

## CAPTEM Minutes

### Minutes of the Fifty-fifth Meeting of the Curation and Analysis Planning Team for Extraterrestrial Materials (CAPTEM) Held virtually on Friday, November 9<sup>th</sup>, 2018

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## 1. Agenda for Fall 2018 CAPTEM Meeting, Friday, November 9

CAPTEM: Kevin McKeegan (Chair), Hope Ishii (Vice Chair), Jess Barnes (Lunar), James Day (Lunar), Juliane Gross (Lunar), Munir Humayun (Asteroids), Noriko Kita (MWG), Sam Lawrence (Informatics), Larry Nittler (Genesis), Liz Rampe (Secretary), Devin Schrader (MWG), Rhonda Stroud (Stardust), Arya Udry (MWG)

Others attending: Judy Allton (Genesis Curator), Mike Callaway (JSC Curation), Dave Draper (JSC ARES Research Officer Manager), Jason Dworkin (OSIRIS-REx Mission Project Scientist, GSFC), Cindy Evans (JSC ARES Division Chief), Marc Fries (Cosmic Dust Curator), Mandy Gaspard (JSC Curation), Jeff Grossman (HQ Program Officer/Discipline Scientist), Andrea Harrington (Mars Sample Curator), Aurore Hutzler (JSC Curation), Dante Lauretta (OSIRIS-REx Principal Investigator, Univ. Ariz.), Darren Locke (JSC Curation), Francis McCubbin (JSC Head Astromaterials Curator), Melissa Morris (HQ Program Officer/Discipline Scientist), Andrea Mosie (JSC Lunar sample collection), Aaron Regberg (JSC Advanced Curation), Kevin Righter (JSC Meteorite and OSIRIS-REx Curator), Melissa Rodriguez (JSC Curation), Carol Schwartz (JSC Curation), Christopher Snead (JSC Advanced Curation), Ryan Zeigler (Apollo Sample Curator, ARES Curation Office Manager), and Mike Zolensky (Curator of Stardust, Hayabusa, and microparticle impact lab).

3:30 pm (all times are EST)

*Approval of minutes from Spring 2018 meeting (McKeegan, Rampe)*

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

3:45 pm

*OSIRIS-REx curation plan (Lauretta)*

4:20 pm

*Subcommittee/Curator discussions – only issues needing attention/action (<5 min each)*

*Stardust (Stroud/Zolensky)*

*Asteroids (Humayun/ Zolensky)*

*MWG (Kita/Righter)*

*Lunar (Gross/Zeigler)*

*Cosmic Dust (Ishii/Fries)*

*Genesis (Nittler/Allton)*

*Informatics (Lawrence)*

4:55 pm

*Break for 5 minutes*

5:00 pm

*NASA HQ updates (Grossman)*

*JSC Astromaterials curation updates (McCubbin)*

5:30 pm

*Items requiring attention from previous meeting (McKeegan, Rampe)*

- Vote on relaxing 2007 CAPTEM finding on discouraging allocation of highest grade science samples
- Review committee for Hayabusa-2 curation plan
- Astromaterials newsletter contributions
- spring meeting(s)
- membership review and summary

*New Business?*

*Summary of action items (Rampe)*

6:00 or 6:15 pm Adjourn

## **2. Welcome and roll call (McKeegan)**

Approval of the Spring 2018 Meeting Minutes: No one disapproved, so the motion was approved unanimously.

Status of action items from last meeting:

Action item 1: Review OSIRIS-REx curation plan.

**Resolution: We will discuss this when Dante Lauretta presents later in the meeting.**

Action item 2: Assemble a subcommittee to review the Hayabusa2 curation plan.

**Resolution: Kevin McKeegan and Munir Humayun will discuss this further in today's meeting. It would be a lot of work for the ASTEROIDS Subcommittee to do on its own. This item was tabled for now, but will be addressed during the Spring 2019 CAPTEM Meeting.**

Action item 3: Changes in subcommittee memberships.

