



HAPI Interface

of the
Trieste Solar Radio System (TSRS)
Heritage Archive

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The Trieste Solar Radio System (TSRS)

2 Solar Radio Polarimeters Frequencies: Metric, Decimetric Coronal Emission (237-2695 MHz)

Polarisation: Circular (RCP/LCP)

Time Resolution: Millisecond

Site: Basovizza Observing Station

(INAF-OATS, Italy)

Data Period: 1969–2010 (4 Solar

Cycles)

Analog acquisition: 1969-1999 Digital acquisition: 1999-2010

Status: Facility is inactive (Legacy

Data Inaccessible)





Modernizing the inaccessible legacy archive

Goal:

To Modernise and refurbish the TSRS Heritage Archive (TSRS-HA) into a durable, open resource.

To serve as a Testbed for the upcoming TSRS2.0 facility, a future node of the Italian Space Weather network.

Mandate:

Follow FAIR principles (Findable, Accessible, Interoperable, Reusable) leveraging on existing community standards.

Legacy Recovery:

Restoration & Digitization of Analogue Media (magnetic tapes, ceramic supports and photographic plates).

Outcome: This process is to extend the Temporal Coverage (back to 1969) and enrich historical SRB catalogue



The project: A bit more details



TSRS Heritage Archive service design



The Trieste Solar Radio System (TSRS) was a set of two multichannel solar radio polarimeters, performing continuous surveillance of the decimetric and metric coronal radio emissions with high time resolution. It was operational in Trieste (Italy) from 1969 to 2010. collecting data in digital form since 1999



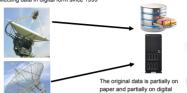
formats included binary files holding blocks of 10' monitoring and derived ASCII tables of lower resolution indices (1' mean

values). The raw binary formats

Complete

re-ingestion

were also converted as FITS



Digitisation process: final goal is to have all digitized data deployed as a set of FAIR enabled resources. Currently the data collection being used is the complete set of available digitised datasets.

It includes all time series spanning the 1999-2010 years of TSRS solar monitoring Bespoke original TSRS data



[~2TB of data] The object-relational database **HAPI: Heliophysics Application** management system (ORDBM) IVOA Table Access Protocol Programming Interface PostgreSQL, free and open-source, is is chosen for its flexibility in can offer a solution dedicated to used to store data. It is SQL compliant deploying tabular data and time series discovery and access rich metadata, as well as its support for metadata models EPN-TAP is one of the models supported by TAP to serve predefined atomic datasets alongside full historical time series Basic usage of the TSRS-1.0 data from the TAP endoor

fast searches across the entire time series stored within the RDBMS Containerized microservice architecture breaks down the large application into smaller components, each enclosed within its own container.

- allows accommodating multiple FAIR-enabling standards from different communities, like TAP, EPN-TAP and HAPI. The choice of multiple standard interfaces is driven both by their ability to connect to a larger audience and by the features they enable.
- introduces isolation allowing to change areas of the application without affecting the whole setup, improving security, providing fault isolation

An improved Web Graphycal User Interface will be provided with enhanced data exploitation capabilities, exploiting the different standard interfaces implemented on top of the RDBMS and allowing users to conduct

supports portability and scalability, facilitating migration to new servers or cloud-based solutions



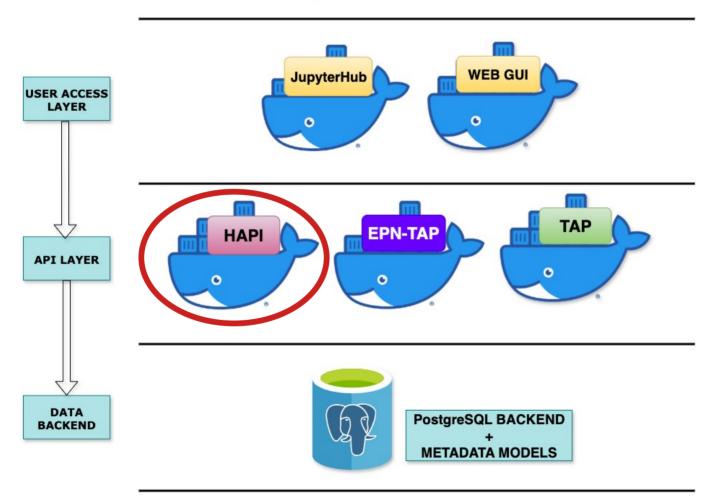
Jupyter notebooks can be used to provide practical examples and documentation for the services, offering users a cookbook-like introduction to leveraging the resources of

