SPUTNIK AND SETI: UNITING EAST AND WEST

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The realization of spaceflight technology and the birth of modern SETI science were contemporaneous and interdependent developments. The impact of early Soviet space accomplishments upon Western society is well documented. Less well known are the parallel strides in the modern Search for Extra-Terrestrial Intelligence, made by Eastern and Western scientist in the years following Sputnik. This short paper presents one Western scientist’s perspective on how the Space Age and the Age of Interstellar Contact have, over the past half century, brought our world closer together.

INTRODUCTION

In the “bad old days” of the Cold War, scientists in the United States and Western Europe were largely cut off from their Russian counterparts, and had little understanding of, or appreciation for, the great strides in space science being made in the Soviet state. The successful launch of Sputnik I, although announced in conjunction with the UN’s 1957 International Geophysical Year, still caught Western scientists largely by surprise, spurring in their countries both great advances in education, and a re-evaluation of Russia’s scientific and technological capabilities. Only years later, when their respective governments decided to wage peace, did Eastern and Western colleagues enter into a productive and collegial relationship. In recent years, Russian and European scientists have even developed a close cooperation regarding future space missions, the launch of space vehicles, and the development of future satellite elements and systems.

Educated in the United States, the author was a direct beneficiary of advances in American scientific and technological education that were largely a result of Western fears regarding Soviet technical superiority. “You are good at science; you are good at math,” his high school guidance counsellor told him, post-Sputnik. “Go and become an engineer; we can never have enough engineers to catch up to the Russians.”

Only quite recently, at the end of the Cold War, did the author finally have the opportunity to meet his anonymous Russian counterpart (one who had, for years, been keeping him employed, and vice-versa). This newfound brother related a similar tale. “You are good at science; you are good at math,” his high school guidance counsellor had told him, post-Sputnik. “Go and become an engineer; we can never have enough engineers to keep ahead of the Americans.”

Despite the regrettable fact that it brought the world to the brink of war on more than one occasion, the Space Race was largely a healthy competition, a backdrop against which mutual progress played out. SETI science, in contrast, was an enterprise largely neglected by governing bodies on both sides of the Iron Curtain. Hence, it evolved in something of a more cooperative environment, with Eastern and Western scientists communicating and collaborating across the geographic and ideological divide (to the extent that their respective governments would permit). This seems entirely appropriate, given that the overall objective of the SETI enterprise is to gain the admission of a united Earth into the galactic community.

COMMON ORIGINS

It is no coincidence that Sputnik and SETI were born mere months apart. As soon as humanity first realized its ages-old dream of space travel (albeit in close proximity to our home planet), we began grappling with the challenges of telemetry, tracking, communications, and control beyond Earth’s atmosphere. It was instantly obvious to telecommunications engineers of the day that the very

This paper was first presented to the Russian Academy of Sciences, during a SETI seminar at Moscow State University on 5 October 2007, in conjunction with the Sputnik Jubilee celebrations marking 50 years of the Space Age.
technologies needed to establish contact with our
own craft in space could readily be applied to the
larger problem of contact with distant civilizations
farther out in space.

By fortuitous temporal coincidence, the great 76
meter diameter parabolic dish at Jodrell Bank, UK
(then the world's largest and most sensitive radio
telescope) was commissioned only months prior to
the 4 October 1957 launch of the first Sputnik. This
dish is, in fact, the first Western instrument known to
have tracked and deduced the orbit of Earth's first
artificial satellite. Jodrell Bank was also the very
antenna which Western academics Giuseppe Cocconi
and Philip Morrison had in mind, when they pub-
lished their landmark paper "Searching for Interstel-
lar Communication" in Nature [1]. From Jodrell Bank
and similar instruments, the authors argued, human-
ity had finally attained the technological sophistica-
tion necessary to seek out intelligent, communicat-
tive civilizations inhabiting worlds warmed by the
fires of distant suns.