**Resolution: The MWG added Jemma Davidson as a voting member of CAPTEM. Other subcommittees should suggest new members. These new members can be approved by Kevin and Jeff Grossman, but voting members of CAPTEM must be approved by a formal vote. These votes can be done as an anonymous online survey. CAPTEM membership extends through the calendar year. This is the last meeting for Devin Schrader and James Day. The Chair greatly thanks them for their service.**

Action item 4: Review new implementation strategy for addressing Stardust requests.

**Resolution: No one has brought up any issues with the new implementation strategy to Kevin. Rhonda Stroud and Mike Zolensky will discuss the new implementation strategy later this meeting.**

Action item 5: Motion to relax former CAPTEM finding that discouraged the investigation of high-quality science samples

**Resolution: This will be discussed more at the Spring 2019 CAPTEM Meeting. Liz Rampe and Kevin will look for the exact language in previous CAPTEM Meeting minutes, and the motion can be voted either in person at the next meeting or online.**

Action item 6: Identify samples with high science priority in each collection; consider how long-term storage may affect curation, conservation, and science; and write special allocation rules that would allow new CAPTEM members to evaluate future proposals to study these samples with high scientific value.

**Resolution: This was tabled until the Spring 2019 CAPTEM Meeting. Stardust has done some of this work on the longevity of aerogel. Subcommittees should think about this for the Spring Meeting.**

Action item 7: Send text to Francis McCubbin for the Astromaterials newsletter.

**Resolution: Francis reported that the Astromaterials newsletter will be released at the same cadence as the Antarctic meteorites newsletter. The newsletter will include targets of opportunity for the community. After these targets of opportunity are announced, there will be a cooling off period of 8 weeks to allow consortia to organize and develop an analytical strategy. The first issue of the newsletter will be released in late February/early March based on the Antarctic meteorites request deadline. Deadlines for the Lunar and MWG requests will not change, but the 8 week cooling off period will be enforced for the other subcommittees. The newsletter will be available on the Curation website, and it will be announced to all PIs from all collections via email. This implementation strategy will occur for one year, then Francis will ask for feedback on the process during the Spring 2020 CAPTEM Meeting.**

### **3. OSIRIS-REx curation plan (Lauretta)**

Dante Lauretta provided CAPTEM with a brief overview of the Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer (OSIRIS-REx) mission and focused on how Curation facilities fit into the mission. Manuscripts published by Lauretta et al. and Dworkin et al. in 2017 in *Space Science Reviews* provide a mission overview and the strategy and implementation of contamination control, respectively. OSIRIS-REx launched on 9 September 2016 and arrived at 101955 Bennu on 3 December 2018. 2019 activities will include mapping, reconnaissance, and sample site selection. Sample acquisition will be rehearsed at the end of 2019. Nominally, in July 2020, OSIRIS-REx will collect at least 60 g of regolith (though it is designed to collect 150 g). Sample return to Earth is expected in September 2023, with a nominal end of mission in September 2025.

Part of the level 2 requirements for the mission is to implement a curation facility capable of receiving the Sample Return Capsule (SRC), storing the samples under controlled conditions, and documenting the received SRC and samples. An issue for CAPTEM to address is the selection and distribution of sample splits to the Canadian Space Agency (CSA), the Japan Aerospace Exploration Agency (JAXA), and the curation facility at the White Sands Test Facility (WSTF). The sample splits should be representative, and CAPTEM should consider how to define a representative sample. Long-term preservation of samples will occur at WSTF, where facilities will maintain pristine samples for >50 years.

Curation has been involved in the OSIRIS-REx mission from the beginning of the mission. Jeff Grossman is the Curation Program Scientist at NASA HQ. Scientific integrity questions should be addressed to Jeff. Kevin Righter is the curation lead at JSC, and Keiko Nakamura-Messenger is the deputy curation lead for OSIRIS-REx. She will help produce the curation plan, archive annual reports, and create the sample catalog. OSIRIS-REx spacecraft materials are currently archived at JSC and are available for sample allocation requests. The science team, along with the designated curation science team, has had monthly tag-ups. Curators have been mapping the surface of Bennu.

