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VAMOS online: archive potentiality and prospects

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Abstract. The VAMOS (Velocity And Magnetic Observations of the Sun) archive allows for archiving and searching on the data acquired by the VAMOS instrument. The metadata structure of the catalog has been conceived for being easily expanded and offering to owners of other instruments the possibility of creating easily and safety the catalog of their data on the web. The observations of the VAMOS instrument produce the RAW images of the Sun, that, together with the products of the scientific analysis, are transformed in FITS format for the archiving. The catalog offers on the web the possibility to insert and to extract the information on the observing campaigns and the visualization of the respective FITS images, with the options of preview and download of the same images in high resolution. All information on the observing campaigns and all images produced by the VAMOS instrument are archived in the VAMOS database, the official home page is: http://vamos.na.astro.it. VAMOS is part of Data Interface to the Sun at Capodimonte Observatory (D.I.S.C.O.): http://disco.na.astro.it. VAMOS is integrated in SOLar ARchive NETwork (SOLARNET): http://solarnet.to.astro.it:8080/solardist.

Key words. Sun: observations – Sun: databases

1. The VAMOS Instrument

Velocity And Magnetic Observations of the Sun (VAMOS) is a project by the solar group at the INAF - Astronomical Observatory of Capodimonte (INAF-OAC), to conduct a full-disk study of solar photospheric dynamics and magnetic field (Fig. 1, 2).

VAMOS is a solar imager, based on the technology of the magneto-optical filter (MOF), to obtain high cadence observations of the intensity (I), velocity (V) and longitudinal magnetic field (B) at the photospheric level. The instrument, with two potassium vapour cells, became operational in May 1999, and is used for campaign observations. Since 2001, the VAMOS is located in the East tower of the INAF-OAC. Data reduction software has been developed for both the Doppler images calibration and the V and I images spherical harmonic decomposition. Currently, the science done with VAMOS deals with the study of photospheric dynamics, based on the analysis of $\ell - \nu$ diagrams for V and I power, I-V phase difference and coherence. The VAMOS archive was designed to store all the data products obtained with the VAMOS observations.

2. The Archive

The Archive is implemented on a modern computational platform whose hardware compo-

Fig. 1. The VAMOS (white box) on the OAC 40cm telescope.

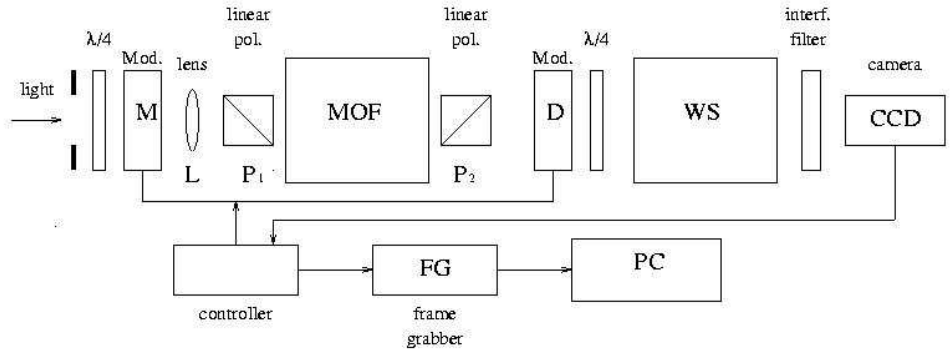

Fig. 2. VAMOS setup.

nent is an Intel Hyper-Threading server architecture (Fig. 3). All data are archived in the object-relational database PostgreSQL 8 working on Linux server with Kernel 2.6.13 of Gentoo GNU/Linux. The compilation of the operating system with Gentoo GNU/Linux has allowed to set up and to add a set of ”hardened” patches which increase the sturdiness, the reliability and the overall performances of the system. A detailed presentation of VAMOS Archive (Powerpoint and Keynote) is available at: http://disco.na.astro.it/english/evamos.htm.

