

**CAPTEM Minutes****Minutes of the Fiftieth Meeting of the  
Curation and Analysis Planning Team for Extraterrestrial Materials  
(CAPTEM)****Held at the Lunar and Planetary Institute at 3600 Bay Area Blvd, Houston, Texas 77058  
on Saturday, March 19<sup>th</sup>, 2016****Table of Contents**

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## 1. Agenda for Spring 2016 CAPTEM Meeting, March 19<sup>th</sup>

### 8:00 AM

*Welcome, roll call (McSween)*

- CAPTEM: Hap McSween, Aaron Burton, Conel Alexander, James Day, Juliane Gross, Hope Ishii, Rhiannon Mayne, Kevin McKeegan, Larry Nyquist, Devin Schrader, Jeff Taylor, Allan Treiman, Andrew Westphal
- Others: Judy Allton, Michael Calaway, Cari Corrigan, Dave Draper, Cindy Evans, Jeff Grossman, Yurimoto Hisayoshi, Julie Hoskin, Jeremy Kent, Kevin Righter, Eileen Stansbery, Ryan Zeigler, Nicolle Zellner, Mike Zolensky, Tom Morgan

*Approval of minutes from Fall 2015 meeting (McSween, Burton)*

*Status of action items from last meeting (McSween)*

- Consider how to define the space-exposed hardware collection, particularly: i) what properties make a piece of space-exposed hardware curatable; ii) who makes the decision on what is or is not curatable, and iii) when is the decision of whether or not something should be included in the collection (Taylor, Grossman).
- Consider scientific data management standards for the sample analysis community (Westphal).

*Approval of/changes to agenda for Spring 2016 meeting (McSween)*

*Announcement of new CAPTEM chair for 2017*

### 8:15 am

*NASA HQ briefing (Grossman)*

### 8:45 am

*JSC organizational report (Stansbery)*

### 9:00 am

*Astromaterials curation/JSC facilities report (Evans)*

### 9:30 am

*MWG curatorial / allocation report (Righter/Alexander)*

### 10:00 am

*Break*

### 10:20 AM

*ANSMET agreement update telecon with NSF, NASA, SI (Grossman, Borg, McCoy)*

### 11:00 AM

*Stardust curatorial/allocation report (Zolensky, Westphal)*

### 11:20 AM

*Cosmic Dust curatorial/allocation report (Zolensky, Ishii)*

11:40 AM

*Asteroid Samples curatorial/allocation report (Zolensky, McKeegan)*

12:00 PM

*Break for Lunch*

1:30 PM

*Genesis curatorial/allocation report (Allton, Nyquist)*

1:50 PM

*Informatics report (Westphal)*

2:10 PM

*Lunar Samples curatorial/allocation report (Zeigler, Treiman)*

2:40 PM

*JAXA Curation Activities (Yurimoto Hisayoshi)*

2:50 PM

*Microparticle Impact Curation (MIC) Lab (Zolensky, Taylor)*

Protocol for Microparticle Impact Curation Laboratory Requests is appended (approved at last meeting; see appendix 2)

3:30 PM

*Break*

3:45 PM

*Consider scientific data management standards for the sample analysis community (Westphal) (see appendix 1: Informatics Committee Proposal)*

4:30 PM

*New business and initiatives?*

*Any CAPTEM-sponsored initiatives or workshops?*

*AGs- mission participating scientist white paper*

*Other?*

4:40 PM

*PSS meetings summary, new findings to be brought to the PSS (McSween)*

4:50 PM

*Action items for CAPTEM and subcommittees (McSween, Burton)*

4:55 PM

*Schedules for Fall (online) CAPTEM and subcommittee meetings (McSween)*

5:00 PM

*Meeting adjourns*

## 2. New action items from this meeting

- (1) CAPTEM will co-sponsor LARS workshop on frontiers in lab instruments/methods for OSIRIS-REx (and Hayabusa 2). Rhiannon Mayne will be the CAPTEM coordinator / representative for this workshop.
- (2) CAPTEM is anticipating a request from OSIRIS-REx to peer review selected aspects of the mission's curation plan.
- (3) Membership of some subcommittees needs revamping, including two chairs (Asteroids, Genesis). All subcommittees might consider member rotation schedules, as done by MWG and Lunar.
- (4) Each subcommittee should identify one representative from each collection (past or current subcommittee member) to assess the online catalog of each collection for the Informatics Subcommittee. That person, with the subcommittee chair, will define the procedure used for that particular collection.
- (5) Identify a CAPTEM Facilities Contact Person

## 3. Welcome (McSween)

CAPTEM welcomes new members Hope Ishii and Devin Schrader. Kevin McKeegan has been selected as the new CAPTEM Chair, effective January 1, 2017.

