**Astrobiology News March 2018:**
**The Clarke Exobelt**

In 1945, the famous science fiction writer and futurist, Arthur C. Clarke, proposed placing satellites in geostationary orbit[1] for the purpose of communication on Earth.[2] Though not considered seriously at the time, Clarke's proposal became a reality within 20 years. This month, a paper published in the *Astrophysical Journal* suggests that systems of geostationary satellites around exoplanets orbiting distant stars (The Clarke Exobelt, or CEB), might signal technological civilizations comparable to our own.[3]

Most current searches for signs of extraterrestrial technology focus on detecting technology that might be produced by civilizations far more advanced than our own. Of course, assumptions regarding what such civilizations might actual develop becomes increasingly speculative as we project our 21st century ideas into the far future! The current paper takes a different approach, asking the question, what kind of technology might be detectable from a civilization closer to our own level of development, which makes a somewhat heavier use of their planetary space environment?

The author calculates the effects a Clarke Exobelt could have on the light from stars with transiting exoplanets[4] and concludes that some CEBs may be detectable even with out current instruments. Nearby exoplanets that orbit in the habitable zones of red dwarf stars might be the best candidates.[5] Furthermore, the kinds of observations necessary to identify a CEB can be "piggybacked" on efforts to search for rings and moons around exoplanets, so these observations wouldn't require any additional effort other than being alert for possible detections.

Of course, given the pace at which we've developed new technologies on Earth, I'm personally a bit skeptical about the prospects of detecting signs of another civilization so close to our level of development; however, I think the bigger takeaway message is that we presently have the ability to search for many signs of technology that would've been inaccessible to us 20 years ago. Much like the geostationary satellites Clarke proposed in 1945, who knows what the next 20 years will bring?

Until next month,

Grace

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[1] An orbit above the equator where the satellite's orbital period is the same as Earth's rotational period, so the satellite remains "stationary" with respect to that location on Earth.

[2] Clarke, A. C. 1945 *Wireless World*, 55, 305

[3] Socas-Navarro, H. 2018, "Possible Photometric Signatures of Moderately Advanced Civilizations: The Clarke Exobelt", *ApJ*, 855, 110 (7pp)

[4] The transit technique is used to identify exoplanets whose orbits pass in front of their stars, causing dips in the amount of light detected from the star.

[5] Such planets are expected to be "tidally locked". A tidally locked planet's orbital period (its "year) equals its rotational period (its "day"). Knowing the rotational period is critical to knowing the distance from the planet that would correspond to a geostationary orbit.