Aladin and HiPS planetary maps

2nd Planetary mapping and Virtual Observatory Workshop – 1-3 July 2019 – Saint-Rémy-Les-Chevreuse

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On behalf of the Aladin team
Aladin? What is it?

- Since **1999**, by the Centre de Données astronomiques de Strasbourg (**CDS**)
- **Highly used** by professional, amateurs and other public (~600,000 queries/day, ~7000 unique client-visitor/day)
- Based on Hierarchical Progressive Survey IVOA standard (**HiPS** IVOA), and **FITS** standard
- Can be seen as a **GIS tool** but **dedicated** to the **astronomy**
- A **Desktop** version & a **Web lite** widget
- Initially dedicated to **celestial data**

Planetary mapping workshop – July 2019 – P.Fernique
Planet maps in Aladin?

- Aladin sky facilities easily re-usable for planets (background map + graphical overlays) => as any regular GIS

- HiPS can be visualised as spherical maps and a planet is mostly spheric (better than cartesian GIS tool projection)

- Europlanet VESPA project CDS participation

- VESPA project is deploying IVOA adapted protocols (TAP EPN-CORE...)
  => Aladin is already IVOA protocol ready

- And it works ! (see video demo in one minute)
Bienvenue sur Aladin, votre atlas professionnel du ciel.

- Accédez à toutes les données astronomiques disponibles sur le net !
- Comparez-les avec vos propres données.
- Préparez vos missions d'observations.

Pour débuter, saisissez un nom d'objet, par exemple M1, puis validez par ENTER...

ou tout simplement, cliquez dans la fenêtre principale pour explorer le ciel.
HiPS state of art

- **IVOA standard** since 2017
- Based on **HEALPix** tessellation
  - Equal area
  - Best angular resolution => 400µas
- No DB, only tiles as regular files
- 20 collaborative HiPS servers (regular HTTP server)
  => ESA, NASA, CADC, JAXA, IAS, IRAP, ...
- 610 celestial HiPS + **60 planet** HiPS
  => [http://aladin.u-strasbg.fr/hips/list](http://aladin.u-strasbg.fr/hips/list)
- **320 TB of data** for $2.3 	imes 10^{14}$ pixels
What is useful for planets?

- **Map display** (HiPS) + **graphical overlays** (catalog + graphical tags)
- **Data discovery tree** for planetary services
- Planetary coverage by **MOC**
- Manual positional **calibration** of planetary images/cubes
A few Aladin adaptations

• **Longitude** inversion (just for display)
  – The sky is visible inside the celestial sphere, contrary to the planets where the observer is outside

• **Coordinate syntax**
  – Decimal, sexagesimal, cardinal specification (NSEW) rather than negative values...

• **EPN-core** support
  – Coordinates extraction form box location
  – FOV interpretation
  – Link to additional resources
A few HiPS adaptations

- VESPA action to convert PDS images into FITS (Chiara Marmo)
- **Hipsgen** extensions:
  - Able to process one file colored CAR map + optional 2 pole images (without additional WCS solution)
  - Usage of «Image sMagik» to prepare (split) huge TIFF maps
- The results:
  - Generation of ~60 HiPS for all planets and satellites at the best public resolution (ex: THEMIS mars 100m/pixel). Thanks to USGS Astrogeology Science Center, University of Arizona, JPL.
  - Distributed in the HiPS network by CDS HiPS nodes & Paris Observatory HiPS node
The video demo (2mn)...

1. Generate your HiPS from a CAR map
2. Display it in Aladin
3. Query for CRISM observations via TAP-EPNcore
4. Manipulate your CRISM cube
Available in Aladin Beta

http://aladin.u-strasbg.fr/java/AladinBeta.jnlp

Thanks – Question?