

MICROWAVE SPECTRAL POLARIMETRIC OBSERVATIONS OF THE SUN IN VENTSPILS : PROGRESS REPORT

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Outlines:

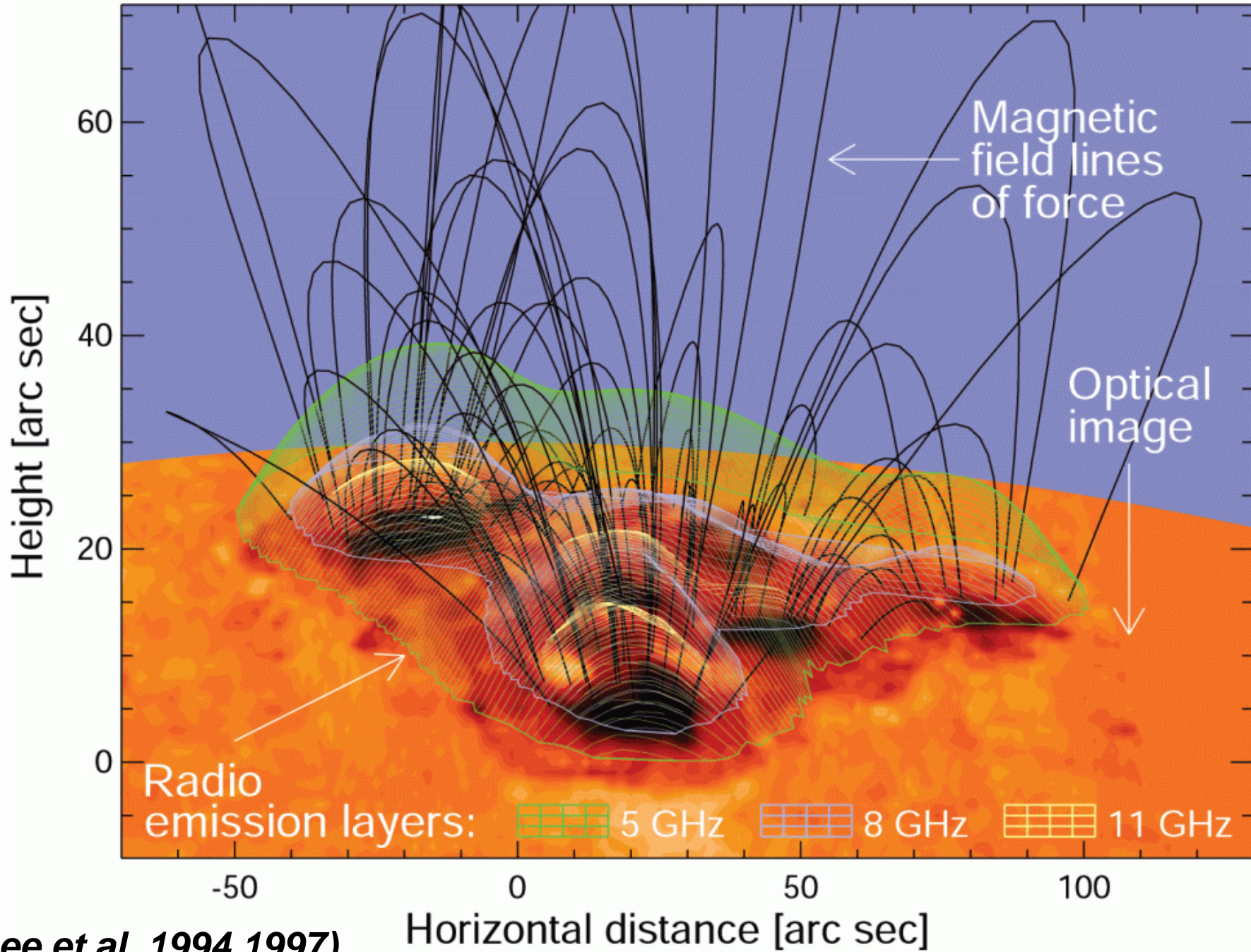
- Why spectral polarimetric observations of the Sun?
- Goals and current results
- Equipments
- Methodological issues

