



Title: Using Light Reflection to Detect Vegetation on Exoplanets

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Abstract:

The more we learn about the Universe, the more prominent questions about extraterrestrial life become, particularly those about multicellular life like our own. From the 1960s onwards, scientists have been investigating these questions in the field of astrobiology, pushed forwards by a few major figures, like Joshua Lederberg, Carl Sagan, and a few major projects like the Mars missions. The concept of a habitable zone and the use of spectroscopy may allow us to find signs of life on exoplanets. However, research thus far has failed to differentiate unicellular life like bacteria from multicellular life like plants or animals. Three papers by Christopher E. Doughty et al. attempt to develop a method to identify multicellular life by using bidirectional reflectance distribution functions and changes in planetary albedo. In this paper, I summarize the historical context of the Christopher E. Doughty et al. paper series, the widely-used tools in the field of astrobiology, and the papers themselves in chronological order beginning in 2010. It also reviews the methods of each paper, the unique questions each paper seeks to answer, how they build upon each other, and possible limitations in the methodology or results. It concludes that though the research conducted in these papers is flawed by its reliance on a limited model and does not consider non-tree-like life, it is still worthwhile research to continue to explore reflectance for use in astrobiology.