Solar Hα and white light telescope at Hvar Observatory

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History of Hvar double solar telescope

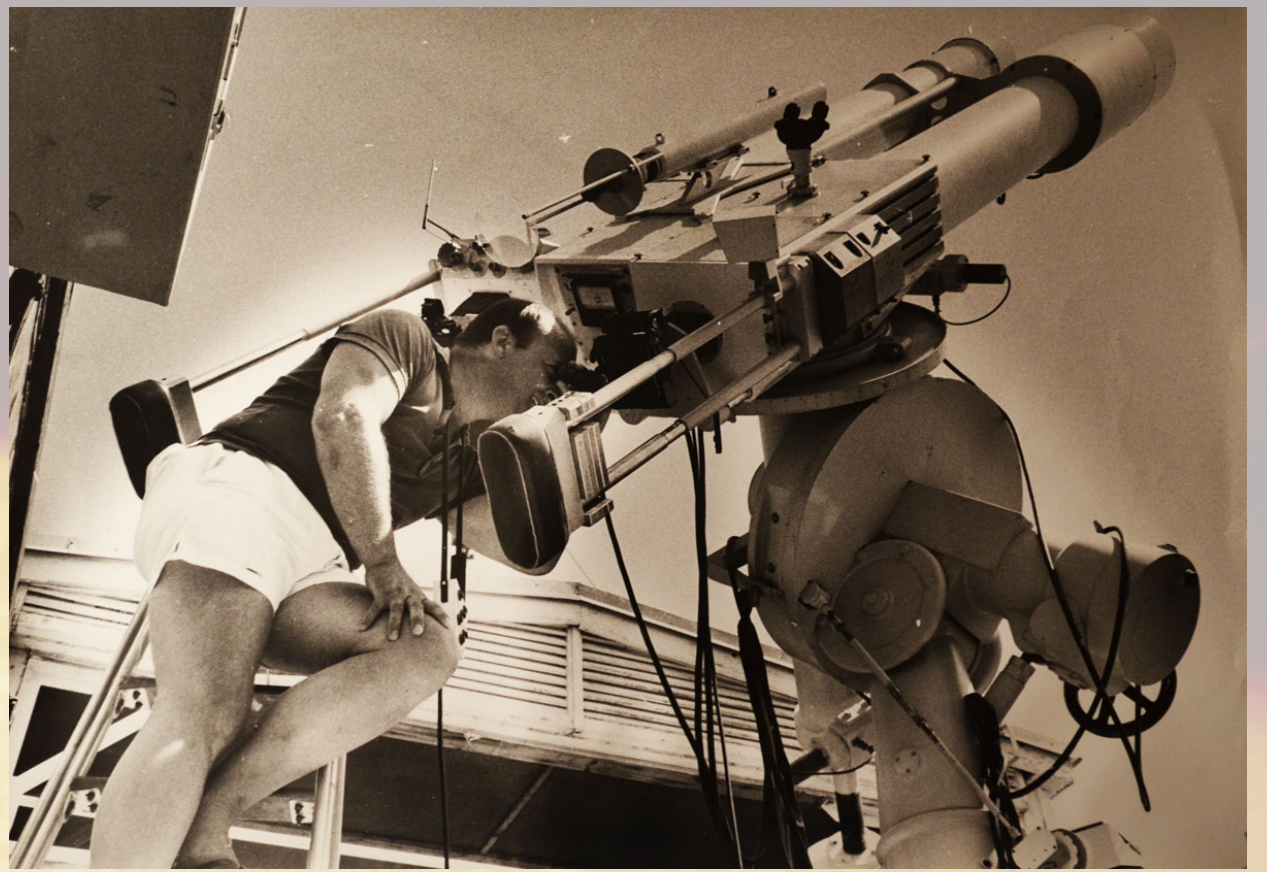
Installed in 1972 based on an agreement between Faculty of Geodesy of the University of Zagreb and the Astronomical Institute of the Czechoslovak Academy of Sciences, Ondrejov.

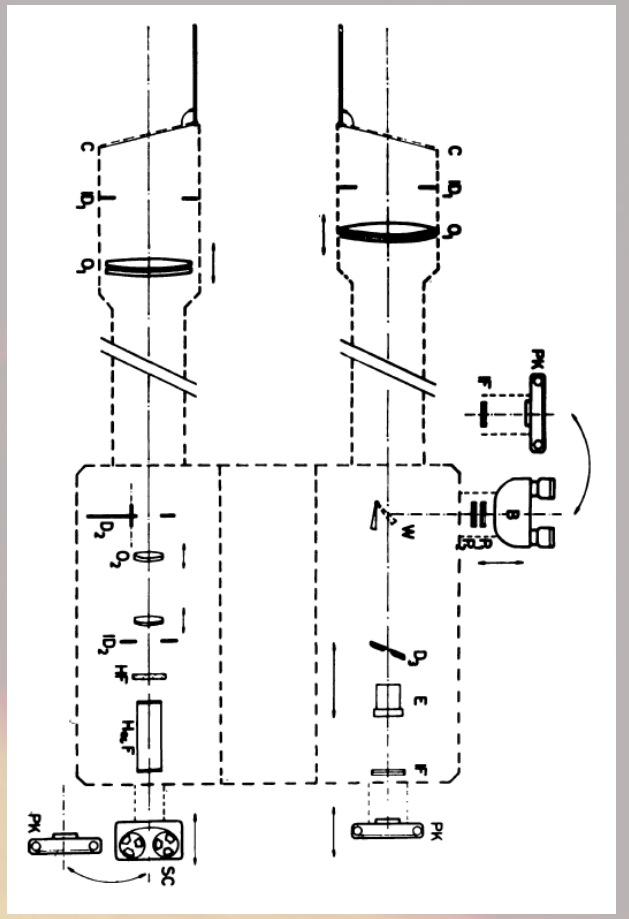
In establishment of Hvar Observatory from Czechoslovak side were participating (Astronomical Institute, Ondrejov):
Dr. B. Valníček, Dr. V. Bumba, Doc. L. Perek, Ing. V. Rajský, Prof. F. Šorm