Calibration

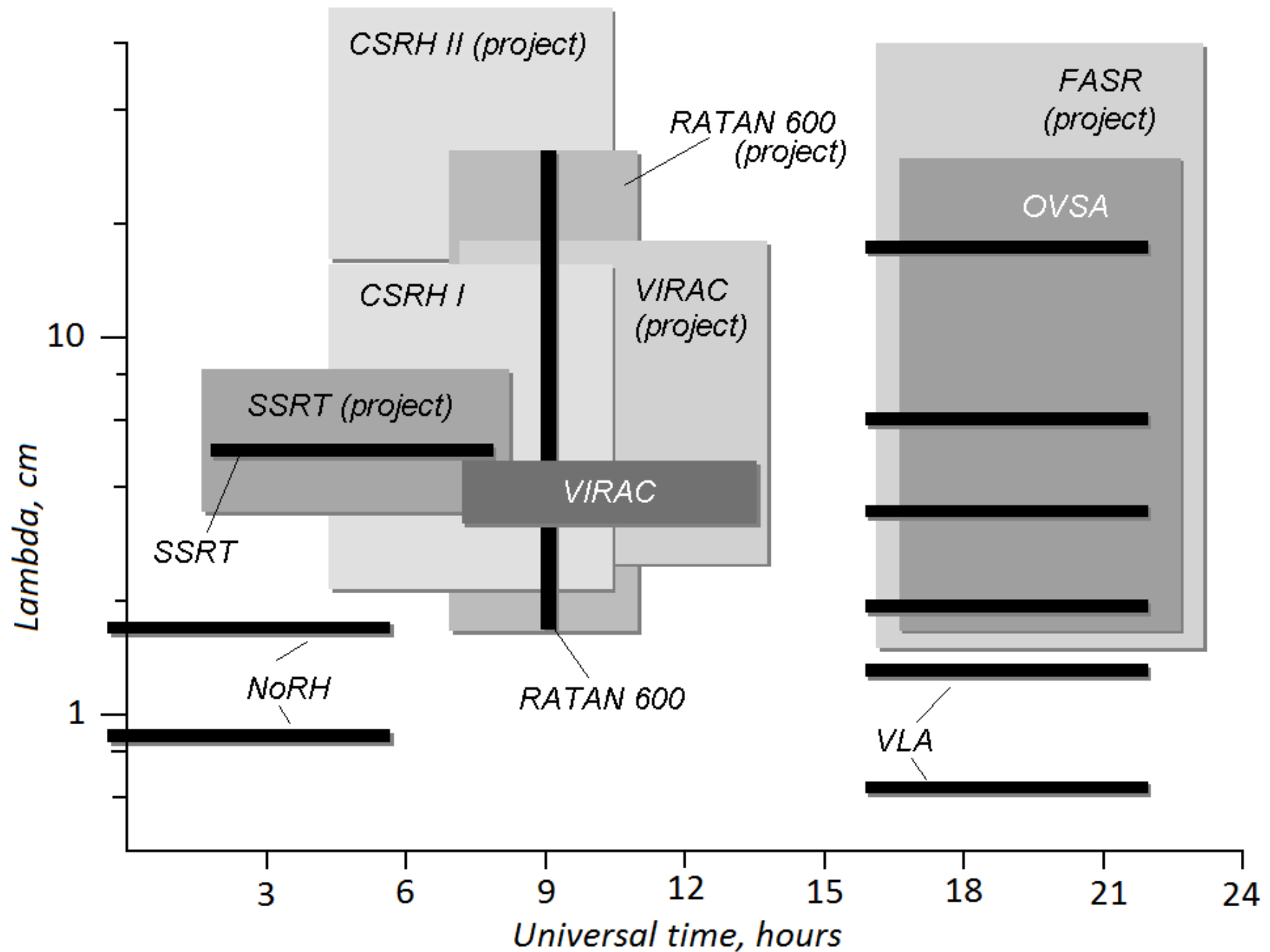
Map construction and “cleaning”

