

USING X-RAY COMPUTED TOMOGRAPHY AS A TOOL FOR PRELIMINARY EXAMINATION TOOL OF CURRENT AND FUTURE EXTRATERRESTRIAL SAMPLE RETURN MISSIONS

R.A. Zeigler¹ and Z. E. Wilbur², ¹Astromaterials Acquisition and Curation Office, NASA Johnson Space Center, 2101 NASA Parkway, Mail Code XI2, Houston, TX, 77058 USA. ryan.a.zeigler@nasa.gov. ²Jacobs-JETS Contract, NASA Johnson Space Center, Houston, TX, USA.

Introduction: The Astromaterials Acquisition and Curation Office at the Johnson Space Center is the past, present, and future home of all of NASA's astromaterials sample collections. The primary goals of the curation office are to maintain the long-term integrity of the samples and ensure that the samples are distributed for scientific study in a fair, timely, and responsible manner, thus maximizing the return on each sample.

Advanced Curation Studies: Part of the curation process is planning for the future. To this end, we perform fundamental research in advanced curation initiatives to better prepared for future sample return missions. Advanced Curation is tasked with developing procedures, technology, and data sets necessary for curating new sample collections, or getting new results from existing sample collections.

X-ray Computed Tomography Laboratory: As part of these advanced curation efforts, we have installed and are operating a Nikon XTH 320 X-ray Computed Tomography(XCT) system in the JSC curation office with four interchangeable X-ray sources, a large-area detector, and a heavy-duty stage. These instrument characteristics allow us exceptional flexibility to analyze a wide range of sample sizes, from sub-mm soil particles to rocks >10 cm in diameter. The penetrative nature of the XCT scans allows for astromaterials samples to be analyzed within sealed low-density containers (e.g., Teflon bags), preserving the pristinity of the samples. We have begun scanning of the Apollo and Antarctic Meteorite sample suites in order to non-destructively map out lithic clasts (and other features) within the samples. The data from these scans will be made available to scientists via the JSC curation website and the Astromaterials Curation Newsletter. We anticipate sample requests from these "new" lithic clasts identified in these "old" samples. We also anticipate that XCT analyses like these would be useful for future sample return missions, like the OSIRIS REx mission, as well as future sample return missions.

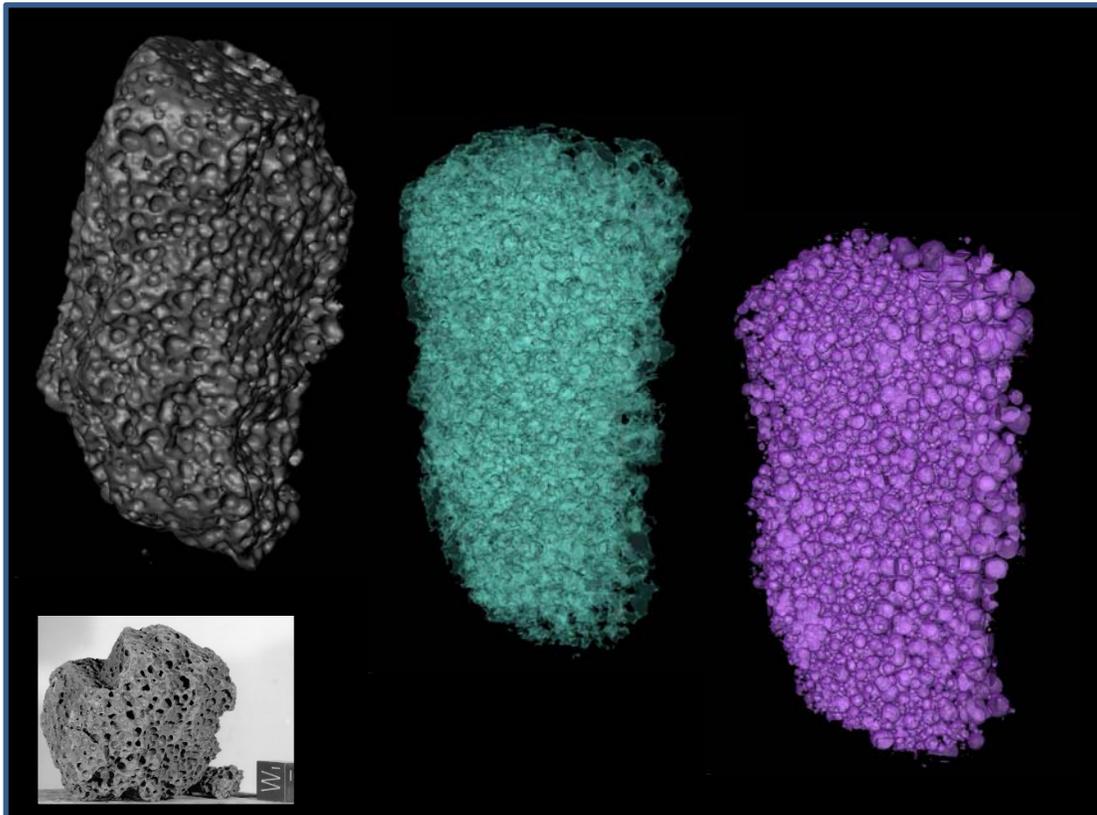


Figure 1: XCT image of Apollo sample 15556 showing, from left to right, the exterior surface, the solid materials inside the sample, and the vesicles within the sample.