THE DUST FLUX MONITOR INSTRUMENT FOR THE STARDUST-NExT MISSION . T.E. Economou[1] and the STARDUST-NExT Science Team, [1]Laboratory for Astrophysics and Space Research, University of Chicago, 933 East 56th Street, Chicago, IL 60637, tecon@tecon.uchicago.edu.

Introduction: The principal goal of the Stardust spacecraft was to collect and return to Earth cometary and interstellar dust particles captured in aerogel capture cells. The spacecraft flew through the coma of comet Wild 2 on January 2, 2004 and collected dust particles, took close-up images of the comet nucleus and coma, and gathered information on the coma particle spatial densities, mass distributions, and chemical composition. The Dust Flux Monitor Instrument (DFMI) provided the real-time data on variations in the particle flux and mass distribution in the coma. The same instrument is now part of the STARDUST-NExT mission to obtain similar information from Tempel 1 comet in 2011.

Instrument Description: The DFMI consists of two PVDF sensors of 200 cm^2 and 20 cm^2, two accustic sensors and the electronic box as is shown in Fig. 1. Each sensor has 4 mass thresholdd from which the differential mass slope can be deduced. It weighs 1.76 kg and runs on 1.8 Watts of power. Its differential detection range is between 10^{-11} g and 10^{-4} g but it will detect all dust particle > 10^{-4} g in integral mode. It has a time resolution of 0.1 s and it is capable of counting up to 10^4 counts/sec without any dead time. More detailed description of the DFMI can be found in A.Tuzzolino et al., [1]. Shortly after the launch the DFMI developed certain thermal problems that limited its reliable operation to about 30 mimutes. That is, however, sufficient time to obtain all the pertinent data during the comet flyby.

Fig. 1

Results from Wild 2 Encounter: Fig. 2 shows the dust particle fluxes for all DFMI counters obtained during the closest approach of the STARDUST with Wild 2 comet for a period of about 30 minutes, centered around the closest approach. The observed dust fluxes match very closely the expected flux time distribution from comet models [2], but in addition it has detected intensive dust activity on several additional periods corresponding to dust jets [3], observed by

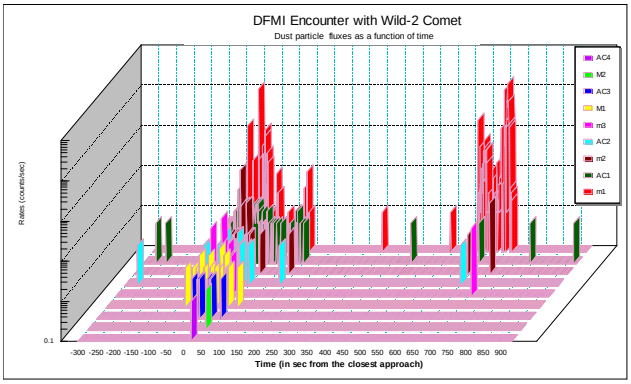

Fig. 2

the onboard camera of the STARDUST spacecraft. It was also observed that the cometary dust particles occur in burst, presumably as a result of fragmentation of larger aggregates emitted from the comet nucleus [4]. From the DFMI data it was possible to get the dust particle mass slope and to compare it with the mass slopes of other comets [5]. The DFMI was also usfull in predicting the number of the dust particles that the aerojgel collector will return back to Earth.

References: [1] Tuzzolino, A.J., et al., (2003), *JGR*, *VOL 90*, 1151–1154. [2] Tuzzolino, A.J., et al., (2004), Science, VOL 304, 1776-1780. [3] Sekanina, Z., et al., (2004), Science VOL. 304, 1769-1774. [4] Clark, B.C., (2004), JGR VOL. 109, E12S03, doi:10.1029/2004JE002319. [5] Green, S. F, (2004), VOL. 109, E12S04, doi:10.1029/2004JE002318.