

CAPTEM Minutes**Minutes of the Fifty-first Meeting of the
Curation and Analysis Planning Team for Extraterrestrial Materials
(CAPTEM)****Held online via WebEx and teleconference on Thursday, November 9th, 2016****Table of Contents**

1. Agenda for Fall 2016 CAPTEM Meeting, November 9 th	2
2. New action items from this meeting.....	3
3. Welcome (McSween)	3
4. NASA Headquarters report (Grossman).....	4
5. JSC Organizational Report (Evans, Draper, McCubbin)	6
6. Astromaterials curation/JSC facilities report (Evans, Zeigler, McCubbin).....	6
7. Curator / Subcommittee reports.....	7
8. PSS Meeting Report (McSween).....	10
9. New business?	10
10. Spring CAPTEM Meeting Schedule (McSween)	10
11. CAPTEM Membership rotations as of January 1 st (McSween).....	10
12. Summary of Action Items (Burton)	11

1. Agenda for Fall 2016 CAPTEM Meeting, November 9th

2:00 PM

Welcome, roll call (McSween)

- CAPTEM: Hap McSween, Aaron Burton, Juliane Gross, Hope Ishii, Rhiannon Mayne, Larry Nyquist, Devin Schrader, Allan Treiman, Andrew Westphal
- Others: Judy Allton, Michael Calaway, Dave Draper, Cindy Evans, Marc Fries, Jeff Grossman, Kevin Righter, Ryan Zeigler, Mike Zolensky

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

Status of action items from last meeting (McSween)

(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

2:10 pm

NASA HQ briefing (Grossman)

2:35 pm

JSC organizational report (Evans, Draper, McCubbin)

3:00 pm

Curator/Subcommittee report and issues needing attention/action (5 min each)

3:35 pm

PSS Meeting Report (McSween)

- Relevant findings:
 - (1) Response to community concerns about the support of laboratory facilities
 - (2) The Planetary Protection concept of "induced special regions" on Mars.
- Any new CAPTEM findings for PSS?

New Business?

3:50 pm

Spring CAPTEM Schedule

- March 25-26 at LPI, immediately following LPSC
- MWG and Lunar allocation meetings on Friday and Sunday, respectively; times and locations TBD

CAPTEM membership rotations as of January 1, 2017 (McSween)

- Thank you Andrew Westphal, Larry Nyquist, and Rhiannon Mayne for your very effective service on CAPTEM!
- Kevin McKeegan becomes new CAPTEM chair
- Announcement of new Subcommittee chairs for Genesis, Asteroids, Stardust and Informatics
- Announcement of new Subcommittee Members (Tom Zega joins MWG, Arya Udry joins MWG and CAPTEM, Susan Taylor and Zahia Djouadi join Cosmic Dust)
- Nominations/volunteers for Facilities chair for CAPTEM?

Summary of action items (Burton)

4:00 PM

Adjourn

2. New action items from this meeting

- (1) CAPTEM will finish filling new appointments to Subcommittee chair positions (Genesis, Asteroids and Informatics).
- (2) Francis McCubbin will consider a role for CAPTEM in planning for storage and allocation of Mars 2020 mission witness coupons to be housed at JSC and will provide a briefing at the Spring CAPTEM meeting.
- (3) McSween will ensure the NRC committee reviewing the status of NASA's analytical facilities relevant to CAPTEM have received the white paper CAPTEM wrote regarding this subject.
- (4) CAPTEM will anticipate working with NASA Headquarters on developing an investment strategy for needed future analytical capabilities and facilities, following delivery of the NRC study.
- (5) Identify a CAPTEM Facilities Contact Person.
- (6) Subcommittee chairs should send lists of their current members and appointment dates to Aaron.

3. Welcome (McSween)

Approval of Spring 2016 Meeting Minutes: Motion approved unanimously.

Disposition of action items from last meeting:

Action Item 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.

Resolution: There were a sufficient number of LARS proposals in ROSES 2016 addressing new techniques and instruments needed for these two missions that the workshop was no longer necessary and was not held.

Action Item 2: CAPTEM is anticipating a request from OSIRIS-REx to peer review selected aspects of the mission's curation plan.

Resolution: NASA Curation had their 60% design review which addressed most of the critical issues needing review. Curation and HQ will discuss whether review by CAPTEM is still desired.

Action Item 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.

Resolution: Rhonda Stroud was appointed as the new Subcommittee Chair for the Stardust collection, but chairs are still needed for Genesis, Asteroids and Informatics Subcommittees. The CAPTEM chair will work with HQ and JSC Curation to get these positions filled, and current chairs have agreed to continue serving until they are relieved of duty.

