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SAMOA Solar and Atmospheric Measurements and Observations Archive

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Abstract. SAMOA is a grid portal developed at the INAF-OAR to share and analyze the solar and atmospheric data provided by the three institutes affiliated to the CVS - Centro per lo studio della Variabilità del Sole. At present, SAMOA includes about 1 TB of data from the geographically distributed archives and consists present and past full-disk solar observations at several spectral bands provided by the INAF-OAR, ionospheric and geomagnetic measurements obtained by the INGV and University of Rome 'Tor Vergata'. Data are all included in a unique virtual environment where several pre-analysis tools are also provided. Realized through open source web languages, SAMOA is an example of Service-Oriented-Architecture tool for virtual organizations devoted to share solar and atmospheric resources.

Key words. Sun: solar-terrestrial relations - Astronomical data bases: Catalogs

1. Introduction

The challenge of understanding mechanisms of past and future climate change requires close interactions of different fields of study, in particular: Solar Physics, Geophysics and Climatology, so researches involved need technical support to share data and tools spanned all over the world. Grid is an emerging web-based technology, that can satisfy this need due to its capability of sharing data, models, hardware and software resources throught geographically distributed institutes in order to address complex problems (Foster, 2001). In the grid philosophy of distributed and remote computing, SAMOA is an experimental grid portal developed to provide an easy user interface to access the data provided by the CVS. SAMOA also enables a preliminary analysis server-side tool to display and compare the available data. A key element of SAMOA is the allowance for an integrated data-mining and analysis capability that can be applied both across and within databases, i.e. across different research fileds. SAMOA resources are intended not only to be available to the specialized people, but also to become the local natural conduit for education and public outreach in Sun-Earth Connections. This paper provides details on the current status of SAMOA development: architecture and software used, use-cases, user requirements and planned future implementations are also summarized.

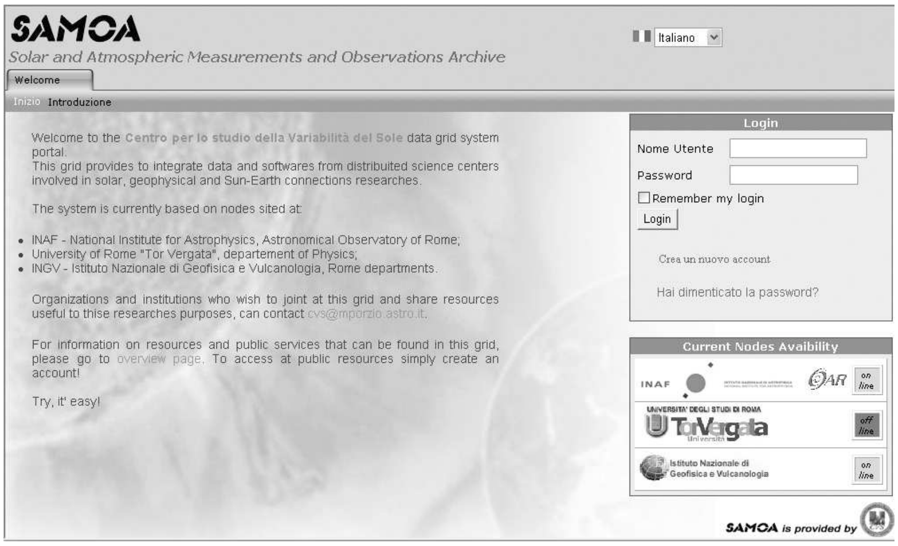

Fig. 1. The SAMOA Portal.

