

A joint TPF & Earth Science opportunity

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Earth Scientists and Astrobiologists will both be interested in Earth observations from either a lunar satellite or a device at Moon-Earth L1. These locations offer an opportunity for a “poor person’s DSCOVR/TRIANA mission”, that would also include the midnight mid-IR image of Earth. Observations would provide a global calibration for current satellites to a precision of 0.1%. For Astrobiology, even far future devices to find and observe extrasolar terrestrial planets, will see planets as single image pixels. Many questions about the planet cannot be answered by spectroscopy alone. E.g. spectroscopy alone will not tell whether water vapor seen in an atmosphere is likely to occur with a liquid phase or not. However the addition of spectropolarimetry offers additional information both from the spectral polarization percentage, and the change of position angle accompanying this. Such information, when coupled with the phase variations seen as the planet moves around its orbit is in principle possible to interpret as indicators of the glint off an ocean, the evidence of the refractive index of cloud material and perhaps even more. The test of such hopes needs observations of the entire Earth through all position angles and seasons, and a parallel suite of images to provide ground truth. Modelling is an essential component of such a process, but only a ground truth comparison would be convincing.