2.1. The Web Interface

The web interface allows easy searches on the data and the possibility to show all information about the observing campaigns, the previews of the respective images and to download the associated FITS files.

The web interface is written in PHP5 on Apache 2 (with AJAX programming). Advanced tools have been developed with Javascript. Data ingestion and search and image previews use the Java J2EE Servlets on Tomcat WSDP 5.0. Data export in XML (VOTable) to external brokers is realized through Apache Jakarta AXIS Web Services.

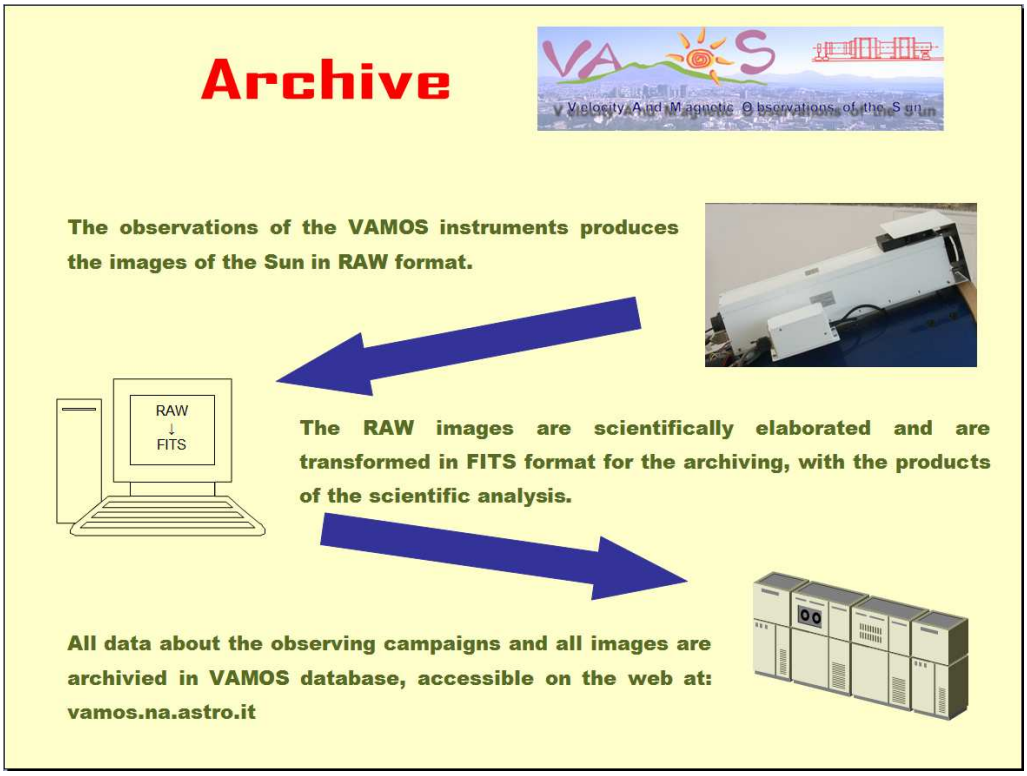

Fig. 3. The Archive pipeline.

Fig. 4. Snapshots of the web interface for observation search.

Fig. 5. Results of searching images.

All the pages resulting from a ”Search” option are linked to a format for the printout.

2.2. The Data Ingestion

The system implemented for the data ingestion is of great importance. Through easy forms accessible after login and password, it guides the end user to the creation of the instrument archive. The enclosed forms allow to define the characteristics of the instrument and to associate to it a responsible person who will insert, with guided procedures, all information about observations and the related data products.

The implemented data ingestion procedures do not require any previous experience of the user with the SQL language or with other sophisticated computer techniques.

