

The FARSUN project : storing and distributing sunspot data to the scientific community



FARSUN

Findability and Accessibility of historical (1610-1980) Raw Sunspot Numbers

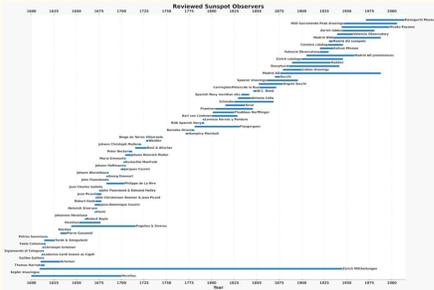
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Project Overview

FARSUN aims to centralize, digitize, and provide open access to all raw sunspot observations from 1610–1980. It builds on the existing SILSO database (1981-present) and complements modern solar indices with historical accuracy.

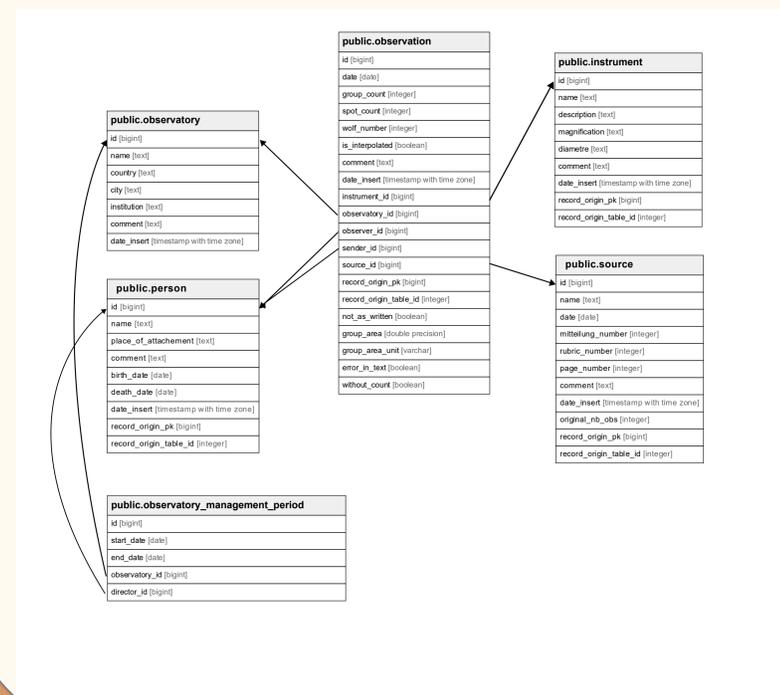
The FARSUN project basically builds up the source database for the complete historical reconstruction of the international sunspot number which is the historical part of the primary mission of the World Data Center SILSO.

The figure below shows the timelines of sunspot data sources that have been recovered by Arlt, Carrasco, Friedli, Hayakawa, Vaquero and others since 2010 and are being included in the FARSUN database (70% complete in December 2025), in addition to the recovered Zürich data from 1611 to 1979 (pointed out by “Zürich Mittheilungen and zürich tables”; Clette, 2021).



