



SearchLites

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The Quarterly Newsletter of The SETI League, Inc.

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Scaling Back on SETICon

Little Ferry, NJ., 19 February 2005 -- Five years after initiating its SETICon Technical Symposium, the nonprofit, membership-supported SETI League has had to scale back the annual membership event to more modest proportions. Because The SETI League chose to make its meetings affordable and accessible to a wide range of amateur radio astronomers, the events have proved a steady drain on the grassroots science group's limited financial resources. Hence, the organization's 2005 annual meeting will be held in conjunction with another, much larger and well-established conference.

"The last few SETICons cost us about \$4,000 each to put on," notes Dr. H. Paul Shuch, volunteer executive director of The SETI League. "Depending as we do upon membership dues and individual contributions, we thought our limited funding would be better spent on SETI science than on hosting scientific meetings." Consequently, Shuch announced, The SETI League's 2005 Annual Membership Meeting will be held on the campus of The College of New Jersey, in conjunction with the annual Trenton Computer Festival.

This year's Trenton Computer Festival is scheduled to run the weekend of 16-17 April, 2005, with The SETI League's membership meeting to be held there on Sunday morning, 17 April, from 10 AM until Noon. SETI League members desiring to avail themselves of a full weekend of social and technical activities are encouraged to register for TCF. Some SETI enthusiasts will be presenting papers on the scientific Search for Extra-Terrestrial Intelligence on Saturday, in conjunction with the regular TCF Technical Program.

There is a registration fee for TCF. Details (including location, lodging, and scheduled activities) appear on the TCF Website, www.tcf-nj.org. There will be no charge for those wishing simply to attend the SETI League Annual Membership Meeting, and all members (and prospective members) are most welcome. Annual meeting details, including the Agenda, appear online at www.setileague.org/seticon/meet2005.htm.

The SETI League expresses its gratitude to its friends at the Trenton Computer Festival and The College of New Jersey, for hosting them in a year in which their organization's finances preclude sponsoring their own technical event. Interested parties can show their appreciation by registering for TCF, and attending both events.

Largely using radio telescopes and optical telescopes, SETI scientists seek to determine whether humankind is alone in the universe. Since Congress terminated NASA's SETI funding in 1993, The SETI League and other scientific groups have privatized the research. Amateur and professional scientists interested in participating in the search for intelligent alien life, and citizens wishing to help support it, should email join@setileague.org, check the SETI League Web site at <http://www.setileague.org/>, send a fax to +1 (201) 641-1771, or contact The SETI League, Inc. membership hotline at +1 (800) TAU-SETI. Be sure to provide us with a postal address to which we will mail further information. The SETI League, Inc. is a membership-supported, non-profit [501(c)(3)], educational and scientific corporation dedicated to the scientific Search for Extra-Terrestrial Intelligence. ❖

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 11 - 12, 2005: *6th World Symposium on Space Exploration and Life in the Cosmos*, San Marino (Italy).

March 18 - 20, 2005: Contact 2005, Mountain View CA.

April 1 - 2, 2005: Dr. SETI ® is featured speaker at Atlanticon QRP Forum, Timonium MD.

April 2 - 3, 2005: Greater Baltimore Hamboree and Computerfest, Baltimore MD.

April 17, 2005, 0000 UTC - 2359 UTC: Seventh annual SETI League Ham Radio QSO Party, 14.204, 21.306, and 28.408 MHz.

April 17, 2005: SETI League Annual Meeting, held in conjunction with the Trenton Computer Festival, College of New Jersey, Ewing Township NJ.

May 7, 2005: Project OSCAR West Coast Space Symposium, College of San Mateo, San Mateo CA.

May 27 - 30, 2005: Balticon 39, Baltimore MD.

June 19 - 21, 2005: *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

July 28 - 31, 2005: *Universus 2005*, Osservatorio Astronomico Scientifico Gian Camillo Gloriosi, Montecorvino Rovella, Salerno, Italy.

