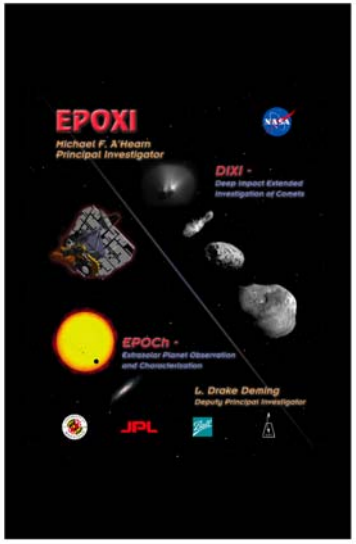
EPOXI & NExT

Mike A'Hearn

The TAPE Mission

Small Bodies Node

As proposed



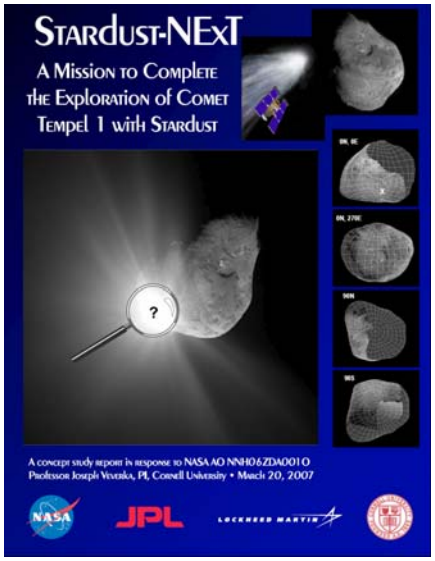
As budgeted by NASA

- Merger at NASA's direction of EPOCh + DIXI
- EPOCh = Extrasolar Planet Observation & Characterization
- DIXI = Deep Impact eXtended Investigation
- The new model for budget caps on PI-led missions
  - EPOCh proposed at $27.8M
  - DIXI proposed at $25.1M
  - Step 2 EPOXI proposed at $40.2M
  - EPOXI selected at $30M

Stardust-NExT

- NExT = New Exploration of Tempel
- Proposed at $28.4M
- Selected at $25M
- NExT & EPOXI both told to increase reserves from 10% to 15% within the lower caps

- There won't be much money left at the end for either science or archiving!!!



DIXI Science

- Why are cometary nuclei so different?
- How do active areas and jets work?
- Are other nuclei so heterogeneous (topographically and chemically) as Tempel 1?
- Earth flyby - 31 Dec 2007, encounter with comet Boethin 5 Dec 2008
- Dataset similar to that taken at DI but without impact
  - See Icarus **187**, #1 (June 2007) and Icarus **190**, #2 (October 2007)
  - See Science **310**, 258 (Oct 2005) = most cited paper in the physical sciences Mar-Apr 2007