Action Item 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, along with the subcommittee chair, will define the procedure used for that particular collection.

Resolution: Each collection has identified a representative to work with the Informatics subcommittee. The membership will be available on the CAPTEM website.

Action Item 5: Identify a CAPTEM Facilities Contact Person.

Resolution: A contact person has not yet been identified. The CAPTEM chair will identify a contact person once the membership of CAPTEM stabilizes.

4. NASA Headquarters report (Grossman)

R&A Programs

Selections for the Emerging Worlds (EW) and LARS programs in ROSES 2016 are expected soon. Proposal pressures to these programs have increased, with EW receiving 156 proposal versus 137 last year, and LARS receiving 28 compared with 18 last year. It was noted that many of the LARS proposals this year were to develop new instruments and techniques in anticipation of returned samples by Hayabusa2 and OSIRIS-REx.

ROSES 2017 is being planned, and no large changes have been proposed. Most proposal deadlines are expected to remain about the same.

The new three-agency agreement (NASA, NSF and the Smithsonian Institution) covering the ANSMET program has been finalized. It was signed in August, 2016 and will be valid for 10 years. The meteorite steering group is composed of civil servants from each agency (Jeff Grossman of NASA, Michael Jackson of the NSF, and Tim McCoy of SI). The NEOO program scientists in charge of the NASA aspects of ANSMET are Lindley Johnson and Mike Kelley. For the most part, the new agreement is an update of the previous agreement, which began in 1980. Notable changes are that NASA is now in charge of planning and overseeing field work, with NSF providing assistance with field logistics. The new agreement also clarifies that custody of the meteorites resides with NASA from time of collection until they are transferred to SI. The ANSMET PI and field teams are the responsibility of NASA and funded through the NEOO program, and the Meteorite Working Group is now a part of CAPTEM.

NASA has asked the NRC for a study on Sample Analysis Future Investment Strategy. The committee will assess:

- What laboratory analytical capabilities are required to support PSD (and partner) analysis and curation of existing and future extraterrestrial samples?
 - Which of these capabilities currently exist, and where are they located (including international partner facilities)?
 - What existing capabilities are not currently accessible that are or will be needed?
- Whether the current sample laboratory support infrastructure and NASA's investment strategy meets the analytical requirements in support of current and future decadal planetary missions.
- How can NASA ensure that the science community can stay abreast of evolving techniques and to be at the forefront of extraterrestrial sample analysis?

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.

A new set of policy requirements (NPR) is still being developed, with details for management of each collection or co-managed set of collections. The astromaterials collections are already in compliance with the new specific policy requirements that are being developed.

Mission updates

OSIRIS-REx launched successfully on September 8th, 2016 and is expected to return samples in September, 2023. Hayabusa2 is in-flight to its target, asteroid Ryugu. NASA and JAXA will exchange materials from these two missions, with NASA to receive 10% of unprocessed Hayabusa2-returned material within one year and JAXA to receive 0.5% of the OSIRIS-REx-returned sample.

The New Frontiers solicitation, to be released in late 2016, includes comet surface and Lunar South Pole-Aitken Basin sample return options.

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

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

JAXA is planning fly-bys of Phobos and Deimos and sample return from Phobos in 2027.

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 (Evans)

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. Cindy Evans has replaced Greg Byrne as the division chief.

Francis McCubbin has been named the Chief Scientist for Curation, as well as the Astromaterials Curator, and has been moved to the division level.

Ryan Zeigler has been named as the manager of Astromaterials Research Acquisition and Curation Office.

The Curation and Research offices are in the process of hiring a Geomicrobiologist/Astrobiologist and Mars mission scientist.

6. Astromaterials curation/JSC facilities report (McCubbin)

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: Curation had the 60% and 90% design reviews for OSIRIS-REx and Hayabusa2. Construction for both labs will begin in FY 2019.

Mars 2020: Francis McCubbin continues to serve as an ex officio 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. Francis is also chairing the Contamination Control and Planetary Protection Working Group (CCPPWG) that was tasked by NASA HQ to determine the implications for sample science resulting from CC and PP practices, and to make findings about any potential problems. Curation will be archiving witness materials and coupons in the near future.

New Frontiers 4 (2017): A number of sample return missions are expected to be proposed and curation is providing a supporting role in all proposals.

Outreach

The Educational Disc and Outreach programs have reached thousands of people. Curation held 11 Sample Disk Certification workshops, and one Authorized Trainer trainings since the Spring CAPTEM meeting. In that interval, curation has loaned 360 educational disks (191 lunar / 169 meteorite), along with 111 thin-section packages (17 lunar / 10 meteorite). In addition, 670 Lunar and Mars Soil Simulant sample packs have been loaned to educators, museums and students. There were 29 public outreach events that used curation-supplied displays; these events reached over 6,185 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

The Cosmic Dust collection is next in line to have its publicly accessible database revamped.

