Science Objective Summary and Science Weekly Debrief

Science Objective Summary

DOY 230–237: No science activities. Spacecraft reboot and recovery, TGM lens contamination checkout, OpNavs.

Science Weekly Debrief

For slides and the WebEx recording on ODOCS, click here then follow the path: Folders \ Documents and Drawings \ OSIRIS-REx Bennu Proximity Operations \ Science Status \ Science Monthly \ 2020-08-20.

General announcements

- 61 days to TAG.

- The JGR Planets/Earth and Space Science special collection on particle ejection from Bennu is nearing completion. Ten papers plus a review-style Introduction are published online, about half of which are finalized. The papers span detection and tracking; orbit determination, trajectory analysis, and longer-term dynamics; photometry and changes in the observed population over time; and mechanisms of ejection. The collection is expected to be finalized by and promoted in early September (date TBD) with press releases from author institutions including UA, a blog post in Eos, and social media amplification by AGU and the journals.

- The Science/Science Advances special collection on Bennu at the "macroscale" (primarily the global Detailed Survey and Orbital B datasets, plus some particle and Recon science) is moving into the post–peer review phase, with all six papers back with the journals after revision and three close to formal acceptance. Broadly, the papers cover MapCam color, the carbon absorption band and other OVIRS data, carbonate geology, thermal properties from OTES and OVIRS, Bennu's gravity field and density distribution from spacecraft and particle tracking, and the OLA v20 shape model. The target release timing is early October, between the TAG–1 month press conference and TAG itself, to contribute to the strategic build-up of attention on the mission for sample collection and to maximize the papers' press/public impact.

Matchpoint Rehearsal (MP/R) data

- OCAMS [Bashar Rizk and Dathon Golish]: Over about 23 minutes during MP/R, OCAMS collected 108 images in the following sequence: 43 MapCam, 42 SamCam, 23 MapCam. The drift rate, measured by tracking the same feature across seven images, was 1.22 cm/s, lower than the expected 2 cm/s. The lateral velocities estimated from OCAMS are higher than those reported by FDS, probably due to a yet-to-be-identified geometric

effect. See the slides on ODOCS for GIFs shown in spatial context with camera footprints, plus comparisons of the MP/R data with Checkpoint Rehearsal and Recon C data. The MP/R resolution is not as good as in Recon C, as expected. The SamCam reconstruction indicates a ~20-pixel offset in the lower right and a ~50-pixel offset in the upper left of the view—that is, not only an offset but a scale issue. The most likely explanation is a pixel scale or distortion effect in the SamCam camera model, although other possibilities were discussed (WebEx recording on ODOCS). The MapCam reconstruction is offset by as much as ~400 pixels (1.6 m); hand registration may be necessary. Root causes of the offsets are under investigation.

- OTES [Vicky Hamilton]: OTES collected 2308 on-body spectra with a low (good) mean emission angle of ~11 degrees; brightness temperatures of 212 to 322 K (285 to 290 K at Nightingale itself, and warmest on the face of Mount Doom); and ground resolutions between 0.36 and 3.45 m. See the slides for reconstructed footprints on the Bennu basemap, colorized by brightness temperature, and for the highest-resolution and average spectra. The cooler-than-ideal surface temperatures reduce the signal-to-noise ratio such that standard spectral indices are not as diagnostic as usual; co-adding more channels may help. Because the spacecraft was configured and moving in a different way than previously, users should be aware of the potential for anomalies not caught by standard scripts. The data will continue to be evaluated before blessing.

- NavCam data are also available to view in the MP/R ODOCS folder. [Mike Nolan]
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- **Upcoming meetings**
- The next meeting will be two weeks from now on 3 September, pending the availability of topics.
- **Daily downlink slides for Day 230 (08/17/20). Click to enlarge.**

All subsystems and payloads are nominal following the spacecraft reboot that was commanded earlier today. Some expected alarms were received. Reboot recovery commanding is in progress and expected to be complete by Wednesday (19 August, DOY 232), after which we will return to nominal OpNavs every 2 hours. There may be an opportunity to acquire OpNavs sooner via a contingency ATF, if recovery proceeds nominally.

All data from last week's Matchpoint Rehearsal and ancillary activities are down. OD276 will be uplinked tomorrow. The ISA list has been reduced down to three items.

Looking ahead: There will be a Science Monthly meeting on Thursday (20 August, DOY 233). The next downlink tag-up will be Wednesday to status reboot recovery. After this week, we will revert to Monday-only downlink tag-ups.

Daily downlink slides for Day 232 (08/19/20). Click to enlarge.

Reboot recovery is progressing well and is expected to be completed today. The instruments will be unsafed shortly. Expected alarms should clear today. Nominal operations will resume tomorrow, with typically 18 NavCam and 18 MapCam OpNavs per day. The partitions are empty and are expected to clear daily.

Looking ahead: A TAGCAM lens contamination checkout will be performed on Sunday (23 August, DOY 236). There will be a Science Monthly meeting tomorrow to discuss data from Matchpoint Rehearsal. We will revert to Monday-only downlink tag-ups for the next several weeks.