

Observing Earth as an Exoplanet. S. M. Som^{1,2} and T. D. Robinson³, ¹Blue Marble Space Institute of Science (1001 4th ave, Suite 3201, Seattle WA 98145, USA, sanjoy@bmsis.org), ²Exobiology Branch, NASA Ames Research Center (MS 239-4, Moffett Field, CA 94035, USA), ³Department of Astronomy and Astrophysics, University of California, Santa Cruz (1156 High St., Santa Cruz, CA 95064, USA)

Introduction: Earth is the only inhabited planet that we know of. How it is perceived from an external observer is interesting because such knowledge will guide how astronomers will detect life on other worlds. We propose an Earth observer mission on a hyperbolic trajectory, with cameras, spectrometers (UV, visible, NIR, & mid-IR), and multiwavelength photometers continuously pointing at Earth (except during opposition), to validate models regarding how the Earth's biological spectral signatures change with observer distance and with seasons. The effect of an orbiting moon could be examined as well. High throughput antenna's transmitting the Earth's image would provide impactful Education and Public Outreach material, building on the success of the DISCOVER mission's broadcast of Earth from space.

Characterizing terrestrial exoplanets present many significant observational challenges. Existing models, such as the Virtual Planetary Laboratory 3-D spectral Earth model have been validated using a combination of data from the EPOXI mission and the Atmospheric Infrared Sounder (part of the instrument suite of the Aqua satellite), but these data exist only for a fixed distance from Earth [1]. Wide wavelength coverage, and complete temporal coverage do not currently exist. As exoplanet characterizations will improve with upcoming space telescopes, experience with interpreting known inhabited planetary spectra would prove invaluable, particularly in anticipation of the proposed LOUVOIR observatory.

References: [1] Robinson, T. D.. (2001) *Astrobiology*, 11, 393-408.