July 28 - 31, 2005: *Central States VHF Conference*, Colorado Springs CO.

August 4 - 8, 2005: *Interaction World Science Fiction Convention*, Glasgow, Scotland UK.

October 8 - 9, 2005: *AMSAT Space Symposium* Lafayette LA.

October 17 - 21, 2005: *56th International Astronautical Congress*, Fukuoka, Japan.

October 27 - 30, 2005: *Microwave Update*, Cerritos CA.

April 22, 2006, 0000 UTC - 2359 UTC: Eighth annual SETI League Ham Radio QSO Party, 14.204, 21.306, and 28.408 MHz.

June 2006 (dates TBA): *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

July 2006 (dates TBA): *Central States VHF Conference*, Minneapolis MN.

August 23 - 27, 2006: *L.A.Con IV World Science Fiction Convention*, Los Angeles, CA.

September 8 - 10, 2006: SETICon06, in conjunction with the Fourth International Congress for Radio Astronomy, Heppenheim Germany.

September, 2006 (dates TBA): *57th International Astronautical Congress*, Valencia Spain.

April 21, 2007, 0000 UTC - 2359 UTC: Eighth annual SETI League Ham Radio QSO Party, 14.204, 21.306, and 28.408 MHz.

June 2007 (dates TBA): *Society of Amateur Radio Astronomers Conference*, NRAO Green Bank WV.

July 26 - 29, 2007: *Central States VHF Conference*, San Antonio TX.

August 30 - September 3, 2007: *65th World Science Fiction Convention*, Yokohama Japan. ❖

Tsunami Damage in Sri Lanka

an email from member Sir Arthur C. Clarke

29 December 2004

Thank you for your concern about my safety in the wake of last Sunday's devastating tidal wave. I am enormously relieved that my family and household have escaped the ravages of the sea that suddenly invaded most parts of coastal Sri Lanka, leaving a trail of destruction. But many others were not so fortunate. For over two million Sri Lankans and a large number of foreign tourists holidaying here, the day after Christmas turned out to be a living nightmare reminiscent of *The Day After Tomorrow*. My heart-felt sympathy goes out to all those who lost family members or friends.

Among those who directly experienced the waves were my staff based at our diving station in Hikkaduwa, and my holiday bungalows in Kahawa and Thiranagama all beachfront properties located in southern areas that were badly hit. Our staff members are all safe, even though some are badly shaken and relate harrowing first hand accounts of what happened. Most of our diving equipment and boats at Hikkaduwa were washed away. We still don't know the full extent of damage -- it will take a while for us to take stock as accessing these areas is still difficult.

This is indeed a disaster of unprecedented magnitude for Sri Lanka, which lacks the resources and capacity to cope with the aftermath. We are encouraging concerned friends to contribute to the relief efforts launched by various national and international organisations. If you wish to join these efforts, I can recommend two options.

Contribute to a Sri Lanka disaster relief fund launched by an internationally operating humanitarian charity, such as Care or Oxfam.

Alternatively, considering supporting Sarvodaya, the largest development charity in Sri Lanka, which has a 45-year track record in reaching out and helping the poorest of the poor. Sarvodaya has mounted a well organised, countrywide relief effort using their countrywide network of offices and volunteers who work in all parts of the country, well above ethnic and other divisions. Their website, www.sarvodaya.lk, provides bank account details for financial donations. They also welcome contributions in kind -- a list of urgently needed items is found at:

http://www.sarvodaya.lk/Inside_Page/urgently_needed.htm

There is much to be done in both short and long terms for Sri Lanka to raise its head from this blow from the seas. Among other things, the country needs to improve its technical and communications facilities so that effective early warnings can help minimise losses in future disasters.

Curiously enough, in my first book on Sri Lanka, I had written about another tidal wave reaching the Galle harbour (see Chapter 8 in *The Reefs of Taprobane*, 1957). That happened in August 1883, following the eruption of Krakatoa in roughly the same part of the Indian Ocean.

