

1. Introduction

Launched in October 1990, Ulysses was an exploratory mission carried out jointly by ESA and NASA and had as its primary objective the study of the inner heliosphere in three dimensions. Phenomena studied by Ulysses include the solar wind, the heliospheric magnetic field, solar radio bursts and plasma waves, solar and interplanetary energetic particles, galactic cosmic rays, interstellar neutral gas, cosmic dust, solar X-rays and gamma-ray bursts. The prime goal of all of these studies was to characterize the heliographic latitude dependence of the physical parameters involved. In addition, however, Ulysses' unique interplanetary orbit was highly suitable for carrying out measurements that are difficult to perform from the relative proximity of the Earth's orbit to the Sun (Stone et al., 1992).

The objective of the Ulysses Dust Detection System (UDDS) was to investigate the physical and dynamical properties of small dust particles (10^{-16} to 10^{-6} g) as a function of ecliptic latitude and heliocentric distance, and the study of their interrelation with interplanetary/interstellar phenomena. This data set contains information on the dust environment in interplanetary space within the inner solar system, between Jupiter and the Sun, and at high polar latitudes of the Sun (Krueger, H et al., 2006). Both interplanetary and interstellar dust particles have been detected. This information is collected with a dust impact experiment, from which may be inferred direction of motion, mass, velocity and charge. This data set contains the data from the Ulysses dust detector system (UDDS) from start of mission through the end of mission, 1990-2007. Included are the dust impact data, noise data, laboratory calibration data, and location and orientation of the spacecraft and instrument.

2. Archive Contents and History

The UDDS data was archived in PDS in the PDS3 archiving standard from 1996-2010. The other Ulysses instruments' data have been archived at the PDS PPI node, in both PDS3 and PDS4, and can be found there.

Table 1. PDS3 UDDS data included in this bundle

Data Description	PDS3 Data Set ID	Date archived	PDS node
Ulysses Dust Experiment data	ULY_D_UDDS_5_DUST_V3_1	2010-06-02	SBN

During 2025, the PDS3 UDDS holdings were migrated to the PDS4 archiving standard by the Small Bodies Node. The data files are unchanged. This data set contains the data from the UDDS from start of mission through the end of the mission. Included are the dust impact data, noise data, laboratory calibration data, and location and orientation of the spacecraft and instrument.

Document and metadata changes made during the migration of the data sets include:

- No primary data files were modified.

- Metadata in the PDS3 labels were migrated to PDS4 labels.
- All documentation was moved to a new document collection
- A new bundle overview document (the one you are currently reading) was created
- PDS3 data documentation was restructured as needed to reflect the new PDS4 bundle organization.

3. Ulysses Dust Detector System Bundle Contents

The Ulysses DDS bundle contains a data collection and a document collection.

The **data** collection contains tabulated data on the dust environment in interplanetary space within the inner solar system, between Jupiter and the Sun, and at high polar latitudes of the Sun. In addition, the subdirectory *sounder* contains the on and off times of the URAP sounder, which is known to increase the noise rate of the dust instrument (Krueger et al. 2006b). The on-off times are given in one file for each year of operation. For years with no corresponding sounder on-off file, the sounder was off for the duration of that year. A document describing the effect of the sounder sequence on the UDDS archived data set is included in the document directory. (See section 4).

The **document** collection contains all of the documentation needed for the UDDS bundle. The *udds_bundle_overview.pdf*, the *urapsoundersequenceasc.pdf*, the *host_ULY_description.txt*, the *instrument_UDDS_description.txt*, the *instrument_URAP_description.txt*, *data_collection_description.txt* and the *references.txt*. (See section 5).

4. The data Collection

The **data** collection contains the data from the Ulysses dust detector system (UDDS) from start of mission through the end of mission, 1990-2007. The data are archived in tabulated format.

ulyddust.tab contains the data received from the dust detector, the spacecraft, and physical properties derived from the detector data (Gruen et al., 1995a, Krueger et al., 1999a, and Krueger et al. 2009b).

ulydevnt.tab contains the data received from the dust detector, the spacecraft, and physical properties derived from the detector data for reliable dust impacts plus noise events.

ulydcode.tab contains the value ranges corresponding to codes found in ulyddust.tab.

ulydcalb.tab contains the laboratory calibration data used to relate instrument responses to physical properties of the impacting dust particles.

ulydarea.tab contains the area of the dust detector exposed to particles as a function of their velocity direction relative to the detector axis.

ulydstat.tab contains the time history of the Ulysses mission and dust detector configuration, tests and other events.

The **sounder/** subdirectory contains files with the on and off times of the URAP sounder, which is known to increase the noise rate of the dust instrument. The on-off times are given in one file for each year of operation. For years with no corresponding sounder on-off file, the sounder was off for the duration of that year.

5. The document Collection

The document collection contains 7 documents.

The **ulysses_udds_bundle_overview_document.pdf** which is the document you are reading now.

The **urapsoundersequencepdf.pdf** document, by Robert MacDowell and Roger Hess, describes the Ulysses URAP active sounding sequence list and the effect of the URAP sounder on the Ulysses Dust Detector System (UDDS) archived dataset.

The **references.txt** document is the reference list for this bundle.

The **data_collection_description.txt** describes the Ulysses data collection and its contents.

The **instrument_udds_description.txt** contains the description of the Ulysses Dust Detection System instrument.

The **instrument_urap_description.txt** contains the description of the Unified Radio And Plasma Wave Experiment instrument.

6. References

Krueger, H., N. Altobelli, B. Anweiler, S.F. Dermott, V. Dikarev, and 18 others, Five Years of Ulysses Dust Data: 2000-2004, Planetary and Space Science 54, 932-956, 2006.

Stone, R.G., J.L. Bougeret, J. Caldwell, P. Canu, Y. de Conchy, N. Cornilleau-Wehrlin, M.D. Desch, J. Fainberg, K. Goetz, M.L. Goldstein, C.C. Harvey, S. Hoang, R. Howard, M.L. Kaiser, P.J. Kellogg, B. Klein, R. Knoll, A. Lecacheux, D. Lengyel-Frey, R.J. MacDowall, R. Manning, C.A. Meetre, A. Meyer, N. Monge, S. Monson, G. Nicol, M.J. Reiner, J.L. Steinberg, E. Torres, C. de Villedary, F. Wouters, and P. Zarka, The Unified Radio and Plasma Wave Investigation, Astron. Astrophys. Suppl. Ser. 92, 291-316, 1992.