Using the multiband imager MapCam onboard the OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, and Security–Regolith Explorer) spacecraft, we identified 77 instances of proposed exogenic materials distributed globally on the surface of the B-type asteroid (101955) Bennu. We identified materials as exogenic on the basis of an absorption near 1 µm that is indicative of anhydrous silicates. The exogenic materials are spatially resolved by the telescopic camera PolyCam. All such materials are brighter than their surroundings, and they are expressed in a variety of morphologies: homogeneous, breccia-like, inclusion-like, and others. Inclusion-like features are the most common. Visible spectrophotometry was obtained for 46 of the 77 locations from MapCam images. Principal component analysis indicates at least two trends: (i) mixing of Bennu’s average spectrum with a strong 1-µm band absorption, possibly from pyroxene-rich material, and (ii) mixing with a weak 1-µm band absorption. The endmember with a strong 1-µm feature is consistent with Howardite-Eucrite-Diogenite (HED) meteorites, whereas the one showing a weak 1-µm feature may be consistent with HEDs, ordinary chondrites, or carbonaceous chondrites. The variation in the few available near-infrared reflectance spectra strongly suggests varying compositions among the exogenic materials. Thus, Bennu might record the remnants of multiple impacts with different compositions to its parent body, which could have happened in the very early history of the Solar System. Moreover, at least one of the exogenic objects is compositionally different from the exogenic materials found on the similar asteroid (162173) Ryugu, and they suggest different impact tracks.

This work was published as Tatsumi & Popescu et al. 2021, Monthly Notices of the Royal Astronomical Society, Volume 508, Issue 2, pp.2053-2070.