Arthur Clarke ❖

Guest Editorial:

Making a Case for METI

by Dr. Alexander Zaitsev,
Charles M. Chafer, and Richard Braastad

"Intelligent life in the Universe is an extraordinary and rare, perhaps even unique, phenomenon. This fact places an especial responsibility on humankind to ensure that this spark of consciousness does not fade away owing to its unwise actions, but instead flares into a blazing bonfire that could be observed even from the remotest regions of our Galaxy."

Iosif S. Shklovskii, *Universe, Life, Mind*

Many leaders of the modern SETI community oppose the deliberate transmission of messages from Earth to the stars in attempts to communicate with extraterrestrial intelligence (ETI). Instead, they prefer to take a passive approach called SETI: merely monitoring optical and radio wavelengths for messages sent by an ETI. This attitude is interesting in that, just a few decades ago, SETI was envisioned as a two-way communication process. In fact, the original acronym for the community was *CETI* for *Communication* with Extraterrestrial Intelligence.

Today, the deliberate transmission of messages to the stars is often referred to as **Active SETI**, as opposed, presumably, to **Passive SETI**, the monitoring approach described above. Other terms have been suggested for Active SETI: *BETI*, for Broadcast to Extraterrestrial Intelligence, and *METI*, our preferred acronym, for Messaging to Extraterrestrial Intelligence.

Several METI attempts have been made over the past few decades: the famous 1974 Arecibo message; the Pioneer and Voyager interstellar spacecraft that carry information about Earth for the benefit of whatever ETI may encounter the spacecraft in the future; and the Invitation to ETI Web site where Dr. Allen Tough of the University of Toronto has composed a message inviting ET, whom, Tough presumes, may be monitoring the World Wide Web, to contact us.

Furthermore, the authors of this paper have, collectively, conducted three METI transmissions: Cosmic Call 1999, Teen Age Message 2001, and Cosmic Call 2003, all from the Eupatoria Planetary Radar facility in Ukraine. Like Arecibo, our transmissions include scientific information. But unlike the Arecibo message, which was composed by a handful of scientific elites, our transmissions also include personal messages of thousands of people from around the world. In contrast to many SETI leaders, we strongly believe in a truly democratic approach to METI: that the people themselves, not just a handful of elites, should speak for Earth through their direct participation in METI.

Indeed, public interest in METI is widespread: Our Cosmic Calls have generated worldwide media coverage. Furthermore, many rank-and-file SETI enthusiasts appear to support METI: According to an informal poll on the SETI@home Web site (see <http://setiathome.ssl.berkeley.edu/polls.html>). As of January 8, 2005, 78% of respondents have answered *yes* to the question, *Should Earth send a signal for aliens to hear?*

Yet many of the elites in the SETI community's leadership remain stubbornly opposed to METI. They cite several arguments. We address three of them here:

1. METI is not scientific.

Quite the contrary, our METI transmissions are conducted under the guidance of scientists and engineers using a powerful planetary radar. The scientific messages included in the transmissions utilize sophisticated encoding techniques based upon basic mathematics and scientific concepts.

There are many analogues in the natural and social sciences to METI. Consider a medical researcher who injects a particular substance into laboratory mice to see how their biological systems react. Or consider an economist, a social scientist, who examines how a new government regulation affects a market system. Or consider an ecologist who studies how the introduction of a pollutant into the environment affects the living system in which we all exist. Similarly, we tweak a system, the ETI community in the Milky Way Galaxy, with METI transmissions in the hope that an ETI will respond, thus answering one of the most fundamental questions of science: Are we alone?

But METI is not just a science, it is also an art. Earth's science is the product of the human mind, which in turn is affected by the cultural and historical influences - and accidents - of human history. The way an ETI views nature may not conform to our scientific paradigm. So, to increase the likelihood of effective communication across interstellar space, we include in our METI transmissions non-scientific messages: text, audio, video, art, music, etc. For example, Teen Age Message 2001 included the *Theremin Concert for Aliens*, possibly the first analog interstellar radio message.

