Astrobiology News November 2016:
Probing for Life on Other Worlds, Protecting Life on Earth

Technology initially developed for the space sciences has benefitted humanity in many ways, from improvements in medical imaging techniques to speed skating. (No, I'm not kidding about that last reference.) When I'm asked questions about the practical applications of space science, I typically recommend NASA's *Spinoff* publication, which has tracked these applications since 1976.[1] Of course, technology is also transferred to the space sciences from other fields. This month, I report briefly on how military technology used to monitor the air for potential biohazards in public places could be applied to searching for life on other worlds, and is being used to take stock of the health of our own planet.

The Bio-Indicator Lidar Instrument (BILI) is a remote-sensing device intended for use on a Mars rover. Described as a "rover's sense of smell,"[2] it might also be thought of as a rover's "eyes," since BILI is envisioned to look for dust plumes on the surface of Mars and then pulse ultraviolet light at them. Dust particles would absorb the ultraviolet light and fluoresce; that is, they would emit patterns of light that could reveal organic particles, their sizes, and even yield information on when they were produced. Because BILI is capable of detecting small levels of complex organic materials from a distance of several hundred meters, it can search for signs of life in a non-invasive way, without altering or contaminating the sample.

NASA has also employed this kind of technology in climate research, taking Earth's vital signs using satellites to monitor fluorescent signatures produced by healthy plants during photosynthesis[3], and to measure carbon dioxide levels.[4] I suspect this won't come as a surprise to anyone on this email list, but the overwhelming scientific consensus is that climate change is real, and primarily due to human activities.[5] NASA's role in providing the data needed to develop plans to mitigate and adapt to the effects of climate change is critical. Since this complex issue affects all life on our world, it calls for a unified human response that transcends political and religious differences. I encourage you to visit climate.nasa.gov to explore NASA's resources on this topic, and make sure to check out the "Beautiful Earth" gallery[6] for spectacular views of our precious and unique world!

Until next month,

Grace

---

[1] https://spinoff.nasa.gov/

[2] https://astrobiology.nasa.gov/news/new-instrument-could-search-for-signatures-of-life-on-mars/

[3] http://climate.nasa.gov/news/956/seeing-photosynthesis-from-space-nasa-scientists-use-satellites-to-measure-plant-health/

[4] http://oco.jpl.nasa.gov/
[5] http://climate.nasa.gov/scientific-consensus/
[6] http://climate.nasa.gov/beautiful-earth/