Approval of Fall 2015 Meeting Minutes: Motion approved unanimously.

*Disposition of action items from last meeting:*

Action item #1: "Consider how to define the space-exposed hardware collection, particularly: i) what properties make a piece of space-exposed hardware curatable; ii) who makes the decision on what is or is not curatable, and iii) when is the decision made of whether or not something should be included in the collection (JSC, Taylor, Grossman)."

**Resolution: The space-exposed hardware collection was reclassified as the microparticle impact collection. Only materials that were affected by microparticle impacts will be kept in the Astromaterials collection.**

Action item #2: "Consider scientific data management standards for the sample analysis community (Westphal)."

**Resolution: To be addressed during this CAPTEM meeting.**

#### 4. NASA Headquarters report (Grossman)

##### *R&A Programs*

The overall R&A budget is similar to last year, but costs of individual proposals have risen. In some programs increases have gone up more than 10%, which increases selection pressure.

The PME budget is currently on hold, but may be resolved soon.

LARS has a reasonable budget of \$6.9M; last year 8 of 18 proposals were selected.

Emerging Worlds is getting the same amount of money as last year, when it had a 21% selection rate.

Hayabusa2 participating scientist selections were made, including 3 sample scientists and 6 instrument scientists.

Proposals submitted to ROSES 2015 had a new requirement to include a data management plan for nearly all of the programs. For ROSES 2016, the data management plans have been expanded to two pages that will be included in the body of the proposal but will not count against the 15 page limit.

Most of the proposal deadlines are similar to ROSES 2015, with the exception that Solar System Workings has been merged to a single deadline in February, rather than the split deadlines that were used last year.

NASA is performing a facilities review, and there will be a special session at LPSC on facilities in the Planetary Science community. NASA is determining whether or not currently funded facilities should be continued, and there may be a call for support of certain kinds of facilities in the future.

There will be a planning workshop this summer (July 28<sup>th</sup> – 29<sup>th</sup>) to develop a new road-map for the LARS program, particularly to identify instruments to maximize the scientific return from the OSIRIS-REx (and Hayabusa 2) missions. The workshop will feature plenary sessions, posters, and panel discussions, and a report will be generated that will inform future LARS solicitations, which will begin receiving funding from the New Frontiers program. *CAPTEM agreed to co-sponsor this meeting by a unanimous vote. Rhiannon Mayne volunteered to coordinate the CAPTEM activities related to this workshop.*

##### *Curation Policy*

There is a new top-level policy directive for all NASA science collections that was developed with the Interagency Working Group on Scientific Collections (IWGSC) and Office of Science and Technology Policy (OSTP), which will be managed out of the NASA Office of the Chief Scientist. Final signatures are being obtained.

The astromaterials collections are already in compliance with the new specific policy requirements. The Space-Exposed Hardware collection has been re-classified as the Microparticle Impact Curation collection and fits within the astromaterials curation policy.

Curation plan requirements for missions are also being developed to define in what state curation plans need to be for specific stages of mission development. These requirements will clarify interactions and roles of curation teams with missions.

*Mission updates*

OSIRIS-REx is on schedule for launch later this year. Hayabusa2 is in-flight to its target, Ryugu. NASA and JAXA will exchange materials from these two missions, with NASA to receive 10% of unprocessed Hayabusa2-returned material and JAXA to receive 0.5% of the OSIRIS-REx-returned sample. There is significant scientific exchange happening between the two missions, with multiple co-investigators participating on both missions.

OSIRIS-REx is amenable to having CAPTEM review portions of its curation plans; CAPTEM's role would be strictly advisory.

The New Frontiers solicitation, to be released in ~January 2017, includes comet surface and Lunar South Pole-Aitken Basin sample return options.

Planning for Mars 2020 and possible future return of sample from Mars is continuing.