2. METI is risky

Is it possible that the ETI whom we contact is an evil, imperialistic sort that, upon receiving our messages, will fly to Earth and gobble us up? We call this the *Darth Vader Scenario*.

Setting aside the plausibility of physical interstellar travel, and whether it would be worth it to Mr. Vader to travel to our neck of the galactic woods, we should recognize that avoiding a risk is itself risky. Another equally plausible scenario is that the ETI we contact is a Luke Skywalker who responds to our METI message both by warning us of Lord Vader's sinister nature, and by telling us what steps we can take to defend ourselves. Assuming Darth is imperialistic and is exploring the various star systems of the galaxy, he may eventually find us anyway. Wouldn't we be better off with Luke's sage advice?

And what of the risk of not learning what we can from an ETI? Perhaps the knowledge and wisdom an ETI could impart to us would save us from humanity's self-destructive tendencies, such as nuclear war, biological warfare, or environmental degradation.

The tendency to focus on the dangers of exploration is nothing new in human history. Centuries ago, everyone *knew* that mariners who sailed too far over the oceans would fall off the edge of the Earth, or be eaten by sea monsters. Yet humans dared to explore. They took the risk of encountering the presumed sea monsters - their own version of Darth Vader - and discovered a new world inhabited by an *alien* civilization with alien crops and resources.

3. METI is pointless

This argument holds that CETI, the two-way communication process of which METI is a part, is too time-consuming. For example, a Cosmic Call transmission aimed at a star 100 light-years from Earth will take a century to reach its target star. Assuming ET replies, another century will elapse before we receive the reply. 200 years far surpasses the lifetime of any of us alive today.

History is full of examples of people who undertook great projects to benefit future generations. For example, it often took several generations of workers to build the great cathedrals of Europe. And in our everyday lives, parents and grandparents make tremendous sacrifices to ensure their offspring are educated and prepared to lead happy lives far after the parents and grandparents have passed away.

As Carl Sagan once put it, "For those who have done something they consider worthwhile, communication to the future is an almost irresistible temptation, and it has been attempted in virtually every human culture. In the best of cases, it is an optimistic and far-seeing act; it expresses great hope about the future; it time-binds the human community; it gives us a perspective on the significance of our own actions at this moment in the long historical journey of our species."

In conclusion, we subscribe to one possible solution to the Fermi Paradox: Suppose each extraterrestrial civilization in the Milky Way has been frightened by its own SETI leaders into believing that sending messages to other stars is just too risky. Then it is possible we live in a galaxy where everyone is listening and no one is speaking. In order to learn of each others' existence - and science - someone has to make the first move.

Editorial:

How Can We Get On Board?

by H. Paul Shuch, Ph.D.

Apparently, there's a SETI Board, and we're not on it. It must have been established while I wasn't paying attention.

Like many of you who are also members of Team SETI, the membership arm of the prestigious SETI Institute in California, I received the Institute's 2005 calendar in the post. Just on the flip-side of its cover is a delightfully concise, one-page history of the 20-year-old Institute. Its third paragraph, discussing the birth in 1960 of modern SETI science, mentions an old friend and esteemed colleague, thus:

"At the same time, Frank Drake, an astronomer at the National Radio Astronomy Observatory in Green Bank, West Virginia and now a SETI board member, conducted the first SETI experiment..."

Well, there's no denying that Dr. Drake performed the first SETI experiment, and in so doing became a pioneer in an important new field of science. But -- SETI board? Well, I knew he was on the Board of Directors of the SETI Institute. In fact, he's also on the Advisory Board of The SETI League,

and doubtless a member of numerous other Boards and Committees. But -- SETI board? That was news to me.

