Search for Candidate Exogenous Material on Bennu using MapCam and PolyCam Images

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Outline

I. Exogenous Material on Bennu & Ryugu (Della Giustina et al. 2020; Tatsumi et al. 2020)

II. New Candidate Exogenous Material on Bennu

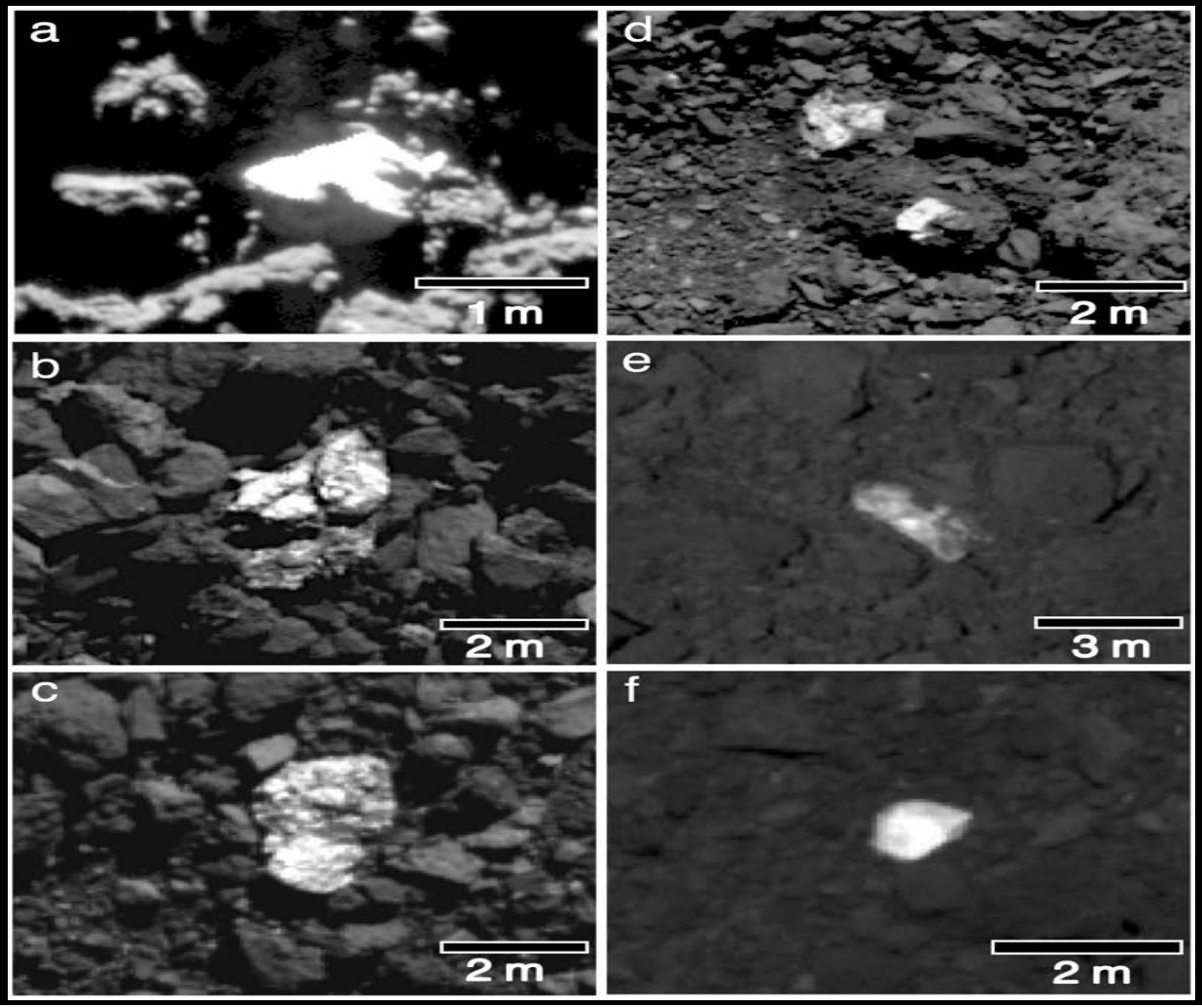
- 44 new boulders identified with red slope and x-band (0.85 µm) absorptions in MapCam colors

III. Conclusions

I. Exogenous Material on Bennu

- Exogenous material reported on asteroids (101955) Bennu and (162173) Ryugu (DellaGiustina et al. 2020; Tatsumi et al; 2020)
- Albedo, color, and spectra of six bright boulders are distinct from the rest of Bennu's surface and are likely basaltic material from asteroid (4) Vesta (DellaGiustina et al. 2020)
- Bright boulders identified on asteroid Ryugu show absorptions near 1 µm but not near 2 µm, suggesting olivine-rich anhydrous silicates (Tatsumi et al. 2020)