3. A Database for everyone

VAMOS has been designed to expand itself in a database of many and even not local instruments with the simple management of the archive on the Web, which allows to benefit

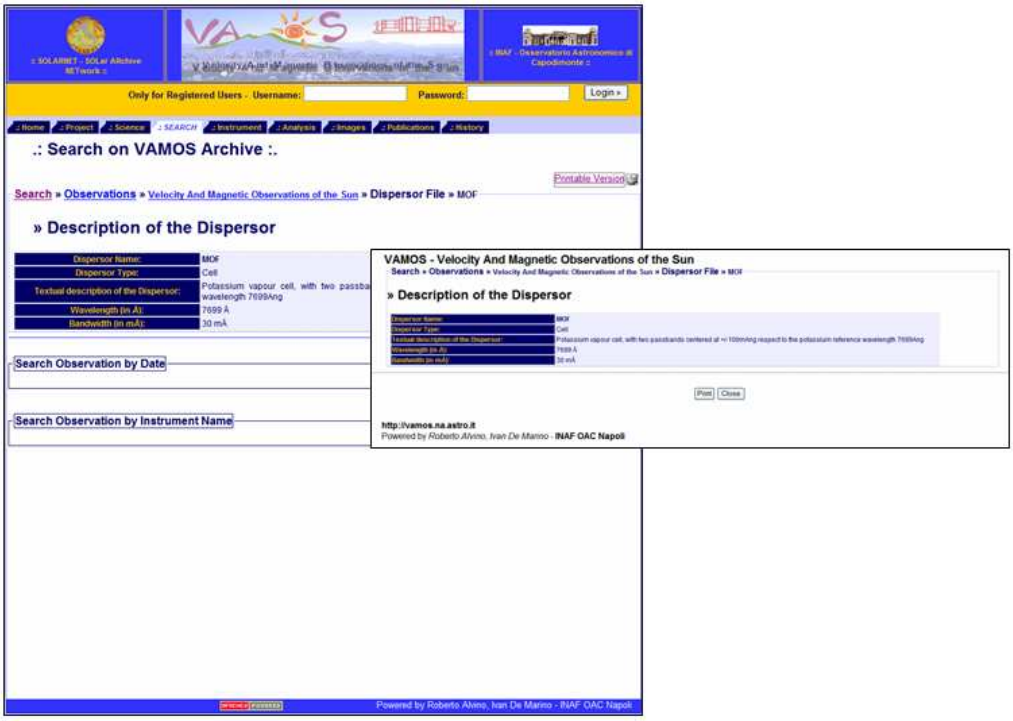

Fig. 6. Searching on instrument configuration.

of all the archive facilities described in this paper. In principle, the researcher responsible of an instrument producing data to catalog can make them available to the scientific community with the help of VAMOS and has not to implement in local a new database with the related costs of hardware, software, development and maintenance. In practice, opening a new database also depends on contacts with the administrators (roalvino@na.astro.it, demarino@na.astro.it) of the VAMOS archive who might be not continuously supported in the near future.

4. SOLARNET

VAMOS is part of SOLARNET (SOLar ARchive NETwork), the Italian net of the solar archives that is conceived for allowing the simultaneous interrogation of more databases through a unified portal. Currently the SOLARNET federation includes 7 data archives, 2 of which belonging to EGSO (European Grid of Solar Observations, link: http://www.egso.org):

1) CATANIA SOLAR ARCHIVE at INAF - Astrophysical Observatory of Catania, link: http://web.ct.astro.it/sun/;

2) DSO (Database for Solar Observatories) at INAF - Astronomical Observatory of Capodimonte, also EGSO superprovider, link: http://dso.na.astro.it;

3) RISE/PSPT at INAF - Astronomical Observatory of Rome - Monte Porzio Catone, link: http://www.mporzio.astro.it/solare;

4) SEC (Solar Event Catalogue) at INAF - Astronomical Observatory of Trieste, also EGSO superprovider, link: http://sec.ts.astro.it;

5) SOLAR (SOho Long-term ARchive) at INAF - Astronomical Observatory of Turin, link: http://solar.to.astro.it;

6) SOLRA (SOLar Radio Archive) at INAF - Astronomical Observatory of Trieste, link: http://radiosun.ts.astro.it;

Fig. 7. Data Ingestion forms.