- Feasible tasks of the solar physics

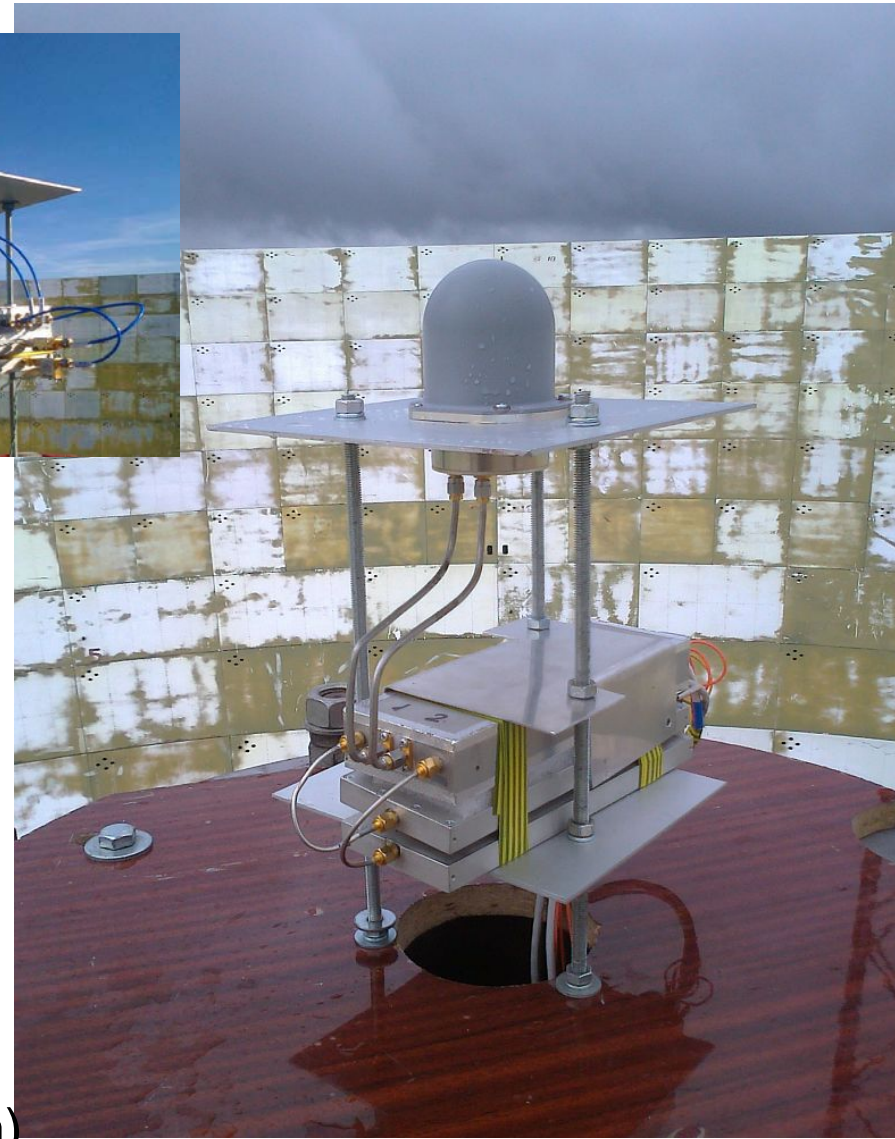
The structure of the solar active region



Wavelength range - time of the day chart of possible solar microwave observations