I. Exogenous Boulders on Bennu (DellaGiustina et al. 2020)



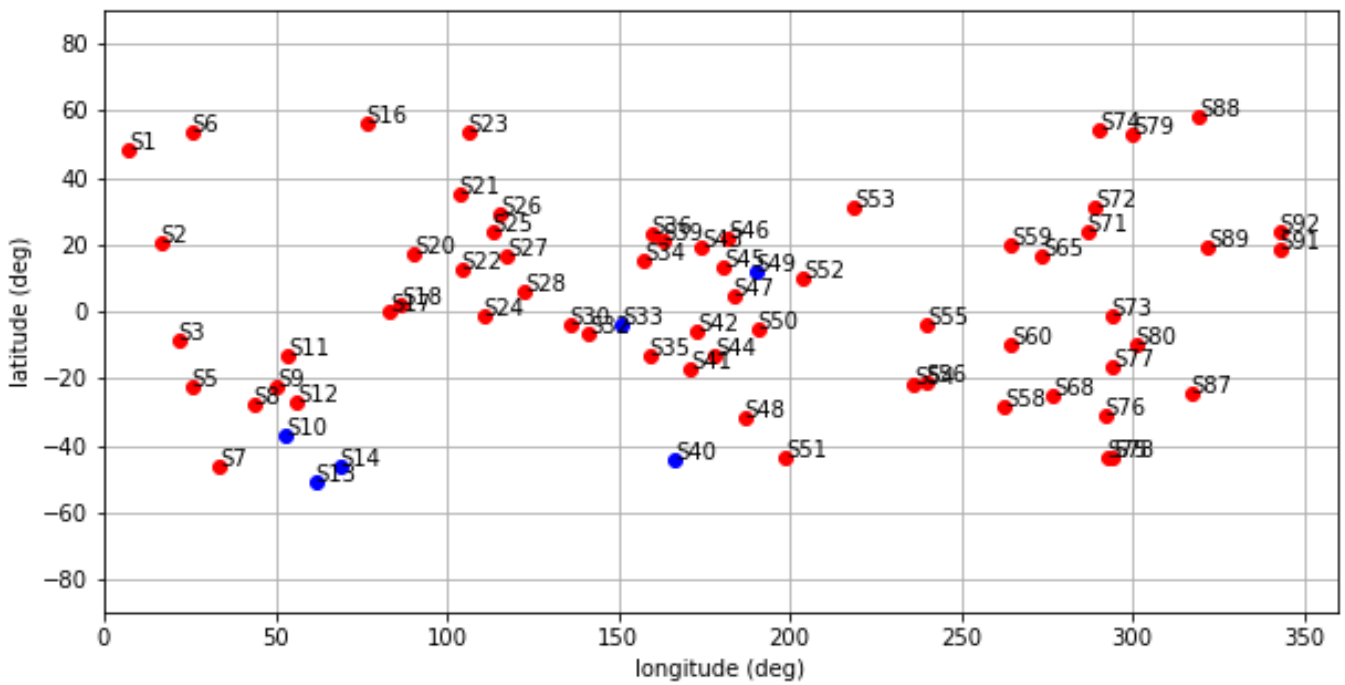
II. New Candidate Exogenous Material on Bennu

- We used images of Bennu obtained by the **MapCam** and **PolyCam** instruments (Rizk et al. 2018; Golish et al. 2020) on NASA's **OSIRIS-REx** spacecraft (Lauretta et al. 2017) to search for more potentially exogeneous material on the surface of Bennu
- We identified 50 bright boulders on Bennu with red spectral slopes and significant x-band (0.85 µm) absorptions, including the six bright boulders previously described in DellaGiustina et al. (2020)