Unbeknownst to Morrison and Cocconi, at the very
time they were writing their seminal paper, at the
United States’ recently organized National Radio
Astronomy Observatory NRAO, the newly minted
radio astronomer Frank Drake was assembling equip-
ment, preparing to conduct the very search which
they were about to propose [2]. As Drake was ob-
serving in the utmost secrecy (not for reasons of
national security, but rather out of concern for his
professional reputation!), neither proponents nor
practitioners knew anything about the other. How-
ever, once the Morrison and Cocconi article saw
print, Drake was thrust into the limelight, as Project
Ozma went public.

Whether our Russian counterparts were at the
same time contemplating SETI science, we in the
West had no knowledge. That particular bridge was
crossed until a year later, following what was
arguably the world's first SETI scientific conference.
Hosted at NRAO by Drake himself, the 1961 Order of
the Dolphin meeting (the name chosen to as an ac-
nowledgment of the challenges of inter-species
communication, even between inhabitants of our own
planet) brought together a small cadre of SETI en-
thusiasts from a variety of disciplines. One among
them was the young planetary scientist Carl Sagan,
who went home from the meeting to contact the dis-
tinguished Academician Iosif Shklovskii. Their re-
sulting landmark publication "Intelligent Life in the
Universe" [3] set the standard for SETI collabora-
tions between East and West, even to the present
day.

SETI VS CETI

Initially, the acronym selected to describe attempts
at interstellar radio contact was CETI, for Communi-
cation with Extra-Terrestrial Intelligence. The name
implied an ambitious agenda: diallog with our cosmic
companions. The term CETI persisted in the Soviet
block for some time, and is in fact still preferred by
many Russian scientists to this day. However, in the
West in the 1970s, a subtle shift in scientific thought
was taking place. Interstellar distances, it was rea-
soned, were too vast immediately to support a two-
way flow of information. Better, it was thought, to
seek first those photons which had already been
traversing the interstellar medium at the fastest of
all possible speeds, which were even now washing
upon our friendly shores. So, in the US and Europe,
the whole enterprise became a receiving endeavour,
renamed SETI, or Search for Extra-Terrestrial Intellie-
gence.

The implications of this subtle difference go far
beyond nomenclature. In the West, the prevalence of
scientific opinion held that we should concentrate
our efforts on reception of extant signals from (pos-
sibly) extinct civilizations. This perspective precluded
transmissions from Earth into space (with but a sin-
gle exception, to be delineated shortly). In the East,
however, the desire for dialog persisted; thus, East-
ern CETI scientists remained (and, in fact, remain to
this day) much more open to the possibility of launch-
ing Earth's own signals into the black void of space.

The single exception to Western silence, to which
I have alluded, occurred in 1974, when a single, brief
but deliberate transmission into space was emitted
from the 305 meter diameter Arecibo Radio Observa-
tory in Puerto Rico, still the world’s largest radio
telescope. The instrument was just being
recommissioned after a prolonged outage for engi-
neering upgrades. The Director of the observatory
was by now Frank Drake (the very same Drake who
performed the world’s first modern SETI experiment
from NRAO in 1960, and hosted the first SETI confer-
ence there in 1961). As part of the dedication cer-
emony to mark the return of his great radio telescope
to service, he crafted a clever digital message, and
beamed it at the M13 cluster of stars, some 18,000
light years distant.

To this day, the Arecibo Message remains the only
concentrated Western attempt at deliberate trans-
mision to our cosmic colleagues. As shall be seen,
Active SETI, or METI (Messaging to Extra-Terrestrial
Intelligence) as it is now becoming known, is at
present largely an Eastern enterprise.
THE SOUND OF SILENCE

For nearly half a century, SETI scientists have sifted through the cosmic static, in search of that elusive fish in the galactic pond. To date, not one single definitive example of an extraterrestrial transmission has yet been detected. Could it be that they are listening too, waiting for us to initiate contact? Might it be time to break our radio silence, and make some noise from Planet Earth?