We've discussed in past editorials the pervasive nature of SETI science. In dozens of countries around the world, consenting adults practice SETI in the privacy of their own homes. Many of them belong to one or more SETI organizations, of which the SETI Institute and our own SETI League are but two. And as far as I know, each organization that supports SETI science is governed by its own Board. To the best of my recollection, there is no single bureaucratic body regulating SETI across organizational boundaries. In other words, *there is no SETI Board!*

OK, so what's the big deal here? Surely, every reader (including your faithful reporter) knew exactly what that calendar *meant*. But, with public confusion about the nature of SETI science already running high, doesn't it behoove us all to *say* exactly what we mean? SETI is indeed a science, not a single search. So let's all be careful not to imply otherwise.

The SETI Institute has accomplished amazing feats in its twenty year lifetime. They run an incredibly good show. But, competent and accomplished as they are, they are *not* the whole show. Their Board is not our Board, their research methods are not necessarily our research methods, (their budget is certainly not our budget), and to paraphrase the book of Ruth, their God is not our God.

The very strength of the SETI enterprise lies in its diversity. Nobody knows for sure which particular research methodology will first detect incontrovertible evidence of our cosmic companions, so we try them all. There are enough techniques to encourage participation from a broad range of players. Each has its own organizational structure, support base, mission, and vision. We try to cooperate, we all tend to be mutually supportive, we frequently work together -- and we each guard our autonomy. That, in my opinion, maximizes our collective chances for success, hastening the day of Contact. If one organization called the shots, if one Board directed all the efforts, we would all be diminished through uniformity.

I am very proud of what our colleagues at the SETI Institute have accomplished in the past twenty years. That's why I support them. I'm equally proud of what you, the members of The SETI League, have accomplished in the past ten years. That's why I continue to support you. That we have different corporate cultures is a good thing. That we have common goals is a given. That we have no single Board is a blessing.

SETI is an enterprise of the many. I'm glad we're a part of it. The fact is, The SETI League is very much onboard. We're just not on the SETI Board. Because there is none.

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. ❖

The Drake Equation: Adding a METI Factor

by Dr. Alexander Zaitsev

METI (Messaging to Extra-Terrestrial Intelligence) is an activity which I believe to be an inherent attribute of advanced civilizations. In order to account for the true prevalence of communicative civilizations (that is, those that engage in METI), I suggest we introduce a METI factor f_m into the classical Drake Equation. In this case, the modified Drake Equation takes on the following form:

$$N = R^* \times f_p \times n_e \times f_l \times f_i \times f_c \times f_m \times L$$

where

N = The number of potentially detectable civilizations in the Milky Way Galaxy

R^* = The rate of formation of stars in the Galaxy

f_p = The fraction of those stars with planetary systems

n_e = The number of planets per solar system that are suitable for life

f_l = The fraction of those planets where life actually appears

f_i = The fraction of life sites where intelligence develops

f_c = The fraction of communicative planets (those on which electromagnetic communications technology develops)

f_m = The fraction of communicative civilizations with clear and non-paranoid planetary consciousness (that is, those which actually engage in deliberate interstellar transmission)

L = The "lifetime" over which such civilizations transmit detectable signals into space

Let us try to estimate f_m . Since we do not adhere to the anthropocentric position, we should proceed from the assumption that Earth's consciousness is not essentially different from that of others. Then the METI factor f_m should be quite small, about 0.01. This figure derives from the fact that our civilization has engaged in about 100 past and current SETI programs (see, for example, Jill Tarter's "Archive of SETI," SETI 2020 Roadmap, pp. 381-425), and only one METI Program (at the Eupatoria Radar Telescope). Moreover, if we assume that an isolationist tendency prevails around the Universe, akin to that stated in Michael Michaud's recent editorial "Active SETI Is Not Scientific Research," and if we agree with his reasons, than we could say the METI factor f_m would be much smaller than 0.01, perhaps close to zero. But in that case, N is close to zero too, and SETI does not make any sense!

From this follows the next SETI Paradox: "Both *We* and *They* must either engage in both SETI and METI, or do nothing."

It is important to emphasize that the SETI pioneers sensed this dichotomy, and have paid attention to both SETI and METI. Philip Morrison recalls in "My Forty Years of SETI" that Giuseppe Cocconi came to him in 1958 with a question: "We already make gamma-ray beams. Why not send them out across space to see if anyone out there can detect them?"