7) VAMOS at INAF - Astronomical Observatory of Capodimonte, link: http://vamos.na.astro.it.

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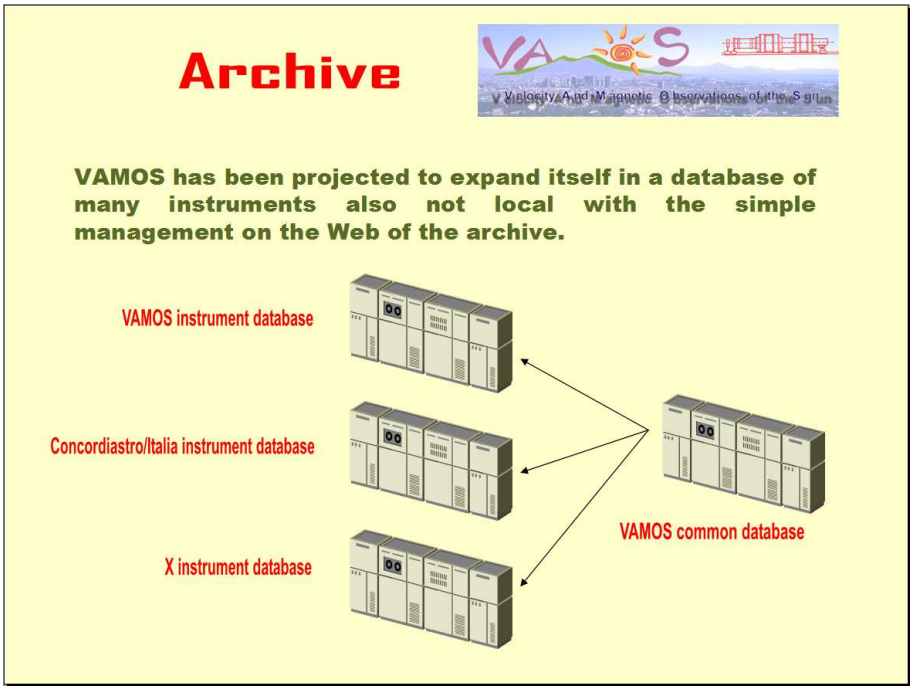

Fig. 8. VAMOS expansion concept.

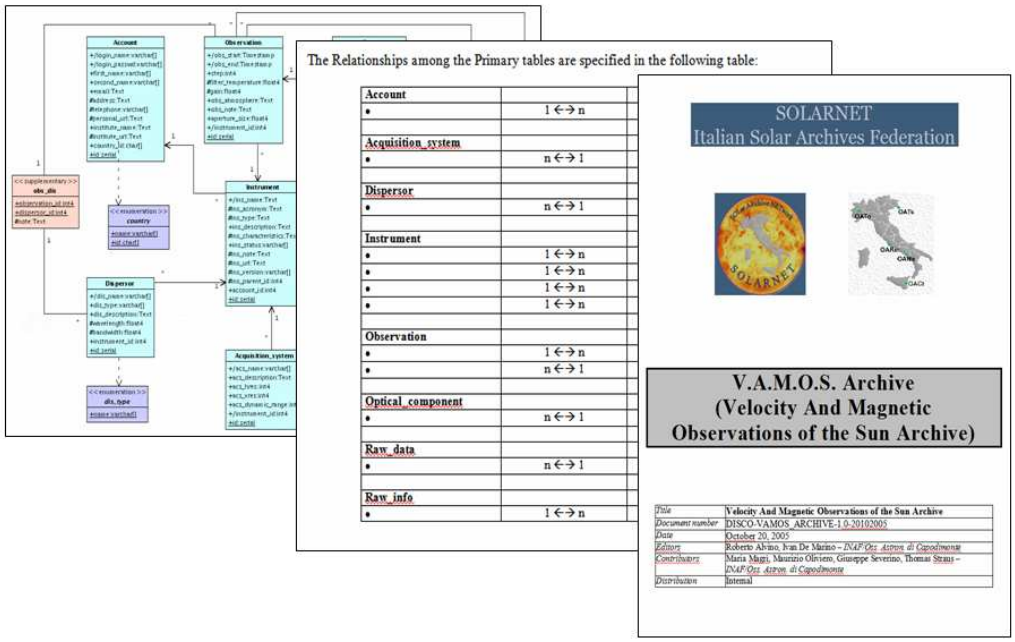

Fig. 9. Archive documentation.