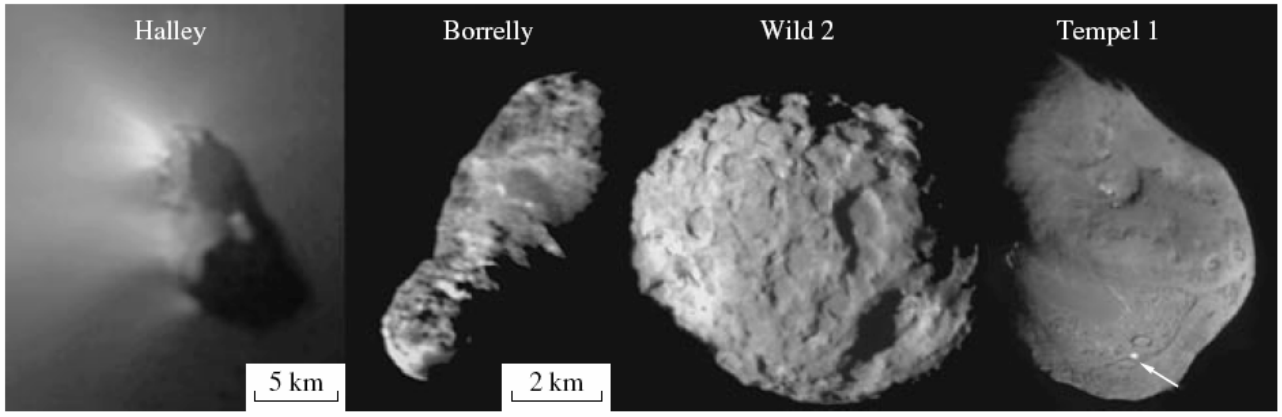
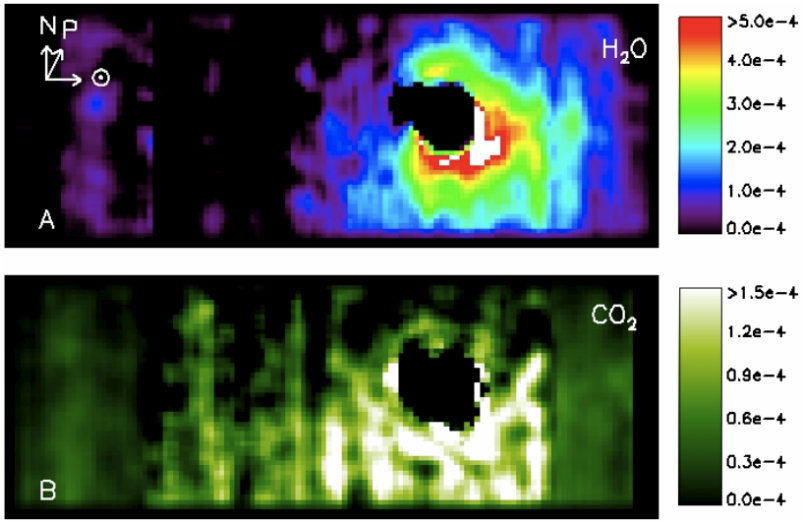


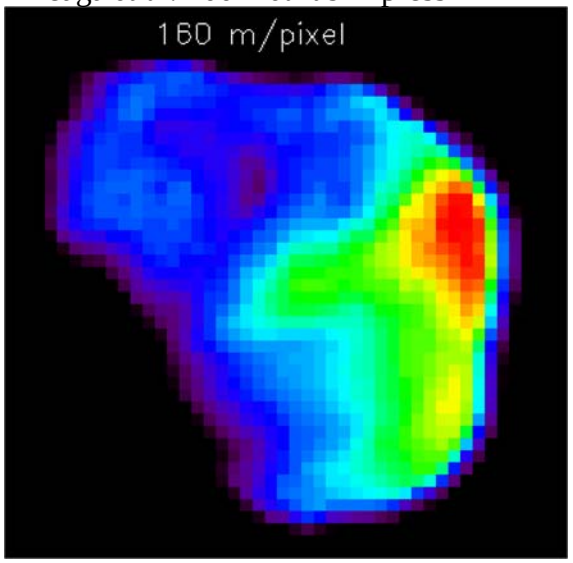
Fig. 1. Images of comets Halley, Borrelly, Wild 2, and Tempel 1. The bright spot in the lower part of the Tempel 1 nucleus shows the initial stage of the impact flash. Images of comets are from the ESA and NASA websites.

DIXI Archiving

- DMAP reviewed by PDS PE & signed by PDS PM
- Plan
  - 21 datasets
  - ~80 Gbytes
  - PDS-labelled FITS format for images & spectra and ascii tables for engineering data and SPICE