And from Yugoslav side (Faculty of Geodesy):
Prof. Veljko Petković and later Dr.sc. Vladimir Ruždjak

Photographic material aqusition system

1972 – 1997

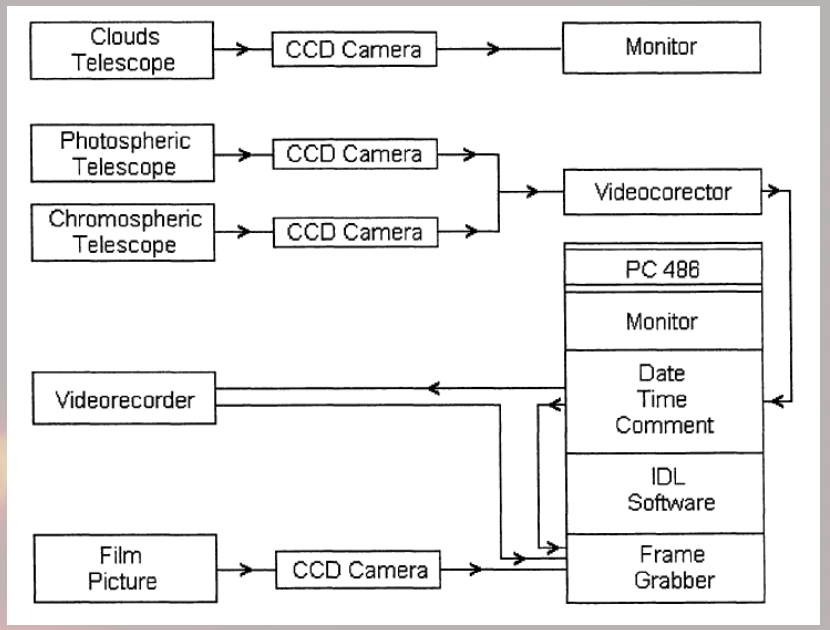




Ambrož et al., 1977

Video-recording acquisition system

1997 – 2004

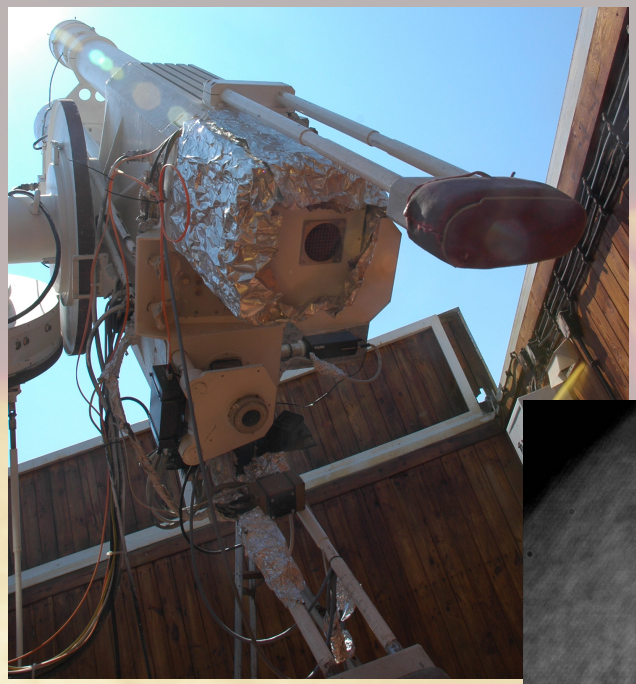


Klvana and Bumba, 1997

CCD camera aquisition system

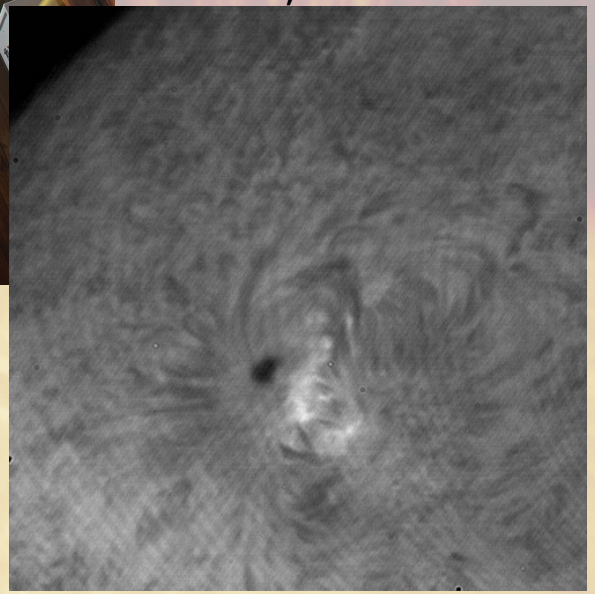
2004 – 2010

1MPix 10-bit Pulnix TM-1010 CCD camera



Otruba, 2005

Hα, 28.10.2009



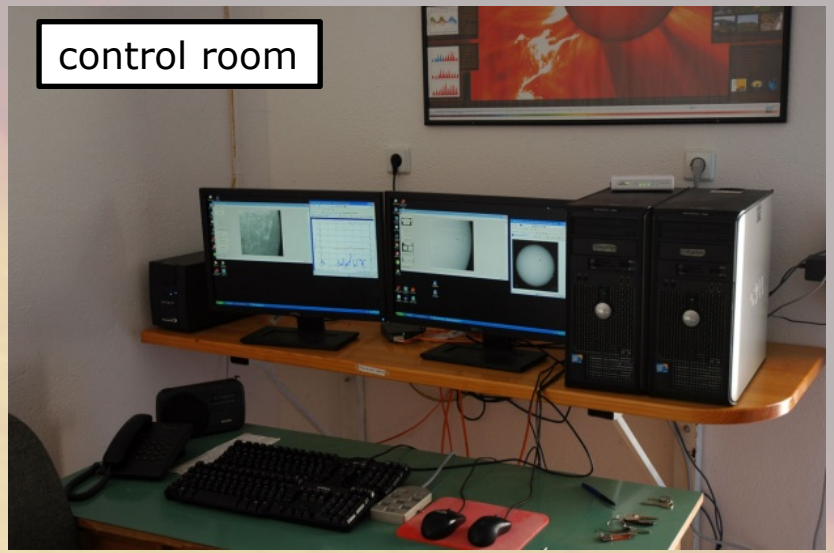
Double Solar Telescope at Hvar

2010 - today

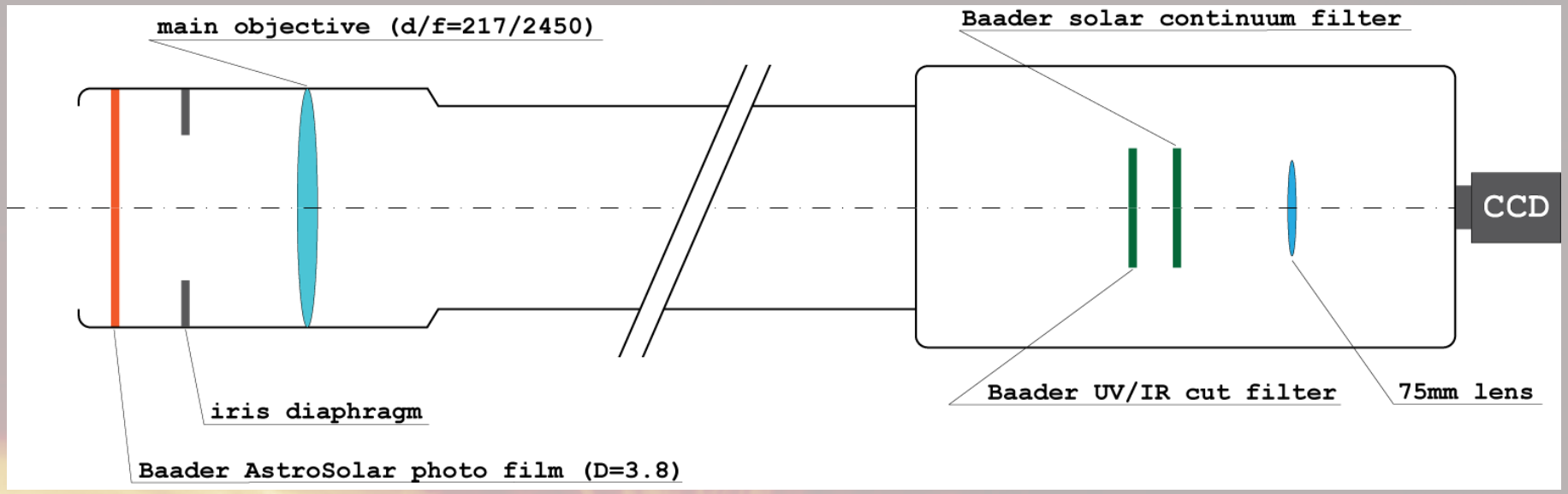
- fourth generation of acquisition hardvare and software
- 4MPix Pulnix TM-4200GE 12-bit CCD cameras
- Identical acqusition system as the Kanzelhöhe Solar Observatory (collaboration with IGAM, Uni Graz)
- Allows high-resolution images of active-regions on the Sun
- Cadence up to 30 images per minute
- New hardware is almost not affected by strong transmitter interferences
- All data are stored to central archive on server in Zagreb (**oh.geof.unizg.hr**)

Some recent improvements

- Photospheric telescope:
  - Baader AstroSolar film (ND 3.8) was introduced instead of prism (reduced telescope heating)
  - Simplified and improved optical design
  - Baader solar continuum and UV/IR filter were added
- Mechanical tracking error significantly reduced by adjusting the telescope mount axes
- New tracking motors
- Electronic system for computerized tracking and control of the telescope (not yet fully operational)
- Better internet connection (50Mbps)

