CURATION OF OSIRIS-REx ASTEROID SAMPLES.

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Introduction: The New Frontiers mission, OSIRIS-REx, will encounter carbonaceous asteroid 101955 Bennu (1999 RQ36; [1]) in 2018, collect a sample and return it to Earth and deliver it to NASA-JSC for curation in 2023. The mission curation plan is being developed and an overview will be given, including the main elements of contamination control, sample recovery, cleanroom construction, and curation support once the sample is returned to Earth.

Contamination: Because the target asteroid is likely made of pristine carbonaceous chondrite, the mission will spend considerable effort archiving materials used in the construction of the sampling mechanism and return capsule, which will be cleaned to levels at or below those specified by IEST-STD-CC1246 level 100 A/2. The archive will be stored in an ISO 7 (Class 10,000) cleanroom at JSC to allow characterization of both the residual organic and inorganic contaminants.

Recovery: Curation team members will participate in the sample return capsule (SRC) recovery efforts in Utah in 2023. Not only will curation personnel be represented on recovery teams, but there will be a portable clean enclosure (ISO 7; Class 10000) established to receive and safeguard the SRC, and initiate a purge on the sample canister before transport to JSC. The SRC and its enclosed asteroid sample will be returned to JSC within a few days of recovery.

Cleanroom: The asteroid sample will be housed in a new cleanroom at JSC. The cleanroom will be ISO 5 (Class 100), with samples stored and processed in multiple dedicated nitrogen cabinets. During construction of the cleanroom, monitoring of the room and archiving of key materials will be carried out as part of the contamination control and knowledge efforts. Special emphasis will be on monitoring organics that are tied into mission science goals, but also extend beyond to gain knowledge of a broad range of potential contaminants.

Sample catalog and two years of curation: The mass of bulk sample returned may exceed 2 kg. In addition, surface contact-pad samplers may collect thousands of particles 1-mm and smaller. Thus, the collection may include a broad range of grain sizes from 10s of microns to several cm. Characterization for a catalog (available 6 months after return) will include various non-destructive techniques such as (but not limited to) optical and SEM microscopy, raman, FTIR and XRF spectroscopy, computed tomography scanning, XRF and thin sectioning. 25% of sample will be available to the mission science team for meeting science goals, and 75% will be stored at JSC in support of other NASA activities, including future sample investigations, as overseen by a peer review sample request process.

Experience with the Apollo, Genesis and Stardust sample return collections, as well as cosmic dust and Antarctic meteorites will inform the curation plan and provide many lessons learned [2,3,4] for all elements of curation.

References: [1] Campins, H., et al. (2010) *Astrophys. J. Lett.* 721, L53–L57; [2] Zolensky, M.E. et al. (2008) *MaPS* 43, 5–21; [3] Sandford, S. et al. (2010) *MaPS* 45, 406–433 [4] Allen, C. et al. (2011) *Chemie der Erde* 71, 1–20.