CAPTEM

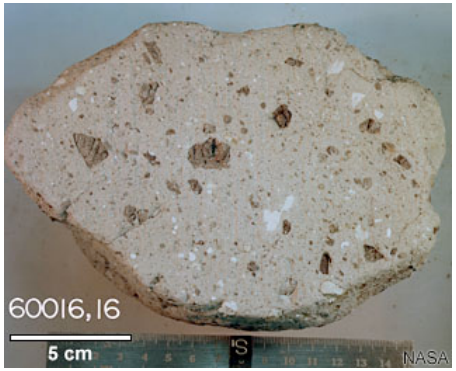
Curation and Analysis Planning Team for Extraterrestrial Materials

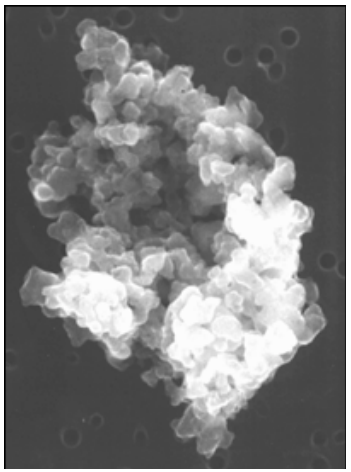
"Dedicated to maximizing planetary sample science while protecting the integrity of NASA-collected extraterrestrial materials"

Report to the Planetary Science Subcommittee

November 21, 2014

Hap McSween, Chair





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CAPTEM activities since last PSS meeting

- Conducted a CAPTEM virtual meeting on November 17, where we considered Curator/Subcommittee issues requiring attention.

- Approved CAPTEM Charter revisions – appendices that explain how our Subcommittees make their findings and recommendations on sample allocations and other matters.

- Working on an update to CAPTEM's previous ARM report.

- CAPTEM (and MWG) will next meet in Houston on March 21-22, 2015, following the Lunar and Planetary Science Conference.

- Selected/announced new (2015) appointments to CAPTEM.

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CAPTEM completes lunar curation review

Brief Summary of Findings
CAPTEM Lunar Curation Task Force

- Johnson Space Center's Lunar Curatorial Facility is uniquely qualified to preserve lunar samples in their pristine state, and its staff does an excellent job in allocating and processing samples for research.

- New analytical needs identified include precise measurements of H, D/H, H_2O, N, organics, non-traditional isotopes, siderophile elements, and paleomagnetism. New technologies include sample x-ray tomography and the handling of very small particles for electron microscopy.

- Nineteen technical findings address the curatorial and sample processing requirements that enable these measurements:
  - Some findings recognize ongoing efforts to develop new procedures (e.g. possible application of OSIRIS-REx methods for minimizing organic contamination).
  - Some findings identify the need for changes in procedures (e.g. minimizing metal smears during sample sawing, documentation of tools used in processing, use of improved shipping containers, elimination of oil coolant in thin section preparation).
  - Others identify actions that are more properly assigned to investigators, in consultation with the Lunar Curator (e.g. preparation of exotic sample mounts, analyses of N in JSC storage cabinets and minor element compositions of saw blades, training in standard operating procedures for investigators who participate in sample selection).

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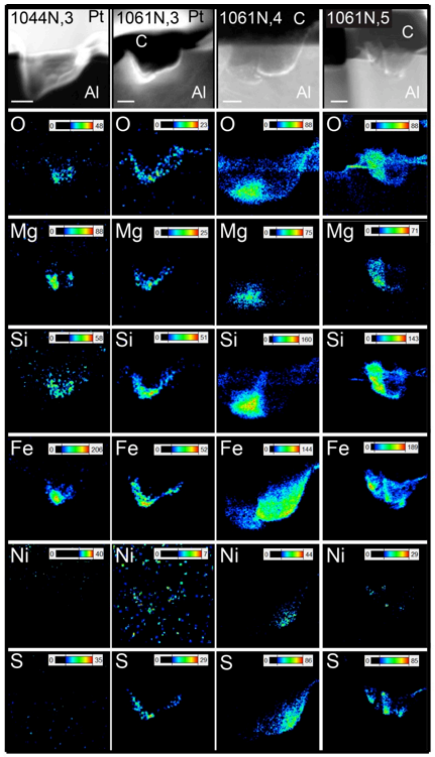
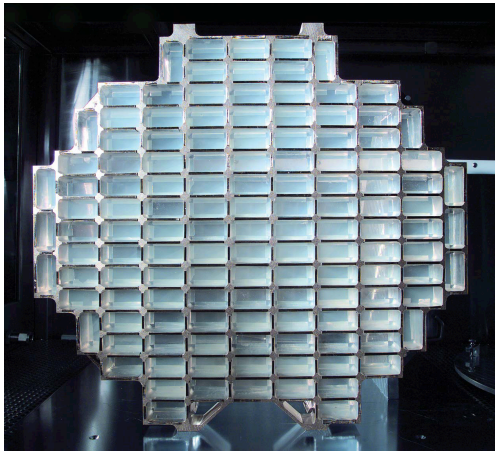
Science Bullet

Evidence for interstellar origin of particles captured by the Stardust spacecraft



A collaboration of 65 professional scientists and more than 30,000 citizen scientists reported the identification and analysis of tiny particles likely to be from interstellar space. Previously, much of our knowledge of interstellar dust has come from telescopic observations, but these analyses were carried out using laboratory instruments. The particles were surprisingly diverse in composition and structure. The number of large particles was also a surprise, and implies that many interstellar grains have a complex, open structure, more like snowflakes than solid rocks. These particles are likely to be similar to the original building blocks of the Solar System – the Sun, the planets, Earth, and us.



A. J. Westphal et al. (2014) *Science* 345, 786.

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Science Bullet

The lunar magma ocean took longer to solidify that previously thought

Using improved analytical techniques and models on one on one Apollo 15 and three Apollo 17 rocks, researchers Have concluded that the lunar magma ocean crystallized at 4368 ± 29 million years ago. This age is about 100 million years later than most previous estimates. The rocks returned to Earth by Apollo astronauts continue to provide new information.

A. M. Gaffey and L. E. Borg (2014) *Geochimica et Cosmochimica Acta* 140, 227.