Migration of Magellan Mission Data from the PDS3 to the PDS4 Standard

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Introduction

- The Planetary Data System (PDS) is migrating its legacy datasets from the older PDS3 standard to the current PDS4 standard.
- The PDS Geosciences Node at Washington University will be migrating its collection of Magellan Venus datasets (see table).
- The migration of Magellan datasets will make these data more accessible and useful to science investigators.
- Updating these data will also support science from the recently selected Discovery Missions VERITAS and DAVINCI.

Magellan Mission

- Launched in 1989, Magellan arrived at Venus in August 1990. The mission ended in 1994.
- The mission focused on global geologic mapping with Synthetic Aperture Radar (SAR) imaging, altimetry and radiometry measurements using the spacecraft's main antenna, along with radio science experiments.

Original Magellan Data Archiving

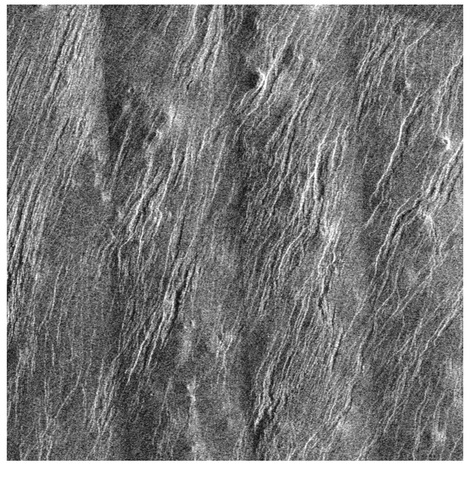
- The Magellan Mission was one of the first missions to archive its data directly to the PDS during the mission.
- PDS standards were in the early stages of development at the time of Magellan operations and archiving. In some cases, the standards used by Magellan pre-date the PDS3 standard.
- Some datasets were created on VAX computers and used VAX storage formats for binary data, which are no longer in common use.
- Many of the raw datasets were written onto 9-track magnetic tape for delivery to PDS and later transferred to CD-WO discs.

Artist View of Magellan Spacecraft at Venus.

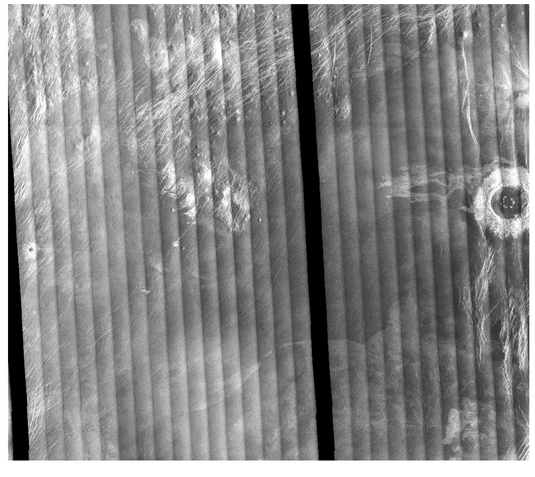
Geosciences Node Magellan Datasets
https://pds-geosciences.wustl.edu/missions/magellan/index.htm

Dataset	Description	Data Type	Size, GB	PDS3 Volumes
F-BIDR	Along track SAR and Radiometry	Image; Table	480.70	594
C-BIDR	Compressed SAR	Image; Table	77.25	124
F-; Cx-MIDR	Mosaicked SAR	Image Mosaic	75.45	127
ALT-EDR	Raw Altimetry	Table	43.32	71
ARCDR	Altimetry and Emissivity	Table	8.34	19
GxDR	Global Mosaics	Image Mosaic	0.50	1
BSR	Bistatic Radar	Table	7.02	16
LOSAPDR	Line of Sight Acceleration	Table	1.06	2
Gravity Models	Spherical Harmonics	Image; Table	0.88	1
Radio Science	Spacecraft Tracking	Table	9.29	1
Totals			747.29	1003

Single Tile



Example F-MIDR Mosaic



Above is an F-MIDR mosaic where the 56 individual tiles were reconstructed into one product. The image to the left is a single 1024x1024 pixel tile from the current PDS3 data set and taken from the upper left corner of the mosaic. The PDS4 version of MIDRs will merge the individual tiles into larger images as shown above.

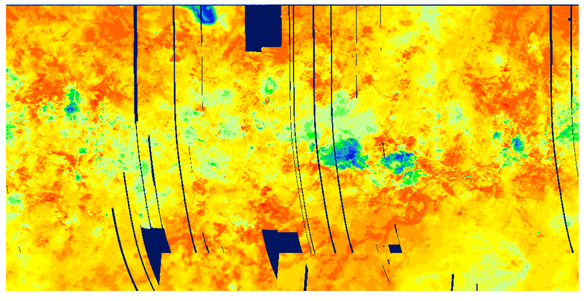
Improvements from PDS4 Migration

- Data will be stored in simpler formats (tables and images).
- Several Magellan data product types will have to be reformatted to meet PDS4 data storage standards. For example, the F-BIDR and C-BIDR image products need to be reformatted because they contain line prefix bytes that are not allowed in PDS4.
- The metadata for each product will be improved.
- The use of XML for labels will enable a variety of standard software tools to access the metadata.
- Any binary data originally stored using VAX floating-point format will be converted to IEEE formats.
- For each F- and Cx-MIDR and GxDR mosaic product, the original 1k by 1k pixel tiles in the mosaic will be merged into a single large image.
- Browse products will be generated, where appropriate, and stored in a commonly used format such as JPEG or PNG.

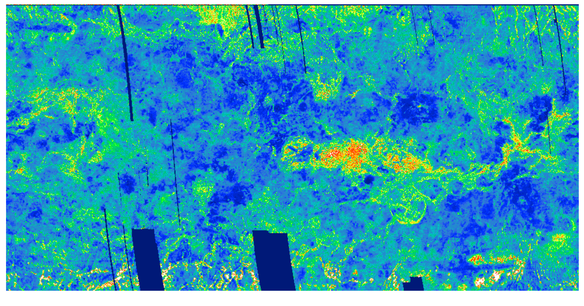
Migration Priorities

- First the imaging datasets – F/C-BIDRs, MIDRs, and GxDRs will be migrated, along with the ARCDR dataset.
- These are likely the datasets that are of most interest to the science community based on input from our Node advisory group.
- The more highly derived datasets would be migrated next, e.g., spherical harmonic gravity data.
- Third priority would be raw datasets, like the ALT-EDR dataset.

Global Emissivity Data



Global Slope Data



The above maps are two of the GxDR data sets shown as color-coded, Mercator projections. The current PDS3 data set has the global maps divided into smaller tiles, which will be reconstructed into global mosaics as shown here.