The notion of terrestrial transmissions into space is not without controversy. Space is, it has been argued, a dangerous place, filled with malevolent aliens lurking everywhere, just waiting for an opportunity to devour our fledgling civilization. While this perspective may seem to rational minds more than a bit paranoid, in truth we cannot say that transmission from Earth is totally devoid of risk. No matter how minuscule that risk might be, it cannot cavalierly be disregarded.

Nevertheless, METI has its proponents, and they are mostly in the East. Over the past decade, from the Evpatoria radar telescope in Crimea, three deliberate transmissions from Earth have been beamed toward neighbouring stars. Cosmic Calls I and II, and the landmark Teenage Message, consisted of carefully crafted analogue and digital content, intended to convey to our cosmic neighbours something about Earth’s technological and artistic sensibilities. Breaking planet Earth’s radio silence, these three transmissions (and perhaps others to follow) represent the very best of Eastern and Western scientific collaboration. Funded by an American, these messages were designed by two French Canadians, and transmitted by a Russian scientist from a Ukrainian radar facility. Although the Evpatoria transmissions cannot pretend to speak for all of humanity, in a way they speak to humanity’s aspirations.

REGULATION AND RESTRICTION

Despite the Arecibo and Evpatoria transmissions (or, more likely, because of them), there have been recent attempts to restrict and regulate transmissions from planet Earth. Within the International Academy of Astronautics (IAA) exists a SETI Permanent Study Group (SPSG) which grapples with such issues as international policy vis-à-vis SETI science. Proposals before the SPSG have of late included protocols establishing a moratorium on, if not an outright prohibition against, de novo transmissions from Earth to space.

Recognizing that not all possible transmissions subject Earth to equal exposure, the distinguished Hungarian astronomer Iván Almár has for the past three years been working on an analytical tool for quantifying the significance of transmissions from Earth. His resulting San Marino Scale (named for the small European republic where first it was proposed) is an integer, ordinal scale on the range of 1 to 10, which considers both signal intensity and information content. The author has been privileged to collaborate with Prof. Almár on the development of this analytical tool [4, 5].

Recently, the San Marino Scale has been invoked in developing a set of four case studies, quantifying the significance of four very different transmission modalities: the landmark 1974 Arecibo Messages, the more recent Evpatoria transmissions, near-Earth asteroid detection attempts from planetary protection radars, and the unconventional Invitation to ETI, an internet-based Active SETI experiment. On the one-to-ten ordinal San Marino Scale, these four examples weighed in at 8, 7, 6, and 4, respectively [6]. Clearly, this exercise has demonstrated, not all transmissions are created equal.

REGULATORY IMPLICATIONS

At its annual meeting in conjunction with the International Astronautical Congress in India in September 2007, SETI scientists embraced the San Marino scale as a rational first step in evaluating the impact of various transmissions from Earth. The IAA SPSG accepted it as the standard by which de novo transmissions should be measured, prior to establishing blanket policy in the arena of Active SETI. Their adopted resolution reads:

"Resolved: that the SETI Permanent Study Group of the International Academy of Astronautics hereby adopts the San Marino Scale, as it now exists or may be modified in the future, as an accepted tool for analysis of transmissions from Earth."

It has been suggested that any proposed international regulations should consider quantification on the San Marino Scale of any given transmission. Below a value of four or so, the impact of a transmission might be considered negligible, not worthy of international consultation or restriction. Above a threshold value (perhaps in the area of eight or thereabouts), it can be argued, the implications of a transmission are sufficiently significant to justify regulation. Between these two extremes, each transmission from Earth should be evaluated on its individual merits.
EAST MEETS WEST

Like the space scientists who launched the first Sputnik, SETI scientists in the East and West share a common goal: to gain entry of our home world into the Galactic Community. We shall continue to seek reception of signals from the stars. We shall also, it is to be hoped, continue to craft clever messages, and to beam these to our cosmic companions. Through such collaborative efforts as the San Marino Scale, it is hoped, we can continue to bring order and reason to our international deliberations. Only by adopting rational standards, accepted by East and West alike, can we ever hope together to speak for planet Earth.

REFERENCES


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