

## GENERATING EXCITEMENT AND INCREASING AWARENESS OF NASA PLANETARY SCIENCE AND ASTROMATERIALS ASSETS P.V.Graff<sup>1</sup>, S.Runco<sup>2</sup>, S.Foxworth<sup>1</sup>, K.Willis<sup>3</sup>, M.K.Luckey<sup>2</sup>, and R.Zeigler<sup>2</sup> <sup>1</sup>Jacobs JETS, NASA JSC, Houston, TX 77058, (paige.v.graff@nasa.gov),<sup>2</sup>NASA JSC, <sup>3</sup>Jacobs JETS/Oceanering Space Systems.

**Introduction:** Students, educators, the public, and the scientific community are so often inspired by NASA science and exploration. Millions have joined NASA during live mission event broadcasts and also follow NASA on social media. Exploration of worlds in our solar system enable the scientific community to obtain and analyze data that provide clues to better understand the history and evolution of our solar system. Missions that collect and return samples to Earth from a target solar system body provide scientists with samples they can research and analyze in their laboratories. For those who are not planetary scientists, they may not understand the significance of these samples and/or the importance of sample return missions. The Astromaterials Research and Exploration Science (ARES) Science Engagement team, through work supported by NASA's Science Mission Directorate (SMD) Science Education Cooperative Agreement Notice NNH15ZDA004C, provides access to samples from NASA's Astromaterials Collections through NASA sponsored exhibits at educator and scientific conferences, NASA relevant public outreach events, and collaborations with other Science Activation Teams supported by the SMD Cooperative Agreement Notice [1]. The goal of this work is to generate excitement while enhancing knowledge and awareness of NASA's unique assets, thus highlighting NASA planetary science and exploration.

**Astromaterials Acquisition and Curation Office:** The Astromaterials Acquisition and Curation Office [2], part of the ARES Division [3] at the NASA Johnson Space Center in Houston, TX, is responsible for the curation of extraterrestrial samples from NASA's past and future sample return missions. Collections include Apollo Lunar Samples collected during the Apollo Missions; solar wind samples collected during the Genesis Mission; dust from comets and interstellar space collected during the Stardust Mission; Antarctic meteorites collected during Antarctic Search for Meteorites (ANSMET) Expeditions; cometic dust collected by high flying aircraft such as the WB57 aircraft; spacecraft and spacecraft components that have flown in space and have been impacted by natural and man-made microparticulates; and asteroid Itokawa samples collected by the Japanese Aerospace Exploration Agency (JAXA) led Hayabusa mission. ARES is currently preparing for two additional sample collections. These include planned returned samples

from asteroid Bennu, currently being investigated by NASA's OSIRIS-REx mission [4], and samples from asteroid Ryugu, currently being investigated by the JAXA-led Hayabusa 2 mission [5].

**Public Outreach Events:** Public outreach events that highlight NASA content provide an opportunity to generate excitement, enhanced knowledge and awareness of NASA science and exploration. These events can highlight specific missions and/or different planetary worlds within our solar system. Engaging participating audiences with Astromaterials assets that are associated with the theme of an event can provide broader awareness of the accomplishments of NASA exploration as well as provide an authentic and tangible context to the theme. Example events in which ARES Science Engagement specialists brought Astromaterials assets include International Observe the Moon Night (InOMN), the Lunar and Planetary Institute SkyFest event focusing on the successful launch of the InSight Mission to Mars, and the Helio Exhibit held at the Kennedy Space Center in conjunction with the launch of NASA's Parker Solar Probe Mission to the Sun. For each of these events, our experts shared Astromaterials samples associated with the theme of the events, including lunar samples, a martian meteorite, and solar wind samples.

