There are no translations available.

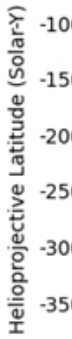
Acronym: SSDB
Duration: 21.01.2026. - 20.01.2029.
Total value: 122.525,00 Euro
Financed trough: Croatian Science Foundation

Project leader: **Davor Sudar**
Description:
The main goal of the SSDB project is to create a database of sunspot observations from images taken by Solar Dynamics Observatory (SDO). The database will contain information about sunspot positions and sizes, as well as grouping into sunspot group or active regions. At the end of the project the catalogue will be made public for use by the general solar physics community. it is expected that the database will have a noticeable impact on broader solar community and solar physics reasearch. There are multiple scientific exploatation possible which incude solar activity, solar rotation studies, meridional motion, transfer of angular momentum on the Sun, Joy's law, and North/South assymetry. Sunspots are among the most prominent manifestations of solar activity and have been observed for over four centuries. Systematic sunspot catalogues form the backbone of our understanding of long-term solar variability, with the Greenwich Photoheliographic Results (1874–1976) representing one of the longest and most homogeneous datasets in science. Earlier telescopic observations, beginning in the early 17th century, and later extensions such as the Debrecen Photoheliographic Data have further expanded this historical record. However, regular publication of ground-based catalogues has largely ceased, creating a gap in the continuous monitoring of sunspot properties.

Sunspot data underpin many fundamental discoveries in solar physics, including the 11-year solar cycle, the butterfly diagram, differential rotation, meridional flows, Joy’s law of sunspot group tilts, and North–South asymmetries. These properties provide key observational constraints on the solar dynamo and its temporal variability.

Smoothed international sunspot number since 1700 (Source: http://silso.be/silso).

The sunspot detection method uses daily full-disk intensity images from the Solar Dynamics Observatory as input. Sunspots are detected automatically using a robust intensity-based outlier method, treating sunspots as deviations from the local background. The procedure operates on flattened images but can also compute and apply limb-darkening corrections when needed. Detected sunspot pixels are then separated into umbra and penumbra using intensity thresholds, grouped into individual sunspots, and used to determine sunspot centers and areas.



Observed portion of the Sun by the SDO on the left and detected sunspots on the right

Team:

01/2026 – ongoing
Dr. Davor Sudar
Dr. Roman Brajša
Dr. Domagoj Ruždjak