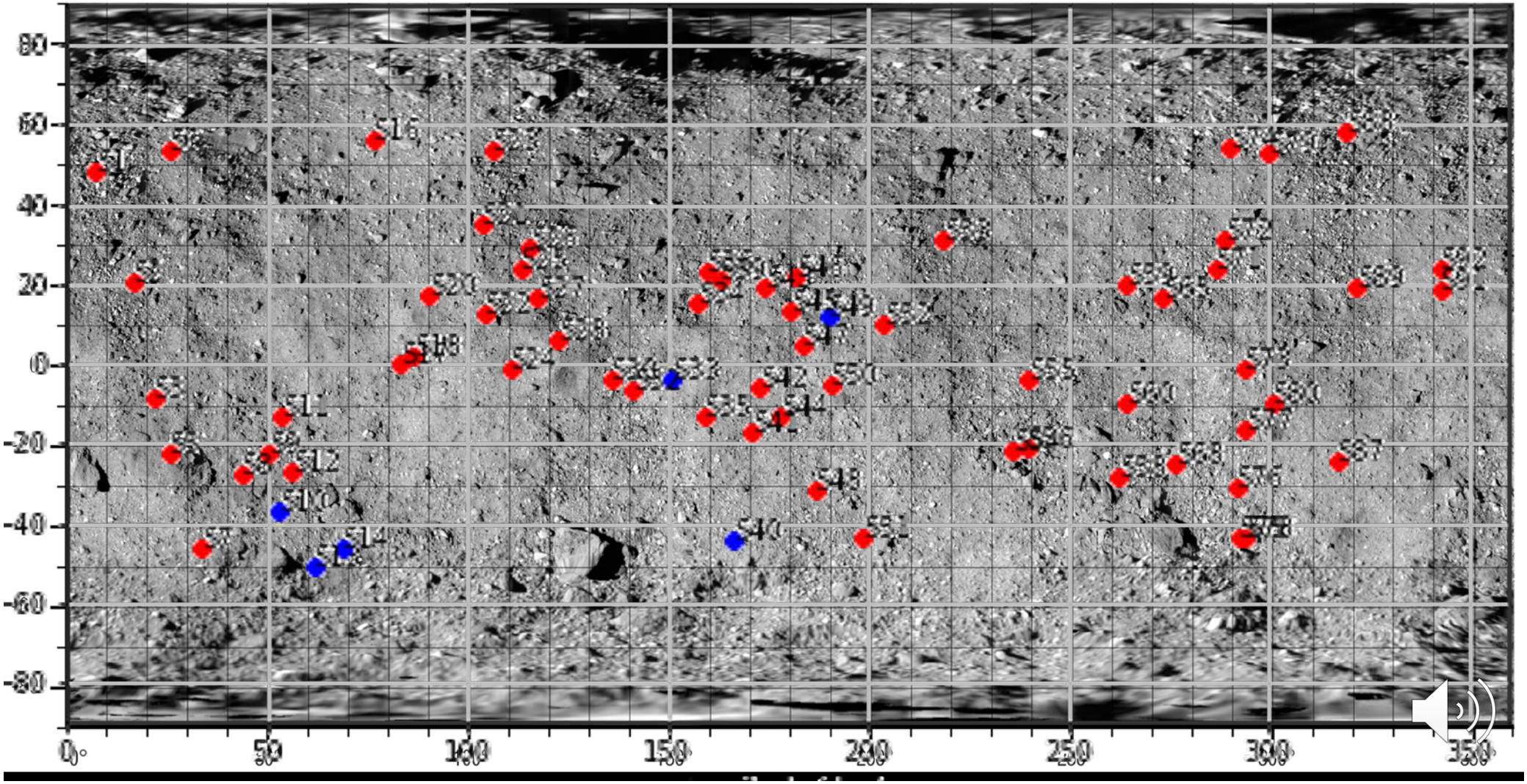
II. New Candidate Exogenous Material on Bennu

- These bright boulders are distributed across Bennu's surface, concentrated in rockier terrains (larger than average particle size)

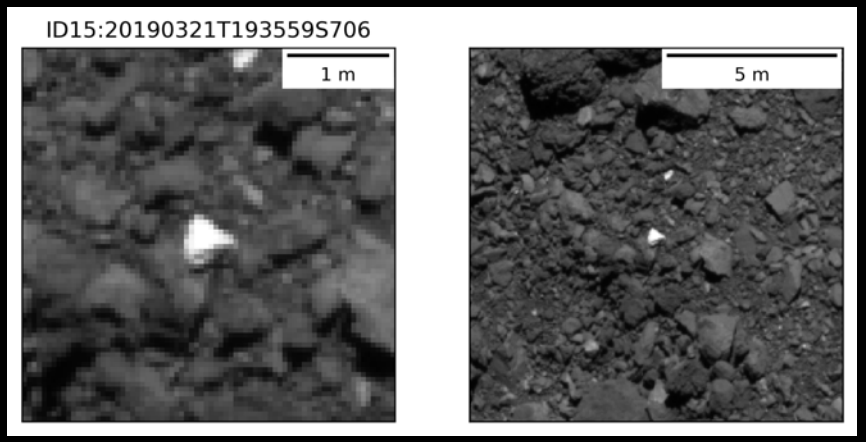
Exogeneous candidates found by spectral slope and x-band absorption (blue also in DG et al. 2020)



