ABUNDANT AMORPHOUS SILICATES IN PRIMITIVE CHONDRITES: IMPLICATIONS FOR ASTEROID BENNU. D. L. Schrader[1], T. J. McCoy[1], L. P. Keller[2], H. C. Connolly Jr.[3,4], K. Nakamura-Messenger[2], D. S. Lauretta[4], and the OSIRIS-REx Team. [1]Smithsonian Institution, Washington, DC 20560-0119; [2]ARES, NASA JSC, Houston, TX 77058, USA. [3]Kingsborough Community College, Brooklyn NY 11235 & Graduate Center of CUNY, New York, NY, USA; [4]LPL, University of Arizona, Tucson, AZ 85721, USA. (schraderd@si.edu)

Introduction: Type C and B asteroids have been linked to carbonaceous chondrites because of their similar VIS-NIR spectral properties [e.g., 1,2]. Asteroid mineralogy is inferred from characteristic features in reflectance spectra obtained over a wide spectral range [e.g., 1–4]. Identifying mineral phases and their abundances will be critical to characterize the Type B asteroid 101955 Bennu using remote sensing data obtained during the OSIRIS-REx mission, especially for sample-site selection. To this end, we have begun a blind study to evaluate spectral deconvolution methods of complex mixtures prepared from well-characterized minerals likely to occur on Bennu. However, amorphous silicates are a major component of primitive meteoritic materials including comets and a few of the least altered carbonaceous chondrites [5–9]. High abundances of amorphous silicates may prove key to identifying a sample site on Bennu of high science value. However, the detection of amorphous silicates in spectra is complicated because they show only a broad, featureless spectrum around 10 μm [e.g., 10] overlain by numerous sharp bands from crystalline silicates.

Discussion: Amorphous silicates are abundant in comets and the least thermally and aqueously altered carbonaceous chondrites (up to ~40%) [e.g., 5–9]. They are most abundant in meteorites that contain the most pristine organics [5,11]. Amorphous silicates within these chondrites are believed to be non-equilibrium nebular condensates [6,8] and are known to be highly susceptible to aqueous and thermal alteration [5,6]. A further complication to spectral studies is that even in the least altered CRs these amorphous silicates are likely hydrated [6,8,12,13]. Progressive aqueous alteration converts these hydrated amorphous silicates to phyllosilicates [5]. Despite their high abundance [5] amorphous silicates were not detected in a thermal IR study of the least altered CRs, leading [14] to consider that their features were masked by those of crystalline phases.

We propose to identify an appropriate analog for amorphous silicates to include in our analog mixtures in an attempt to further our ability to identify amorphous silicates on Bennu. This may also provide a useful parameter for identifying the degree of aqueous alteration via spectroscopy. Testing this hypothesis requires analysis of the returned sample, which will provide ground-truth for remote sensing data; a major goal of the OSIRIS-REx mission.

References: [1] Hiroi et al. 1996. *MAPS* 31:321. [2] Clark et al. 2011. *Icarus* 216:462. [3] Sunshine et al. 2004. *MAPS* 39:1343. [4] Campins et al. 2010. *Nature* 464:1320. [5] Howard et al. 2011. *MAPS* 46:A102. [6] Keller and Messenger 2012. LPSC XLIII: #2065. [7] Le Guillou and Brearley 2014. *GCA* 131:344. [8] Abreu and Brearley 2010. *GCA* 74:1146. [9] Howard et al. 2014. LPSC XLV: #1830. [10] Speck et al. 2011. *ApJ* 740:93. [11] Pizzarello et al. 2012. *PNAS* 109:11949. [12] Le Guillou et al. 2014. *GCA* 131:368. [13] Garenne et al. 2014. *GCA* 137:93. [14] Beck et al. 2014. *Icarus* 229:263.