EXOPLANET AND EARTH-CLIMATE SCIENCE FROM THE MOON. W.A. Traub[1], P. Chen[1], P. Goode[2], A. Eldering[1], K. Jucks[3], L. Kaltenegger[3], M.C. Noecker[4], S. Seager[5], and D. Waliser[1], [1]Jet Propulsion Laboratory, M/S 301-451, 4800 Oak Grove Dr., Pasadena, CA, 91109, wtraub@jpl.nasa.gov, [2]New Jersey Institute of Technology, Newark, NJ 07102, [3]Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138, [4]Ball Aerospace & Technologies Corp., Boulder, CO 80301, [5]MIT, Cambridge, MA 02139.

Introduction: Exoplanet science and Earth climate science observations could be done from the Lunar surface. A single small instrument package, REFLECT, could repeatedly measure the dynamic variations in the Earth's reflected-light spectrum, albedo, polarization, and image, 24 hours per day, for ten-plus years, using a telescope, spectrometer, photometer, polarimeter, and camera system. Any site on the Moon is acceptable, but the South Pole is an especially attractive site.

Earth as an Exoplanet: The Earth's reflected visible-light spectrum could be observed as if the Earth were an exoplanet. Dynamic variations of the color, spectrum, and polarization would be interpreted to derive the rotation period, evidence of continents and oceans, land-plant signatures, variation of column abundance of water and oxygen due to large-scale cloud-height changes, and evidence of weather and seasonal activity on Earth. The Moon provides a perfect platform for diurnal and long-term validation observations of the Earth as an exoplanet.

Earth-Climate Science: The Earth's visible albedo could be measured in several wide bands, for 10-plus years, at nearly all phase angles, using a photometer with excellent calibration and stability. These data would be combined with other albedo methods (low Earth orbit, geostationary orbit, ground-based observations of Earthshine) to derive an improved long-term measure of the Earth's Bond (global) albedo. Since albedo and greenhouse trapping compete to determine the surface temperature of the Earth, it is important to have precise measures of both quantities. The Moon is ideal for observing changes in the integrated reflected light (the global albedo) of the Earth.