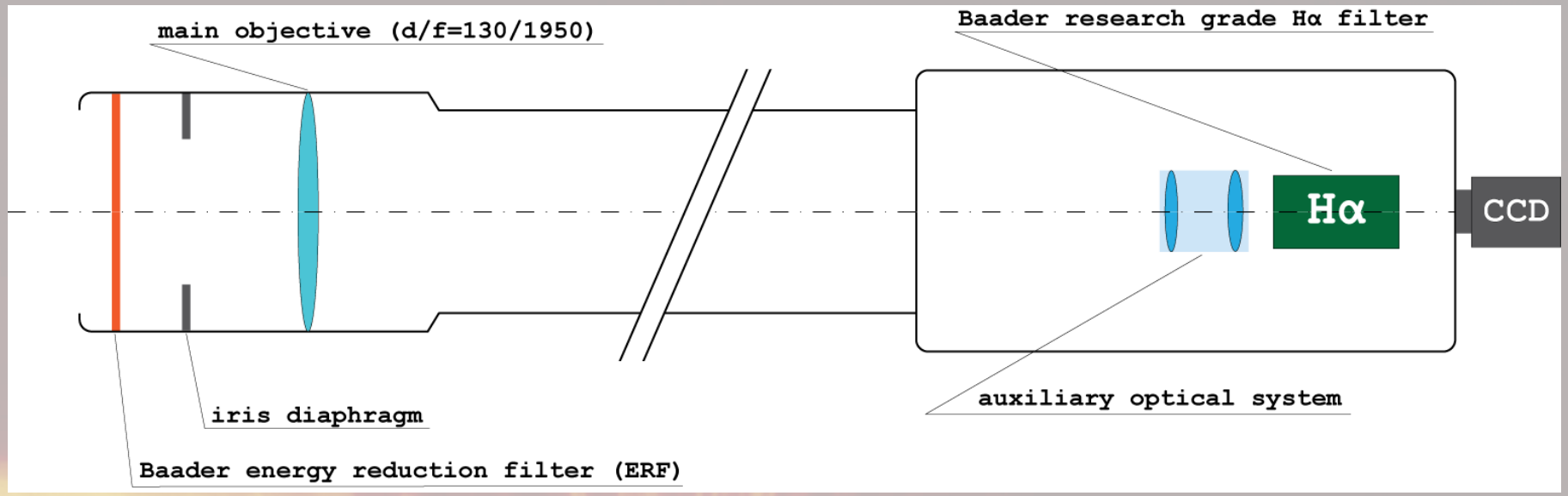


Photospheric telescope



- Main objective (acromatic doublet) with diameter of 217mm and focal lenght of 2450mm
- Field of view: 11.3 arcmin
- Resolution of 0.33 arcsec/pixel (2048x2048 CCD), oversampled images (1 arcsec for best seeing conditions)
- Cadence: 1 image per minute

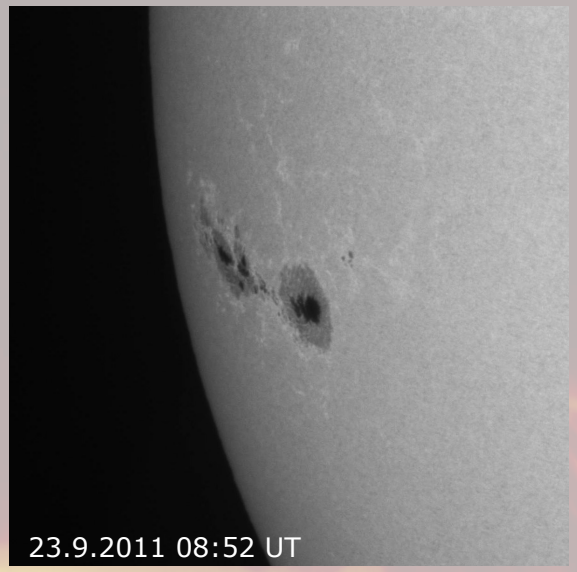
Cromospheric telescope

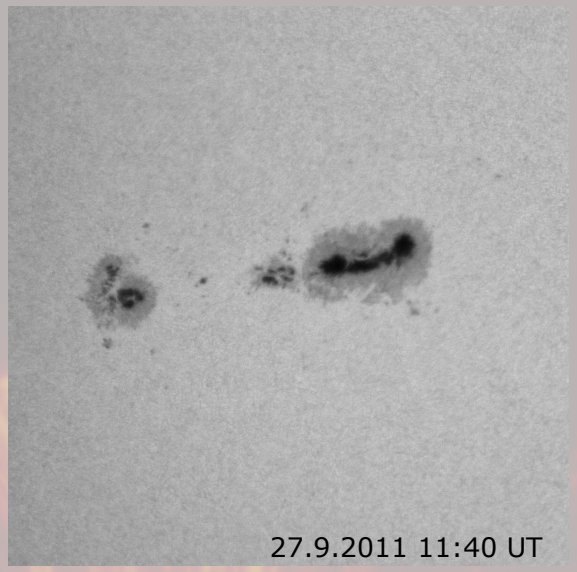


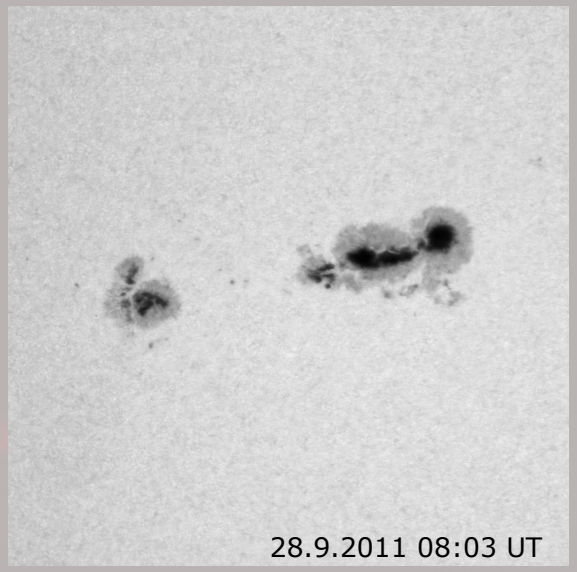
- Main objective (acromatic doublet) with diameter of 130mm and focal lenght of 1950mm
- Baader research grade filter (656nm) with passband 0.2Å
- Field of view: 7.15 arcmin
- Resolution of 0.21 arcsec/pixel (2048x2048 CCD), oversampled images
- Cadence: 4 images per minute