The OSIRIS-REx clean room design and construction at JSC has been coordinated with that of the Hayabusa2 cleanroom. Hayabusa2 samples are expected in 2022. The design of both cleanrooms is complete.

SRC recovery will be rehearsed before samples are returned. Many lessons were learned from Stardust recovery operations. As a result of Stardust recovery operations, local environmental samples (e.g., soil) will also be collected during SRC recovery. An end-to-end curation rehearsal was completed in 2013. The rehearsal was completed with flight-like hardware, similar to the SRC currently in flight. A second rehearsal will occur in mid-2021 and a third in mid-2023.

During the preliminary examination (PE) of the samples once they are returned, samples will be documented and selected for distribution to the science team, international partners, WSTF, and JSC for hermetic storage. Approximately 25% of the returned sample will be distributed to the science team, but probably not all at once. The science team is committed to long-term preservation and will only take the amount they need to characterize the sample. The samples will be split according to volume percent, not mass, because the sample might be heterogeneous. PE and allocation will be managed by the principal investigator of the mission and the JSC Curation team. The individuals responsible for PE and allocation will be documented in the curation plan, along with plans for changes in lines of authority.

Dante identified specific areas of interest and questions for CAPTEM to address regarding the review of the curation plan. (1) Does the curation plan capture the appropriate level 3 requirements? (2) Are roles and responsibilities appropriately defined? (3) Will curation

activities maintain the scientific integrity of the samples? (4) Does the curation plan provide for longevity and security of the samples?

Dante requested feedback from CAPTEM on the curation plan by January, after the LPSC abstract deadline. Munir thought that it would be feasible to return feedback by mid-to-late January. The document has been distributed to some CAPTEM members via NSPIRES, and those who will review the document must sign a non-disclosure agreement. If other members would like to provide consultation on the document, please email Jeff Grossman. This draft must not be circulated outside of CAPTEM and must not go to the public. The final version will be publicly released and will go into long-term storage at the University of Arizona. Jeff mentioned that the curation policy for the Agency is being revised such that the required curation plans for future sample return missions will be reviewed by CAPTEM.

Munir asked CAPTEM members to send him suggestions on the curation plan in Word documents so that he can collate them and send them to Dante.

Dante and Jason Dworkin thanked CAPTEM and signed off.

#### **4. Subcommittee/Curator discussions**

As part of the new Fall CAPTEM Meeting structure, subcommittee chairs and Curators were asked to only discuss issues that need attention/action and were asked not to provide summaries of allocations since the Spring 2018 CAPTEM Meeting.

*Stardust (Stroud/Zolensky)*

Mike Zolensky discussed the review of the new implementation strategy for addressing Stardust sample requests. The Stardust Review Committee suggested four action items:

(1) Establish an email alias that reflects the email to the curator, head curator, collection manager, and CAPTEM subcommittee chair. This will promote transparency and accountability in the system, without out undue burden on the recipients. The total number of emails expected is <100 per year, and more likely to be in the 10s. The logistical hurdle of including the CAPTEM subcommittee chair on the email will need to be addressed to be in compliance with federal regulations. This alias would not be used for internal deliberations among the Stardust allocation committee or among the curators and collection managers. It would specifically cover: receipt of request from the PI, the acknowledgement of the request by the committee, the recommendation by the committee to the Curator, the issuance of orders from the curator to the collections manager, and notice of shipment of samples to PI.

**Resolution: The Stardust subcommittee and Curator have established and begun to use the alias [jsc-stardustPIcomm@mail.nasa.gov](mailto:jsc-stardustPIcomm@mail.nasa.gov) and has also established an internal alias for Curation staff.**

(2) Encourage more requests by making more high value samples readily available for request. Harvest ~ 5 keystones every 6 months and widely advertise their availability for allocation. Evaluate the effectiveness of this strategy after one year. It is strongly advised to make the first set of 5 keystones available prior to the shutdown of the lab for the OSIRIS-REx cleanroom renovations.