Planning for possible curation of returned asteroid samples by the ARRM mission is also ongoing.

NASA has signed a Space Act Agreement with BoldlyGo. NASA would get some of the returned samples if the SCIM mission proceeds. The effort would still be bound to the same Planetary Protection conditions as any NASA-led mission.

## **5. JSC Organizational Report (Stansbery / Pace)**

Astromaterials Research and Exploration Science (ARES) is now a division in the Exploration Integration and Science Directorate (EISD) at JSC. Vanessa Wyche is the new director of EISD, replacing Steve Stich who accepted a position as the deputy program manager for commercial crew. Eileen Stansbery was acting director in the interim, and will be staying on as deputy director of EISD and JSC chief scientist.

The Exploration mission planning office is now housed in the EISD. This group plans architectures for future human exploration, such as how ORION will be used, and is developing plans for missions to asteroids, Mars, and the Moon. ARES scientists are working with people from the mission planning office to better integrate science and exploration goals. A special action team is also being put together to determine science goals for missions to cis-lunar space ("the Proving Ground") to solicit input and enhance buy-in from the scientific community.

The ARES division is reviewing its strategic plan to prioritize needs and opportunities for the next 20 years.

ARES division chief Greg Byrne was selected to fill an endowed chair at the Naval Postgraduate School. This is a one- to two-year post, and Greg's position is expected to be filled soon.

Two new hires will be joining ARES soon, Drs. Jeremy Boyce and Sam Lawrence.

Two ARES scientists, Dr. Mike Zolensky and Dr. Scott Messenger, were selected as Hayabusa2 participating scientists.

## **6. Astromaterials curation/JSC facilities report (Evans)**

### *Allocation and Curation highlights*

Sample traffic through curation is high; midway through 2016, approximately 950 samples have been allocated. A large number of samples are being returned from PIs as well. A total of 865 meteorite samples were transferred to the Smithsonian Institution. A total of 215 new meteorites from the ANSMET 2010 – 2014 seasons were announced in the Spring 2016 newsletter. JSC is expecting 569 new meteorites from the 2015-2016 ANSMET mission to the Miller Range. More than 100 items have been curated for OSIRIS-REx Contamination Knowledge. There have been nearly 800 shipments of educational materials, and outreach events have reached more than 5000 people.

### *Mission Support*

OSIRIS-REx and Hayabusa2: So far, 108 spacecraft materials have been archived from the spacecraft in the Microparticle Impact Curation Lab. A total of 12 contamination knowledge witness plates have been deployed during ATLO (March 2015 to present). These will be curated at JSC and deployments will continue at KSC up until launch. Cleanroom requirements have been defined for companies to make bids to design the cleanrooms for both OSIRIS-REx and Hayabusa2. The designs are on schedule to be completed in September and will include 30%, 60%, and 90% reviews. OSIRIS-REx science team meetings were held in Pasadena (March 2015), Maryland (October 2015) and Tucson (March 2016). Curation is archiving and documenting materials from the spacecraft, and cleaning and deploying witness plates for construction phases. Curation is also contracting for the lab designs for OSIRIS-REx and Hayabusa2 curation labs. Keiko Nakamura-Messenger is coordinating with the JAXA curation team about curation of Hayabusa2 samples.

Mars 2020: Francis McCubbin is a member of the Returned Sample Science Board for Mars 2020. This body has produced a report on the maximum allowable temperature of samples is available on the MEPAG website. Curation is developing a Contamination Knowledge Plan for Mars 2020 mission operations, with initial results to be presented at the Mars Returned Sample Science Workshop to be held before LPSC in The Woodlands, TX on March 20<sup>th</sup>. Curation will begin working with the Mars 2020 project to develop a curation plan before CDR.

### *Outreach*

The Educational Disc and Outreach programs have reached thousands of people. Curation held 26 Sample Disk Certification workshops, and four Authorized Trainer trainings in FY16 to date. For FY16 so far, curation has loaned 375 educational disks (206 lunar / 169 meteorite), along with 27 thin-section packages (17 lunar / 10 meteorite). In addition, 382 Lunar and Mars Soil Simulant sample packs have been loaned to educators, museums and students. There were 9 public outreach events that used curation-supplied displays; these events reached over 5,000 people. In addition, many of the Astromaterials samples/collections have been featured on various social media sites including the ARES blog, myares.wordpress.com, Facebook (NASA ARES), Twitter, and Instagram. The Lunar and Meteorite Disk overview video has now been made Section 508 compliant and is posted online.

