much as happened in the early days of NASA SETI, the Space Shuttle era began in fits and starts. Cost overruns and launch delays were the norm. Thirty years ago, I had hanging on my office wall an STS-1 launch calendar. It showed the year (1981), and an artist's conception of a Shuttle orbiter, along with the optimistic words "STS-1 -- we *will* launch in March!" Below, in a bit of whimsy that proved both realistic and prophetic, were block calendars for the twelve months of the year, labeled January, February, March, March, March, March, March, March, March, and March. I suspect scheduled commercial spaceflights will run to a similar calendar.

Many of us in The SETI League happen to be licensed radio amateurs. We were motivated and inspired by the Shuttle Amateur Radio Experiments, and some of us had the privilege of talking to astronaut/hams as they orbited the Earth. The SAREX program morphed into ARISS (Amateur Radio on the International Space Station), and continues to this day. We can still talk to astronauts in low Earth orbit. But, few of us ever contemplated being on the high-altitude end of such a radio contact. Now, we can. Sure, the ticket costs \$200,000, but that's today. I can easily envision a tomorrow in which members of our fraternity can venture into space with our hand-held transceivers, handing out contacts for little more than the cost of an ocean cruise. And I'm talking ordinary citizens here, not just astronauts! With the privatization of spaceflight will come its true democratization.

I look forward to the day when commercial space access is the norm, when we look fondly back to the quaint old days of costly Shuttle missions, viewing the Space Shuttle as the technological ancestor to modern spacecraft. After all, with all that's been accomplished in the privatization of SETI over the past two decades, isn't that how we're beginning to view the brief (but fondly remembered) NASA SETI program?



Guest Editorial:

An Open Letter to All Wall St. Occupiers

by **Adriano V. Autino**

President, Space Renaissance International

Space Renaissance International salutes you for your courage and sacrifice in standing up for the interests of all people of the world in the face of corporate greed that would sell out the planet for the sake of profit. You have demonstrated the power of the public to influence the course of history in the same way that protesters in many Middle East countries have proven that democracy can prevail over autocratic rule.

There are countless examples of how the manipulators of money have taken advantage of the freedoms embodied in the capitalist system to wreck the lives of millions. The economic collapse witnessed in recent years is one of the most glaring of such abuses in recent years. One must look no further than the global environment, however, to see the wholesale damage wrought by placing selfish gain over the common good. This practice has imperiled almost 7 billion human beings, placing humanity and civilization on the precipice of total destruction. We would like to remind you that in addition to protesting the violations of human values symbolized by Wall Street there are also worthwhile goals to demonstrate for – goals that offer a way out of the dilemma left by careless following of traditional political and economic paths. The democratic freedoms can be used for very much higher ends! These ambitions are found in Space Renaissance (<http://www.spacerenaissance.org/>), which is a movement dedicated to the exploration and development of extraterrestrial space. The only way to assure the continuation of our civilization and begin to relieve our mother planet from the burden of human development, fulfilling mankind's destiny to advance to a solar civilization, taking advantage of all the resources beyond the confines of Earth to improve the lives of all its residents.

Space Renaissance – which is likened to the Renaissance that began to move Western civilization out of the Dark Ages some 600 years ago – offers an alternative to the traditional economic models of capitalism and state socialism. It would meld free enterprise with the collective spirit and will to further humanity's horizons and expand our reach to solve problems ranging from energy and the environment to education and healthcare.

We, the people, can realize low cost access to Earth's orbit (first step for any other goal), build space-based solar power stations to capture the Sun's power and relay it to Earth via microwave or some other method to provide the bulk of the planet's energy needs. We can create millions of jobs worldwide through a space industry geared toward civilian passenger space transportation and hosting, tapping resources on the Moon and Near Earth Asteroids, collecting solar energy, building habitats for humans in orbiting settlements or perhaps on the Moon, and – perhaps most significant of all – launching a program over the coming decades to fulfill the eternal dream of traveling to other star systems within our galaxy or beyond.

All of this is possible, and there already are millions of people working toward such goals. It will take an international effort, unbridled by the current global political structures, and unencumbered by exclusive and restrictive economic systems symbolized by Wall Street. We hope you will join with us in advancing the spirit and fulfilling the goal of advancing civilization into a new age – one of Space Renaissance.