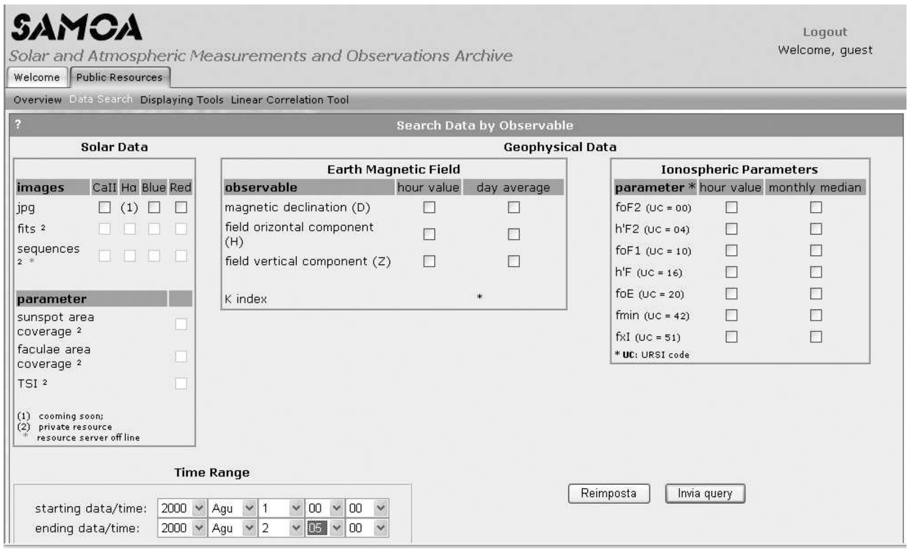

Fig. 2. The Data Search tool.

2. The Data

At present, the data available through SAMOA are:

– PSPT full-disk observations in four spectral bands (393, 409, 450, 607 nm) acquired from 1996 to date at the Astronomical Observatory of Rome;
– Images obtained by the digitization of the Arcetri CaII K and Hα full-disk spectroheliograms acquired form 1927 to 1974;

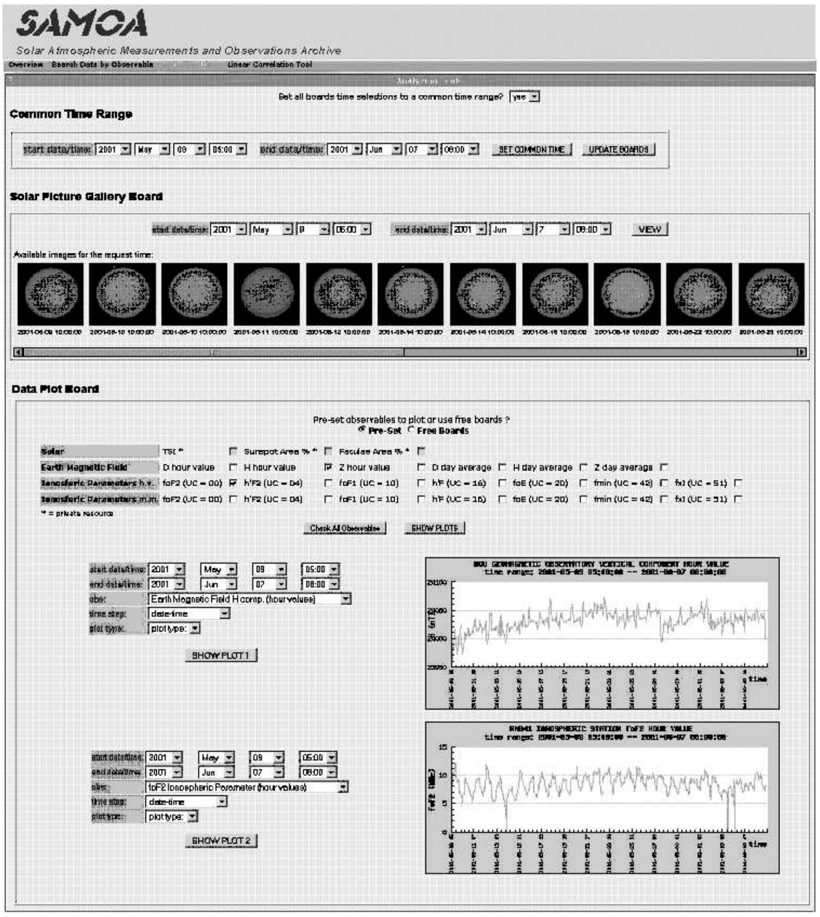

Fig. 3. The Displaying Tool.