### *Curation database*

Curation is continuing work on improving its online databases.

There is a new Lunar sample photo database online that is accessible by mobile devices. A searchable database is being developed for cosmic dust.

The Genesis catalog has been updated with concentrator target, gold foil and polished aluminum samples.

All forms and documents have been updated for the Microparticle Impact Collection (formerly Space Exposed Hardware).

The Stardust database is in the process of migrating to a new website that is not dependent on Flash.

More than 1500 peer-reviewed references, from 1978 to present, have been appended to their appropriate meteorites in the Antarctic meteorites database.

Work is continuing on the MoonDB Lunar Data Rescue site (<http://www.moondb.org/>), which is being built on the PetDB framework. This is a data system that will preserve, digitize and curate lunar geochemical, geochronological and petrological data and their associated metadata (sample and analytical metadata). The project is currently ingesting and formatting references (BibTex, RTF, EndNote tagged, xml, and RIS). There will be a workshop at LPSC for collaborators and interested investigators, and a poster during the Thursday night poster session.

A new PDART award has been funded to collect and serve detailed 3D photography combined with microCT data for key lunar and meteorite samples.

Curation submitted a response to the recent Planetary Data Systems (PDS) Request for Information (RFI).

#### *Curation archives – digitization*

An effort is underway to digitize the curation archives. A number of forms (F75, F73, F72, F71 and F70) have been filled out by principal investigators over many years. These constitute a valuable research tool for the curation staff; however, 98% of the forms are handwritten (over 42,000 documents in 48 boxes, totaling over 1500 pounds) and are not easily searchable. Other miscellaneous documents are also in the process of being digitized (lunar datapacks, COs, etc.).

#### *Curation facilities*

The thin section lab is being modified to house the new MicroCT instrument.

Progress continues on the OSIRIS-REx and Hayabusa2 labs. The Laboratory Design period will continue until September 30, 2016. RS&H selected the engineering design firm; they have more than 50 years of design experience with NASA. This includes the design of many laboratories and cleanroom for NASA, as well as the pharmaceutical and medical device industries. Relevant past experience includes:

- ISO Class 8 payload change-out room at KSC
- University of South Florida's 35,000 sq ft Science & Technology building
- Nano Therapeutics 160,000 sq ft laboratory and vaccine manufacturing facility including ISO 6 – 9 clean rooms and BSL3 containment areas.
- Walter Reed Army Institute of Research, 24,000 sq ft Vaccine Research and Production facility, including ISO 5 – 9 laboratory spaces.

Phase 1 and 2 bids are expected in Jan 2019, with construction taking place from June 2019 – June 2020. The labs are expected to be completed and operationally ready one year prior to the arrival of samples at JSC.

Whole-system assessments were conducted for all Curation facilities, including labs and subsystems such as glove boxes, to complement last year's end-to-end N<sub>2</sub> and UPW assessments. This study will enable future planning and proactive maintenance. It was noted that nearly all of the cleanrooms and major hardware subsystems are near or beyond published life expectancy. The ARES strategic planning efforts include prioritizing maintenance and upgrade of these facilities.

## **7. ANSMET Agreement update telecon (Grossman, Borg, Jackson, McCoy)**

CAPTEM was briefed on progress on the new three-agency agreement between NASA (Jeff Grossman), the National Science Foundation (Scott Borg), and the Smithsonian Institution (Tim McCoy). The U. S. began collecting meteorites in Antarctica in 1976; a three-agency agreement was entered into in 1980 between NASA, NSF and SI. The NSF provides logistics and field support, NASA provides curation of specimens and produces the Antarctic meteorite newsletter, and the Smithsonian Institution serves as the ultimate long-term repository of samples and immediate repository of iron meteorites, and performs classifications. The agreement has not been updated since 1980, meaning there is a need to modernize the agreement and update the language to ensure it is consistent with federal laws and policies.