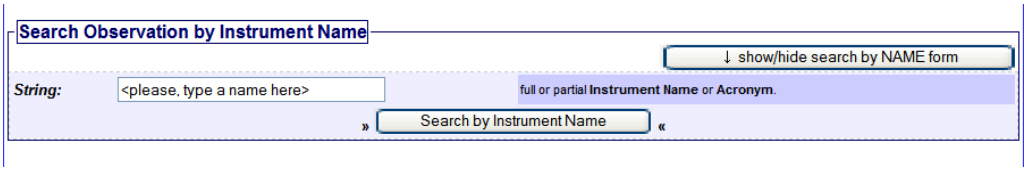

Fig. 10. Search by instrument name.

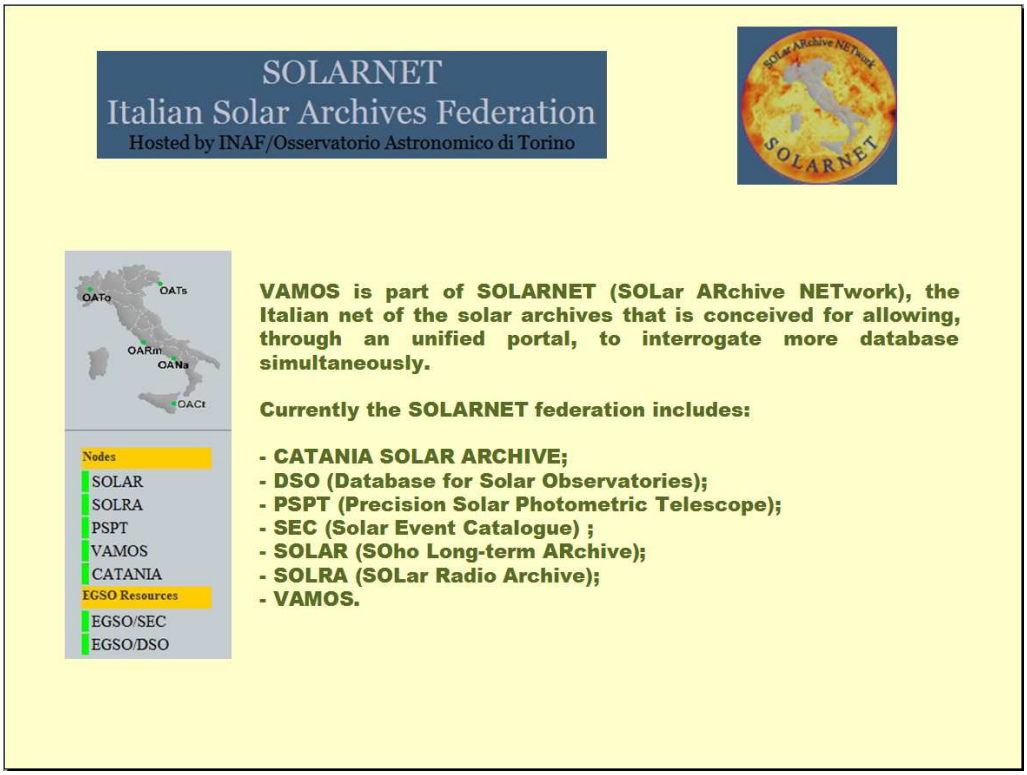

Fig. 11. SOLARNET.