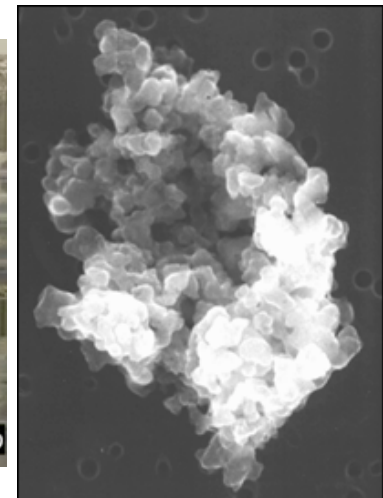
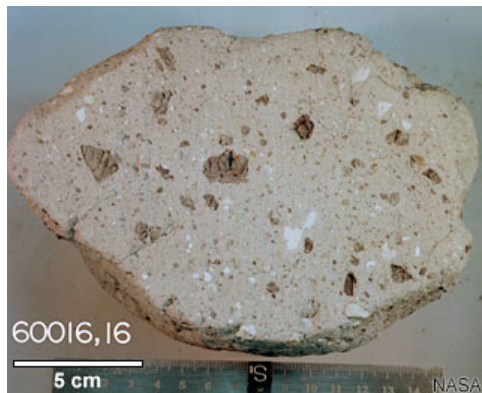




“Dedicated to maximizing planetary sample science while protecting the integrity of NASA-collected extraterrestrial materials”

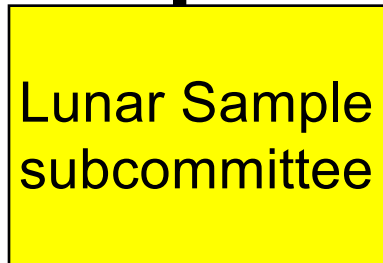
Report to the Planetary Science Subcommittee

September, 2016
Hap McSween, Chair





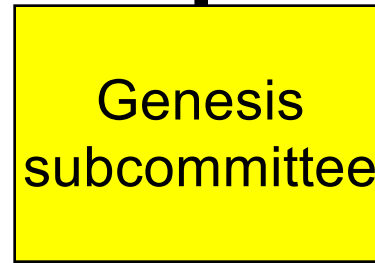
Kevin McKeegan
New chair Jan 16



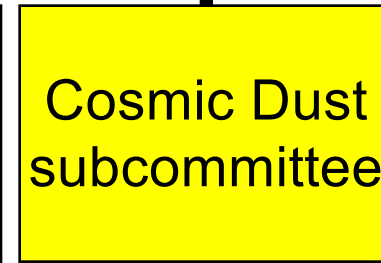
*Chair: Alan Treiman
(LPI)*



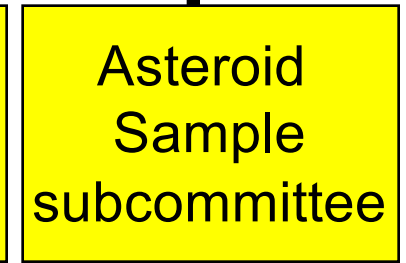
*Andrew Westphal
(UC Berkeley)*



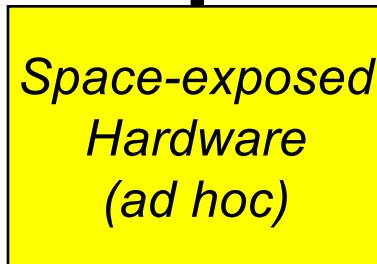
*Larry Nyquist
(JSC)*



*Hope Ishii
(U Hawaii)*



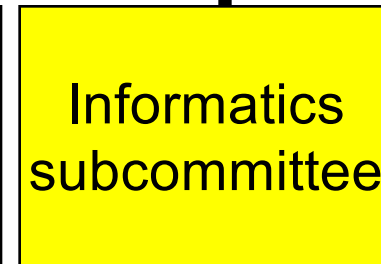
*Kevin McKeegan
(UCLA)*



*Jeff Taylor
(U Hawaii)*



*Conel Alexander
(Carnegie Inst)*



*Andrew Westphal
(UC Berkeley)*

Additional Members: James Day (UCSD), Juliane Gross (U Houston), Rhianon Mayne (TCU), Devin Schrader (ASU), Dimitri Papanastassiou (JPL), Aaron Burton (JSC, Secretary)

