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# Coordinación de Formación de Capital Humano en el Campo Espacial

Dirección de Divulgación de la Ciencia y Tecnología Espacial

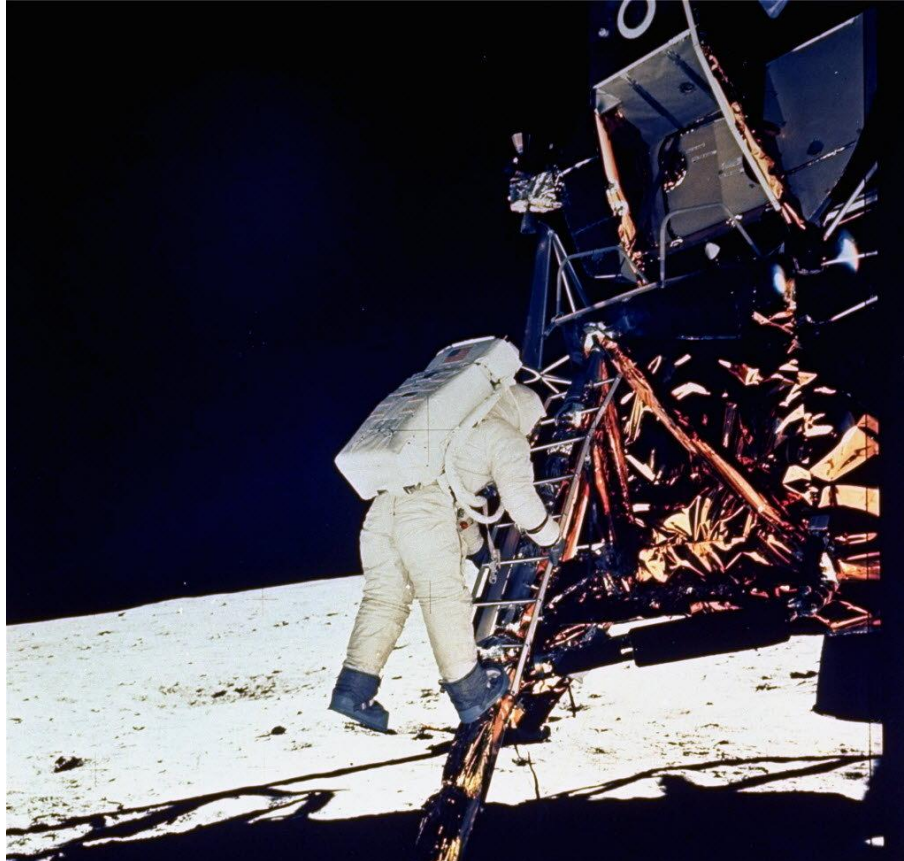
**Big Data**

Conferencia Internacional de Archivística

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@mario\_eduspacio

# ¿Llegó el hombre a la Luna?



# Problema común: Crecimiento de Archivos.

- Soportes físicos y digitales
- Libros Digitales
- Multiformato
- Multiplataforma
- Audio
- Video

# Consulté a mis amigos en NASA

- Estación Espacial Internacional (Houston, Tx)
- Misiones Robóticas en Marte (JPL, California)
- Finalmente una búsqueda en
  - La Web

