



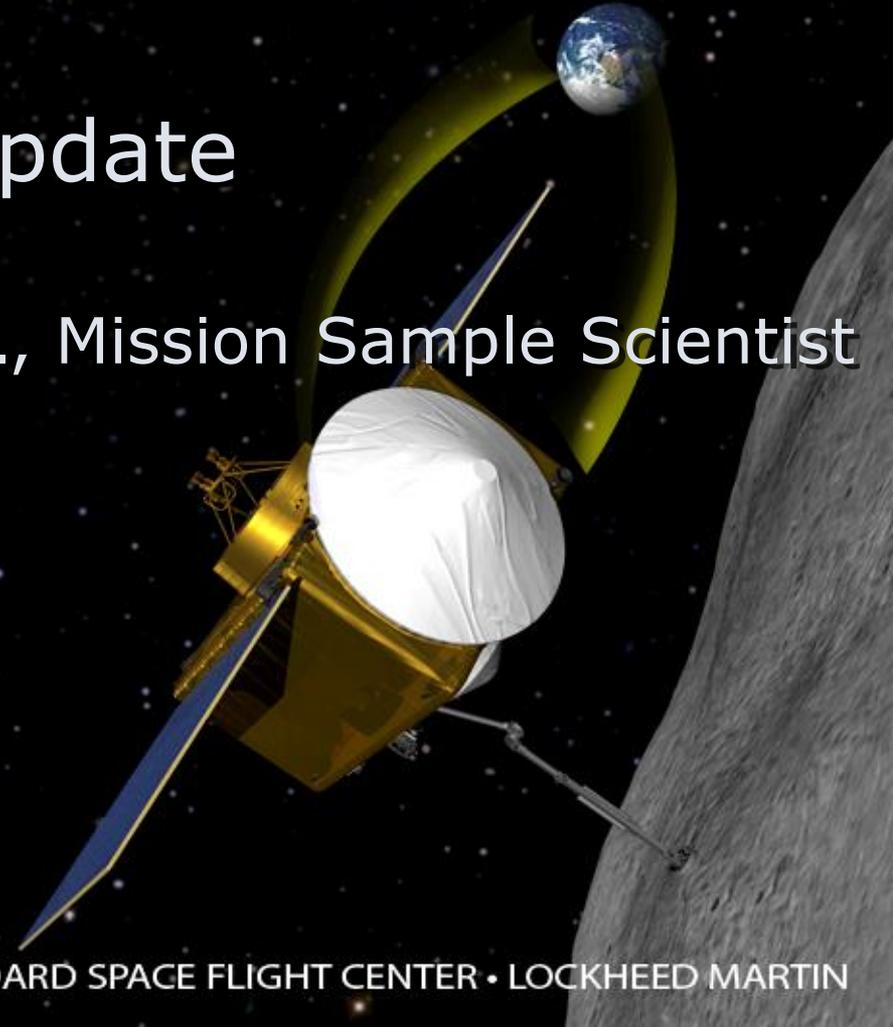
# OSIRIS-REx

Asteroid Sample Return Mission

MSS Report: Science Team Meeting  
April 2012 @ NASA GSFC

Trade Study - Update

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# STATUS OF TRADE STUDY APRIL 2012

## CMWG Charter states:

- “During Phase B, the CMWG will perform a trade study to determine the laboratory configuration for acquiring the spectra to be used in the mission spectral library, a key component of the data-processing pipeline during encounter. The key issue is whether all data for this library need to be collected under vacuum.
- If the trade study indicates that a vacuum system is required to collect the laboratory spectra, the mission will have to allocate reserve dollars to this task.
- The results of this trade study will also be a trigger point for deciding whether to 1) implement descope options C-4 and C-5, 2) continue to hold the descope options on the descope list and identify a new decision point, or 3) continue with the baseline plan and remove the descope options from the list. The results of this trade study are due to the project on August 1, 2012.”



## Historical Summary:

- In November of 2011 a small group of mission personnel (PI, Dante Lauretta; Mission Asteroid Scientist Beth Clark; Mission Sample Scientist, Harold Connolly; and Mission Assistant Project Scientist, Lucy Lim) visited the Planetary Emissivity Laboratory (PEL) at the Deutsches Zentrum für Luft und Raumfahrt (DLR) in Berlin, Germany (14<sup>th</sup> and 15<sup>th</sup> November) and the Oxford Planetary Spectroscopy Facility (OPSF) located at the Clarendon Laboratory, University of Oxford, Oxford, UK.
- Reports were submitted by Oxford (19 December 2012) and DLR (18 January 2012) based on the data collected at each institution.
  - Connolly, Lim, and the lead scientist for the SAWG, Vicky Hamilton, evaluated the reports and we are in agreement about the recommendation on how to proceed with the Trade Study.



## Goals of our visits:

- The major emphasis of our visit was to access the laboratories and personnel to provide clear data for an accurate evaluation of whether or not we could use the visited laboratories to obtain spectra in the mid-IR on powdered meteorites at 1 atm and simulated asteroid environmental conditions for the trade study.
- We are interested in quantifying potential thermal gradients caused by shortwave heating in asteroid regolith, especially for different grain sized powders of meteorites.



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## ■ **Recommendation 1:**

- Continue with trade study through the use of Neil Bowles' laboratory at the University of Oxford.

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## ■ **Summary of Rationale:**

- After consideration of several issues that arose from our initial visits to both laboratories, including the fact that the Oxford experimental set-up provides clearly analogous simulated asteroid conditions of total pressures  $\sim <10^{-6}$  atm whereas the DLR does not yet do so, future research needed to complete the trade study will occur within only the OPSF at Oxford.



## ■ **Recommendation 2:**

- A focused implementation plan is to proceed with trade study using two different grain sizes (0-75  $\mu\text{m}$  and 250-425  $\mu\text{m}$ ) of a CM chondrite (Murchison) and a CO (NWA 502).
- If time permits we may wish to analyze the same two different grain sizes of a CV (Allende). You are reminded that it is not the focus of the trade study to create a spectral library but to evaluate the potential effects of thermal gradients at simulated asteroid environmental conditions compared with ambient Earth (1 atm).
- The data from the focused study, added with the data previously collected in November of 2011, is predicted to provide enough information for an accurate evaluation for closing the trade study.



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