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EuroPlaNet VO use case: images of planetary surfaces

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Abstract

This abstract (as well as several accompanying abstracts in this conference) presents a use case of the Virtual Observatory for Planetary Science being defined in JRA4/IDIS. The goal is to illustrate possible applications of a VO system in the context of this session.

1. Introduction

The JRA4/IDIS working group of EuroPlaNet-RI is setting the basis for a Virtual Observatory (VO) in Planetary Science. At the end of the project, a protocol will be available to access complex databases described using a specific Data Model. Any data provider will be allowed to describe their data services using this Data Model and declare them in a system of mirrored registries. The perimeter of the data accessible through this mechanism is therefore expected to increase greatly in the coming years. The preferred approach is to preserve the compatibility with tools developed in the framework of the astronomical VO (IVOA), and to save the development of specific tools in particular for visualization.

The present abstract, as well as several accompanying abstracts in this conference, illustrates a possible use of such a system in the context of this session.

2. Planetary images

The basic imaging tool in the astronomical VO is Aladin, developed at CDS in Strasbourg [1]. Aladin can directly load many formats of images, allowing for quicklook and quality check, including zooming, quick measurements, basic radiometric calibration… Although the main data format in the astronomical VO is FITS, PDS images and cubes can also be read thanks to a specific interface developed in the Europlanet framework [2].

Although Aladin currently supports only sky coordinates (RA-Dec…), it can in principle handle any spherical coordinate system, including latitude/longitude on a planetary surface.

Image coordinates on planetary surfaces are often computed using the Spice system. If such coordinates are correctly associated with the data, Aladin can be used as a very efficient tool to quickly build mosaics, color composites, and spectral cubes from filter camera images. The data access protocol developed in JRA4/IDIS implements the description of specific surface coordinate frames (such as Mars/IAU2000, Moon/ULCN…) to support high-resolution imaging in the future.

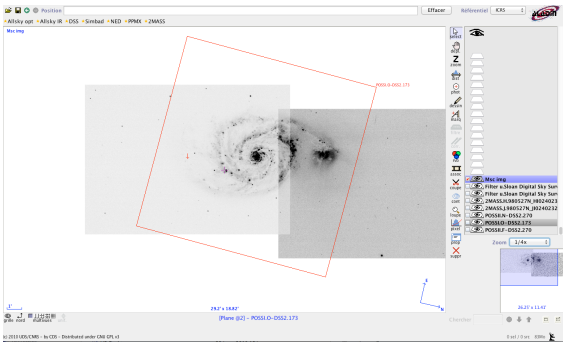

Fig. 1: Automatic image mosaic in Aladin. This can be performed with surface images if their header includes coordinates correctly formatted (example is M51)

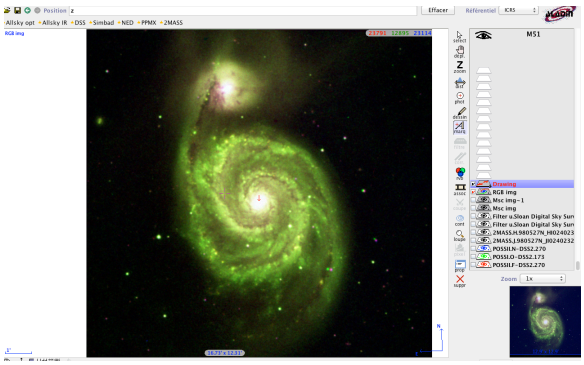

Fig. 2: Similarly, color composite and image cubes are readily built in Aladin from filter images.

3. Landmark analysis

Aladin is not only a powerful plotting and image analysis tool, but also a smart search interface to astronomical catalogues. It will be able to identify other data sets related to the selected Field Of View, provided that they are described consistently; this will allow overplotting contextual images, or comparison of independent data sets.

Similarly, Aladin can download catalogues of objects present in the FOV. In Planetary Science, catalogues of landmarks, craters, faults… can be accessed if they are formatted adequately, therefore providing basic GIS capacities to Aladin in this context. In addition, catalogues can also be created from image measurements within Aladin, allowing e. g. for crater counting and description.

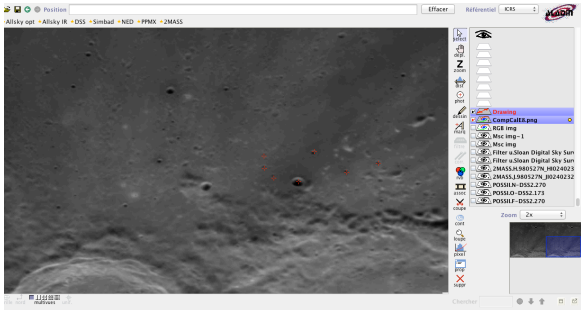

Fig. 3: Aladin also includes measurement tools, and can create catalogues of landmarks. An obvious application concerns crater statistics and properties (here on a AMIE/Smart-1 image).

Since VO tools can exchange and share data, object properties can be cross-correlated using other tools such as TopCat, which is well adapted to plotting series of parameters.

Acknowledgements

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References

[1] Aladin is described and distributed on this page: http://aladin.u-strasbg.fr/

[2] Erard et al 2012. EuroPlaNet VO use case: imaging spectroscopy. This conference.