Frank Drake and Carl Sagan developed and actualized the Pioneer Plaque, Arecibo Message, and Voyager Record. Nobel

Laureate Andrey Sakharov wrote in "Questionnaire CETI" in 1971: "I would like to notice the importance of designing and, especially, accomplishing practical projects directed to sending signals. This is the only way to understand subtle problems of contacts. Here, as it always happens, egoists end up with failure." At JPL, Steven Ostro wrote in "Project Moonbeam: An Omnidirectional Radio Beacon for the Lunar Farside" in 1989: "We might conclude that it is better to give than to receive, and that the war on silence must begin at home."

In this way, the classical Participatory Anthropic Principle, which was first put forth by John Wheeler in 1983, gains additional strength - intelligent low-entropic METI signals represent a conscious participation in the observable structure of the Universe. Only we who help in overcoming the Great Silence deserve to hear the voice of the Cosmos. ❖

Ask Dr. SETI:

Understanding the Jansky

Dear Dr. SETI:

The Jansky (Jy) is defined as:

$$1 * 10^{-26} \text{ Watts} / \text{m}^2 / \text{Hz}$$

Is the Hz term the frequency of reception, or the bandwidth of the received signal?

Argonaut Roy (via email)

The Doctor Responds:

Neither, Roy. It's the detector bandwidth of the receiver. But don't be discouraged; that was a really great question.

The key to understanding flux density is the "per Hertz" denominator in the definition of the Jansky. The Jansky is a unit of flux density used for natural continuum emissions. Since continuum sources are extremely broadband, it is difficult to exactly quantify their bandwidth. But we consider that they are broader than the detector bandwidth of the receiver being used to detect them, and assume that the received energy is more or less uniformly distributed across the receiver bandwidth. The detector will thus pick up more total power the wider its bandwidth is. First we measure total power scooped up by the antenna (in Watts per square meter of collecting area). Then, if we divide that power reading by the bandwidth of the receiver, in Hertz, we get flux density in Watts per square meter *per Hertz*. Since a Watt per square meter per Hertz is one helluva lot of power, we divide it by 10^{-26} to get a more realistic unit for measuring natural astrophysical phenomena. We call the resulting unit the Jansky, after the (accidental) father of radio astronomy.

So, to answer your question directly, we use receiver bandwidth when measuring flux density in Janskys. But remember that doing so only makes sense if the signal in question is spectrally **BROAD**, so that the recovered power can be assumed to be uniformly distributed across the receiver's detector bandwidth. While this is likely the case for continuum sources, it is decidedly *not* true for the kinds of narrow-band signals we look for in SETI (or, for that matter, any other signals likely to be generated by technology, as opposed to nature). That's why, although we characterize the sensitivity of radio telescopes in Janskys, the Jansky is *not* the appropriate

unit of measure for the sensitivity of a SETI receiver. For those, we define sensitivity simply in Watts per square meter.

For what it's worth, the threshold sensitivity of the typical amateur SETI station (such as yours, Roy) is on the order of 10^{-23} Watts per square meter. This is about the sensitivity of the late Big Ear Radio Telescope at Ohio State University, back in 1977 when it detected the famous "Wow!" signal. We achieve that sensitivity through digital signal processing, which makes the instantaneous channel bandwidth ("bin width") exceedingly narrow, thus shutting out much of the broadband background noise. That trick only works if the signal we're trying to receive is ALSO very narrow. That trick also makes the Jansky a meaningless unit for the SETI enterprise (although if you use your SETI station to do continuum radio astronomy, then for that application you can talk Janskys).

Early Warning of Natural Disasters

Dear Dr. SETI:

Will it be possible to use the SETI model to develop an open source global Disaster System to watch for Tsumami and other natural disasters?

