

Updates on OSIRIS-REx: Return journey to Earth and the sample from Bennu

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NASA's OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security and Regolith-Explorer) spacecraft explored B-type near-Earth asteroid (101955) Bennu from December 2018 to May 2021. [1]. The spacecraft data indicated that Bennu's surface material contains hydrous silicates, carbonates, magnetite, and organic matter [2-4], suggesting that it experienced aqueous alteration within a parent body. In October 2020, the spacecraft collected a sample of surface material from a site nicknamed Nightingale within the 20-m-diameter Hokioi crater. The in-flight inspection of the sample with the SamCam imager showed that millimeter- to centimeter-sized particles were successfully collected [5]. Analysis of various telemetry data from before and after sample collection yielded an estimated sample mass of 250 ± 101 g, well above the mission goal (60 g) [5]. The spacecraft will fly by Earth and drop the Sample Return Capsule (SRC) into the Utah desert in the western United States on September 24, 2023. As of writing (September 21, 2023), the spacecraft is on track targeting Earth. After retrieval, the SRC will be delivered to the NASA Johnson Space Center (JSC) to be curated in a new cleanroom dedicated to the Bennu sample [6]. At the symposium, we will report updates on the SRC retrieval operation, curation processes at JSC, and the sample.

References

- [1] Lauretta D. S. et al. 2019. *Nature* 568: 55-60. [2] Hamilton V. E. et al. 2019. *Nat. Astron.* 3:332-340. [3] Kaplan H. H. et al. 2020. *Science* 370:eabc3557. [4] Simon A. A. et al. 2020. *Science* 370:eabc3522. [5] Lauretta D. S. et al. 2022. *Science* 377:285-291. [6] Righter K. et al. 2023. *Meteorit. Planet. Sci.* 58: 572-590.