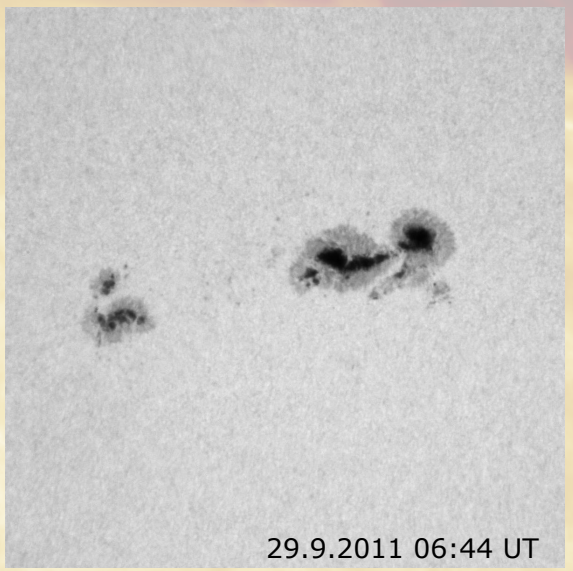
Observations in white light

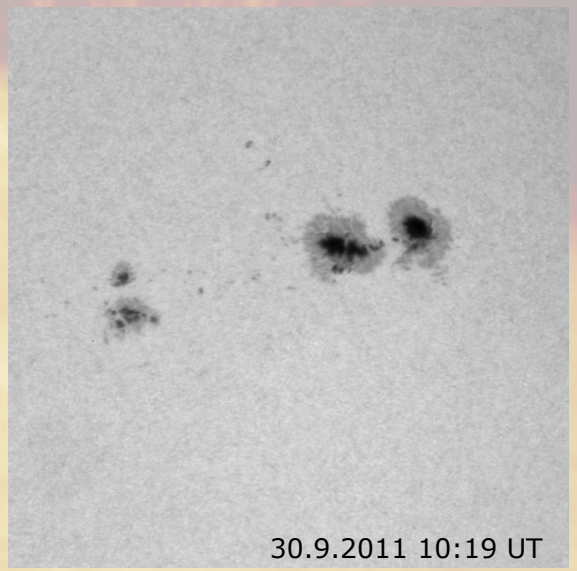
Sunspot group: 11302







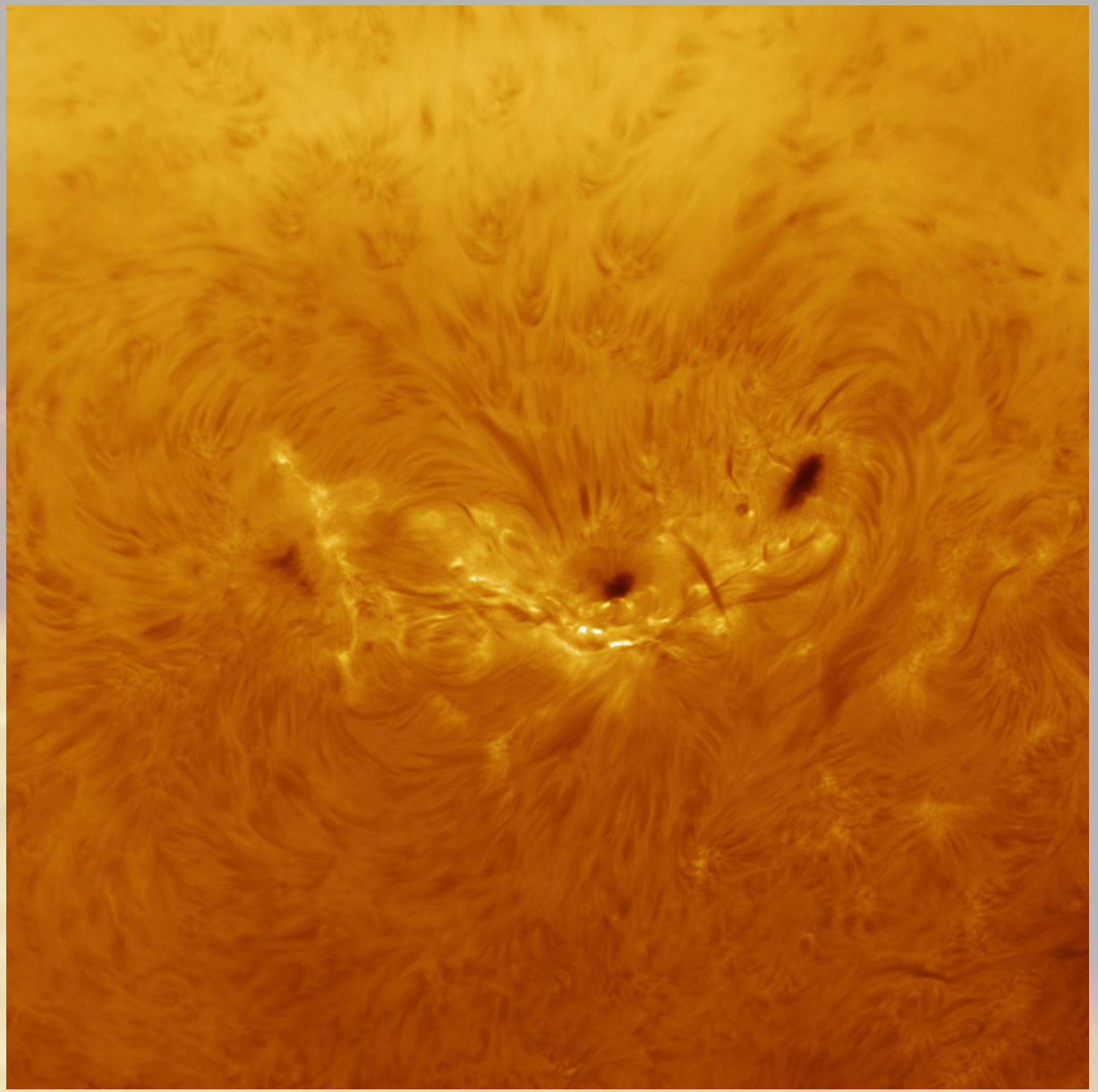




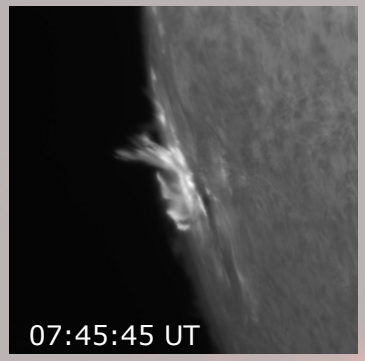
Observations in Hα

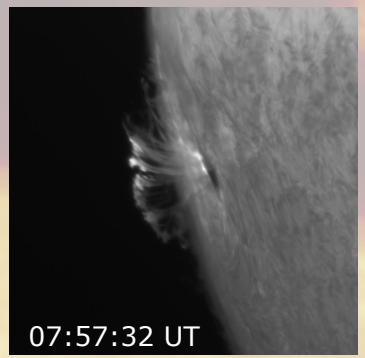
Processed image

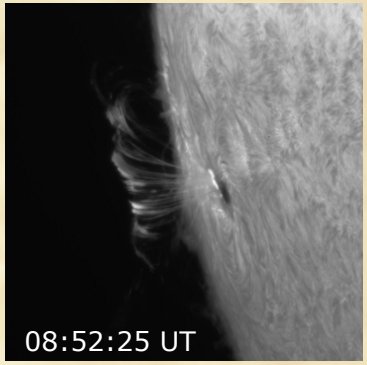
04.07.2012, 11:55 UTC
Sunspot group: 1515



