PRELIMINARY RESULTS FROM THE DUST FLUX MONITORING INSTRUMENT DURING THE ENCOUNTER OF STARDUST SPACECRAFT WITH WILD-2 COMET. A.J. Tuzzolino[1], T.E. Economou[1], J.A.M. McDonnell[2], S.F. Green[2], N. McBrite[2], [1]University of Chicago (tecon@tecon.uchicago.edu), [2] Open Univ., U.K.

Introduction: On January 2nd, 2004, the Stardust spacecraft successfully encountered the Wild 2 comet. The Dust Flux Monitoring Instrument (DFMI) provided quantitative measurements of dust particle fluxes and particle mass distributions throughout the entire flythrough.

The Dust flux Monitoring Instrument: The DFMI on the Stardust mission was designed, constructed and tested at the University of Chicago [1]. The DFMI consists of two different dust detector systems — a polyvinylidene fluoride (PVDF) dust sensor unit (SU), which measures particles with mass < Less than ~ 10^{-4} g, and a dual acoustic sensor system (DASS), which utilizes two piezoelectric accelerometers mounted on the first two layers of the spacecraft Whipple dust shield to measure the flux of particles with mass larger than 10^{-4} g. The entire Whipple shield structures provided the large effective area required for detection of the expected low flux of high-mass particles. The analysis of the acoustic sensors will be undertaken by the Open University, U.K.

The STARDUST spacecraft was launched on February 7, 1999 on a Delta II rocket. The DFMI was turned ON shortly after the launch to monitore interplanetary dust particles. After several months of data collection, the instrument started to experience thermal problems and became noisy, if left ON for long periods. It could only operate properly for only a little more than half an hour. Consequently, the DFMI was left OFF for most of the remaining cruise period and occasionally was turned ON to test its operation during that period. It was last tested during the Annefrank encounter on November 2, 2002 and the instrument performed nominally.

Encounter with Wild-2 comet. The DFMI instrument was turned ON 15 minutes before the estimated closest approach. It started to detect the first dust particles just a few minutes before the closest approach with both types of the sensors in the instrument. As the S/C was departing the comet several more dust particle streams were encountered some 2-12 minutes after the closest approach. The source of these particles is believed to be several of the jet streams that were observed in many of the images obtained by the navigation camera on the STARDUST spacecraft.

Data flux rates and dust particle mass distribution are currently being evaluated and will be presented at the meeting, The instrument detected thousands of small particles and a few of them were large enough to even penetrate the first layer of the Whipple bumper shield.

Referenhces

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