



Mass-spectrometric Measurements of Dust at Comets Wild-2 and Tempel-1

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Abstract

Stardust and Stardust-NEXT have successfully completed missions where two comets have been observed and one of them has been visited by two different spacecrafts. We discuss the observations made at the comets by the impact time of flight mass spectrometer CIDA [1]. At Wild-2, 29 spectra in positive and 2 in negative mode were observed [2]. At Tempel-1 CIDA recorded 46 spectra in negative mode on the inbound and 34 in positive mode on the outbound leg. The difference in speed for the two encounters makes the instrument observe different aspects of the physical and chemical properties of the dust grains. A taxonomy of the data is established using principal component analysis. The data from the two encounters is compared with data from the cruise phase where measurements of interplanetary dust were made.

1. Introduction

The CIDA instrument [1] measures the current from ions formed when dust grains colliding with a silver target disintegrate and partly become ionized. The instrument can detect either positive or negative ions. The measured ion current is a time-of-flight spectrum representing the composition of the dust grain. It may be converted into a mass spectrum by determining two system constants from the recorded data itself. Having computed the system constants we use principal component analysis to find patterns in the data sets. Similar groups of spectra may be treated together. This has been done for both comet encounters and the results are compared to the interplanetary dust measurements made on the voyage towards the encounters. The results are discussed.

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References

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