# Development of a planetary Web GIS at the *Photothèque Planétaire* in Orsay

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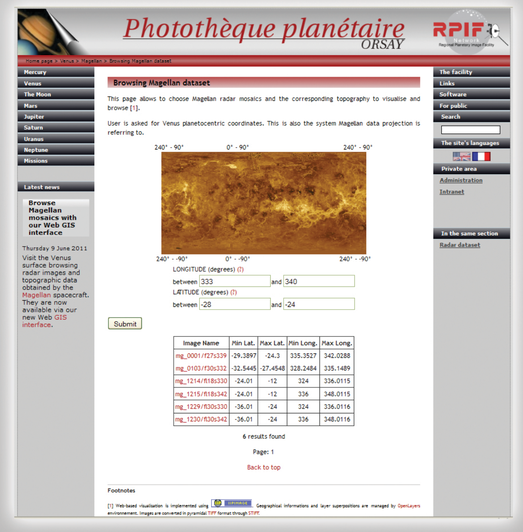
**http://fototek.geol.u-psud.fr**

The *Photothèque Planétaire d'Orsay* belongs to the Regional Planetary Image Facilities (RPIF) network started by NASA in 1984. The original purpose of the RPIF was mainly to provide easy access to data from US space missions throughout the world. Although RPIFs are still a rich documentary resource for the understanding of historical data-sets, they are deeply innovating themselves to answer the challenges of the digital era. Digital data acquisition and processing has increased the volume of the available information. Standardized and automatic tools designed to efficiently handle information are increasingly necessary to produce relevant and coherent scientific results. At the same time the digital epoch has reduced the gap between professional and non-professional users, making scientific images and data easy accessible via websites and community forums. Scientific institutions must participate in communicating scientific culture to the public. That is why the main purpose of RPIFs today is the production of efficient tools dedicated to Planetary Sciences and information diffusion. The *Photothèque* itself specialises in planetary data processing and visualization for research and public outreach.

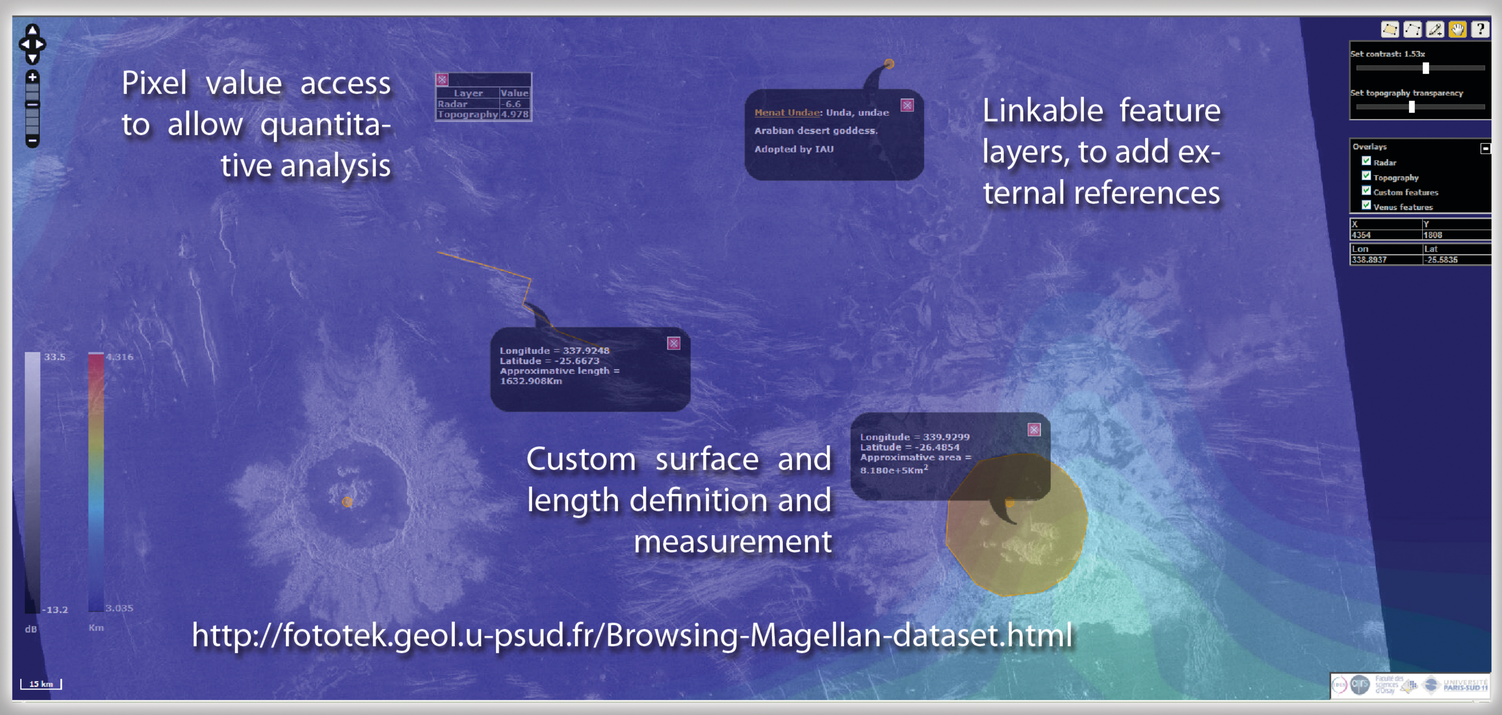
Planetary Science data are largely heterogeneous with respect to the objects they describe (surfaces, atmospheres, magnetic and gravitational fields of Earth-like planets and satellites, giant plasma planets, asteroids, or the Sun...) and with respect to the formats they are encoded in (raster, vectorial, time-series, in ASCII or binary various formats). A coherent and efficient scientific comparison of those data needs a standardized metadata description and an interoperable data archiving and distribution.
Two scientific communities are essentially involved in Planetary Science research, astronomers and geologists/geophysicists. Two approaches to standard definition are arising. The Virtual Observatory framework (VO), coming from Astronomy and Astrophysics (see for example Le Sidaner 2011), and Geographical Information Systems, coming from Earth Sciences (see for example Hare et al. 2011).
From the planetary scientist point of view, the weakness of the VO lies in his single standard format definition: FITS and VOTable are not the only planetary data formats and a massive conversion is unlikely to happen.
On the other hand, GIS software suffers from a lack of systematic and controlled access to pixel values for quantitative physical analysis on raster data. Moreover, the lack of flexibility in the definition of coordinate systems makes GIS more suitable for high-level products than for low-level, non-resampled images.
A compromise between the two schemes would be advisable.