Disclaimer: The opinions expressed in editorials are those of the individual authors, and do not necessarily reflect the position of The SETI League, Inc., its Trustees, officers, Advisory Board, members, donors, or commercial sponsors. ❖

Event Horizon

SearchLites readers are apprised of the following conferences and meetings at which SETI-related information will be presented. League members are invited to check our World Wide Web site (www.setileague.org) under *Event Horizon*, or email to us at info@setileague.org, to obtain further details. Members are also encouraged to send in information about upcoming events of which we may be unaware.

March 10, 2012: 37th Trenton Computer Festival, The College of New Jersey, Ewing, NJ.

April 21, 2012, 0000 UTC - 2359 UTC: Thirteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 22, 2012: Eighteenth SETI League *Annual Membership Meeting*, Little Ferry NJ.

May 22 - 24, 2012: IAA *Global Space Exploration Conference*, Washington, DC.

May 25 - 28, 2012: *Balticon 46*, Hunt Valley, MD.

July 26 - 28, 2012: *Central States VHF Conference*, Cedar Rapids, IA.

August 30 - September 3, 2012: *Chicon 7*, 70th World Science Fiction Convention, Chicago IL.

September 2012 (dates TBA): *Sixth International Congress for Radio Astronomy*, Medicina, Italy.

September 25 - 28, 2012: *Fourth IAA Symposium on Searching for Life Signatures*, Republic of San Marino.

October 1 - 5, 2012: *63rd International Astronautical Congress*, Naples, Italy.

October 12 - 14, 2012 (tentative): *AMSAT Space Symposium*, Orlando, FL.

April 20, 2013, 0000 UTC - 2359 UTC: Fourteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 21, 2013: Nineteenth SETI League *Annual Membership Meeting*, Little Ferry NJ.

August 29 - September 2, 2013: *Lonestarcon 3*, 71st World Science Fiction Convention, San Antonio TX.

September 23 - 27, 2013: *64th International Astronautical Congress*, Beijing, China.

April 19, 2014, 0000 UTC - 2359 UTC: Fifteenth annual SETI League *Ham Radio QSO Party*: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 20, 2014: Twentieth SETI League *Annual Membership Meeting*, Little Ferry NJ.



Ask Dr. SETI®

Hiding from SETI

Dear Dr. SETI:

Suppose there was a civilization around a nearby star that was deliberately taking steps to make itself less detectable (for whatever reason). How hard would it be to conceal itself from present SETI searches, assuming said civilization had technology no more advanced than ours?

Looking around various papers on the internet, it looks like the most detectable component of our radio emissions would be high power radars, like those used for air traffic control. According to one paper I found, "decades ago, it was thought that ETI would have an easier time spotting signals from over-the-horizon radars built during the Cold War... But those have since been superseded by frequency-hopping 'spread spectrum' broadband radars that are undetectable by ETI."

Is this accurate? If such a civilization used frequency hopping radars, would such signals be undetectable to SETI? I would guess that present SETI searches need long integration times, so a detectable signal would have to be long duration, and a signal that kept changing frequencies wouldn't be detected.

Online Reader

The Doctor Responds:

You raise a very good question, Reader, and I'm pleased to see you've done your homework!

The fact is, there are many things an extraterrestrial civilization can do to make themselves undetectable, should they wish to. But, spread spectrum itself is not a sufficient answer. It is a common misconception that direct-sequence spread spectrum (DSSS) signals cannot be detected without having the sequence key. To show that this is untrue, take a look at [this image](#) of a DSSS 1227.6 MHz GPS L2 P code signal, modulated on a +8.1 dBW carrier at a 10.23 MHz chip rate, with a resultant bandwidth of 20.46 MHz. This is the "secure" military GPS signal that's supposedly undetectable. Yet, you see it here, received by my Project Argus station!

Truth be told, there is no way for me to *decode* this signal without the proper algorithm, but *detection* is another matter altogether. And, this detection was done with a standard Fast Fourier Transform (FFT) algorithm. For even more complex (and more widely spread) modulation modes, a nonlinear adaptive transform such as the KLT would have to be used. These are very computationally intensive, but certainly not beyond our capabilities, even on backward Planet Earth.