The updated agreement language has been agreed upon in principle, and is undergoing final review. The new agreement is similar in both language and spirit to the original agreement. Most of the changes are already in place: the MWG is now part of CAPTEM; NASA funds the ANSMET field team through the NEO program (Mike Kelly at NASA HQ), and the Meteorite Steering Group remains in place with one representative from each agency, with Jeff Grossman [NASA] and Tim McCoy [SI] remaining, and Mike Jackson replacing Scott Borg [NSF] in the near future. There are fewer specifics in the agreement, giving each agency more latitude to execute its portion of the agreement. The new agreement states that the custodial agency has final curatorial control of the meteorite samples. It has been requested that the agreement be valid for 10 years, but there may be a requirement to review it in 5 years.

For meteorites, it was clarified that SI as a matter of policy asks that all Antarctic meteorite requests be routed through JSC regardless of where the samples are at the time of the request.

Transfer of samples from JSC to SI will continue as in the past, based on the number of requests for a given sample. The SI reserves the right to request the transfer of samples at their discretion.

## **8. Curator / Subcommittee reports**

### *Meteorite Working Group (Richter, Alexander)*

Over the past year, 757 samples have been allocated to 79 investigators, with 443 of those samples going to 45 investigators over the last 6 months, and there were 43 new requests for meteorite samples for the Spring 2016 MWG meeting. In the Fall 2015 and Spring 2016 newsletters, 261 new meteorites were announced. A total of 865 samples have been transferred to SI. In the 2015-2016 field season, ~569 new meteorite samples were collected in the Miller Range; these will be returned to Houston in Spring 2016. Work on the meteorite database is

ongoing, and more than 1500 peer-reviewed papers, from 1978 to present, have been linked to specific U.S. Antarctic meteorite samples.

*Stardust (Zolensky, Westphal)*

In the past 6 months, 25 samples have been allocated or re-allocated to 4 PIs, and 4 sample requests have been received. So far, 48 out of 124 tiles have been removed from the Stardust cometary tray; 14 of these are at White Sands Test Facility. There are a few PIs that have never responded to the latest Stardust audit started 6 months ago. New personnel are being trained in cell removal to preserve skills.

It was noted that the curation facility in WSTF may be running out of room, and NASA is considering this in their facility planning. While it is not a strict requirement to transfer a subset of curated material to a secondary location for all collections, in practice this is being done (either at WSTF or SI) for all collections.

Routine sample allocations of interstellar particles are occurring, and three cells were scanned at the end of last year. The next set of cells to pull for scanning this summer is currently being identified.

Samples from the largest impact features on the Stardust cells are intentionally being saved for consortium studies that require larger amounts of sample.

The Stardust allocation committee has had little turnover, and they are in the process of recruiting new people. They have created a policy to identify rare / unique samples to allow the committee to review analysis plans.

There is a compendium of publications (142 to date) resulting from Stardust samples on a shared papers domain.

After the Stardust workshop in Berkeley last year, a white paper was written on the next set of critical questions that can be answered through analysis of the Stardust samples. The white paper will be published at some point. There will be a special issue of *Meteoritics & Planetary Science* on the Stardust-related research.

About  $\frac{3}{4}$  of the Stardust cells have been scanned, and in this process 3D movies are being made. The movies are put online and the presence of particles / features is being reported by citizen scientists through the Stardust@home project, which was inspired by SETI. A new project called “foils@home” has been started to enable citizen scientists to search for impact features in the foils that line the cells in the Stardust collector trays.

*Cosmic Dust (Zolensky, Ishii)*

A total of 20 cosmic dust particles were allocated to 2 groups in the past 6 months, and 2 new sample requests have been received.

The collectors are currently flying on ER2 and WB57 aircraft, though there have been few flights in the past 6 months. New collectors based on carbon nanotubes and polyurethane foam are also being flown to help alleviate contamination from silicon oil.

It was noted that the cosmic dust collection does not have materials stored offsite, but some of the material is stored in a different vault at JSC.

The Cosmic Dust database is being upgraded and catalog 20 is in preparation.

There are two new proposed methods for surface airborne particle collection; these involve passing high volumes of air through a filter to collect and concentrate the particles. The collections can be timed to minimize the collection of terrestrial particles and maximize the amount of cosmic dust particles. These collected particles would be considered part of the cosmic dust collection at JSC, and JSC curation could accommodate them.

