

ESA Archives and VO Tools: Without Frontiers

The Science Archives and VO Team (SAT), at ESAC, is in charge of the challenging task of developing tools for easy, fast and friendly access to scientific data. Scientific applications developed by the SAT are continuously evolving under the ideas of:

- Common architecture
- Quick building
- Flexibility
- Extensibility
- Interoperability
- Easy maintenance

The resulting infrastructure reusable for a wide variety of space based missions.



Top Level Architecture of new archives generation

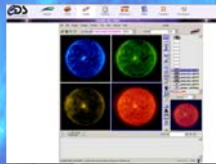
Communications among different services using message brokers allows users to study scientific data through suitable analysis tools.

SAT implements interoperability solutions among tools using the IVOA SAMP protocol.

SAMP is a messaging protocol that enables astronomy software tools to interoperate and communicate.

VO Tools

Images from SOHO displayed in Aladin visualization tool.



Spire spectra displayed in VOSpec, the ESA-VO tool for handling spectra.

ESA VO <http://esavo.esac.esa.int>

Highly Distributed Data

Scientific tools developed within the context of interoperability and highly distributed data must be ready to deal with uneven data coming from different services.

In the case of spectral analysis tools this implies dealing with data coming from different sources, at different wavelengths, with different resolutions,...

SAT develops many VO tools. As an example of the progress of these tools within the context of interoperability we present Best Fit. This application is integrated in VOSpec.

Best Fit helps us to find the theoretical model (from TSAP server) that best fits a given Spectral Energy Distribution (from SSAP server/s).



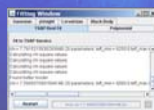
The best model is the model that achieves the global minimum of the Chi-square function.

$$\chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}$$

To solve this minimization problem this tool uses a modified version of the iterative Levenberg-Marquardt method.

TSAP server and initial parameters are selected by the user.

Chi-squared values and parameters are shown in the fitting window for every step during the minimization process.



If the best fit model is found, the user can choose to load and view it in the display window.

Archives

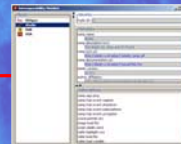
SAT has undertaken the effort to build state of the art sub-systems for a new generation of archives.

This new technology has already been applied to the creation of SOHO and EXOSAT science archives.

The development of archives for such different missions shows clearly the flexibility and adaptability of the resulting infrastructure.

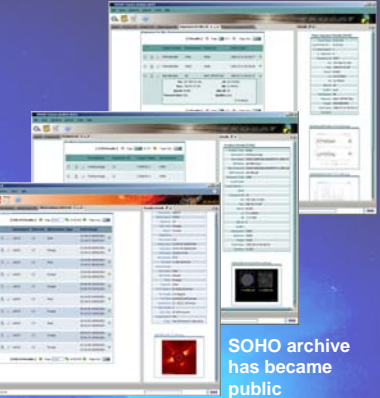
SOHO and EXOSAT, have been developed as prototypes of the new SAT archives generation.

One important objective of the SAT group is to implement interoperability solutions among services.



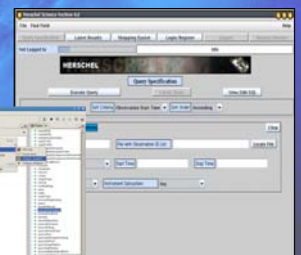
SOHO archive sends images to any VO SAMP compatible application.

Coming soon: we will be able to send also SOHO 1D spectra to VOSpec.



SOHO archive has become public recently.

EXOSAT archive will be public very soon.



Herschel Interactive Processing Environment (HIPE) is already integrated with VOSpec.

First Herchel spectra (SPIRE spectra) have been displayed.

SOHO Science Archive https://soho.esac.esa.int/data/archivo/index_ssa.html
EXOSAT Science Archive (coming soon) <https://www.esops.esa.int/index.php?project=SAT>

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