GLOBAL MINOR SPECTRAL FEATURES ON (101995) BENNU FROM THE OSIRIS-REX VISIBLE AND INFRARED SPECTROMETER (OVIRS). A.A. Simon[1], H. H. Kaplan[2], E. Cloutis[3], V.E. Hamilton[2], C. Lantz[4], D.C. Reuter[1], E.S. Howell[5], B.E. Clark[6], D.S. Lauretta[5]. [1]NASA Goddard Space Flight Center, Greenbelt, MD, USA, [2]Southwest Research Institute, Boulder, CO, USA, [3]University of Winnipeg, Winnipeg, Manitoba, Canada, [4]Institut d'Astrophysique Spatiale, France [5]Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ, USA, [6]Ithaca College, Ithaca, NY, USA.

Introduction: The OSIRIS-REx mission completed its Detailed Survey Equatorial Station mapping campaign from 25 April through 6 June 2019 [1]. In this mission phase, global maps were generated with each of the instruments by nodding the spacecraft along Bennu's rotation axis as the asteroid rotated below. The OSIRIS-REx Visible and InfraRed Spectrometer (OVIRS) acquired data from 0.4 to 4.3 microns, with prime spectral mapping occurring at 10 am, 12:30 pm, and 3 pm local solar time. These globally-averaged spectra show minor absorption bands at several wavelengths. Maps of these features were also generated to show any variations in band depth across Bennu's surface.

Global Major Spectral Features: Bennu's visible-near IR spectrum is dominated by the 2.74-micron hydration band [2]. Additionally, there is a broad, variable, absorption feature from 3.2 to 3.6 microns attributable to a mixture of carbonates and organics [3,4]. Lastly, a few locations show a distinct orthopyroxene absorption tied to specific bright boulders [5]. These deeper absorptions are discussed in other presentations [6, 7, 8]

Global Minor Spectral Features: In addition to the bands above, weak absorptions are detected at 1.05, 1.4, 2.2 and 2.55 microns, Fig. 1. Each of these bands is consistent with a number of different phyllosilicate or carbonate bands, but none are uniquely identified at this time.

The 1.4-micron feature is likely an overtone of the 2.7-micron band, and the combination of 1.4 and 2.74 micron features is consistent with Mg/Fe bearing minerals [e.g., 9]. This band is not typically seen in powdered, heated (to remove adsorbed water) meteorites, but is occasionally seen in meteorite chip spectra.

The 1.05-micron band may be consistent with a number of Fe/Mg-bearing phyllosilicates or magnetite, and is likely associated with Fe^{2+} or Fe^{3+} bands. The 2.2- to 2.55-micron bands appear in many phyllosilicates due to Mg-OH, Fe-OH or Al-OH. However, these bands may be attributed to carbonates as well. Further work is underway to identify the full suite of bands, and it is quite likely that a mixture of materials are present and contributing to the global spectrum.

We will present our latest results on classifying the globally-averaged Bennu absorption features. In addition, we will present any endmember spectra in the context of laboratory mineral and meteorite spectra. For the most distinct features, we will also show surface distribution maps for comparison with geologic units and investigate phase angle/viewing effects.

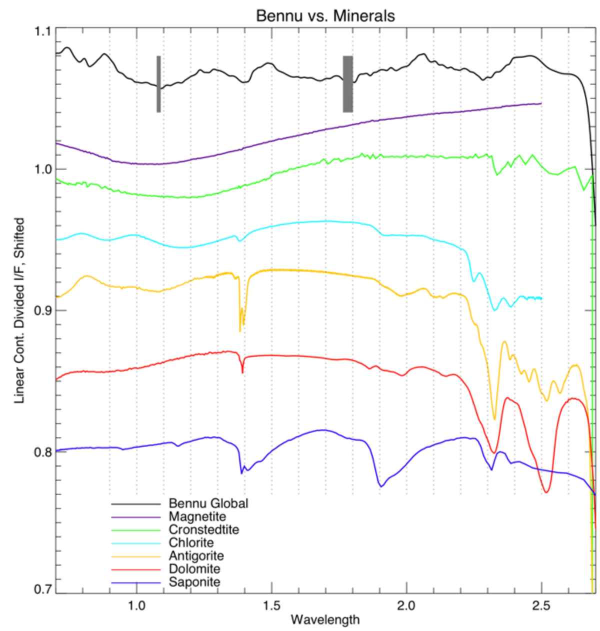

Figure 1. Bennu global average spectrum, from 12:30 pm data, compared with various phyllosilicate and carbonate minerals. Grey bars indicate filter overlap regions. Laboratory spectra were obtained from RELAB and the USGS Spectral Library [10, 11].

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References:

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[10] RELAB Spectral Database copyright 2014, Brown University (antigorite: JA-JLB-559, magnetite: MG-EAC-007). [11] Kokaly, R.F. et al. (2017), *USGS Spectral Library Version 7: U.S. Geological Survey Data Series 1035,* 61.