Very Brief Highlights of JSC Astromaterials

- Curation: 950 samples allocated midway through 2016; 215 new Antarctic meteorites announced, expect 569 more from ANSMET 2015-16 season.
- Mission support: 108 spacecraft materials from OSIRIS REx and Hayabusa 2 archived; witness plates deployed for ATLO; contracting for curation lab designs for these missions.
- Outreach: Huge continuing interest in lunar and meteorite educational disks and thin-section packages; curation supplied displays for events that reached 5000 people.

CAPTEM March 2016 Meeting Summary

- CAPTEM will cosponsor a LARS workshop on frontiers in laboratory instruments for OSIRIS REx and Hyabusa 2
- Anticipating a request to peer review aspects of OSIRIS REx curation plan
- Reviewed newly established Microparticle Impact Curation Laboratory (space-exposed hardware collection, which can provide collection surfaces for extraterrestrial materials)
- Members are assessing online catalogs for each collection for the Informatics Subcommittee

Meeting Summary Continued

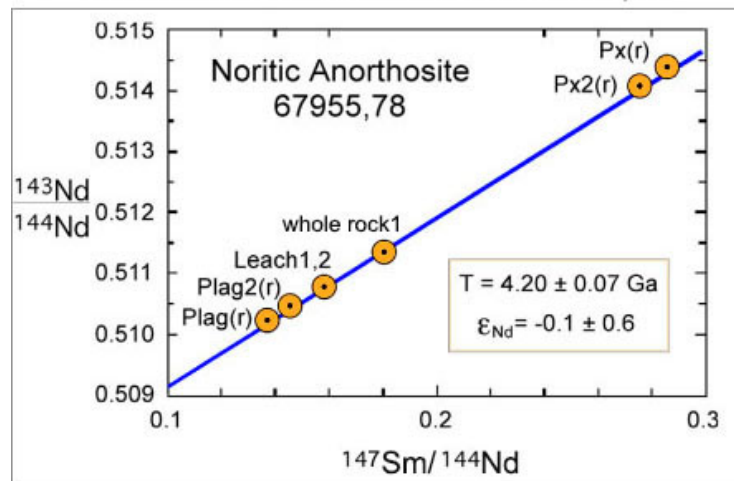
- Received an update on the three-agency agreement for collecting and curating Antarctic meteorites
- Considered a query from NASA HQ regarding archiving sample analyses. Because of wide range of instruments used, there is no consensus on format of data products. If a PDS requirement is established, only data that has been peer reviewed (as in the published literature) should be archived.
- Received a briefing on JAXA curation, as it will affect Hayabusa 2 and OSIRIS REx samples.

Impact Melt Clast in Lunar Sample 67955,77



(Norman et al., 2016, *Geochim. Cosmochim. Acta*, v.172, p. 410-429.)

Sm-Nd Isochron Plot for Clast in 67955,78



(Norman et al., 2016, *Geochim. Cosmochim. Acta*, v.172, p. 410-429.)

