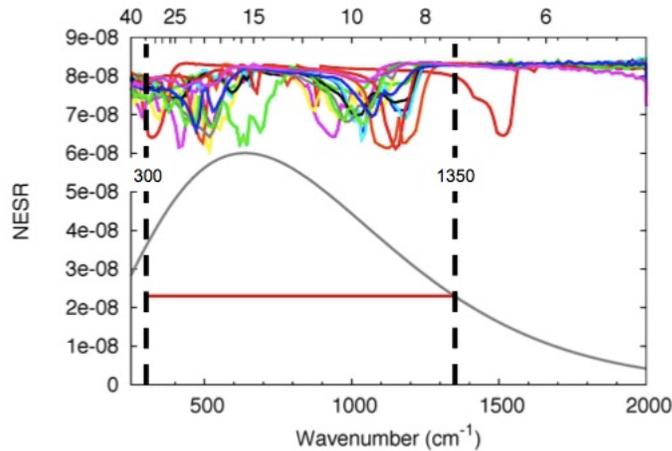


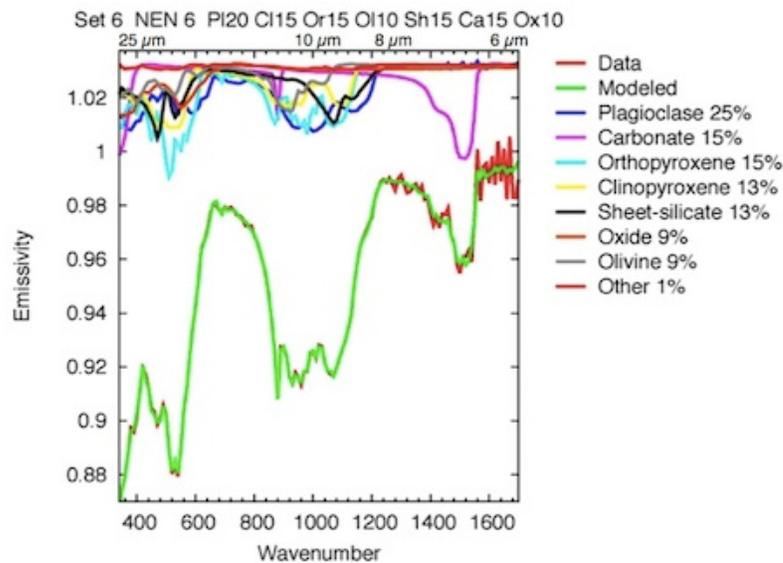
OSIRIS-REx Thermal Emission Spectrometer (OTES)

OTES (Arizona State University) is an uncooled, FTIR point spectrometer that maps the thermal flux and spectral properties of Bennu from $\sim 5 - 50 \mu\text{m}$ with a signal to noise ratio (SNR) of >325 between 7.4 and $33.3 \mu\text{m}$ for a 325 K target. The design of the spectrometer is heritage from the Mars Global Surveyor TES and the Mars Exploration Rovers Mini-TES instruments. The heart of the instrument is a Michelson interferometer that collects one interferogram every two seconds (where each two-second data acquisition is called an ICK, for Incremental Counter Keeper). OTES's spectral resolution is 10 cm^{-1} and its field of view is 8 mrad , achieved with a 15.2-cm f/3.91 Ritchey-Chretien telescope. At Bennu, OTES will have an accuracy of better than 3% and a precision (noise equivalent spectral radiance, NESR) of $\leq 2.3 \times 10^{-8} \text{ W cm}^{-2} \text{ sr}^{-1} / \text{cm}^{-1}$ between 300 and 1350 cm^{-1} . OTES calibration in flight is achieved via a two-point calibration that uses space and an internal, conical blackbody calibration target. To map the compositional variation of Bennu at global and site-specific scales, OTES collects data at multiple times of day during the Detailed Survey and Reconnaissance phases, respectively. The data for thermal mapping are collected during the Orbital B, Detailed Survey, and Reconnaissance phases.

OTES Data Rates: 123.1 Mbytes/day (telemetry + science); 6.6 Mbytes/day (telemetry only).



OTES NESR vs. wavenumber (wavelength in microns at top) for a 325 K target. Representative mineral spectra are shown at top and each has multiple spectral features across the OTES spectral range.



Demonstration of OTES mineral detection capability. Simulated OTES mineral mixture spectrum (with representative SNR as a function of wavelength) in red and linear least squares model fit in green. Best-fit component mineral spectra are shown offset at top; each component spectrum is shown at the spectral contrast representative of its proportional contribution to the mixture spectrum.