# Comunicaciones desde el espacio profundo

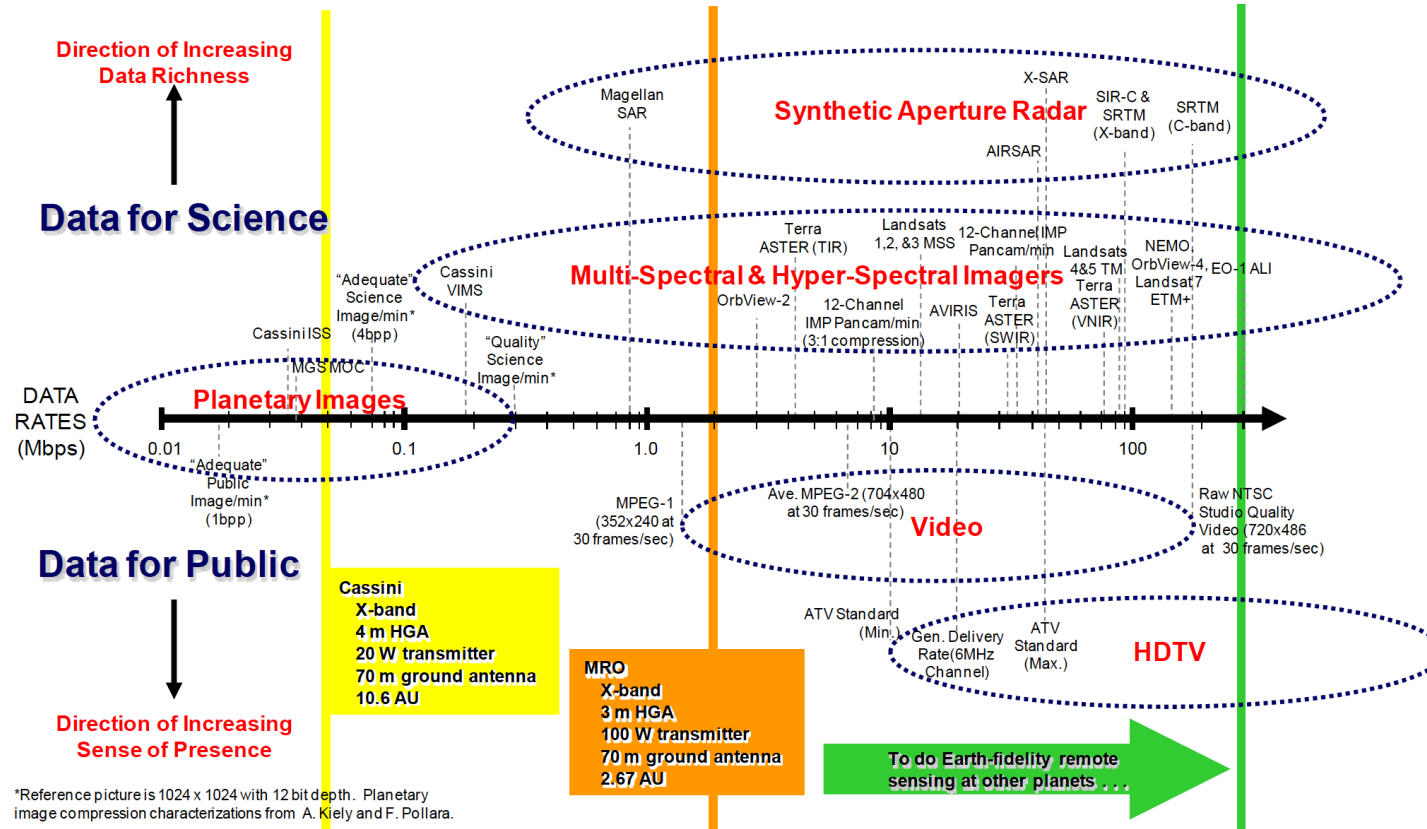


Figure 1. Required data rates as a function of data type.

# Retos de NASA

- 1 PetaByte de archivos  $1e15$
- 1990's Comunidad científica= miles de sistemas heterogéneos distribuidos. Unix, Linux, DOS, Win3.x, Mac, VMS...
- Diversas plataformas, bases de datos, formato de datos, RMS, ODBS, interfaces y volúmenes de datos de KiloBytes a TeraBytes.
- Múltiple de todo: tipos de objetos, interpretaciones, software.
- Metadatos incompatibles y/o perdidos
- Si, ¡todo un caos!

# Respuesta: Object Oriented Data Technology

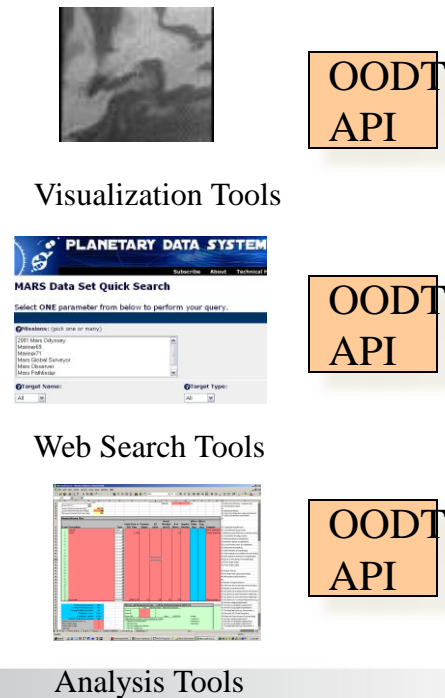
- Proyecto iniciado en 1998 en JPL.
  - Aplicación de IT a Ciencias Espaciales
  - Proporcionar infraestructura para gestión de datos distribuidos.
  - Métodos de Interoperabilidad, gestionar y descubrir conocimiento.
  - Marco de Software para gestión de los datos, reusar software, reducir costos, administrar el riesgo y apalancar la experiencia IT.
- OODT enfoque inicial:
  - Archivos de datos; gestionar productos de datos y recursos distribuidos.
  - Ubicación y descubrimiento de datos.
  - Recolectar e integrar datos.

# Que resuelve OODT

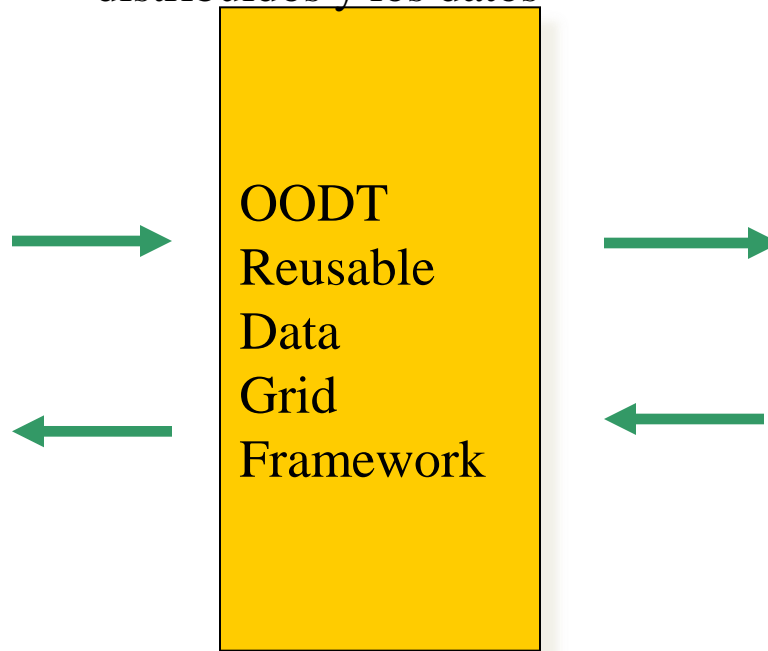
- Amarrar datos heterogéneos distribuidos en una red virtual.
- Arquitectura que proporciona una base para el trabajo.
- Infraestructura de flujo de trabajo para manejar los productos de datos.
- Escalabilidad al enlazar grandes grupos de datos.