The membership of this subcommittee needs to be revamped.

*Asteroid Returned Samples (Zolensky, McKeegan)*

No sample allocations have been made in the past 6 months, though one allocation is in progress and one request is under review. The next allotment of samples from JAXA to NASA will probably occurring in April. JAXA has been pre-characterizing samples, but they will begin allocating uncharacterized samples to NASA, which should speed up the process. NASA currently has 25 of the 1,000 particles they expect to receive. The subcommittee will need a new chair to replace Kevin McKeegan, who will be taking over as the CAPTEM chair in January, 2017.

*Genesis (Allton, Nyquist)*

There were 6 requests, and 9 Genesis-flown samples were allocated to 4 PIs. There was also 1 request and 2 reference materials were allocated to 1 PI. There have been new science requests for osmium abundances and measurement of the 187/88 ratio. To date, 597 Genesis-flown materials and 329 reference materials have been allocated. There are a number of requests that involve a range of cleaning procedures – often these are performed by the sample requestors and documented by the Genesis curators. Almost half (9 of 19) investigators have returned their inventories. There are 4,260 samples at JSC, 53 at WSTF, and 219 samples are with investigators.

Laser scribing subdivision is not yet available, in part due to construction of the microCT lab. Options for subdividing SiC and CVD diamond targets are being researched.

The Genesis-flown sample database has been modified to accommodate non-collector canister hardware, though Genesis science takes priority on requests. A total of 191 canister hardware samples have been added to the sample database; these materials will be characterized, and a subset will be selected for posting online. The subset will contain surfaces exposed to the solar wind or relevant contamination sources.

The Genesis curator is evaluating the best approach for balancing sample use versus conservation. In particular, new smaller / unique samples are continually being added to the collection.

After 3 years as chair, the subcommittee is seeking a replacement for Larry Nyquist, and membership on the committee may be revamped. There is a desire to expand the investigator base, as many of the remaining investigations that could be completed with the Genesis samples are difficult and may require novel approaches. The subcommittee is reviewing how requests are evaluated to ensure that the perceptions of the review process agree with how the reviews are being performed.

Although a tremendous amount of scientific value has been returned from the Genesis mission, some science was undoubtedly lost with the off-nominal landing. It may be time to start thinking about a follow-up mission to answer new and remaining unanswered questions.

### *Informatics (Westphal)*

The informatics subcommittee responded to an RFI from NASA HQ regarding data management, in consultation and coordination with JSC curation. The specific question explored was: “What role should the [Planetary Data System] PDS play, relative to other archiving alternatives (including scientific journals), in providing the public access to the data that is the product of NASAs funded research and the basis of published scientific studies?”

The informatics subcommittee determined that the use of the PDS for curation data is premature because there are a wide range of instruments commonly used for analysis, there is no community consensus on the format for data products, without this consensus the analytical methods for the data would need extensive documentation, and there is no consensus on which types of data would be of use to current or future researchers.

However, the informatics subcommittee recognized “the need to make data collected using public funds publicly accessible. . . . The emerging requirement by journals to include data, data products and analysis procedures or code, and include these in the review process, is a step toward and addresses many of the issues [raised in the RFI].”

There was a lengthy discussion on possible distinctions between mission data, which is largely unique and cannot be easily collected again, and research data where the analyses could be repeated. It was also debated whether or not research data should be reviewed in a traditional manner (i.e., through the journal review process) or if the burden should be placed on the PDS review process. In response to the questions of whether or not research data should be included in the PDS, and if so whether or not there should be a requirement that data going into the PDS should undergo peer review, CAPTEM evaluated and approved the statement that “Data put on the PDS should be restricted to data that has been peer reviewed.”

Tom Morgan also informed CAPTEM that the PDS is working on a new roadmap for the time period from 2017 – 2026. There will be an open call for members on the committee.

The informatics subcommittee re-evaluated its charter and proposed to focus on three items for the next 2 years:

- To represent the PI community in the development of external requirements for the JSC databases and catalogs
- To provide ongoing, periodic assessments of external aspects of JSC databases and catalogs
- To provide findings to JSC Curation on the capability and sustainability of current informatics technology as applied to collections

There was a motion to change the informatics subcommittee charter to add members for each catalog and narrow the focus to the three items listed above. It was determined that the chair of each subcommittee would work with an informatics representative from each collection to perform annual assessments of the quality and thoroughness of the data available for a small number of representative samples of each collection. The proposed wording is attached as Appendix 1. The motion passed unanimously.

