## What Happens If We Find the Aliens?

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## One trillion planets







## So what happens if SETI picks up a signal?







Figure 1. Schematic representation of the growth in confidence of the extraterrestrial nature of a detected SETI signal.

INTERNATIONAL POLICY ON A REPLY FROM EARTH This is a White Paper on a major question which will emerge should unope evidence be found for the ensurement of extracemental successing life. One as part shirty years many clients have been made to Search for Excernmental handquare USE THE THE POWER of these scatters in proving connectedly. If we been a signal form andre protostante i a same to air whether we doubt reft. The protost is clearly important, and warrants some level of exemise even below the signal is This paper consists the background and separates for developing an international the second by which the question may be addressed and second that is the an international policy may be developed by the people of planet lash The scientific and suchaired involutions of SETI at new some dury your, eds. The an complet. They are downed from in the paper is an inclusion in the second that we can have be capable of a second commercial methods its an about of country and factor communication with maker distances therein we down The second part of the state part data with the state second reaction in the the description of a segment. The data's extension for comma or entering of the procession of the the balance of a balance. The balance was not as the section of the balance of th (12) the set offer and two lines lines and i produce a second by exclusion in the second by the second b L. Die Science. Technology and Incidences of 2023 The same in the same is a subscription of the same is a subscripti And the second distances of the second distances in the second distances of th For many bundleside of your, philosophies and some The Avenue of small be band. They arrend our has a balance of second

SUMMARY

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Internet actions

In many is the place target

Declaration of Principles Concerning Activities Following the Detection of Extraterrestrial Intelligence

## The public expects the big cover-up! But that's goofy ...

### A vast, hydraulic society nearby ... but who cares? A century ago ... a SETI success





### How would it affect religious belief?



#### Brother Guy Consolmagno



"The very learned theologians would be fascinated, because it would provoke many interesting theological questions."

"If your religion has survived millennia – if it can handle Copernicus, Galileo, and even Darwin – then ET should eventually prove palatable." Sociologist Bill Bainbridge believes the fundamentalists would

"Get upset, become angry, and feel beleaguered. They'd begin to snipe at science in a broader context, and perhaps argue that this is all a hoax, similar to what we see happening with global warming."



Don't underestimate the fundamentalists.

"Whenever scientists talk to theologians, they speak to scholars at the Harvard Divinity School, not to the people who represent the real believers. And the latter are likely to say 'no, that signal isn't actually from extraterrestrial beings. That's Satan, tempting you.'"

## What would they send? (What have we sent?)









## But there's this!

"Don't initiate contact!"



Stephen Hawking





### Don't take the chance ...



99%



1%

### What we know about alien intentions:



## But aren't we already telling the aliens we're here?

#### Television: 100 kW broadcast, at 500 light-years ...

### $\sim 10^{-33}$ watts/m<sup>2</sup> for carrier, $\sim 10^{-39}$ watts/m<sup>2</sup> for picture.

### Typical SETI sensitivity: 10<sup>-25</sup> watts/m<sup>2</sup>

Put another way ...

Our present SETI experiments could detect a TV carrier no farther than 0.05 light-years away!

### But a beamed transmission could do better

The Arecibo megawatt radar could be found by our present SETI experiments 400 light-years away!

#### "Send my love to the aliens. All the best, Paul." - February, 2008.

## Across the Universe ... en route 450 light-years to Polaris.



Suggestion by those who want SETI to forbid transmissions:

Our current transmissions are OK ...

But SETI should proscribe any directed signals!

### But this is nonsense!

Why?

Because if they can pose a threat across hundreds of light-years' distance, they can easily pick up our leakage.



## But the argument's even stronger.



# Use the Sun as a gravitational lens.

A very, very big telescope – great sensitivity.



# Problem is: Need to get receiver to >550 AU.

Voyager's only at about 100 AU. Hard, but worth it. And we could do it by 2100 AD.

### Example:

As noted, Arecibo could detect 1 MW transmitter on Arecibo-size dish from 400 L-Y.

Using Sun as lens, sensitivity would be enough to detect 3 watt transmitter from 400 L-Y.

Or 100 kW transmitter on other side of the Milky Way.

#### Find most of our powerful radars easily at hundreds of L-Y.

Distribution of Terrestrial Radars



Log EIRP (watts)

### What else could they see?

Detectable!

Gain at optical wavelengths  $\sim 5 \ 10^9$ .

Hubble can reach 30<sup>th</sup> magnitude, which is Sun at 3 million light-years.

Hubble with solar gravitational lens, could find NY ( $\sim 10^8$  watts in street lighting) at 300 L-Y!

### That's right: They could not only pick up our radio leakage, they could see our street lights!

And maybe some of our streets ...

# So there's no point in worrying about transmissions – now or in the future.





Even worse ...

We'd have to lay low

Not for the weekend Not for this year But ... forever!



And this has an interesting corollary for SETI:

- Beacons may not be what ET wields. Any society that's at least a few centuries beyond the invention of radio can find leakage.
  - Deliberate signals may not be out there. We'll find the aliens because ... they exist, and they leak that information into space.

Could we possibly understand?



### It will be one-way communication ...

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## It's not going to be these guys!



## Like drinking from a firehose of information ...

OUP

### Response to Steve:



Let's not stop ...

Amateur radio moon bounce, ionospheric radar, mapping of long-period comets.

Let's not forbid to our descendants ...

Solar system GPS, solar powersats, or Dyson swarms

## ... and let's keep looking.