The OSIRIS–REx Earth flyby: OVIRS views of the Earth and Moon. Amy A. Simon[1], Dennis C. Reuter[1], Joshua Emery[2], Richard G. Cosentino[1,3], Nicolas Gorius[4], Allen Lunsford[5], Dante Lauretta[6] and the OSIRIS-REx Team. [1]NASA Goddard Space Flight Center (amy.simon@nasa.gov), [2]University of Tennessee, Knoxville, [3]NASA Postdoctoral Program, [4]Catholic University, [5]American University, [6]University of Arizona.

Introduction: In September 2017, the OSIRIS–REx spacecraft executed an Earth gravity assist (EGA) flyby[1]. Soon after closest approach, OVIRS acquired spectral data of the Earth and Moon. These data were used to check the pointing direction of the OVIRS boresight, as well as provide a post-launch check on wavelength and radiometric calibration. Data taken on the approach to (101955) Bennu were used to refine the radiometric calibration. This final calibration coefficients were then applied to the Earth and Moon data.

Data Reduction and Analysis: During the Earth flyby, OVIRS acquired about 30,000 spectra, primarily in north-south or east-west scans, from a range of 150,000 to 5.09×10^6 km. These data were ingested into an automatic calibration pipeline where the data are converted into radiance units. As described in Simon et al. 2018 [2], the closest approach Earth data were first used to adjust the wavelength of each pixel using Earth atmospheric lines. The radiance values were then compared with those from other near-simultaneous Earth viewing instruments to adjust the pipeline radiometric coefficients. This method greatly improved the calibration in the 0.6 to 1.0 µm region, but the limited spectral coverage left uncertainty in other wavelength regions, Figure 1. The first full-disk Bennu approach data were used to confirm the radiometric coefficients derived from ground testing and Earth gravity assist observations. A few wavelength regions, particularly <0.5 µm and 1.5 to 2 µm, were adjusted based on the approach data, Figure 2.

Results: We will present maps of water and vegetation indices produced using J-Asteroid (this software is based on J-Mars) and based on the EGA calibration coefficients. Three days after the EGA closest approach, the Moon was also observed at 1.17×10^6 km when it subtended 3 mrad, nearly filling the OVIRS 4-mrad field of view. These data were also obtained in east-west and north-south scans. The Moon was never fully in the FOV, however, and the fast scan rate meant only a few spectra contain the Moon and suffer from scanning artifacts that affect the short wavelength regions. Calibrated lunar radiances match well with OCAMS imaging acquired at the same time. We will also present our search for the 2.7-µm mineral hydration band [3-6] in the OVIRS moon data.

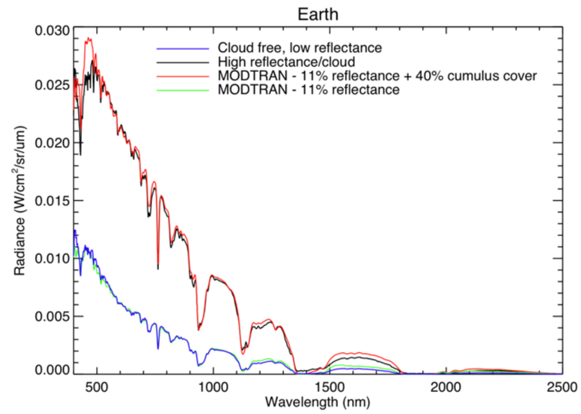

Figure 1. OVIRS spectrum of the Earth cross-calibrated with Earth observing satellites

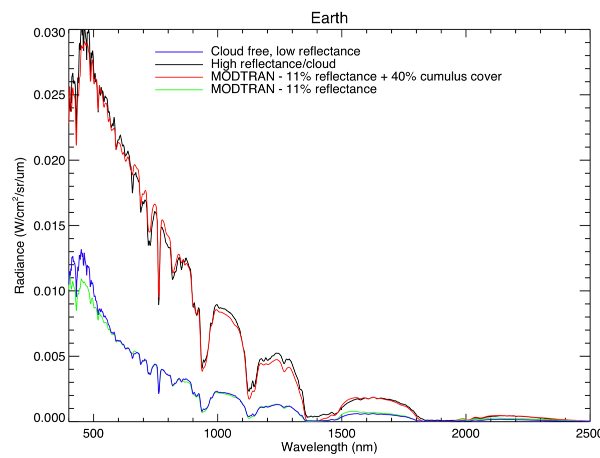

Figure 2. OVIRS spectrum of the Earth, after Bennu approach calibration.

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