**Resolution: The Stardust curators will remove all remaining cells and foils from the cometary tray and then begin to keystone large tracks. They have announced this plan so that the community can begin to plan for these samples. Consortia will not be required to study these tracks, but the community might prefer to establish consortia. The Stardust curators have begun receiving suggestions from the community about which tracks to remove first. Removing tracks will commence once the curators have caught up with the current allocation work.**

(3) Encourage more requests for samples by advertising the availability the small particle handling training at JSC. Increasing the frequency that this training is offered should also be considered. This recommendation is relevant to a number collections and should be handled at the Head Curator level.

**Resolution: The LPI is already organizing regular small sample handling training, so the Stardust curators and subcommittee have not taken action on this recommendation.**

(4) A significant effort focused on improving the catalog is required, so that both experienced and novice investigators can make intelligent sample requests. The Excel database constructed by Brad De Gregorio should be imported into the catalog. He should be consulted to see if he can provide a revised version. A review of the existing catalog entries by the Curator is needed. Data entered by the collection managers may be confused by jargon in PI summaries and are sometimes missing some details on mineralogy. Overall, the information needs to be more accessible (e.g., better keyword searching, a list of ranked tracks by type, better linking of optical documentation, etc.). This recommendation is best addressed with an iterative solution in which the Curator first identifies a draft plan and timeline for improvements, and the allocation subcommittee provides suggestions for improvement and feedback on the implementation. The draft plan should be available to the allocation committee at least one month prior to the Fall CAPTEM meeting so that the committee can provide feedback by the Fall CAPTEM meeting.

**Resolution: Mike reported that the Stardust catalog is a work in progress, but has been significantly improved in usefulness over the past year. The curators have loaded all sample analysis data culled from the literature by Zolensky and De Gregorio. They are now inputting more recent results into the Catalog. The curators will require additional resources to bring the Catalog to a state where data are entered as soon as they are published.**

Rhonda Stroud reported that new harvested tracks will be advertised in the newsletter along with optical characterization. The new tracks will not be on the webpage until they are announced in the newsletter. She also noted that the formal reply to the Stardust Review Committee differed a bit from what Mike presented. Rhonda, Mike, and Francis will tag up to coordinate release of harvested tracks and updates to the Catalog.

*Asteroids (Humayun/Zolensky)*

Mike updated CAPTEM on the allocation of Hayabusa samples from JAXA. JAXA is allocating 10% of the samples to JSC, but it is proceeding slowly. The Hayabusa curation activities by JAXA will be shutting down in favor of supporting Hayabusa2, so Mike asked the Hayabusa Curator at JAXA to send a lot of particles all at once (e.g., 1000 particles). Mike expects this will be resolved in 6 months.

Curation plans are being reviewed for Hayabusa2. The plan is not finished, so this will be discussed at the Spring 2019 CAPTEM Meeting.

*MWG (Kita/Righter)*

Kevin reported on allocation numbers from recent cycles, where 812 samples have been allocated to 85 investigators in the last year. MWG received 45 requests for the Fall 2019 meeting (8 curatorial requests, 37 meteorite requests), which included requests from 8 new PIs. The curators are adding field images of the meteorites and latitude/longitude information to the database. They updated the Antarctic Master Directory (AMD) listing and plan to continue updating it semiannually. They added 20 new sample chapters to the martian meteorite compendium. The roof leak in the meteorite lab was fixed and the HEPA filters were changed since the Spring 2018 CAPTEM Meeting.

*Lunar (Gross/Zeigler)*

Neither Juliane nor Ryan had anything to report.