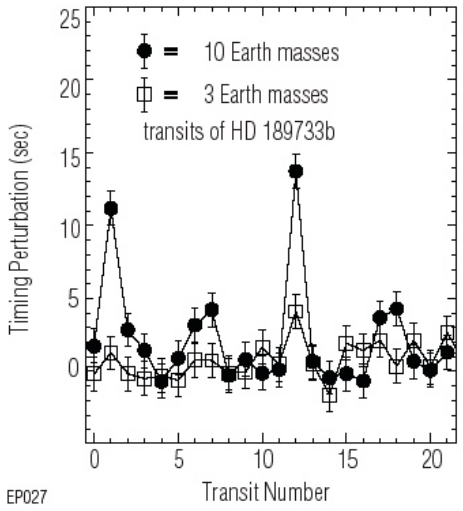


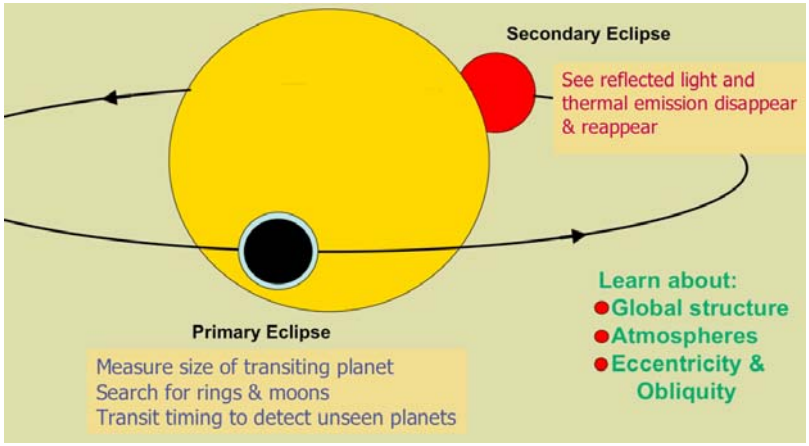
Feaga *et al.* 2007 *Icarus* in press



Groussin *et al.* 2007 *Icarus* **187**, 16

EPOCh Science

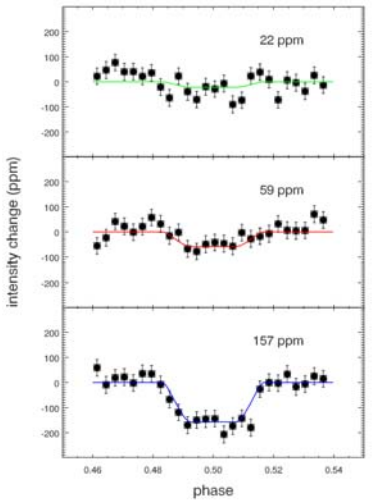


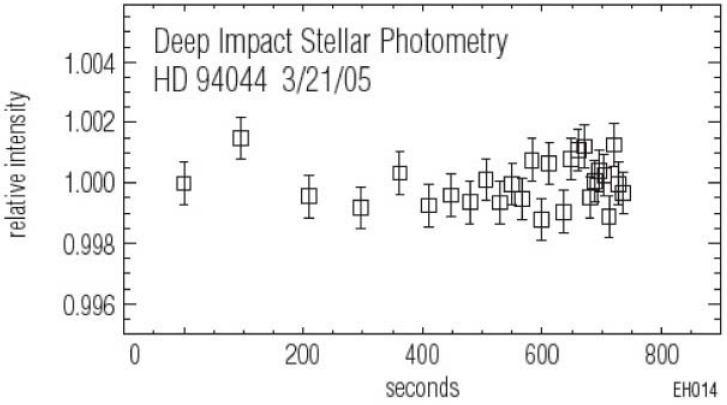


- Observe stars known to have transiting hot Jupiters (continuously 1-2 months per star)
- Detect
  - Timing perturbations due to exterior, smaller planets
  - Eclipses due to exterior smaller planets
  - Secondary eclipses of hot Jupiters
- Search for
  - Rings
  - Moons
- Characterize Earth as an astronomical object
  - Calibrate searches for true Earth-like planets
  - Imaging in all filters
  - Near IR spectra