Yes, the decommissioning of our old cold-war over-the-horizon search radars, plus the transition from high power terrestrial TV to cable and low-power digital satellite distribution, have made Earth less visible than we once were. Other civilizations may be getting dimmer in the RF spectrum, which may make our job of detection harder -- but not impossible.

Now, what if a civilization decided tomorrow to hide under a rock? If they ceased *all* electromagnetic emissions, they would indeed become radio-silent. But, if they did so right now, and were, let's say, 100 LY distant, they wouldn't go quiet *in our receivers* for another 100 years! So in SETI, as in comedy and so many things, timing is everything. ❖

Pete Worden Gives 2011 Billingham Lecture

SETI League members attending the International Astronomical Congress in Cape Town, S. Africa last October were privileged to meet Dr. Simon P. Worden (Brig. Gen., USAF, ret.), who delivered the annual *Billingham Cutting-Edge Lecture* that kicked off the SETI and Society session. Dr. Worden is the center director at NASA Ames Research Center where he leads a staff of nearly 2,500 civil servants and contractors and oversees an annual budget of approx. \$800 million providing the critical R&D support that makes NASA's and the nation's aeronautics and space missions possible. In just three years, Worden has completely transformed Ames, reinvigorating the center's workforce and taking a leadership role in important, cost-effective small satellite missions.

Worden has also put Ames on the critical path for all major NASA space exploration missions through effective use of the center's unique wind tunnels, arc jets, intelligent systems and supercomputer facilities and capabilities. Worden's 'GreenSpace' initiative has brought Ames' remote sensing capabilities to bear on air traffic safety, fighting forest fires, and the study of climate change. And Ames' new Sustainability Base facility will serve as a model for future eco-friendly, high-performance federal buildings. In recognition of these outstanding achievements, Worden was named the Federal Laboratory Consortium's Laboratory Director of the Year for 2009.

Prior to becoming Ames' director, Worden was a Research Professor of Astronomy, Optical Sciences and Planetary Sciences at the University of Arizona where his primary research direction was the development of large space optics for national security and scientific purposes and near-earth asteroids. Additionally, he worked on topics related to space exploration and solar-type activity in nearby stars. He is a recognized expert on space issues — both civil and military. He has authored or co-authored more than 150 scientific technical papers in astrophysics, space sciences, and strategic studies. Moreover, he served as a scientific co-investigator for two NASA space science missions.

In addition to his former position with the University of Arizona, Worden previously served as a consultant to the Defense Advanced Research Projects Agency (DARPA) on space-related issues. In 2004, he worked as a Congressional Fellow and chief advisor to the Chairman of the US Senate Subcommittee on Science and Space regarding NASA and space issues.

Worden retired in 2004 after 29 years of active service in the United States Air Force. His final position was Director of Development and Transformation, Space and Missile Systems Center, Air Force Space Command, Los Angeles Air Force Base, CA. ❖

Book Review

Solar System:

A Visual Exploration of All the Planets, Moons and Other Heavenly Bodies that Orbit Our Sun

the book of the best selling, award winning app

By Marcus Chown

Black Dog & Leventhal, November 2011

\$29.95 hardback

Reviewed by H. Paul Shuch

When astronomer Marcus Chown brought out his innovative *Solar System for iPad* eBook over a year ago, I told him, "this is almost enough to make me want to go out and buy an iPad." Just one month after I finally *did* go out and buy an iPad, Chown's book came out in hardcover! Timing is everything...