*Lunar Samples (Zeigler, Treiman)*

Since October 1<sup>st</sup>, 2015, 448 samples have been allocated. In order to more accurately count allocations, samples that are allocated but analyzed at JSC without leaving the building are now being allocated and then unallocated when the analyses are complete (these were not counted as allocations previously). There were 18 Apollo sample requests for Spring 2016; 6 were approved as is, 9 were approved with modifications, and 3 were denied; in total, ~336 of the 535 requested samples were approved for allocation. About 40% of allocations are going to foreign PIs and about 20% of samples are going to new PIs (defined as investigators without existing loan agreements in their names). The average allocation time for lunar samples is 45 days. Two requests from Spring 2015 are still awaiting PI action; all other approved sample requests not needing PI action are complete.

The Thin-Section lab made 10 new thin sections, cleaned 131 thin sections, repaired 14 thin sections and rounded one thin section.

A total of 194 educational disks were loaned for K-12 education, 68 lunar lab tours were given to 3,884 people including three film crews, and two radio interviews were given.

A total of ~3,500 samples are in the process of being re-accessioned.

All 122 lunar PIs are current on their loan agreements. The 2015 Lunar Sample Inventory was sent out to 98 external (to JSC) PIs and 100% compliance was achieved; an addition 13 PIs were exempt because the allocations were too new to be inventoried or they chose to return the samples. The 11 JSC PIs performed their inventories with JSC security (standard procedure). This summer JSC will perform the bi-annual lunar sample location inventory with JSC security.

The Micro-CT has been purchased, and the large Lunar Thin Section Lab will be renovated to house it. The Micro-CT is a Nikon XTH 320 micro-CT system with:

- 4 interchangeable x-ray sources (180 kV, 225 kV, 225 kV rotating, 320 kV)
- A 2000 pixel, 16-bit detector
- Ability to handle large samples (100 kg, 300 mm diameter)
- weighs 8000 kg, with dimensions 9' x 7' x 6'

The timeline of instrument set up is:

- Demolition – March-April 2016
- New construction – April-May 2016
- Casework installed – June 2016
- Hire a technician – July/August 2016
- Instrument arrival – August 2016
- System acceptance – September 2016
- Data produced – Fall CAPTEM

A total of 20 new thin-section cases have been constructed to supplement the 8 existing thin-section cases. As the existing thin-sections are moved into the new cases, each sample will be macroscopically photographed to ensure a consistent photographic record of all existing lunar thin sections. These images will be included with information about their respective samples in the Apollo sample database. It was also discovered that thin sections that pre-date the digital database are not flagged. There are approximately 8,000 of these, as many samples are contained in bags as multiples. It is expected that all of the thin sections will be rearranged before the Fall CAPTEM meeting, and to have the photographs available in the catalog by the next Spring CAPTEM meeting.

The migration of the Lunar Sample and Photo Catalog to a site that does not require Flash is complete. There is a revamped search interface that is more intuitive. A list of available thin sections is included, and it is now much easier to limit photo searches, rotate images and report problems. The database can now be easily accessed on mobile devices. Data, photos and references for cores and drive tubes have been added to the website. And all of the Apollo Sample History Forms (F-75s) have been scanned. Many new catalogs are online (or coming soon):

- Catalog of Apollo Lunar Surface Geological Sampling Tools and Containers (JSC-23454 – March 1989 – Allton)
- Apollo 12 Lunar Sample Information Catalog ( NASA TR R-353–Dec 1970 – Warner)
- Table of Sample Depths for Apollo 15, 16, and 17 Drill Cores (Pub. 56 – March 1981 – Allton, Waltz, Dardano)
- Drive Tubes 74002/74001 (January 1978 – Nagle)
- Description of Core Samples Returned by Apollo 12 (NASA TM-X-58066 – Nov 1971 – Lindsey, Heiken, and Fryxell)

The MoonDB is a quality-controlled data system to preserve, digitize, and curate lunar geochemical and petrological data and associated sample and analytical metadata. The project is led by Kerstin Lehnert of IEDA (at Lamont Doherty) and funded through NASA's PDART program. JSC curation is providing sample numbers, sample collection/processing metadata, and sample lithologies. Data from the first ~400 references has been ingested, with many more to come (using lunar compendia as ref. source). The project is also working with lunar PIs to get unpublished (but vetted) data to be included as well. The data interface is under construction with PetDB serving as the template. There will be a workshop and poster (abstract #2738) during LPSC.