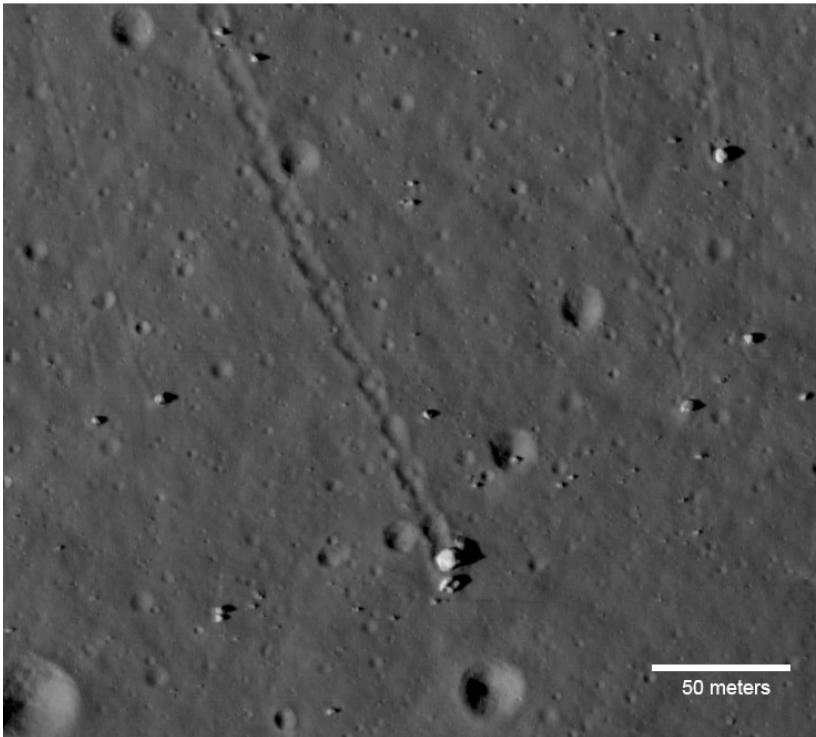
Sophisticated computer modeling of the formation of lunar multi-ringed basins by impact indicate that substantial volumes of impact melt are produced, leading to melt bodies hundreds of kilometers in diameter and tens of kilometers deep.

Such deep pools of melt should have differentiated into a series of rock types. A team from Australian National University, the University of Tennessee, and NASA Johnson Space Center show that a clast in an Apollo 16 impact breccia likely formed 4.2 Ga ago by minerals accumulating in a sea of impact melt. The old age predates the estimated ages of impact basins on the nearside of the Moon.

Mineral analyses indicate that the impact melt was rich in trace elements, suggesting formation in the Procellarum KREEP Terrane, and then transported to the Apollo 16 site by the impact that produced the Imbrium basin.

Rock and Roll at the Apollo 17 Site

Boulder Tracks Down the North Massif Wall at Station 6 -- Apollo 17



NASA LROC NAC image M134991988R, NASA/GSFC/Arizona State University, <http://lroc.sese.asu.edu/images>

Boulder tracks show that impact melt breccias collected at the Apollo 17 site originated from outcrops on the massifs.

The latest orbital images and topographic data offer new insights to the geologic context of Apollo 17 impact melt breccias.

Apollo 17 Impact Melt Breccia -- Sample 76295

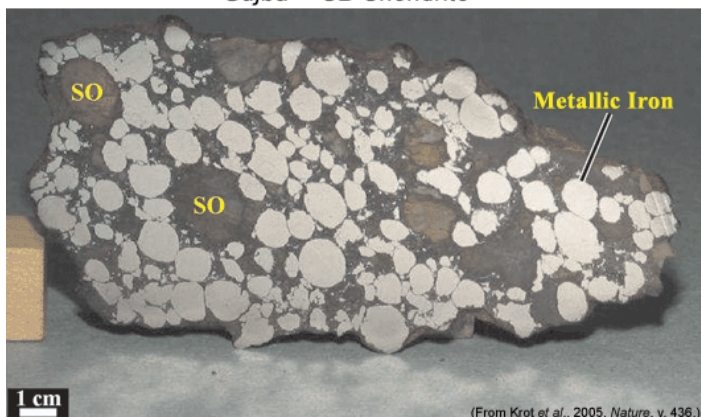


NASA photo S73-19312

If the Apollo 17 impact melt breccias came from the Serenitatis basin impact, then their age dates the basin-forming event and is consistent with the global lunar cataclysm theory. But if the cataclysm is a chronologic illusion stemming from the pervasive effects that the Imbrium impact had on the lunar nearside, the cataclysm might be a sampling problem, not an event. Testing the cataclysm hypothesis by determining the ages of lunar impact basins is a top-priority topic and requires broad geologic studies involving samples, mapping, and computer modeling.

