OTES Data Caveats V1.0 (05/21/2018)

The primary caveat associated with EGA data is the “ringing” that occurs as the Earth (or Moon) comes into or leaves our field of view. This is a known and expected effect; the transition from a very hot target (e.g., Earth) to a cold one (space) or vice versa produces a slope in the OTES interferogram that cannot be instantaneously accommodated by the DC-correction electronics. The transform of the interferogram results in high-frequency “ringing” in the spectrum that usually appears in a few sequential observations. A correction algorithm has been written and refined by the OTES team using the EGA data and will be implemented in a future update.

Update: 2019-05-30

EGA and Approach calibrated radiance spectra were observed to exhibit “ringing” that occurs as the target (Earth, Moon, Bennu) comes into or leaves the OTES field of view (FOV). This is a known and expected effect; the transition from a very hot target (e.g., Earth) to a cold one (space) or vice versa produces a slope in the OTES interferogram that cannot be instantaneously accommodated by the DC-correction electronics. The transform of the interferogram results in high-frequency “ringing” in the spectral region of interest (resulting from a step function that occurs when the interferogram is folded) that usually appears in a few sequential observations. A correction algorithm has been written and implemented by the OTES team to equalize the ends of each interferogram, thus removing any ringing from the data. The algorithm identifies the values at the ends of each interferogram, calculates the linear slope between them and then removes the slope to force the ends of the interferogram to zero. This can impart a low frequency sine wave on the interferogram but the frequency/power of this wave is at such low wavenumbers that any distortion of the spectrum occurs outside the spectral region of interest for science. The algorithm is applied to all interferograms, with the most strongly affected spectra typically being where the FOV_fill_factor changes from 0 to 1 or 1 to 0 over the span of a few spectra.

An important caveat accompanying OTES data is associated with observing sequences in which the OTES field of view (FOV) was not filled by the target (e.g., Earth, Moon, Bennu). The standard calibration of OTES data uses views of space and an internal calibration target that fill the FOV; when the target does not fill the FOV, wavelength-dependent, off-axis modulation of energy through the interferometer results in an apparent low signal at short wavelengths. Correcting this effect requires a substantially more complex calibration approach, which is under consideration. These data may be used for relative comparisons of, for example, one channel’s radiance throughout the sequence, but the spectral data should not be used for absolute radiance or emissivity science.

Update: 2019-07-20

Spatially-resolved data acquired in December 2019 (at the end of the Approach phase and during the Preliminary Survey phase) were obtained as “ride-along” observations during imaging-optimized campaigns and, as a result, some of the OTES sequences did not include an ideal cadence of space calibration observations. To improve the resulting calibration, the OTES team developed an approach that uses trends in instrument radiance as a function of temperature over time to better predict and remove instrument effects in the calibrated radiance data. The method of calculating calibrated radiance that was used (method 1 vs. method 2) is indicated by the calrad_used attribute found in the calibrated data product Mission Area/data_processing_information portion of the label.