*Cosmic Dust (Ishii/Fries)*

Marc reported that the Cosmic Dust curators are engaging in discussions and preparations for receiving the South Pole micrometeorites and IDPs in Susan Taylor's collection. Texas A&M is developing a prototype for a balloon-based dry collector, which would reduce the dependence on aging aircraft for Cosmic Dust collection. He expects the prototype will be completed at the end of the academic year. These balloon flights have been requested out of Palestine, TX.

Hope did not have anything additional to report.

*Genesis (Nittler/Allton)*

Judy reported progress on all three portions of the compendia (material characterization, cleaning techniques, and science data). Facilities in the Genesis lab and scheduling have been affected by the installation of a new air handler.

#### *Informatics (Lawrence)*

Sam reported that the beta search function for MoonDB is ready to test, which is a major milestone. A MoonDB user survey was issued and completed earlier this year and the Informatics Subcommittee is still digesting the results. Sam noted that there is a diverse continuum of opinions within the community of users.

#### *Mars (Harrington)*

The first Mars 2020 contamination knowledge (CK) samples arrived in September. Andi is expecting 1000 samples to come in 33 shipments. She expects to receive more biological CK samples in February 2019 and other CK samples in December 2018 and January 2019. The bulk of the samples should come by Fall 2019. In order to curate the Mars 2020 geologic samples, Andi anticipates needing ~600 ft<sup>2</sup> of storage space, two different types of freezers, 12 desiccators, multiple storage cabinets, and engineering models of the sample tubes to troubleshoot removing samples from the tubes.

CAPTEM discussed the implementation of a Mars Subcommittee to work with Andi on the Mars Sample Return campaign. An existing CAPTEM member could lead it and other experts could be added as needed. CAPTEM members should think about what expertise is needed for this subcommittee and who should be asked to join. Jeff Grossman noted that CAPTEM is not a US committee, so international scientists could be invited. Kevin asked CAPTEM members to send him suggestions for a Mars Subcommittee Chair and members before the Spring 2019 CAPTEM Meeting. Invitations could be sent out in the next month or so.

*5 minute break*

### **5. NASA HQ updates (Grossman)**

Jeff's new unofficial title is NASA HQ Chief Scientist for Curation. He caught us up on the news from HQ. Lori Glaze is the new acting director of the Planetary Science Division and Jim Green is now the NASA Chief Scientist. A new NASA policy on the curation of Astromaterials has been drafted for approval in FY19. There will be no changes to JSC's curation responsibilities in this policy.

We are currently in a continuing resolution for a few more weeks, but we should expect a healthy budget for R&A and Curation. The Curation budget has been excellent and Jeff expects that to continue because there is a new initiative in data archiving and it is a big year for constructing curation facilities for Hayabusa2 and OSIRIS-REx. Jeff reported that the Laboratory Analysis of Returned Samples (LARS) program is no longer funded by Discovery research, but now has its own main line of research funding. There is new funding for lunar studies, the Apollo Next Generation Sample Analysis (ANGSA)

program. Future budget items are likely to include Mars Sample Return, comet sample return, Phobos sample return from the JAXA Martian Moons eXploration (MMX) mission, and funding to return to the Moon.

Most sample requests are related to Emerging Worlds (EW) and LARS proposals. 2018 selections are pending in both programs. If there is additional Lunar funding in FY19, there may be additional selections. Stardust- and Genesis-related proposals are waning for LARS, and it is expected that Asteroids-related proposals will increase in 2021-2023. In 2018, ANGSA solicited proposals to work on “specially curated” samples (e.g., vacuum sealed, frozen, stored in He). 21 proposals were received and they are currently in review. The Lunar Subcommittee will not be involved in the selections, but a CAPTEM-style review was incorporated into the proposal review process. ROSES 2019 is expected to be released in February 2019. EW and LARS are expected to have similar scopes and dates as in 2018.

Jeff reported that OSIRIS-REx is ~180 km from the asteroid Bennu and approaching it at ~1 mi/hr. The construction of curation facilities will start in 2019, but the design is complete, so comments on the design of the facility would not be especially helpful at this stage of the game. A catalog of the samples is expected to be published for the 55<sup>th</sup> LPSC in 2024, and CAPTEM would receive sample requests in 2024. CAPTEM should consider a special call and/or committee meeting for these requests.

