

Asteroid (142) Polana at 3 μm and its Linkage to the Primitive Asteroid (101955) Bennu

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The Polana family is a low-albedo family located at a low inclination and a semimajor axis of ~ 2.42 au in the inner main asteroid belt. This family is likely the source of primitive near-Earth asteroids, including the OSIRIS-REx mission target (101955) Bennu. The B-type asteroid 142 Polana is the largest remnant of the "New Polana" family, and it has been spectrally (~ 0.5 - 2.5 μm) and dynamically linked to Bennu. Here, we investigate the compositional linkage of asteroids Polana and Bennu using spectra measured at longer wavelengths (~ 1.6 - 4.0 μm), which cover the 3- μm band. Polana's spectra were measured at NASA IRTF using the LXD mode of SpeX. Bennu's spectra were measured by OSIRIS-REx's OVIRS spectrometer and revealed that this primitive asteroid is hydrated consistent with CM, CI, or CR carbonaceous chondrites. Polana's LXD spectra, on the hand, show that the parent body of the Polana family is not hydrated (i.e., no absorption band at ~ 3.0 μm). Additionally, Polana's LXD spectra do not indicate the presence of organics and/or carbonates. Polana's lack of significant water, organic, and carbonate spectral features on its surface could be related to the degree of heating in the Polana family-forming event and the reaccretion of ejecta that contributed to additional heating. The Polana family-forming event could also expose the parent body's dehydrated, organic/carbonate-poor interior. These results will be placed in the context of other low-albedo families and background objects in the inner main belt. An approved JWST program to observe Polana (with both NIRSpec and MIRI) will be able to assess if there is a Ryugu-like band and should allow a comparison of the MIR spectrum to Bennu.

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