# Arquitectura Distribuida

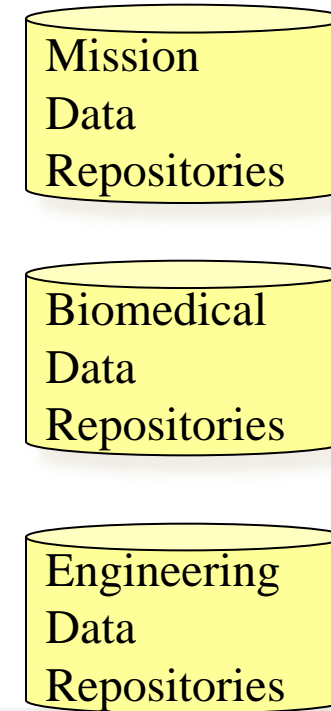
1. Las Aplicaciones científicas usan “APIs” para conectarse con un almacén virtual de datos



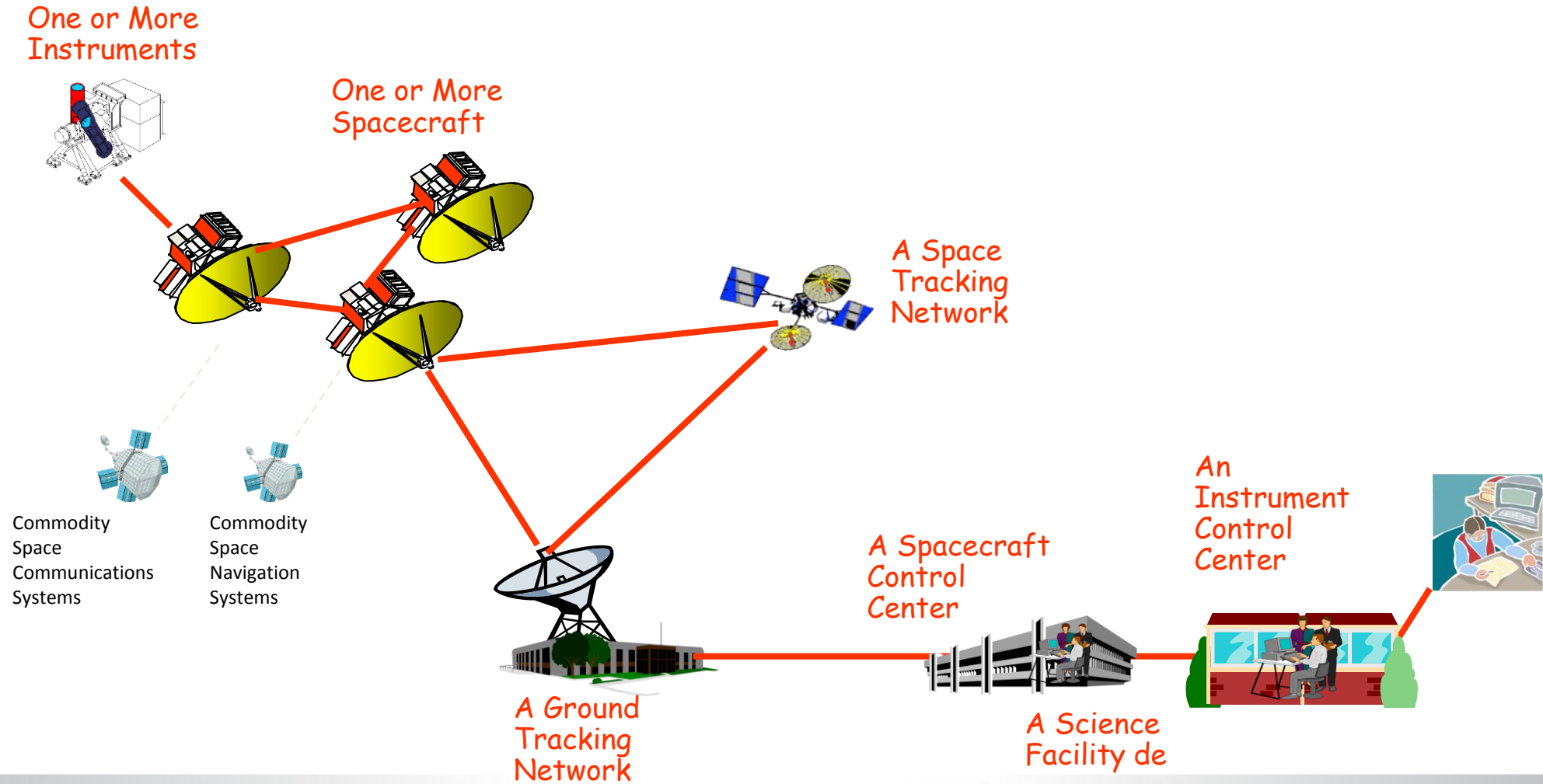
2. El “Middleware” crea la infraestructura en malla o red de datos que conecta los sistemas heterogeneos distribuidos y los datos