Primordial Molecular Cloud Material in Metal-Rich Carbonaceous Chondrites

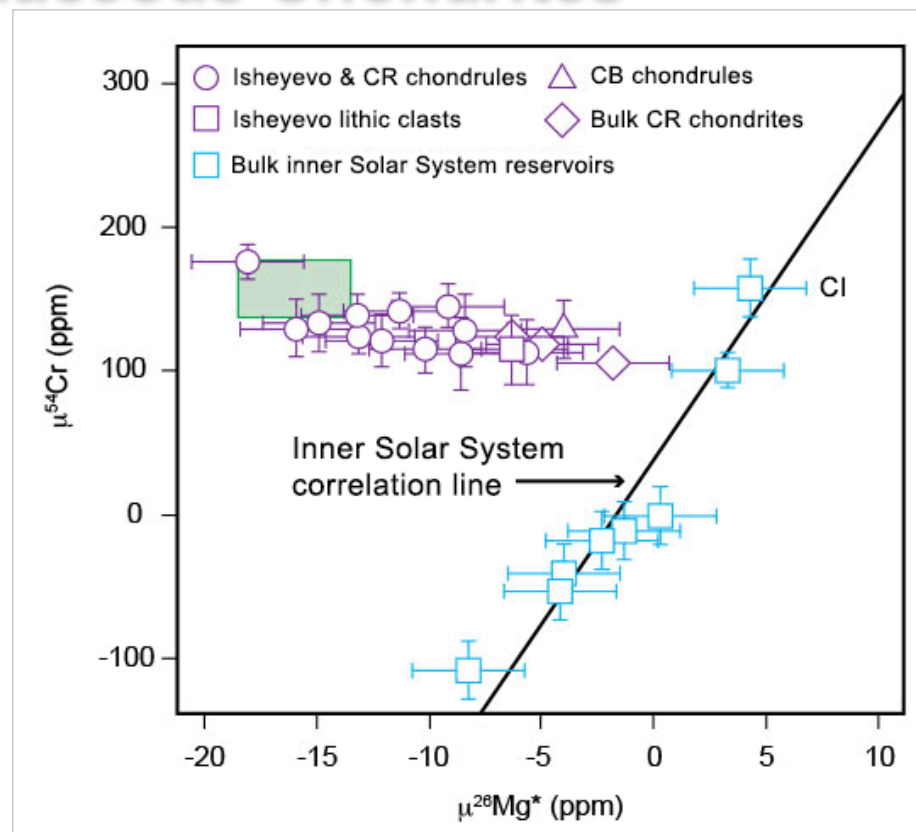
Gujba -- CB Chondrite



Metal-rich carbonaceous chondrites contain primitive Solar System dust:

- High abundance of pre-solar grains.
- Calcium-aluminum-rich inclusions contained little, if any, ^{26}Al when they formed.

They also contain the isotopic record of the primordial molecular cloud in which the Solar System formed.



(From Van Kooten et al., 2016, PNAS, doi: 10.1073/pnas.1518183113.)

Components in metal-rich carbonaceous chondrites are mixtures of thermally-processed inner solar system components and molecular cloud material (green box).

Current Issues of Concern

- Impact of possible delays in Discovery and especially New Frontiers AOs to potential sample return missions that could be launched in the next decade
- Continued funding pressure on extraterrestrial materials research and great interest in the NRC review of NASA's R&A reorganization
- Participating in the AGs white paper on mission participating scientists