Curation facilities

There was a significant issue with a water leak containing rust that came from a failed high-pressure water chiller line. This is discussed in more detail in the Apollo / Lunar sample update.

7. Curator / Subcommittee reports

Cosmic Dust (Zolensky, Ishii)

The Cosmic Dust Subcommittee thanks Giles Graham and Matthew Genge for their many years of service, and welcomes Susan Taylor and Zahia Djouadi. Hope Ishii is the chair of the Cosmic Dust Subcommittee, and George Flynn has agreed to stay on to preserve continuity.

Since March, four requests were received and three were recommended for allocation. The request that was denied was for use in an art exhibition.

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

Genesis (Allton, Nyquist)

There were 8 requests from 6 investigators. A total of 18 Genesis-flown samples were allocated to 5 PIs and 3 reference material samples were allocated to 2 investigators. There have been new science requests for Br feasibility, Mg fluence and isotopes, sulfur fluence, and cleaning studies.

The question was raised of how to preserve corporate knowledge about collector materials, and the development of a “compendium” of materials by batch is being considered. This would include bulk purity, surface cleanliness, and ion implant runs. It was also suggested that a compendium of published science results be established. This would help the subcommittee evaluate new requests, and also help requestors by providing ready access to studies that have already been performed. CAPTEM expressed support for both of these initiatives, though it was unclear who would perform the required work.

Another question the subcommittee is wrestling with is whether solar wind ions have a “shelf life”. Stated differently, at what point does the risk of sample loss / degradation over time outweigh the benefit of preserving samples for future analysis?

The subcommittee is looking for ways to use science and engineering knowledge from Genesis samples to enhance further exploration. Specifically, they are looking for ways to bring scientists into mission participation. A sample of possible topics is space weathering, molecular contamination distribution, and crash impact modeling.

Asteroid Returned Samples (Zolensky, McKeegan)

One Hayabusa sample allocation was made. The subcommittee needs a new chair to replace Kevin McKeegan, who will be taking over as the CAPTEM chair in January, 2017.

Stardust (Zolensky, Westphal)

In the past 6 months, 3 new requests were received.

There is a compendium of publications (148 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. Using the white paper as a framework, a manuscript has been submitted to *Meteoritics & Planetary Science*.

Curation has trained a new sample processor, and that has allowed the completion of a sample allocation that had been delayed.

The Stardust@Home program has led to spin-off of “microscopy at home”, where Cornell, Princeton, U.C. Berkeley and Human Computation Institute have made imagery of brain tissue in living mice available for citizen scientists. This collaboration could increase the rate at which this research on Alzheimer’s disease can be performed by a factor of 10.

Lunar Samples (Zeigler, Treiman)

Since the March meeting, 395 samples have been allocated, including 181 thin sections and 214 other samples, bringing the total allocations for 2016 to 843 samples. There were 33 Apollo sample requests (16 curatorial, 17 CAPTEM) for Spring 2016; 11 were approved as received, 6 were approved with modifications, and 0 were denied; in total, 265 of the 455 requested samples were approved for allocation. Two requests from Spring 2015 are still awaiting PI action and four Spring 2016 requests are awaiting PI action.

The Thin-Section lab made 27 new thin sections, including 21 new specialty potted butts for SIMS work.

A total of 191 educational disks and 16 thin section sets were loaned for K-12 education, 131 tours were given to 999 people including three film crews and Wired Magazine.

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 has been delayed somewhat:

- Demolition – March-April 2016 (complete)
- New construction – April-May 2016 (complete)
- Casework installed – ~~June 2016~~ July 2016 (complete)
- Hire a technician – ~~July/August 2016~~ October 2016 (complete)
- Instrument arrival – ~~August 2016~~ February 2017
- System acceptance – ~~September 2016~~ March 2017
- Data produced – ~~Fall CAPTEM~~ Spring 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. Significant progress is being made on the thin section reorganization.

There was a water leak in Building 31 at JSC. A water supply line to a chiller burst overnight and flooded the new micro CT lab, lunar and meteorite thin section labs, as well as the EIL. The water contained visible rust. No samples were damaged, the water was quickly cleaned up and the area dried. Samples of rust were collected for analysis to determine the composition as a precaution if anomalous results are observed in samples. Remediation efforts to remove rust from underneath and behind cabinetry are in progress and should be complete soon. Leak detectors are being installed to enable early detection of leaks should they occur in the future.