3. Almacenes para archivar y recuperacion de muchos tipos de datos.



# Arquitectura espacial de principio-a-fin



Source: A. Hooke, NASA/JPL

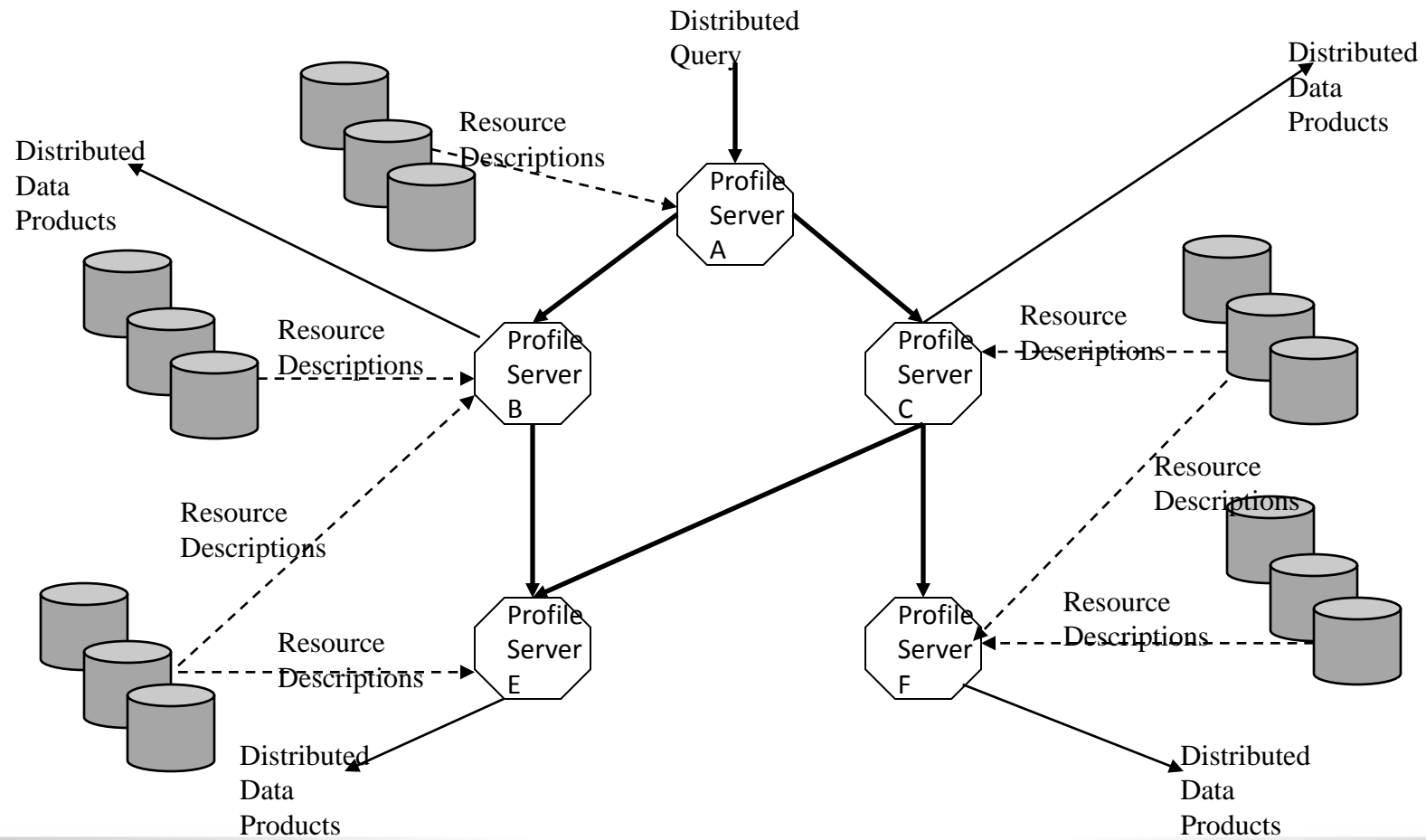
# Implantación del software

- Desarrollo de un algoritmo de búsqueda.
- OODT esta basado en software libre:  
[www.openchannelsoftware.com](http://www.openchannelsoftware.com)
- Basado en estándares: ISO/IEC 11179
- Esquemas XML comunes para intercambio de datos.