- Images obtained by the digitization of the Rome CaII K full-disk filtergrams acquired form 1964 to 1979;
- foF2, foF1,h[1]F, hF2, fmin, fxI, foE hourly values ionospheric parameters in the range time 1976 2003 from RM041 station,
- Monthly medians of foF2, foF1,h[1]F, hF2,fmin, fxI, foE ionospheric parameters in the range time 1949 2003 from RM041 station;
- Daily measurements of the terrestrial magnetic field (D, H, Z components) hourly values obtained at AQU observatory.

3. The Portal and the Data Tools

SAMOA Portal (Fig. 1) is powered by gridsphere 2.0.2 (gridsphere (2005)), the gridlab (gridlab (2005)) open-source package developed to administrate Virtual Organizations. The access to the public resources just browse to the URL: *http://samoa.mporzio.astro.it:8080/gridsphere* and create an account, then an email containing the link for the first access will be sent to the declared address. Once in, the user can customize and save his personal layout and re-use his own settings for future access.

The Data Search service (Fig. 2) is developed to customize the query in order to view

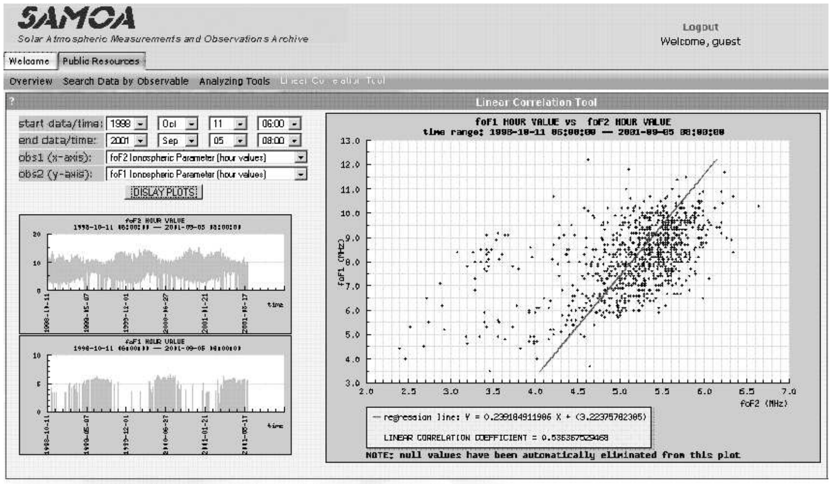

Fig. 4. The Correlation Tool.

the data by selection of observables and time range. The output is a date-time ordered table that shows the values of the selected observables and images weblink. The easy view of the table enables a raw comparion of data in the data-data schema.

The Displaying and Analyzing Data service allow to open a maximum of 23 boards containing plots (Fig. 3) one for each available observable; each board can be adjusted for fine analysis in an independent way from the others. It is also possible to show the scatter plot (Fig. 4) between two observables over a common time range. and to quantify the linear correlation between the data and computing coefficients of the regression line. Those are examples of server-side computing tools in a SOA framework, developed using web languages only, that do not require data downloads.

4. Next steps and Conclusions

Using the remote computing philosophy, we aim to enable the submission of executable routines through the portal to perform their own analyses of the available data rather than download them and also to use webservices to connect distribuited databases, and return data to the user.

We are currently adding solar activity time series for TSI composites. We also intend to add further active regions coverages and UV, EUV and TSI time series.

Collaborations with other existing databases, as well as the creation of new computing tools to improve the portal performances, are welcome. T he final aim is the creation of an easy-use system available to the Sun-Earth connections community and a testbed fot future VSTO - Virtual Solar Terrestrial Observatory (Fox, 2005) developments.

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