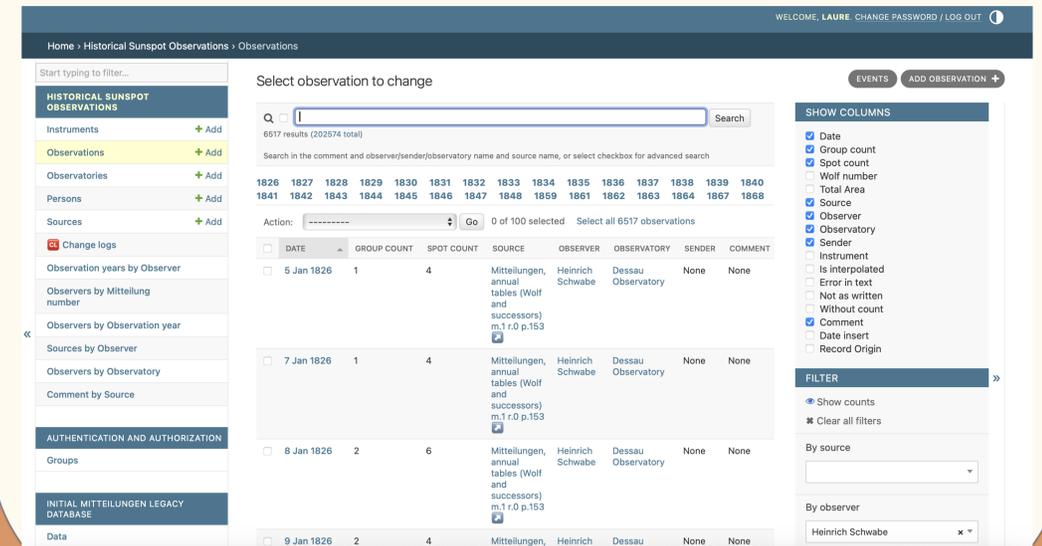
Database Structure

The schema below represents the relational design of the FARSUN historical database, including tables for Observations, Instruments, Observers, Sources, and Observatories, all cross-linked for data traceability. For example, observatory, persons, observers, and instruments are separated because a person can be the director of an observatory, the sender of data or the observer themselves. In the first version of the database, only the observer existed, and was often wrongly attributed data.



Interface and Data Access

The most important development, is the FARSUN web interface (of which you can see a snapshot below). It allows filtering, querying, and downloading of historical sunspot data. Users can search by date, observer, or source and visualize observation metadata interactively. At this stage the interface is completely optimized for quality control and data and metadata addition, since the work is in progress. However, all data is already queryable and downloadable as csv files. It is only available to the development team in 2025 but will be released to the public in 2027, when it is populated with all available data and the quality control is complete.



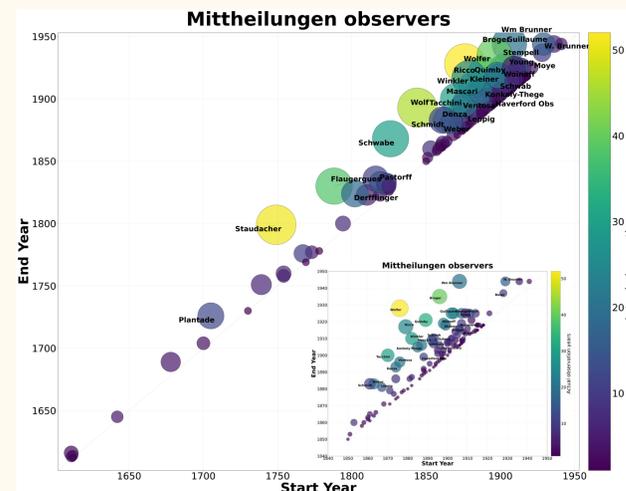
Integration within the silso mission



The FARSUN project (<https://sidc.be/farsun>) integrates fully within the mission of the World Data Center SILSO which is to produce and preserve the international Sunspot Number. On the figure, you can see that FARSUN is pivotal in the gathering of data, in the creation of the historical database and in the creation of statistical indices of quality for the data. It is central to the reconstruction effort led by the Sunspot Workshops team.

Database Content Visualization

This bubble plot illustrates the temporal distribution of sunspot records across centuries, highlighting observer coverage in the FARSUN historical database.



Summary

FARSUN makes the raw historical sunspot data from 1600 to 1980 Findable and Accessible for all users. The project gathers, interprets and valorizes the data, where the latter includes data pre-processing, quality assessment and standardization, as well as advocating these data to end users. A detailed statistical study provides quality criteria for these historical data, and the most pertinent criteria are included in the metadata describing each dataset.

The output of this project will be made available via standard VTools making the data Interoperable and Reusable, i.e. the data will be FAIR-compliant. Making these validated historical sunspot data collections FAIR will allow solar physicists, Earth-climate modellers, experts in statistics, or anyone with a keen interest in solar variability, to analyze this unique natural record, increase awareness of the public of the effects of solar variability on Earth and thus feed future science in the service of society.

References

Clette, F., Lefèvre, L., Bechet, S., Ramelli, R., & Cagnotti, M. (2021). Reconstruction of the Sunspot Number Source Database and the 1947 Zurich Discontinuity. *Solar Physics*, 296, 137. doi:10.1007/s11207-021-01882-6.
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