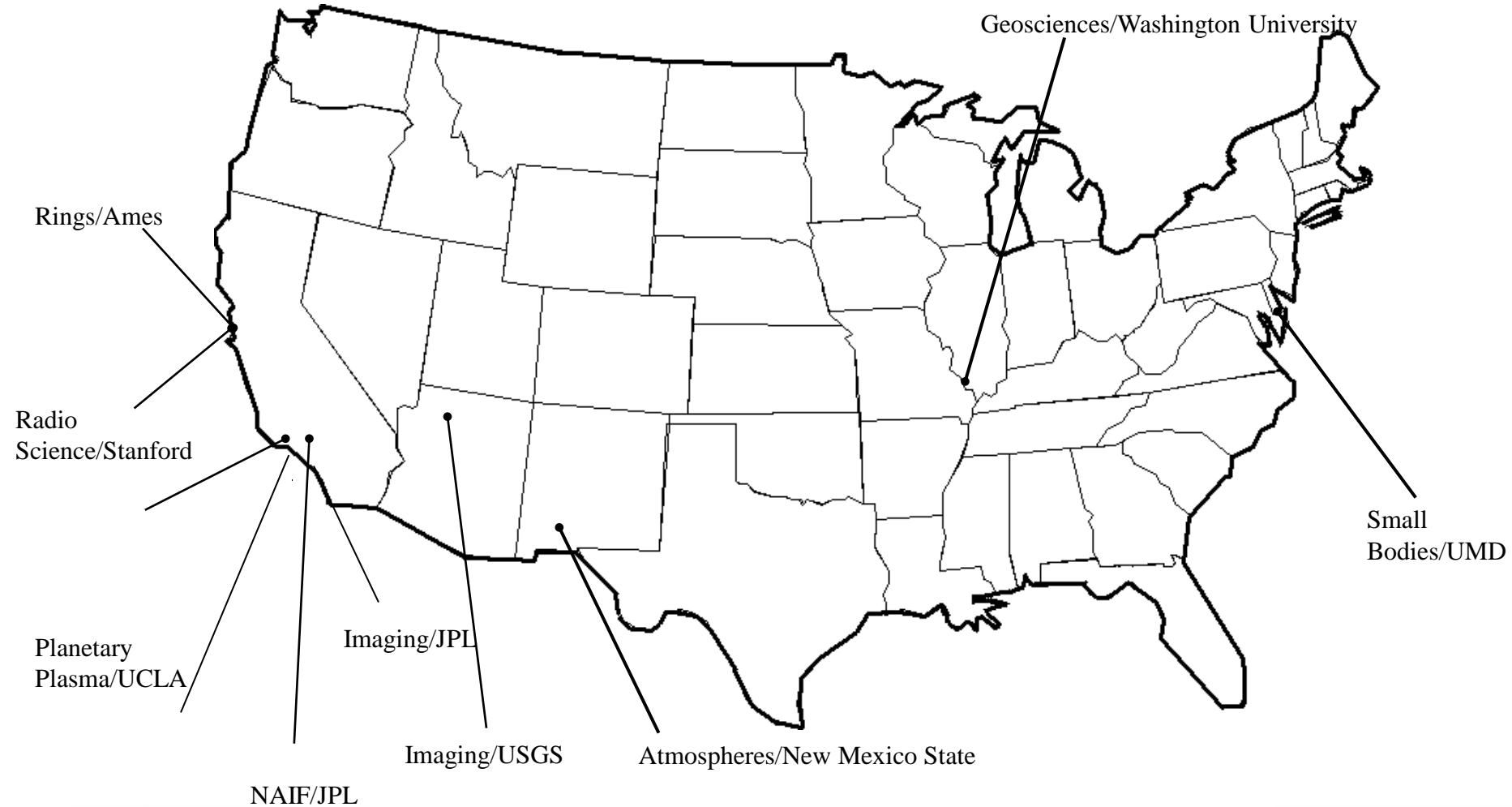
# Planetary Data System (PDS)

- Es el archivo de datos de ciencias planetarias de NASA
- Disponible bajo contrato, asegura su resguardo y disponibilidad a la comunidad científica.
- PDS es un sistema distribuido diseñado para optimizar el descuido científico en el proceso de archivo.