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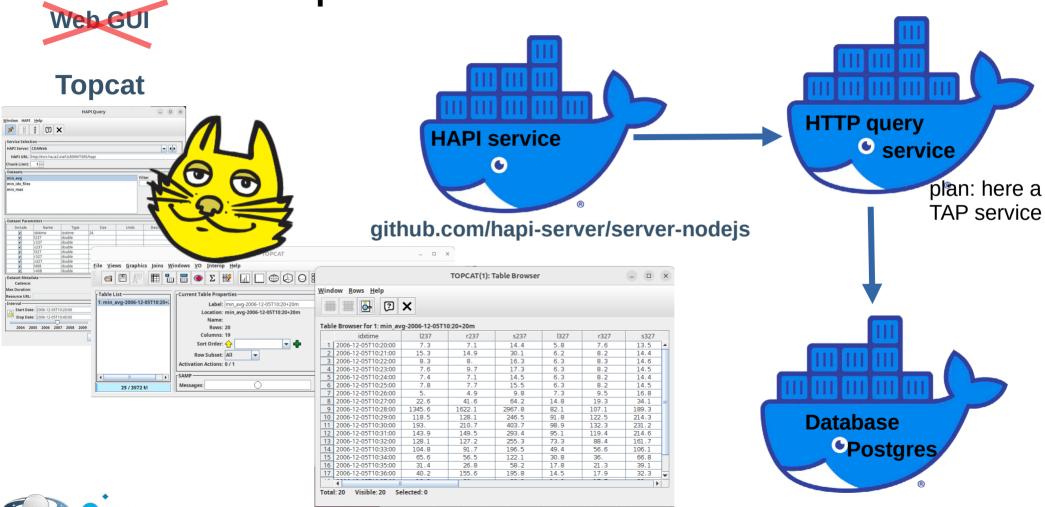
Our project: Standard Interfaces & Access Services

FAIR-Compliant Containerised Architecture 🥥



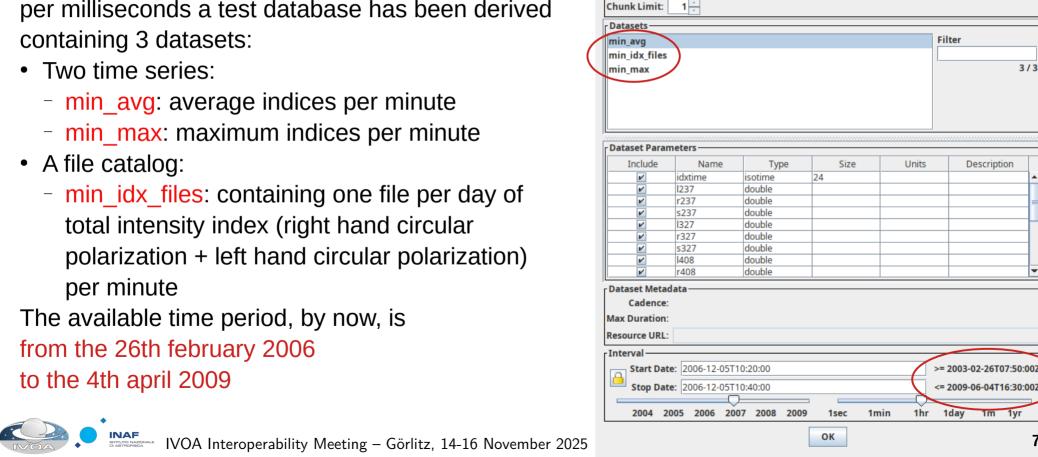


Simple HAPI service archirecture



Available datasets, by now

Starting from the original data of solar flux samples per milliseconds a test database has been derived