McSween asked how the possible rust contaminants for samples in these labs would be described and disseminated to investigators in the community. An abstract for LPSC will be prepared.

Meteorite Working Group (Righter, Alexander)

Over the past year, 843 samples have been allocated to 75 investigators. There were 44 new requests for meteorite samples since the Spring 2016 MWG meeting, including requests from 5 new PIs. Of these 44, six were handled by advance and 5 were handled by the JSC curator. In the Spring 2016 and Fall 2016 newsletters, 434 new meteorites from the 2010, 2012, 2013, 2014 and 2015 field seasons were announced. A total of 740 samples were transferred to SI. Repaired isopods were sent to Port Hueneme in mid-September. Work on the meteorite database has been completed.

The Meteorite laboratory at JSC has a 3D laser scanner, which was used to produce a 3D laser scanned model of a new iron meteorite, DOM 14170, which was observed to have a very unusual shape. There is also a new Leica microscope in the Meteorite processing lab, and CT scanning has been performed on selected samples as part of Cindy Evans' funded PDART proposal. This includes the bencubbinite MIL 07411.

Kevin Righter has written drafts of 5 new chapters as updates for the Martian meteorite compendium, including the meteorites NWA 10153, NWA 8694, Yamata 002192/2712, NWA 7034, and NWA 2975 and its pairs.

During this report, Grossman raised the question of whether the individual collections have formal decision-making processes for sample requests involving samples with little mass

remaining. This was found to be the case for each collection except Cosmic Dust, though for most collections it sounded like the process could be better codified.

Informatics (Westphal)

The informatics subcommittee has particularly focused on its task to provide ongoing, periodic assessments of external aspects of JSC databases and catalogs. In concordance with this, the subcommittee selected a representative for each collection, and is producing a report on the functionality and content of each collection's external website. Future work will focus on assessment of data quality and completeness.

8. PSS Meeting Report (McSween)

McSween gave CAPTEM an update on CAPTEM-relevant findings from the Planetary Science Subcommittee. The PSS was pleased with NASA's response to community concerns about the support of laboratory facilities. The response included the commissioning of an NRC study to evaluate existing facilities and those that will be needed in the future. The PSS also made a finding that NASA should convene a workshop with subject matter experts to evaluate the Planetary Protection concept of "special regions" on Mars and, in particular, "induced special regions", stemming from the notion that heat from rovers or other vehicles could create a special region during the course of a mission, with implications for further exploration and sample return.

9. New business?

Jim Green gave CAPTEM an overview of upcoming sample return missions by NASA and other agencies, as well as insight into NASA's plans to evaluate existing analytical capabilities and prioritize future investments to ensure maximum science return. Efforts by NASA to partner with other space agencies were also discussed.

CAPTEM finding: CAPTEM advocates that NASA PSD find a mechanism for using PI grant funding to bring foreign investigators to U.S. laboratories for research collaborations.

Background: Given PSD's focus on community concerns about the support of laboratory facilities and capabilities to perform state-of-the-art analyses on the many returned extraterrestrial samples anticipated during the next decade, more international collaborations at the investigator level would benefit instrument development and be cost effective.

10. Spring CAPTEM Meeting Schedule (McSween)

The Spring CAPTEM meeting will be held immediately after LPSC, March 25th and 26th, at the LPI. MWG and Lunar allocation meetings will be held on the 24th and 26th, respectively.

11. CAPTEM Membership rotations as of January 1st (McSween)

- Thank you Andrew Westphal, Larry Nyquist, and Rhiannon Mayne for your very effective service on CAPTEM!
- Kevin McKeegan becomes the new CAPTEM chair.

- Rhonda Stroud has been named as the new Stardust Subcommittee chair.
- New Subcommittee chairs for Genesis, Asteroids and Informatics are being identified.
- Nominations or volunteers were sought for CAPTEM facilities contact.

12. Summary of Action Items (Burton)

CAPTEM will finish filling new appointments to Subcommittee chair positions (Genesis, Asteroids and Informatics).

Francis McCubbin will consider a role for CAPTEM in planning for storage and allocation of Mars 2020 mission witness coupons to be housed at JSC and will provide a briefing at the Spring CAPTEM meeting.

McSween will ensure the NRC committee reviewing the status of NASA's analytical facilities relevant to CAPTEM have received the white paper CAPTEM wrote regarding this subject.

CAPTEM will anticipate working with NASA Headquarters on developing an investment strategy for needed future analytical capabilities and facilities.

Identify a CAPTEM Facilities Contact Person.

Adjourn.