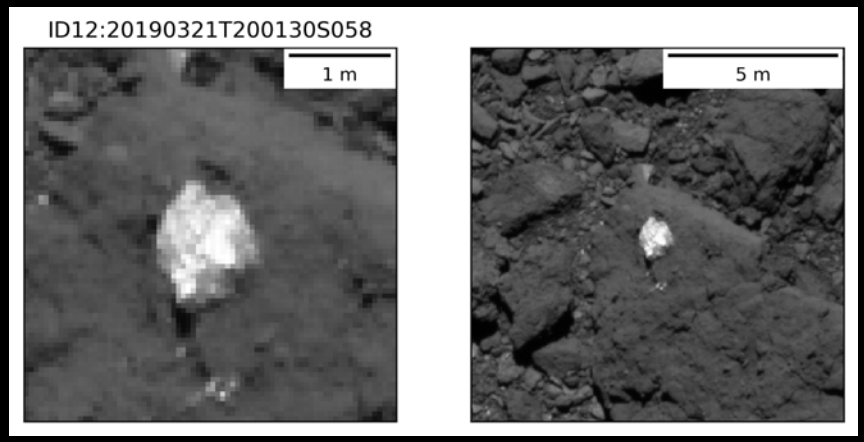
Exogeneous candidates found by spectral slope and x-band absorption blue also in DG et al. 2020



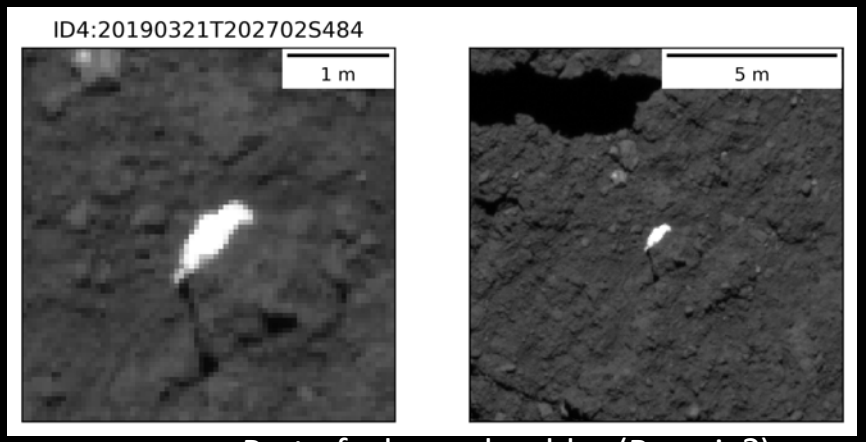
Morphology of new bright spots in PolyCam Images



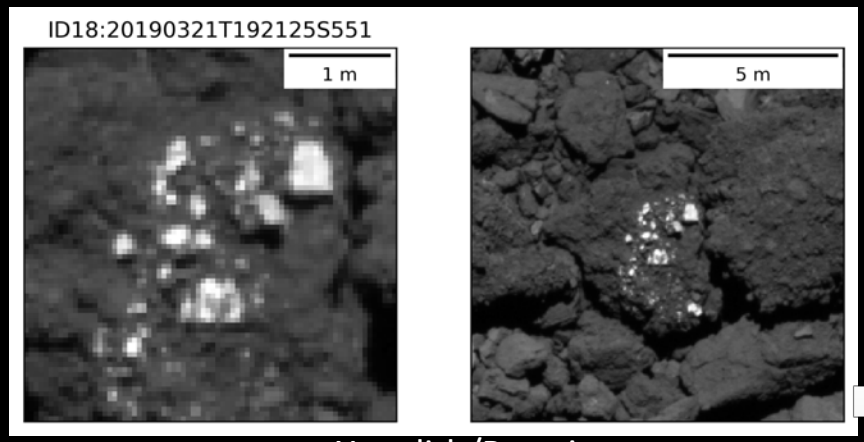
Single homogeneous boulder



Single heterogeneous boulder



Part of a larger boulder (Breccia?)



Xenolith/Breccia

II. New Candidate Exogenous Material on Bennu

- There is some correlation between their morphology and spectra
- Bright boulders with reflectance peaking at 0.55 µm have lower normal albedo than the other candidates, suggesting a different composition and possibly a different origin
- An initial comparison with Ryugu (Tatsumi et al. 2020) indicates that Bennu is more abundant in possible exogeneous material

V. Conclusions

- Exogenous materials identified on asteroids Bennu and Ryugu (Della Giustina et al. 2020; Tatsumi et al. 2020)
- Further analysis of MapCam and PolyCam images has revealed a wider diversity of potentially exogenous lithologies on Bennu, expanding on the findings of DellaGiustina et al. (2020).
- We continue our study of this diverse material on Bennu's surface to constrain the asteroid's origin, evolution, and collisional history (e.g., Ballouz et al. 2020)