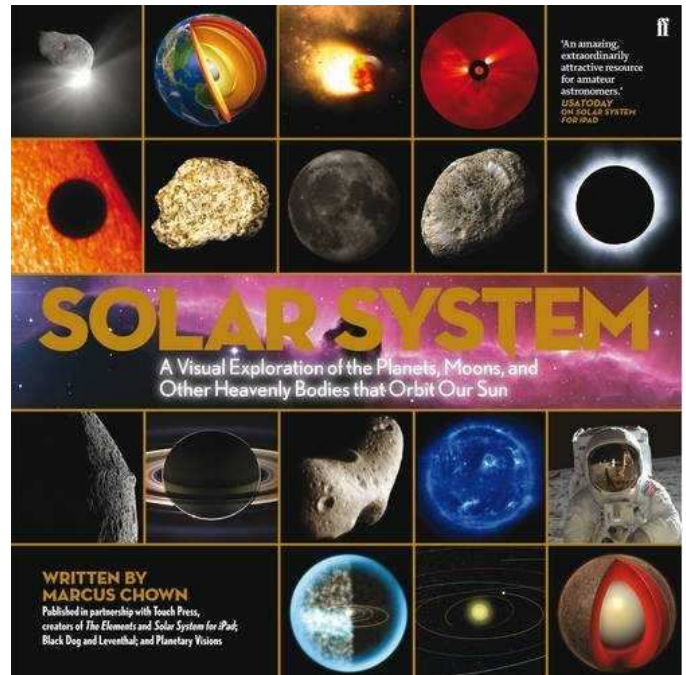
Solar System for iPad has been downloaded about 100,000 times in just one year.. "An out-of-this-world digital book that is as informative as it is beautiful," said *USA Today*. It won The Bookseller 2011 Digital Innovation of the Year as well as Best App of 2011. But, if you were not lucky enough to have an iPad, you were stuck.

Not any more.

Now, at last, comes the book of the App. Written by former CalTech astronomer, Marcus Chown, and with the very best of the 800 images of the interactive book, *Solar System* is an awe-inspiring introduction to our cosmic backyard. Perfect for Christmas!

Did you know that...?

- Today's sunlight is 30,000 years old.
- There is mountain range twice as high as Everest that was built... in an afternoon.
- The body that generates heat at the fastest rate in the Solar System is not the Sun.
- When Galileo pointed his telescope at Saturn, he declared it a planet... with ears!
- The planet Uranus was originally not called Uranus (It was called George!)



About the author: leading science writer Marcus Chown is cosmology consultant to *New Scientist* magazine and the author of numerous books including The Quantum Zoo (known internationally as Quantum Theory Cannot Hurt You).

Contents			
The Data Explained	6	Jupiter's Other Moons	137
Solar System Map	8	Saturn	138
Solar System	10	Saturn's Rings	148
The Inner Solar System Map	24	Titan	154
Sun	26	Enceladus	160
Mercury	38	Iapetus	164
Venus	46	Mimas	169
Earth	54	Hyperion	172
The Moon	66	Saturn's Moons	175
Mars	78	Uranus	176
Phobos	90	Miranda	182
Deimos	94	Uranus's Moons	184
Asteroid Belt Map	96	Neptune	188
Ceres	102	Triton	194
Eros	104	Kuiper Belt Map	196
Gaia	106	Kuiper Belt	198
Ida	108	Pluto	200
Hokawa	110	Eris	204
The Outer Solar System Map	112	Makemake	206
Jupiter	114	Haumea	207
Io	122	Orbit Cloud	208
Europa	126	Ceres	210
Ganymede	130	Cerberus	218
Callisto	134	Jules	221

IAC 2011 Photos

Cape Town, S. Africa, October 2011



SETI League members (left to right) Alex Antonites, Lori Walton, H. Paul Shuch, and Hans Van de Gronendaal, at the 2011 International Astronautical Congress in Cape Town, South Africa.



IAA Secretary General Jean-Michel Contant kicks off Academy Day, the day before the International Astronautical Congress commences.



On 4 October 2011, Executive Director Emeritus H. Paul Shuch kicks off the IAA 40th Symposium on the Search for Extraterrestrial Intelligence in Cape Town, South Africa, with his annual "Introduction to SETI Science and Technology."



A new International Academy of Astronautics Board and Officers are inducted during Academy Day in Cape Town.



Opening ceremonies included a number of native dance acts.



Eight SETI enthusiasts gathered for the annual IAA SETI Dinner.



Several local student groups entertained during the International Astronautical Congress.



Traditional music livened up events in the Cape Town International Convention Centre.



The popular Soweto String Quartet was well received at the Cape Town IAC.



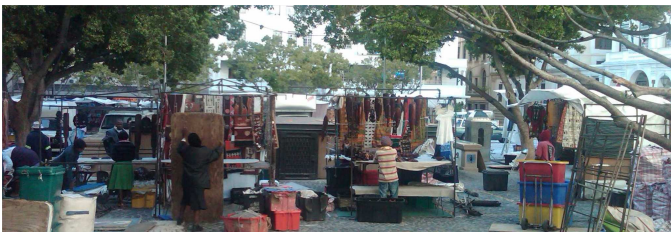
Prof. Martin Dominik of St. Andrews University, Scotland, leads off the SETI I session with the annual Rudolph Pesek Invited Lecture, this year titled "Exploration Rather Than speculation."