Results from the National Academy of Sciences study on extraterrestrial sample facilities are imminent. The report has been reviewed.

## **6. JSC Astromaterials curation updates (McCubbin)**

Ryan Zeigler reported on data archiving updates. The short term plan for MoonDB is to include geochemistry and geochronology information about samples and to include lunar meteorites. The long term plan is to update MWG, Stardust, and Genesis databases next. Ryan will work with CAPTEM to figure out which data should be captured in those databases and how.

Francis reported on two new Curation policy memos:

One memo includes guidelines for curatorial X-ray computed tomography (XCT) scans of Apollo or Antarctic meteorite samples. The amount of sample available for XCT scans depends on the abundance of organics in the sample. Up to 80% of the original sample mass will be available for XCT of Apollo samples. Up to 75% of the original sample mass will be available for XCT of unbrecciated achondrites and lunar meteorites. Up to 50% of the original sample mass will be available for XCT of polymict breccias, Mars meteorites, and type 3 carbonaceous chondrites. Up to 25% of the original sample mass will be available for XCT of carbonaceous chondrites. The Lunar and MWG Curators can refer the request for XCT scans to CAPTEM.

The second memo establishes a process for appeals for sample recall. Changes to the Cosmic Dust collection resulted in the need for this second policy memo. The memo states that the Curator and sample PI should establish a timeline for sample recall. The PI may appeal to the Astromaterials Curator, and the Astromaterials Curator can send appeals to CAPTEM for review.

Kevin McKeegan asked Francis if he needed input from subcommittees for the Astromaterials newsletter. Francis said that he did not need any specific inputs. The process of writing and releasing the newsletter will be reviewed after two issues have been released. Francis emphasized that ample time should be allotted (8 weeks) between the announcement of available samples and submission of proposed research. He speculated that Genesis targets of opportunity would not be identified in the newsletter, unless there is a new question to be answered or a new technique available to study the samples. He anticipates that XCT work at JSC could reveal interesting samples and targets of opportunity for the Lunar and meteorite sample community.

### **7. Items requiring attention from previous meeting (McKeegan, Rampe)**

The vote to relax the 2007 CAPTEM finding on discouraging allocation of highest grade science samples and the review committee for the Hayabusa2 curation plan were tabled for the Spring 2019 CAPTEM Meeting.

The Astromaterials newsletter contributions were just discussed, and Francis said that he does not need specific contributions from the Subcommittees.

The Spring 2019 CAPTEM Meeting will be held at the LPI on the Saturday after LPSC (March 23<sup>rd</sup>) because of the 50<sup>th</sup> anniversary of Apollo 11 and other meetings that occur before LPSC. The Lunar and MWG Subcommittees will discuss requests prior to the Spring 2019 CAPTEM Meeting, and MWG will be excused on Saturday to continue their discussions. The Spring Meeting will last one day. Remember that LPSC will end at noon on Friday March 22<sup>nd</sup>.

Subcommittees should continue to review their membership and consider new members.

### **8. New business**

Sam Lawrence said that LEAG is organizing a celebration of the first Moon landing. He will email Kevin on how CAPTEM and the rest of the sample community can participate.

The main item for significant thought is how to populate the new Mars Subcommittee. Membership can be expanded to accommodate the new subcommittee. Please email either all of CAPTEM or Kevin, Jeff, Francis, and Hope with ideas. This should be done in January. If the subcommittee is established before LPSC, CAPTEM could encourage the group to get together at LPSC to discuss Mars sample return.

### **9. Summary of action items (Rampe)**

Complete review of OSIRIS-REx curation plan and send comments in a Word document to Munir.

Establish a Hayabusa2 curation subcommittee to review its curation plan.

Establish a Mars Subcommittee Chair and membership.

Send out a request for hotel before the Spring meeting.

**Adjourn.**