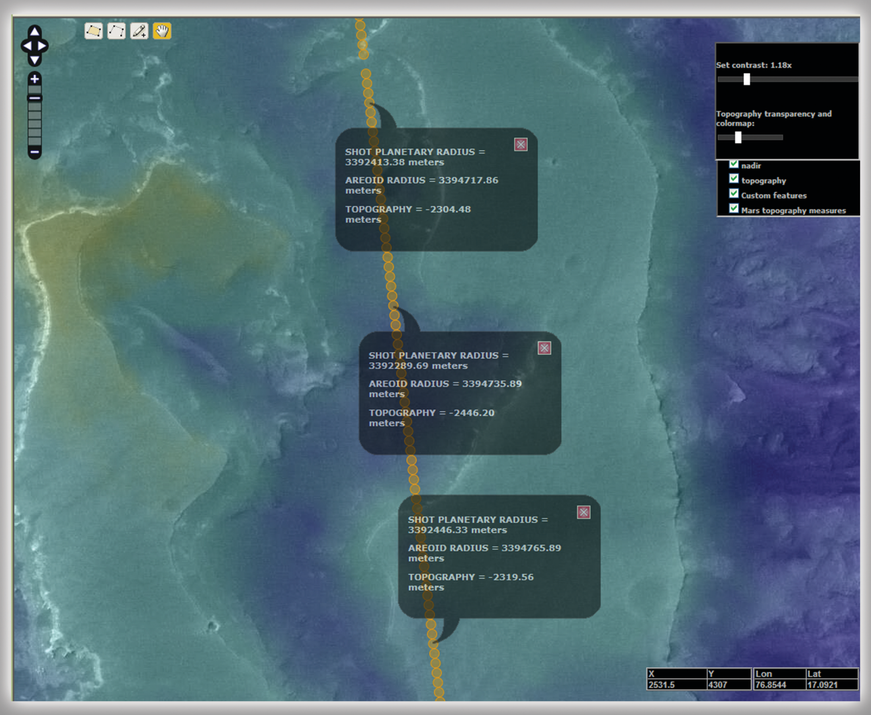



NASA's Magellan spacecraft was launched by a space shuttle on May 1989. It used a sophisticated imaging radar to make the most highly detailed maps of Venus ever captured during its four years in orbit around Earth's sister planet from 1990 to 1994. After concluding its radar mapping, Magellan also made global maps of Venus gravity field.

Our Venus Magellan data-set interface contains the radar (SAR) data-set, the topography and IAU feature nomenclature.

We use IIPImage, a C++ FCGI image server, allowing on-the-fly JPEG image compression to efficiently transfer data through the Web ( http://iipimage.sourceforge.net) and an OpenLayers based JavaScript client (http://openlayers.org).




The Mars Orbiter Laser Altimeter (MOLA) had two primary objectives. The first was a global mapping of Mars topography for geophysical and geological studies. The second was atmospheric circulation and three-dimensional structure studies. The altitude determination process works by measuring the time that a pulse of light takes to leave the spacecraft, reflect off the surface of Mars, and return to the MOLA collecting mirror. The reconstruction of the Mars surface done by the MOLA Science Team is the recommended topographic reference surface for Mars (Smith et al. 2003) .

MOLAutils is a tool for reading MOLA Precision Experiment Data Records (PEDRs), the binariy catalogs containing all MOLA measurements.
It provides:
- translation of PEDRs files in different easily manageable formats (ASCII, XML, KML);
- computation of the areoid surface (and the corresponding topography) with the spherical harmonic model of choice;
- computation of the IAU standard ellipsoid surface (and the corresponding topography).
The FCGI server version will be soon available, that wil allow to display MOLA topography as a vector layer in a GIS interface.
MOLAutils is distributed under GNU/GPL licence. Visit http://fototek.geol.u-psud.fr/MOLAutils.html

**REFERENCES**:
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Smith, D., Neumann, B., Arvidson, R. E., Guinness, E. A., and Slavney, S.: 2003, 'Mars Global Surveyor Laser Altimeter Mission Experiment Gridded Data Record', NASA Planetary Data System, MGS-M-MOLA-5-MEGDR-L3-V1.0, 2003.