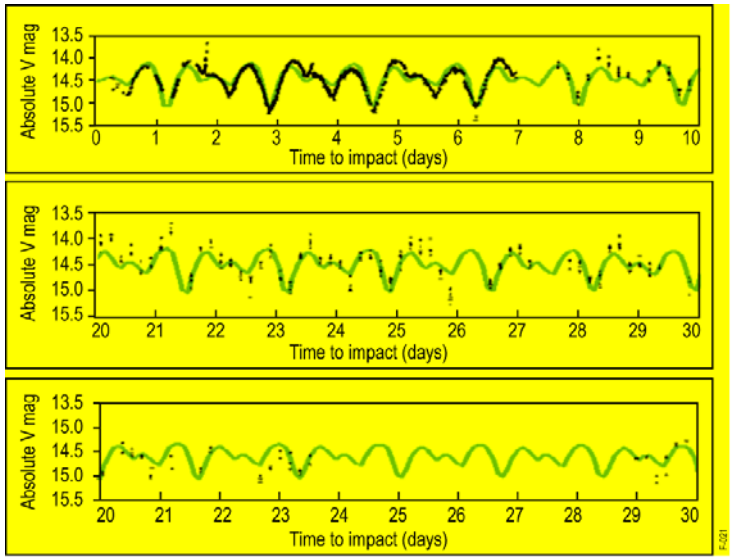
EPOCh Archiving

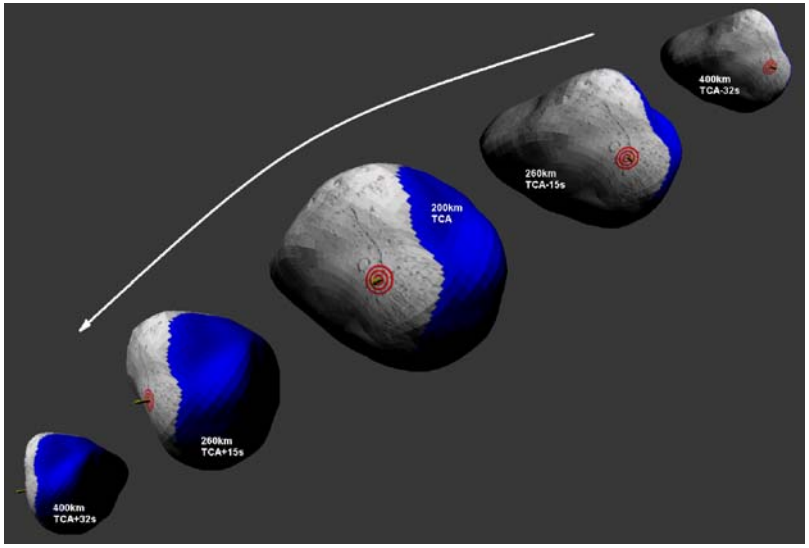
- Data pipeline identical to DIXI
- Archiving identical to DIXI
  - PLUS! Delivery of FITS files to MAST
  - Covered in same DMAP as DIXI
  - Signed by MAST
- Data
  - 6 datasets
  - 80 Gbytes
  - PDS Labelled FITS format
  - Delivery to PDS because good PSF calibration
  - Delivery to MAST as astrophysics archive without PDS labels





NExT Science





- Study the crater made by Deep Impact
  - Better understand nature of material at impact site
- Map some of the unseen portions of Tempel 1
  - Are the layers ubiquitous?
  - Are they primordial or evolutionary?
  - What is the real stratigraphy?
  - Determine ambient mass distribution of dust
- Encounter
  - 3 Deep Space Maneuvers
  - Encounter Tempel 1 14 Feb 2011 (1 month after perihelion)
  - Most will recognize that Bob Farquhar did the navigation

NExT Archiving

- Data Volume
  - 4.7 Gbytes total
    - Mostly Navcam & SPICE
    - DFMI 20 MBytes
    - CIDA 100 MBytes
- DMAP
  - Complete draft exists
    - Was available at site visit
    - Not yet signed
    - Raw & calibrated data within 6 months of encoutner (required by AO)
- SDC, Data pipeline (spacecraft to archive) all the same as for EPOXI