ANALYSIS OF DISCRETE IMPACT EVENTS FROM THE GIOTTO COMET HALLEY DUST IMPACT EXPERIMENT

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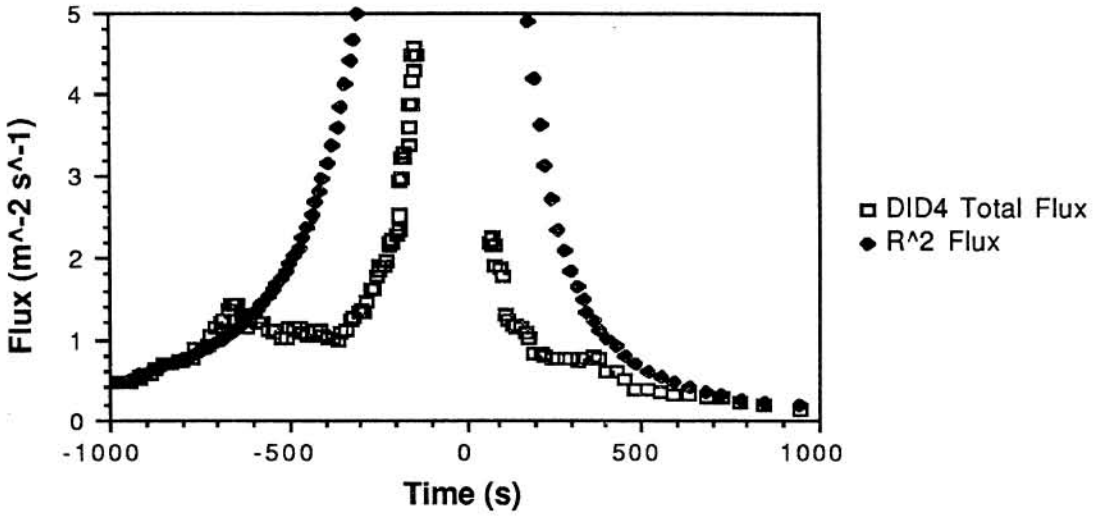
The Giotto Comet Halley probe successfully traversed the inner coma of Comet Halley on March 14, 1986. The Dust Impact Detection system (DID) /1/ aboard the Giotto spacecraft provided the information on the dust flux, mass spectrum and cumulative mass distribution flux in the coma of Comet Halley /2/.

Analysis of discrete pulse height data of specific individual cometary particles registered by the Giotto DID detectors 1, 3 and 4 have been completed. For the size range of particles between 10 E-10 and 10 E-12, a cumulative flux has been determined. The technique employed in the investigation utilized a constant number of events for each data sample. Thus, the time interval for each sample group varied. In addition, this data sample window was shifted through the complete time frame and the cumulative flux was calculated. The technique above provided the basis for deriving a cumulative flux curve from the DID experiment that started with event one of pre-encounter time and followed through to 1000/s of the post-encounter period.



Inside the cometopause, anomalous peaks, which were followed by plateaus, were observed which deviate from an r-squared curve that was seen in both pre- and post-encounter measurement. The curves are depicted in Fig. 1. A theoretical r-squared curve based on the initial post-encounter data is seen to agree very well from inside a -2000/s to almost -700/s. At this time, the flux, as determined from the experiment, is seen to show a plateau for over 300/s. Then a continuance with r-squared commences again. A similar feature is seen in the presentation of post-encounter data. The relationship of these flux variations to plasma depletion zones, magnetic pile-up regions and contact surface zone is discussed.Another study has considered the question of particulate mass sensitivity to the dynamic forces involved in the apparent "pile-up". The same cumulative flux calculation technique was used with one change. Vary one parameter, the mass threshold sensitivity. The result is seen in Fig. 2 /3/. As the smallest particles are eliminated, the magnitude of the flux at the "pile-up" is reduced until the effect essentially disappears. The significance of this effect is discussed /4/.

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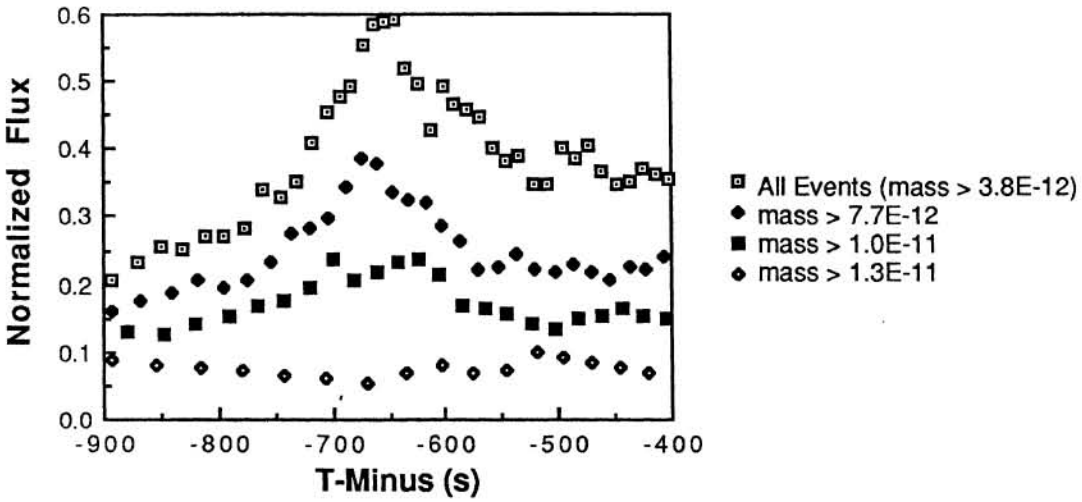

References:

/1/R. Reinhard, European Space Agency Report, ESA Sp-10077 90 (1986)
/2/J. Pollock, MS Thesis, Baylor Univ. (1987)
/3/S. Goad, MS Thesis, Baylor Univ. (1988)
/4/W. M. Alexander, et al, Adv. Space Res. to be published 1988