# escalabilidad para buscar Recursos Distribuidos



# PDS Nodos e Instituciones (Silos)



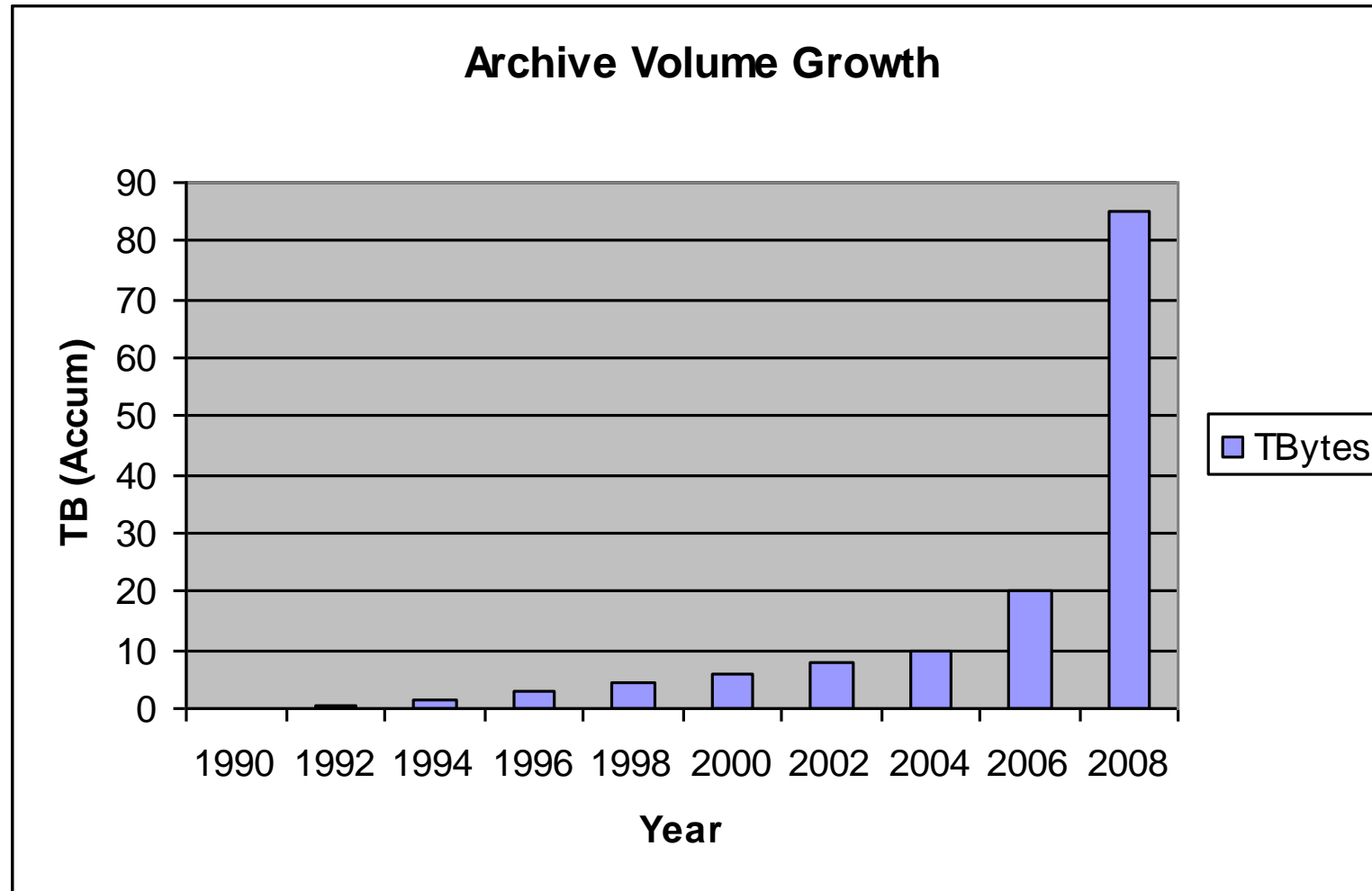
Central Node/JPL



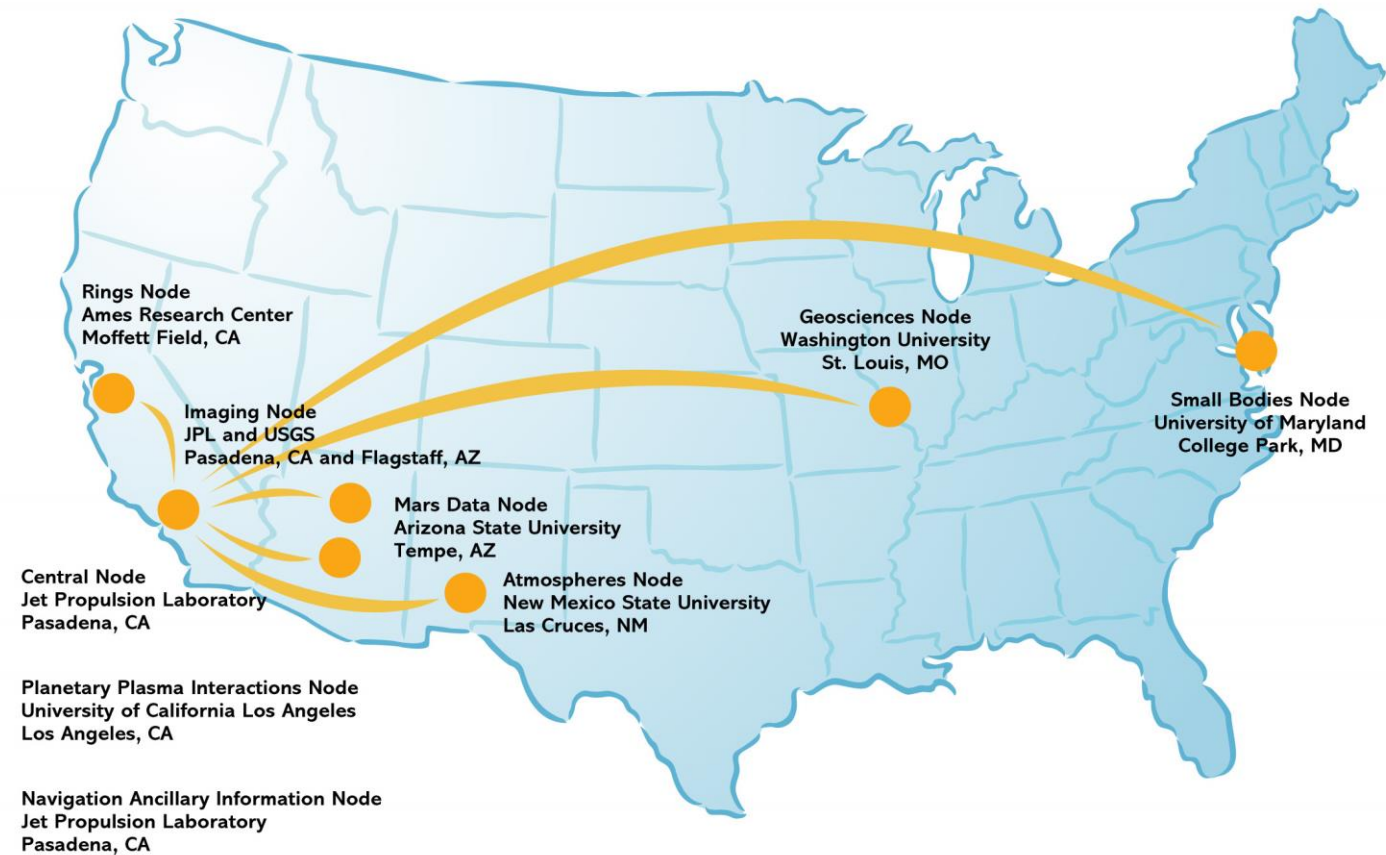
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# Crecimiento del Archivo por Misiones Planetarias



# OODT Infraestructura de Datos de Ciencias Planetarias emplazada



# PDS interfaz de usuario para búsquedas

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Planetary Data System

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**Data Set Quick Search** Help

Select one or more parameters from below, then hit Go!  
Click on **Filter** to filter parameters. Click on parameter name for more information.

