

DR. SETI'S STARSHIP

Searching For The Ultimate DX

Shouting in the Jungle

Nearly half a century of SETI science, and still not a single confirmed transmission from "Beyond." What kind of DXpedition is this?

When Frank Drake conducted the world's first SETI experiment in 1960, he was just days into the project when he heard a loud, periodic signal from Up There. "My God," he thought, "could it really be this easy?" The signal was, of course, RFI, a phenomenon with which every subsequent effort to detect evidence of extraterrestrial intelligence has been plagued. No, it *wasn't* that easy, then or now. The bands, it seems, are dead.

After a while, when the band seems dead, any sensible ham will want to stir the pot. So why aren't we calling CQ?

The whole question of transmitting from Earth is fraught with controversy. Every ham knows that if everyone is listening and no one is transmitting, no one is going to know when a band opening occurs. That's one of the reasons why we put propagation beacons on the air from exotic locations. Early on, SETIzens thought that advanced extraterrestrial civilizations would accommodate us immature Earthlings by providing just such beacons, to draw us into membership in the Galactic Club. Thus, the early SETI experiments, beginning with Drake's, concentrated on searching nearby sun-like stars for just such strong and steady beacons. If they are abundant, you'd think we would have heard one by now.

We haven't, though, and not necessarily because the bands are dead. Maxwell's laws quantify propagation, and they suggest that even a modest beacon, properly aimed, will easily be detectable by Earth's receive technology, across the interstellar gulf. Maybe, then, it's time to rethink our assumptions. Advanced civilizations, if indeed they exist, apparently *don't* announce their presence using radio waves. Do they perhaps know something we don't?

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Put out a CQ, or build a beacon of our own, many urge. If somebody doesn't break radio silence soon, the universe is going to remain a pretty lonely place. However, it's a dangerous universe out there, others argue. If you transmit, you're giving your position away to possible predators. No sane species shouts in the jungle.

Thus, the argument has raged for as long as humans have pursued SETI science. The only trouble is, no one knows what the risk of transmission really is, and we've never had tools to quantify it. Until now. . . .

It's widely recognized that not all transmissions are created equal. QRP is likely to pose less of a hazard to humanity than QRO, and a steady carrier is likely to be more detectable than a random pulse in the night. The level of risk associated with a given photon is related to its detectability, and detectability is a function of power, duration, direction, and information content. If we could assess all those, we could readily decide which transmissions are potentially hazardous and which are benign.

That is exactly what was proposed last spring in San Marino, a tiny republic perched on a mountaintop surrounded on all sides by Italy. San Marino, you see, maintained its independence for half a millennium, throughout countless wars of conquest, not by maintaining radio silence, but rather by having defensible borders in the form of steep cliffs. The ancient Roman catapults lacked the thrust to hurl rocks that high, so San Marino remained secure in its own 49 square kilometers of sovereign land.

But I digress. The Republic of San Marino hosts an annual SETI conference every March. This past March a friend of mine, an astronomer from Budapest, presented a paper there proposing a way to quantify at last the risk of transmitting from Earth. Iván Almár's proposal instantly became known as the San Marino Scale. (Yes, that's the same Iván Almár who concocted the Rio Scale for quantifying reception of SETI signals, as dis-

Value	Potential Hazard
10	Extraordinary
9	Outstanding
8	Far-reaching
7	High
6	Noteworthy
5	Intermediate
4	Moderate
3	Minor
2	Low
1	Insignificant

The San Marino Scale is an ordinal scale between one and ten used to quantify the relative risk of a given electromagnetic transmission from Earth. Each numeric San Marino Scale value correlates to a subjective measure of risk, from Insignificant to Extraordinary.

cussed in last quarter's column in *CQ VHF*.) Although no international body has yet adopted the San Marino Scale as a standard, it is a promising tool that helps us to contemplate the consequences of our actions.

Here's how it works: The San Marino Scale is an ordinal scale between one and ten used to assess the potential risk of employing electromagnetic communications technology to announce Earth's presence to our cosmic companions, or of replying to a successful SETI detection. In computing the San Marino index value, we must consider the power level of a given transmission not in absolute terms, but as a logarithmic ratio relative to the current background radiation from Earth in that particular frequency range. (We live on a radio-polluting planet. Only signals significantly stronger than our background noise are likely to stand out and be noticed.) We also consider where the antenna is pointing (straight down

doesn't represent much of a hazard), the signal's duration (for centuries key-down certainly has been more detectable than random dits), and information content (the more we say, the more *they* learn about us). Plug all these factors into an equation, and the San Marino number emerges. The higher the number, the more hazardous a given transmission should be considered.

I won't belabor the math here. The whole scale is explained in great detail on the website of the International Academy of Astronautics,¹ SETI Permanent Study Group, which I am privileged to co-chair. You can see it, and try it on for size, by browsing to <http://iaaseti.org>. On the left-hand main menu, click on Protocols, and then on San Marino Scale to find full disclosure. There's also a JavaScript calculator there to find out just how detectable (and, by some reasoning, just how hazardous) your EME station or OSCAR uplink might be.

No, I'm not proposing that any of us stop transmitting. However, before we reply to FT's CQ or broadcast one of our own, it would be nice to know the level of risk to which we are committing our defenseless planet. The San Marino Scale will tell us that. It will also provide the would-be regulators with a quantitative tool.

For years, the SETI community has been engaged in ongoing policy and protocol discussions dealing with the possibility or advisability of issuing either binding or voluntary restrictions or prohibitions against deliberate transmissions from Earth. The proponents of the San Marino Scale recognize that not all such transmissions imply the same level of risk or hazard. We hope that the international SETI community will consider using this tool for helping to define a threshold below which no prior consultation may be required in the event of a transmission from Earth, but above which discussions should take place, and a consensus be sought, prior to engaging in active SETI or replying to received signals.

Where do I stand? As a ham, I am committed to communicating. I'm loath to hide in my hilltop fortress, fending off invading Romans. Then again, though, I'm not the sole inhabitant of this planet. If my actions have the potential to affect others, it behooves me to analyze the consequences before I commit my whole planet to a course of communications and contact. The San Marino Scale will help me do that.

73, Paul, N6TX