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Description

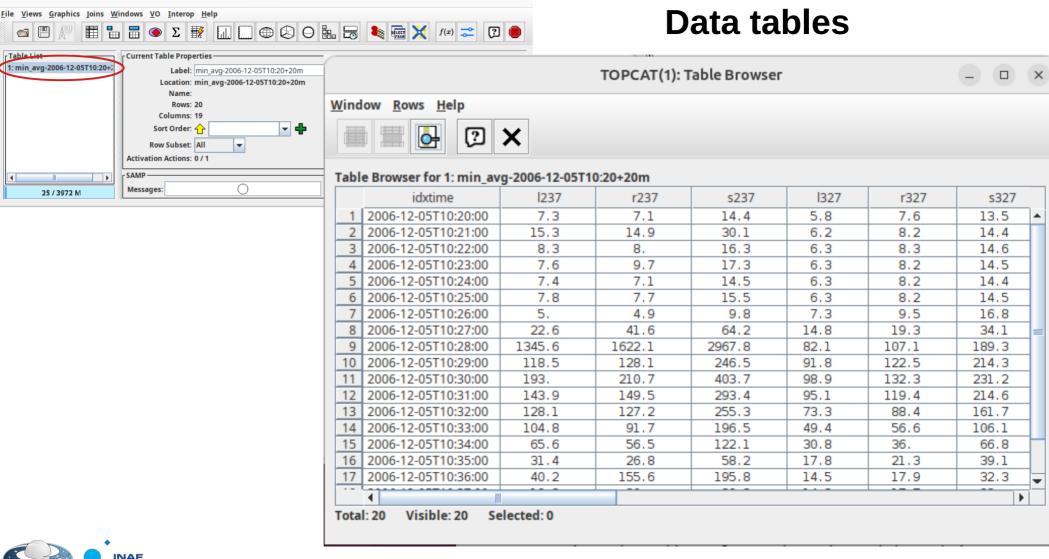
HAPI Ouerv

Window HAPI Help

Service Selection

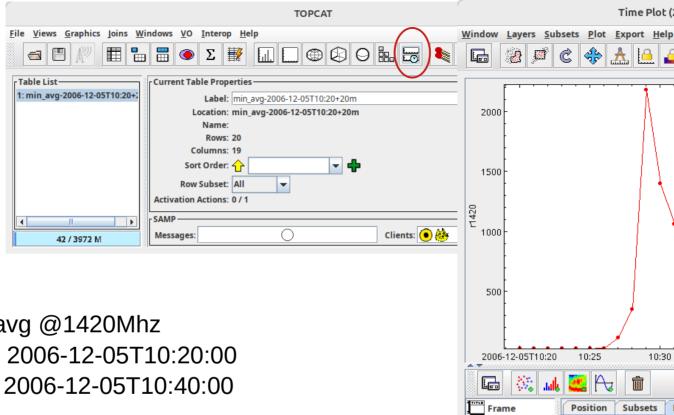
HAPI Server: CDAWeb

HAPI URL: http://tsrs-ha.ia2.inaf.it:8999/TSRS/hapi



TOPCAT

Display events



Dataset: min avg @1420Mhz

Start: 2006-12-05T10:20:00

Stop: 2006-12-05T10:40:00

Parameter: Right circular polarization

Event: Solar radio burst



② X

Time Plot (2)

10:30

Form

Sort Axis: TIME

Thickness:

Antialiasing:

Count: 20 / 20

Subsets

10:35

Zone

10:25

Position

Forms

■ • Mark

≜ ✓ ✓ Line

Legend

Axes

stilts STILTS

Position:

‡ 🗹 🎊 3: min_av

‡ ✓ Function

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Display events

"Bastille Day" event - 14 July 2007

Dataset: min_avg @1420 MHz

Start: 2007-07-14T08:30:00

Stop: 2007-07-14T13:00:00

Parameters: circular polarization

top figure: [Left + Right]

bottom figure: [Left - Right]