Reset Go!

**Missions:** (pick one or many and Filter)

- 2001 Mars Odyssey
- Cassini-Huygens
- Comet S105/Jupiter Collision
- Deep Space 1
- Deep Space Program Science Experiment
- Galileo

Filter

**Target Name:** (pick one to Filter)

All

**Target Type:** (pick one to Filter)

All

**Instruments:** (pick one or many and Filter)

- 2 Channel Photometer
- A Star Tracker Camera
- Accelerometer
- Adv. Solid-State Array Spectroradiometer
- Airborne Visible/Infrared Imaging Spectrometer
- Airsar

Filter

Advanced Search | Power Search

Reset Go!

**Active Missions** | **New Data** | **Search Options**

Active Missions contains a list of currently active mission data sets from which to select.

New Data contains a list of data set sources from the latest mission data release.

Quick Search allows the user to search using standard PDS parameters. An Advanced Search is for experienced users with detailed knowledge of PDS mission data and science. A Power Search is for those with a detailed knowledge of the PDS internal organization.

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Curator: Valerie L. Henderson  
Webmaster: Brian Truong  
NASA Official: William Knopf  
Last Updated: 08 Oct 2004  
+ Comments and Questions

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**Search Results (116 data sets found)** Help

Data Set	Instrument Host	Information About the Data Set	Data Products & Related Files	Other Resources
1. ESO NTT EMMI Images of the P/Shoemaker-Levy 9 impact into Jupiter	ESO	View Information for ESO-C-EMMI-3-RDR-SL9-V1.0	Search for Products with PDS Explorer	<ul style="list-style-type: none"> <li>CN Online Archives</li> </ul>
2. ESO NTT IRSPEC Images of the P/Shoemaker-Levy 9 impact into Jupiter	ESO	View Information for ESO-J-IRSPEC-3-RDR-SL9-V1.0	Search for Products with PDS Explorer	<ul style="list-style-type: none"> <li>CN Online Archives</li> </ul>
3. ESO NTT SUSI Images of the P/Shoemaker-Levy 9 impact into Jupiter	ESO	View Information for ESO-J-SUSI-3-RDR-SL9-V1.0	Search for Products with PDS Explorer	<ul style="list-style-type: none"> <li>CN Online Archives</li> </ul>
4. METHANE ALBEDOS OF THE JOVIAN PLANETS AND TITAN	ESO	View Information for ESO-JSINU-SPECTROPHOTOMETER-4-V2.0	Search for Products with PDS Explorer	<ul style="list-style-type: none"> <li>Atmospheres Online Archives</li> <li>CN Online Archives</li> </ul>
5. Galileo Imaging Spectrometer (NIMS) Asteroids Gaspra and Ida Experiment Data Records	GO	View Information for GO-A-NIMS-2-EDR-V1.0	Search for Products with Atlas	<ul style="list-style-type: none"> <li>CN Online Archives</li> <li>Imaging Online Archives</li> <li>Imaging Online Archives</li> </ul>
6. Galileo Imaging (SSI) Asteroid and Comet Shoemaker-Levy 9 Experiment Data Records	GO	View Information for GO-AIC-SSI-2-REDR-V1.0	Search for Products with Atlas	<ul style="list-style-type: none"> <li>CN Online Archives</li> <li>Imaging Online Archives</li> </ul>
7. Galileo Imaging (SSI) Asteroid, Earth and Moon Experiment Data Records	GO	View Information for GO-AIE-SSI-2-REDR-V1.0	Search for Products with Atlas	<ul style="list-style-type: none"> <li>CN Online Archives</li> <li>Imaging Online Archives</li> </ul>
8. This data set contains all Dust Detector data submitted by the DOS team. All data from spacecraft launch through the Europa 12 Orbit is supplied.	GO	View Information for GO-D-DDDS-5-DUST-V2.0	Search for Products with SBN Website	<ul style="list-style-type: none"> <li>CN Online Archives</li> </ul>
9. Galileo Imaging Spectrometer (NIMS) Earth and Moon Experiment Data Records	GO	View Information for GO-EAL-NIMS-2-EDR-V1.0	Search for Products with Atlas	<ul style="list-style-type: none"> <li>CN Online Archives</li> <li>Imaging Online Archives</li> <li>Imaging Online Archives</li> </ul>
10. Galileo Imaging Spectrometer (NIMS) Jupiter and Comet Shoemaker-Levy 9 Experiment Data Records	GO	View Information for GO-J-NIMS-2-EDR-V1.0	Search for Products with Atlas	<ul style="list-style-type: none"> <li>CN Online Archives</li> <li>Imaging Online Archives</li> <li>Imaging Online Archives</li> </ul>
11. Galileo NIMS tabular data from the P/Shoemaker-Levy 9 impact with Jupiter	GO	View Information for GO-JNIMS-4-ADR-SLIMPACT-V1.0	Search for Products with Atlas	<ul style="list-style-type: none"> <li>CN Online Archives</li> <li>Imaging Online Archives</li> <li>Imaging Online Archives</li> </ul>
12. Galileo PPR calibration data for P/Shoemaker-Levy 9 impacts with Jupiter, fragments G, H, L, and O1	GO	View Information for GO-J-PPR-3-RDR-SL9-GHMLG1-V1.0	Search for Products with PDS Explorer	<ul style="list-style-type: none"> <li>CN Online Archives</li> </ul>
13. Galileo UVS tabular data from the P/Shoemaker-Levy 9 impact with Jupiter	GO	View Information for GO-J-UVS-2-EDR-SL9-V1.0	Search for Products with PDS Explorer	<ul style="list-style-type: none"> <li>CN Online Archives</li> </ul>

