Astrobiology News April 2016:
Searching for Life Searching for Us

Since 1960, astronomers have conducted more than 100 searches for extraterrestrial intelligence (SETI). All such surveys are necessarily based on certain assumptions regarding the behavior and desires of hypothetical alien civilizations, and as SETI scientist, Jill Tarter, has pointed out, they would more aptly be called searches for extraterrestrial technology, since it's signs of technology that we'd detect. Of course, it's probably safe to assume that intelligent life would be the source of that technology! Major SETI questions include which stars and exoplanets would make the best targets, what frequency range to search for messages, and what kind of sensitivity we'd need to detect artificial extraterrestrial signals. This month's issue of the journal *Astrobiology* featured an article that suggested a way to identify exoplanets whose hypothetical inhabitants might be predisposed to considering Earth an interesting target for communication.[1]

The article's authors suggest building on the tremendous success of the Kepler Observatory in finding exoplanets whose orbits periodically pass in front of (*transit*) their stars. A remarkable amount of information can be gleaned from transiting exoplanets through a technique known as *transit spectroscopy*, which may soon enable us to distinguish the chemical imprints of life in exoplanetary atmospheres. In order to observe a transit, however, the plane of an exoplanet's orbit must be nearly along the line-of-sight as viewed from the Earth. The same is true for any remote extraterrestrials – in order to view Earth transiting the Sun, their line-of-sight would have to lie very close to the plane of our Solar System, which we call the *ecliptic*.

The authors compile a list of 82 known stars fairly similar to our Sun that are within what they call the restricted Earth transit zone (rETZ), where they argue extraterrestrials might be able to characterize our planet's atmosphere from observing Earth's transits across the Sun. They point out that even if Earth chose to remain intentionally "radio-quiet", we couldn't hide from observers located in Earth's transit zone, if they exist. Such observers might describe our planet similar to the way Carl Sagan did after viewing Voyager 1's famous image of the Earth from a distance of more than 4 billion miles away - "a mote of dust suspended in a sunbeam."

Since I'm writing this during *EarthFest*, the Adler Planetarium's extended celebration of Earth Day, it seems appropriate to end with another famous quote from *Pale Blue Dot: A Vision of the Human Future in Space*, published only two years before Carl Sagan passed away, and one year before the discovery of the first

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[1] Heller, R. & Pudritz, R.E. The Search for Extraterrestrial Intelligence in Earth's Solar Transit Zone, *Astrobiology*, Vol. 16, No. 4, 2016 (DOI: 10.1089/ast.2015.1358)

exoplanet orbiting a Sun-like star. “It has been said that astronomy is a humbling and character-building experience. There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we’ve ever known.”[2]

Until next month,

Grace

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[2] Sagan, C. (1994) *Pale Blue Dot: A Vision of the Human Future in Space*, 1st ed., Random House, New York.