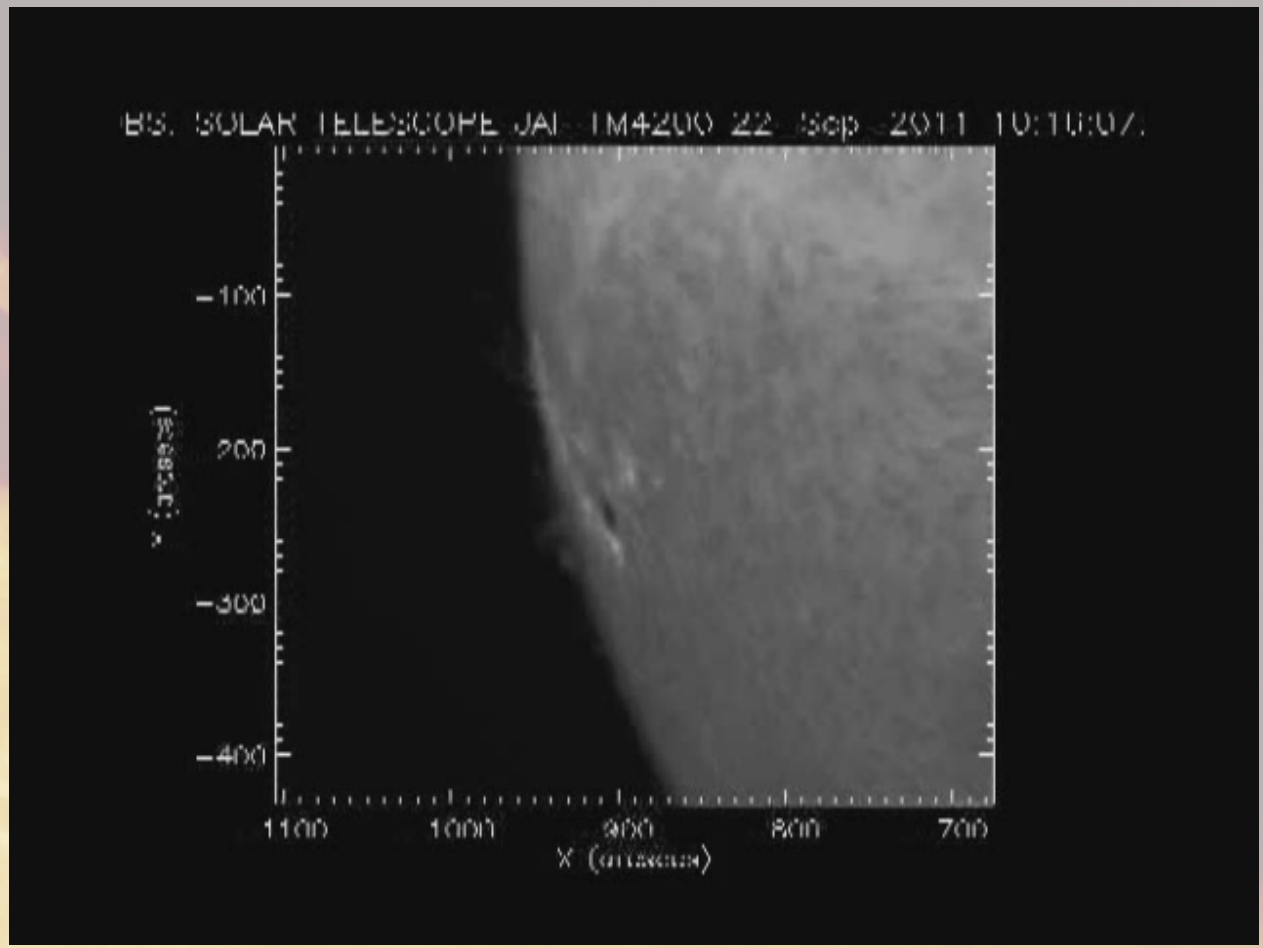
Observations in Hα



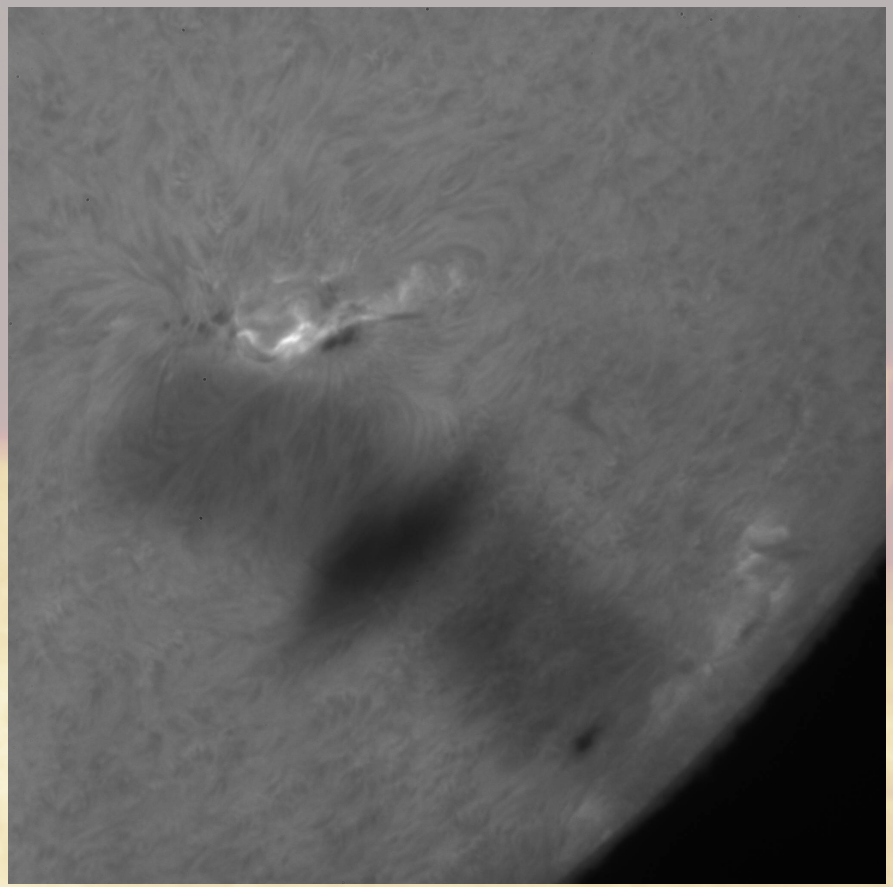


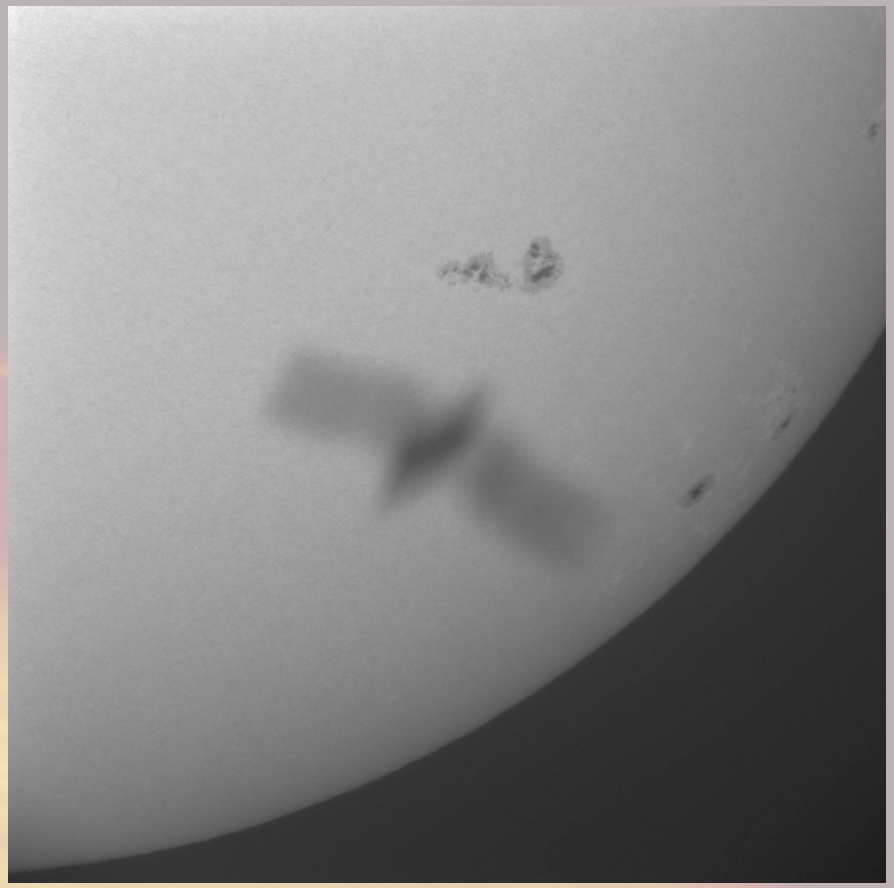


22. September 2011, sunspot group 11302, X1.4 flare



Some common artifacts at Hvar



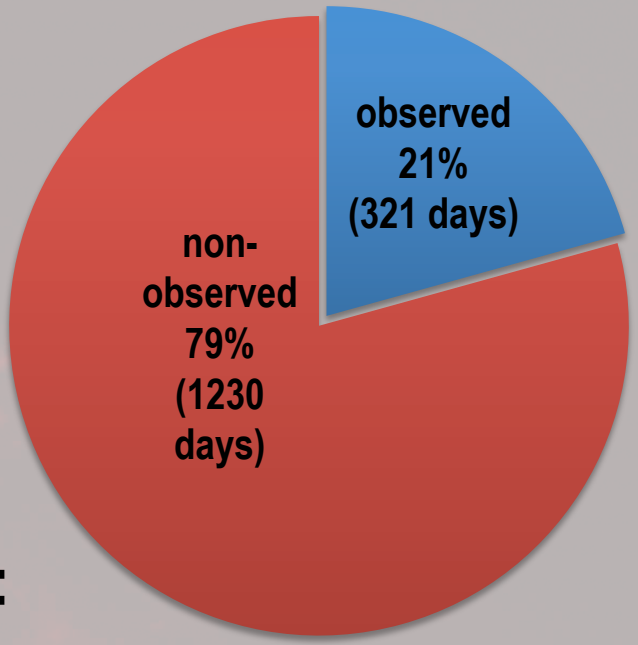


27.10.2013, 12:02 UTC

Some stats about observations

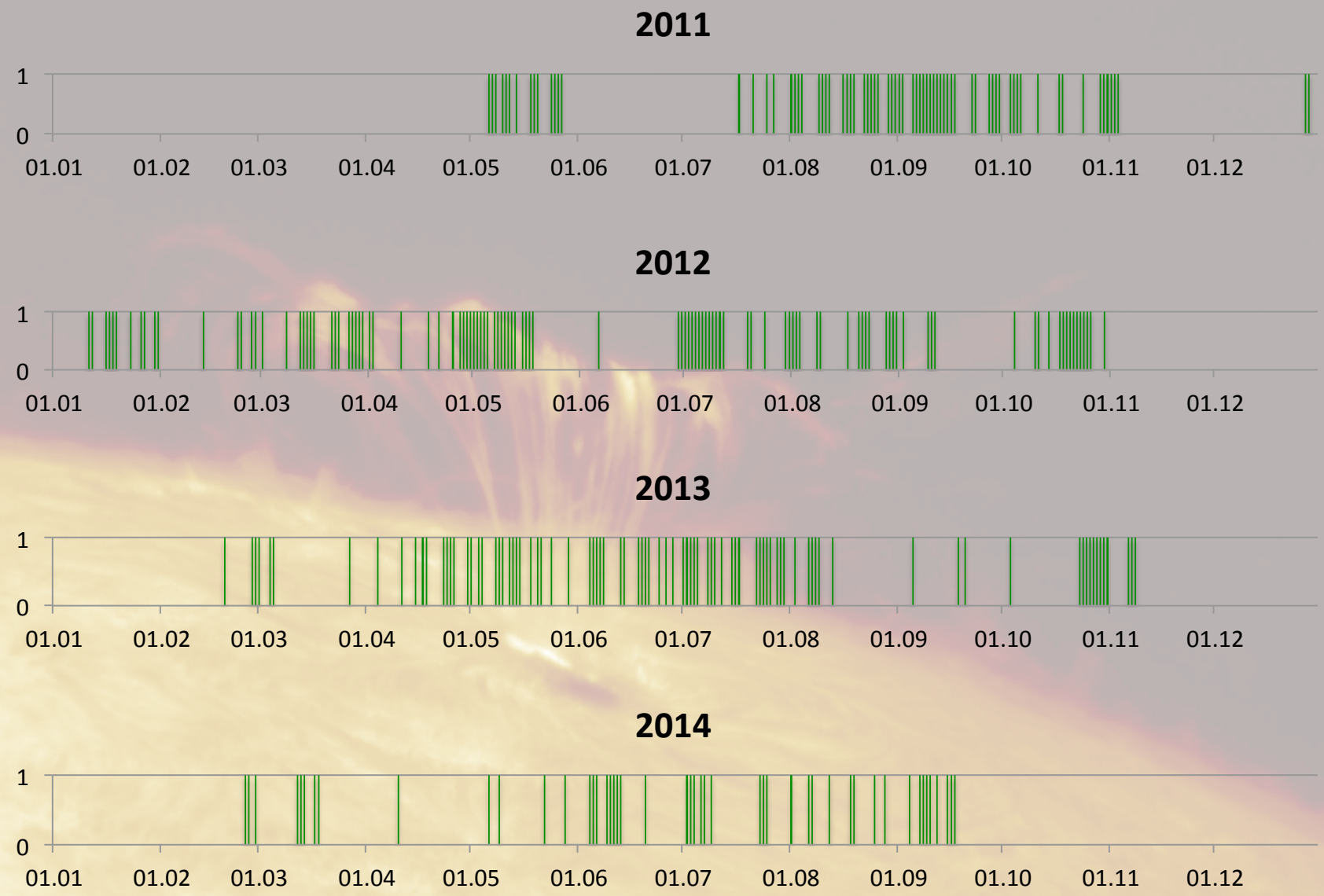
6.5.2011 - 17.09.2014

- Hα observations (cadence 15 sec):
  - Number of days observing: 321
  - Number of images: 320 500
  - Total duration: 1335h (55 days)
  - Size in archive: 2.6 Tb



- WL observations (cadence 60 sec):
  - Number of days observing: 303
  - Number of images: 74 500
  - Total duration: 1241h (51 days)
  - Size in archive: 600 Gb

Distribution of observations 2011-2013



Some planned improvements on Hvar Solar Telescope

- Fully computerized tracking system
- Reconstruction of solar telescope dome
- Improvment of data post-processing
- Completion of web page interface to retrieve the data
- Weather station (winter 2014/2015)

Thank you!

Data archive and more information about Hvar Solar Telescope:

http://oh.geof.unizg.hr/index.php/en/instruments/solar-telescope