An AOL user, via email

The Doctor Responds:

In the wake (pun intended) of the disasterous Southern Asia earthquake and tsunamis of December 2004, many are asking what a technological civilization can do to provide early warning of natural disasters. Thus, your question is very timely.

By "the SETI model," I presume you mean the SETI@home distributed processing experiment. (It is important to note that SETI is a science, not a single experiment. SETI@home is just one of dozens of SETI experiments being conducted, most of which involve radio telescopes, *not* networked computers. See this [editorial](#) for clarification.)

That said, the utility of the SETI@home experiment lies in its ability to use existing computer power to sift through a huge, extant database, one that would otherwise go unanalyzed. SETI@home is about post-processing. That is, the data sits in the archives for weeks or months or years, until somebody crunches the numbers.

The natural disaster situation is different in several respects. There is no massive database of geophysical data that I can think of, that contains the required predictive clues. Even if there were, post-processing of archival data is not likely to be sufficiently timely to provide meaningful warning of impending danger. Perhaps distributed computing can be harnessed some day to analyze weather and seismic data, providing a global monitoring means existed for generating that data. But analysis and feedback would have to be instantaneous, not eventual. I doubt that a global network of volunteers, using their idle computer cycles, could provide sufficiently timely warning, even if the data base could be generated and properly parsed out.

Of course, I am always prepared for someone more clever than myself to prove me wrong!



SETI League 2004 Program Service Accomplishments

(a) Science Programs:

- Coordinated 127 Project Argus radio telescopes in 23 countries, built and operated by volunteers, logging an estimated 100,000 hours of astrophysical observations. Argus stations analyzed and cataloged several candidate signals during 2004.
- Operated W2ETI Moonbounce Beacon for 4 1/2 months, providing 1600 hours of free microwave calibration signals to the world's amateur and professional radio telescopes.
- Provided Committee leadership (as co-chairman) to the SETI Permanent Study Group of the International Academy of Astronautics.
- 246 members contributed an additional 1,000 additional years of processing time to the SETI@home distributed computing experiment.
- Performed laboratory measurements to help refute a claim of extra-terrestrial technology on Earth.

(b) Technology Programs:

- Designed and tested an analog power combiner circuit for the Very Small Array radio telescope prototype.
- Provided design consultation and proposal assistance to the Montecorvino SETI Telescope Array (MStar).
- Coordinated and archived four closed technical email lists.
- Inducted five more amateur radio astronomers into the Extra-Terrestrial Century Club.

(c) Public Education Programs:

- Conducted EuroSETI04, The SETI League's first European Technical Symposium, and published Proceedings on CD-ROM.
- Conducted SETICon04, The SETI League's fourth annual Technical Symposium, and published Proceedings on CD-ROM.
- Distributed 15 copies of "Tune In The Universe!", a radio amateur's guide to the Search for Extra-Terrestrial Intelligence.
- Distributed 7 print copies of "The SETI League Technical Manual."
- Executive Director delivered ten public lectures in four countries, on radio astronomy techniques and related SETI science.
- Published more than a dozen technical articles in the popular and scientific press.
- Published third issue of "Contact In Context," a Web-based peer-reviewed SETI scholarly journal.
- Provided webmastering services to the Society of Amateur Radio Astronomers, the International Academy of Astronautics SETI Permanent Study Group, and Invitation to ETI.

(d) Media and Outreach Programs:

- Published four issues of SearchLites, the quarterly newsletter of The SETI League, Inc.
- Coordinated and archived two open public email lists.
- Distributed six Press Releases and twelve Editorials to over 700 media outlets worldwide.
- Filed 52 weekly updates to The SETI League's extensive website, bringing its total document count to over 2800 pages.
- 65 volunteer Regional Coordinators in 49 countries conducted a dozen print and broadcast media briefings and interviews.
- Executive Director granted print media and broadcast interviews in the US, Canada, Italy, and Germany.
- Presented the tenth annual Giordano Bruno Memorial Award, the third annual Orville N. Greene Service Award, four Best Ideas Awards, and twelve SETI SuperStar Awards.



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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.

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