## **9. Briefing on JAXA curation activities (Hisayoshi)**

Dr. Yurimoto Hisayoshi (Hokkaido University) presented an overview of JAXA curation. Curation started with the Hayabusa mission in 2009, which returned samples to Earth in 2010. Initial analysis was 1 year, and the first AO in 2012 had 17 proposals accepted. In 2013, 16 proposals were accepted, and in the 3<sup>rd</sup> and most recent AO, 12 proposals were accepted. There is a database for 748 particles returned by Hayabusa. Currently, sample requests can be made anytime, and requests are reviewed on demand. The curation staff consists of 1 curator, 2 assistant curators, and 2 technicians. Available facilities include a clean chamber, FESEM/EDS (x2), micro-Raman, micro IR, XRD, FIB, ultramicrotome, TEM/EDS instruments.

Hayabusa2, currently in flight to type-C asteroid Ryugu, will rendezvous in 2018 and return >1 g of sample from each of three locations in 2020. The mission will collect two surface samples and one interior sample. It is expected that there will be an international AO in 2022 for requests of the returned samples.

## **10. Status of Microparticle Impact Curation (MIC) Lab**

The MIC lab curates space-exposed surfaces that contain impacts from IDPs or space debris and associated materials that could have contaminated these surfaces. Curatable items are those that contain microparticle impact features. Decisions on what will be curatable are made by the MIC curator, and by PIs and curators of missions that return materials to Earth. The MIC lab website provides a portal to space hardware that is part of mission collections, e.g. Genesis, as well as loan agreements, an investigator handbook, and necessary forms. Individual pieces of missions belong to that mission, while LDEF is in the MICL only. The company that built parachutes for Genesis and Stardust recently requested parachute material from the MIC lab to help guide the design of the OSIRIS-REx parachute.

## **11. PSS Meeting Report (McSween)**

McSween updated CAPTEM on relevant activities of the Planetary Science Subcommittee (PSS):

- The addition of Ocean Worlds to the approved New Frontiers mission targets has raised considerable concern in the community. In particular, some feel that it is unclear whether or not it is fair to add targets outside of the Decadal Survey and mid-course correction processes. The possibility of a future liquid/gas returned sample from an Ocean Worlds mission should be considered by JSC.
- The National Research Council is reviewing the effects of PSD's R&A reorganization. A report is expected in December 2016.
- There is continuing concern in the planetary science community about the perceived underfunding of laboratories. To more accurately determine the magnitude of this issue and whether critical areas of research are being compromised, the PSS has set up an online survey about funding of laboratories: [www.tinyurl.com/psslabs](http://www.tinyurl.com/psslabs)
- The Analysis Groups (AGs) are all getting together to write a white paper on the importance of having participating scientists in missions. CAPTEM will participate in this effort (McSween).

## **12. Consider scientific data management standards for the sample analysis community**

See discussion under Informatics Subcommittee (item #8 above).

## **13. New business? (All)**

McKeegan proposed a statement on increased cooperation between NASA and JAXA on OSIRIS-REx and Hayabusa2:

“CAPTEM notes the improved procedures and the increasingly excellent working relationship between NASA and JAXA in sharing returned samples from primitive solar system bodies, and encourages future agency support for exchange of participating scientists and curatorial knowledge.”

The motion was moved and approved unanimously.

There was a call for science bullets. Jeff Taylor has set a nice example for how to get more science bullets. Subcommittee chairs should look for important findings from samples allocated by their committees.

A Joint LPI/JSC working group has been established, as part of new CAN to improve working conditions between LPI and JSC. Treiman and McSween serve on this working group.

#### **14. Fall CAPTEM Meeting Schedule**

The next CAPTEM meeting (virtual) will be held in the fall (TBD). It is preferred that MWG and lunar subcommittees meet beforehand.

**Adjourn.**