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**Data Set Information**

DATA_SET_NAME	ESO NTT EMMI IMAGE DATA FROM SL9 IMPACTS WITH JUPITER V1.0
DATA_SET_ID	ESO-C-EMMI-3-RDR-SL9-V1.0
NSSDC_DATA_SET_ID	XD-B3B
DATA_SET_TERSE_DESCRIPTION	ESO NTT EMMI Images of the P/Shoemaker-Levy 9 impact into Jupiter
DATA_SET_OVERVIEW	<p>ESO MultiMode Instrument has various spectroscopic options with large-field capabilities (up to 10 x 10 arcmin with a 2048*2 CCD).</p> <p>The scheduling of the observing programmes at the NTT can be adapted to the sky conditions. When the image size is better than 0.7 arcsec, the telescope can be configured for observing with SUSI. In order to take full advantage of this unique capability, ESO has now introduced a special category of observing programmes which require exceptional seeing and are executed in a service mode by ESO staff when the sky conditions are favourable.</p>
DATA_SET_RELEASE_DATE	1996-08-14
RESOURCE_LINK	http://starbrite.jpl.nasa.gov/pds-explorer/isdnode.jsp?nodeid=jsp?nodeid=ES0-C-EMMI-3-RDR-SL9-V1.0
DATA_OBJECT_TYPE	IMAGE
START_TIME	1994-07-01T03:57:22
STOP_TIME	1994-07-02T04:50:19
MISSION_NAME	COMET S105/JUPITER COLLISION GROUND BASED ATMOSPHERIC OBSERVATIONS
MISSION_START_DATE	1993
MISSION_STOP_DATE	1996 1995
TARGET_NAME	JUPITER SL9
TARGET_TYPE	PLANET COMET
INSTRUMENT_HOST_ID	ESO
INSTRUMENT_NAME	ESO MULTIMODE INSTRUMENT
INSTRUMENT_ID	EMMI
INSTRUMENT_TYPE	IMAGER
NODE_NAME	SMALL BODIES
ARCHIVE_STATUS	ARCHIVED
CONFIDENCE_LEVEL_NOTE	LINK
CITATION_DESCRIPTION	Citation TBD
ABSTRACT_TEXT	ESO MultiMode Instrument has various spectroscopic options with large-field capabilities (up to 10 x 10 arcmin with a 2048*2 CCD).

Juno >> WAV

**VOLUME 0000: JUNO WAVES STANDARD RAW PRODUCTS**



JNO-E/J/SS-WAV-2-EDR-V1.0

**Start Time: 2011-08-09 00:00:00 - Stop Time: 2017-04-10 00:00:00**

This volume contains documentation and all available Juno Waves telemetry for spacecraft event times (SCET) 2011-08-05 to 2017-04-10. These are raw data and are not intended for use by the wider community. The companion volume JNOWAV\_1000 contains calibrated, full resolution, electric and magnetic field data of greater interest to most [more ...](#)

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-  **ERRATA.TXT**
-  **VOLDESC.CAT**

Juno >> WAV

**VOLUME 0000: JUNO WAVES STANDARD RAW PRODUCTS**



JNO-E/J/SS-WAV-2-EDR-V1.0

Start Time: 2011-08-09 00:00:00 - Stop Time: 2017-04-10 00:00:00

This volume contains documentation and all available Juno Waves telemetry for spacecraft event times (SCET) 2011-08-05 to 2017-04-10. These are raw data and are not intended for use by the wider community. The companion volume JNOWAV\_1000 contains calibrated, full resolution, electric and magnetic field data of greater interest to most investigators. [less ...](#)

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[WAV\\_2011221T165656\\_HRS\\_REC\\_V01](#)

Start Time: 2011-08-09T16:56:56.796 Stop Time: 2011-08-09T16:59:53.171

[WAV\\_2011221T235924\\_HRS\\_REC\\_V01](#)

Start Time: 2011-08-09T23:59:24.796 Stop Time: 2011-08-10T00:00:07.171

[WAV\\_2011221\\_HSK\\_V01](#)

Start Time: 2011-08-09T00:00:00.000 Stop Time: 2011-08-10T00:00:00.000

[WAV\\_2011221\\_LRS\\_V01](#)

Start Time: 2011-08-09T00:00:00.000 Stop Time: 2011-08-10T00:00:00.000

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