**NASA Sponsored Exhibits at Educator Conferences:** Informal and formal educators attending professional conferences are always excited to visit the NASA exhibit. The NASA exhibit offers experiences with NASA and contractor staff and information that educators can use with their audiences. During 2018, our ARES Science Engagement Specialists participated in NASA exhibits at the National Science Teachers Association (NSTA) Conference in Atlanta, GA and the American Library Association (ALA) Annual Meeting in New Orleans, LA showcasing Astromaterials samples along with the histories of the samples and associated NASA content. In many cases, audiences reached had little to no idea that NASA has and curates extraterrestrial samples at the NASA Johnson Space Center in Houston, TX. Through data collected about their experience, participants also indicated how valuable it was to have Astromaterials samples for them to engage with along with knowledgeable experts who could share the science in a meaningful way as well as ideas on how to incorporate related content into their educational learning environments. Our team

has shared Astromaterials samples educators can hold in their hands, including Lunar and Meteorite Sample Disks, Antarctic meteorite samples, as well as specially designed display samples from NASA's Apollo, Antarctic, and Genesis Astromaterials Collections. Our team has also shared authentic non-flight sample return items such as aerogel, and a Genesis non-flight hexagonal wafer.

**NASA Sponsored Exhibits at Scientific Conferences:** Similar to educator conferences, NASA exhibits at scientific conferences draw huge crowds of excited attendees. Attendees browse the exhibit area interacting with staff sharing exciting NASA content. In 2018, in addition to sharing Astromaterials assets at the Lunar and Planetary Science Conference (LPSC), which ARES staff has done over the past few years, Astromaterials samples were also brought to NASA exhibits at the Geological Society of America (GSA) Annual Meeting in Indianapolis, IN, as well as at the American Geophysical Union (AGU) Fall Meeting in Washington, DC. Participants that engaged with our ARES experts were extremely enthusiastic about the Astromaterials samples. Undergraduate and graduate level students as well as seasoned professional scientists engaged with our experts and Astromaterials samples and shared their knowledge and awareness (sometimes extensive but oftentimes not) and asked questions about the samples on display and NASA's overall Astromaterials Collections. Many attendees repeatedly returned to our samples on display bringing friends, family members, and colleagues with them. The reaction from scientific conference attendees was extremely positive, whether they had a background in planetary science or not.

**Collaborations with SMD Science Activation Teams:** As part of ARES efforts to share NASA's unique Astromaterials assets, our team also aims to partner with other supported SMD Science Activation Teams. As these teams are based in various locations across the nation, sharing our Astromaterials assets in-person with these distributed audiences can be challenging. One way we have worked through this challenge is by virtually connecting Science Activation Team audiences involved in Lunar and Meteorite Sample Disk Program Training with curation staff in our Lunar Laboratory at the Johnson Space Center. We have successfully facilitated virtual tours of our Lunar Lab for audiences involved in NASA @My Library and Universe of Learning Science Activation Team Sample Disk trainings. This enabled participants to truly gain context related to the samples they were being certified to use with their audiences along with learning from subject matter experts who work with

Astromaterials samples in NASA's curation laboratories.

Occasionally participants involved in activities being led by SMD Science Activation Teams visit the NASA Johnson Space Center, gaining access to some of our Astromaterials collections, subject matter experts, and specialized laboratories. For example, the STEM Enhancement in Earth Science (SEES) Program, facilitated out of the University of Texas at Austin Center for Space Research and the Texas Space Grant Consortium, brought their 2018 SEES High School Interns to the Johnson Space Center where they had the opportunity to visit the Viewing Area of the NASA Lunar Curation Laboratory as well as had access to other display samples from NASA's Astromaterials Collections. This type of exposure to assets, facilities, and subject matter experts is truly an awe-inspiring experience that would otherwise not be possible if not for the collaboration among the ARES Science Engagement team and other Science Activation teams.

**Conclusions:** Engaging students, educators, the public, and the scientific community with NASA's unique Astromaterials assets through public events, professional conferences, and collaborations with NASA SMD Science Activation Teams generates excitement and enhanced knowledge and awareness of the rich and cutting-edge science, research, and exploration being facilitated through NASA's Science Mission Directorate. It also enables individuals to gain a stronger appreciation, awareness, and understanding of NASA's Astromaterials samples along with past, present, and future NASA sample return missions.

**References:** [1] NASA Science Mission Directorate (SMD) Science Activation Teams, <https://science.nasa.gov/science-activation-team> [2] Astromaterials Acquisition & Curation Office, <https://curator.jsc.nasa.gov/> [3] Astromaterials Research and Exploration Science (ARES), <https://ares.jsc.nasa.gov/> [4] OSIRIS-REx Mission, <https://www.asteroidmission.org/> [5] Hayabusa 2 Mission, <http://www.hayabusa2.jaxa.jp/en/>

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