Opening ceremonies at the Cape Town IAC kicked off with a marimba band.



Prof. Doug Vakoch (right) introduces invited Billingham Cutting Edge Lecturer Dr. Pete Worden, whose talk was titled *“Expanding Human and Other Earth Life into the Universe.”*



Attendees at the International Astronautical Congress enjoyed shopping for souvenirs at Cape Town’s many open-air markets.



SETI League regional coordinators Alex Antonites and Lori Walton shared a glass of fine South African wine at the Academy Day reception.



The creators of the Global Positioning System were honored with an award from the International Astronautical Federation.



Non-Profit Org.
U.S. Postage
PAID
Williamsport, PA
Permit No. 38

ADDRESS SERVICE REQUESTED

To:

**Has your address changed?
Please correct your label and return it to us.**

SearchLites Volume 18 No. 1, Winter 2012
Printed in the USA

Annual Renewal: Is This Your Last SearchLites?
SETI League memberships are issued for the *Calendar Year*. Please check the expiration date indicated on your mailing label. If it reads December 2011 or earlier, you have already expired, and *must* renew your SETI League membership **now!** Please fill out and return this page along with your payment.

Please renew my membership in this category:

Full Member	\$50 / yr
Supporting Member (elderly, retired, or disabled)	\$35 / yr
Scholarship Member (full-time students only)	\$25 / yr
Household Member (same address as a Full Member)	\$15 / yr
Household Life Member (same address as a Life Member)	\$300
Life Member (until we make contact)	\$1,000
Sustaining Life Member – a generous <i>annual</i> pledge of:	\$1,000 / yr
Patron (priority use of The SETI League's radio telescope)	\$10,000
Director (Patron membership plus seat on advisory board)	\$100,000
Benefactor (a major radio telescope named for you)	\$1,000,000

Annual memberships are issued for the calendar year. Those processed in January through April expire on 31 December of that year. Those processed in September through December expire on 31 December of the *following* year. Those members joining in May through August should remit half the annual dues indicated, and will expire on 31 December of the same year.

Order Your Membership Premiums:

	(u /c)*	(o)*
Pocket protectors	\$ 3	\$ 4
Mouse pads	\$ 5	\$ 7
<i>Tune In The Universe! (CD-ROM)</i>	\$25	\$30
<i>Proceedings of SETICon01</i>	\$20	\$27
<i>Proceedings of SETICon02</i>	\$20	\$27
<i>Proceedings of SETICon03 (CD)</i>	\$15	\$17
<i>Proceedings of EuroSETI04 (CD)</i>	\$15	\$17
<i>Proceedings of SETICon04(CD)</i>	\$15	\$17
SARA Conference Proceedings:		
2006, 2007, 2008, 2009 (specify)	\$20	\$27
<i>SETI League Technical Manual (CD)</i>	\$10	\$13
<i>Project Cyclops 2nd Edition</i>	\$20	\$30
<i>The Listeners</i> by James Gunn	\$15	\$21
<i>Sing a Song of SETI</i> (Songbook)	\$10	\$13
<i>Sing More Songs of SETI</i> (Songbook)	\$10	\$13
<i>Sing a Song of SETI</i> (music CD)	\$15	\$17
<i>Demented!</i> (music CD)	\$15	\$17
T-shirts, specify M, L, or XL	\$15	\$22
SETI Nerd Gift Set (one each Mouse Pad, Pocket Protector, <i>Project Cyclops</i> and <i>Tech Manual</i>) at 20% Savings to Members Only:	\$30	\$43

***Includes postage to (u/c) US/Canada, or (o) other locations
Payments in US Dollars, check payable through a US bank**

Pleased to Accept PayPal

The SETI League invites you to pay your membership dues and additional contributions via credit card, using the PayPal online payment system. Simply log on to www.paypal.com and specify that your payment be directed to paypal@setileague.org.

Name: _____
 Address: _____
 Phone: _____ email: _____
 Ham call: _____ URL: _____
 Contribution enclosed (US Dollars): _____