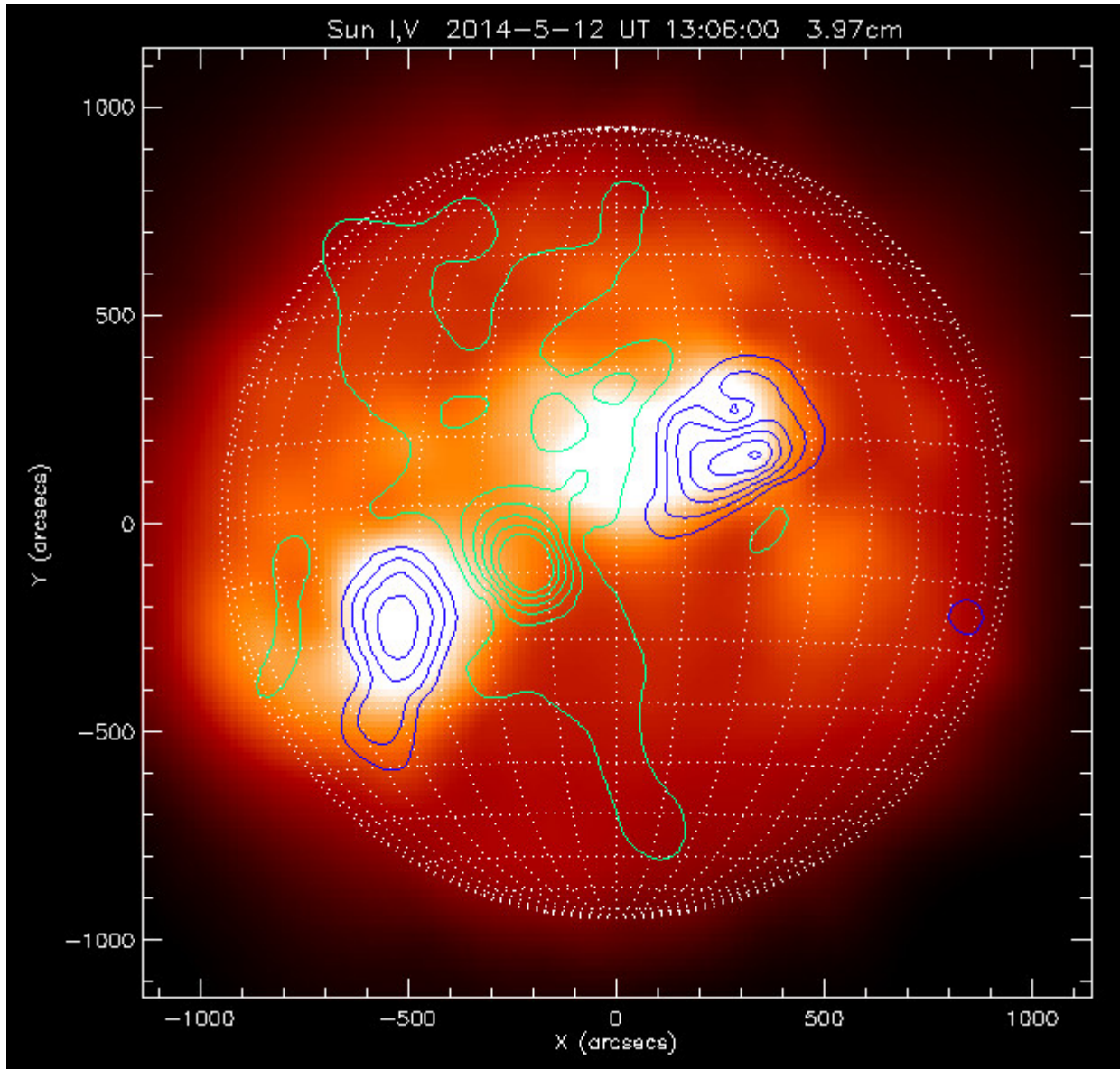


The RT-32 VIRAC radio telescope equipped by the spectral polarimeter

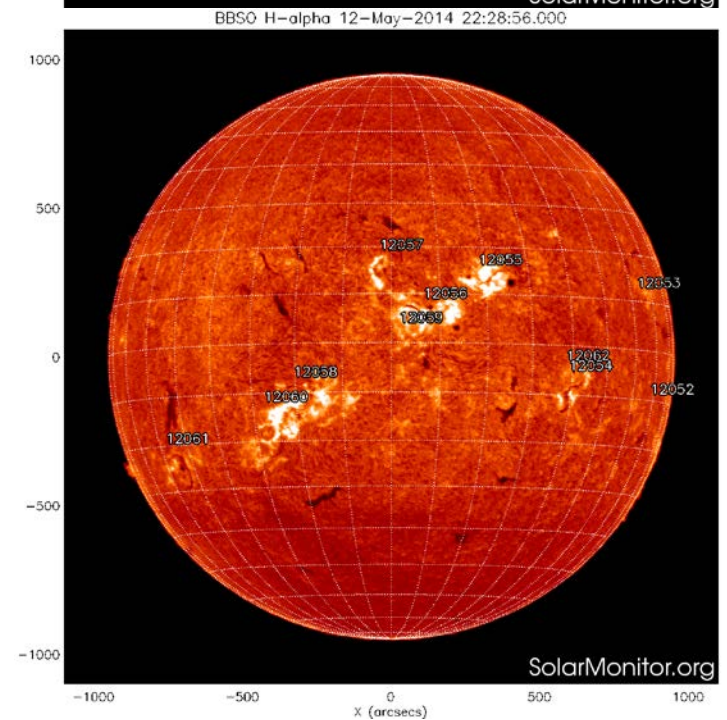
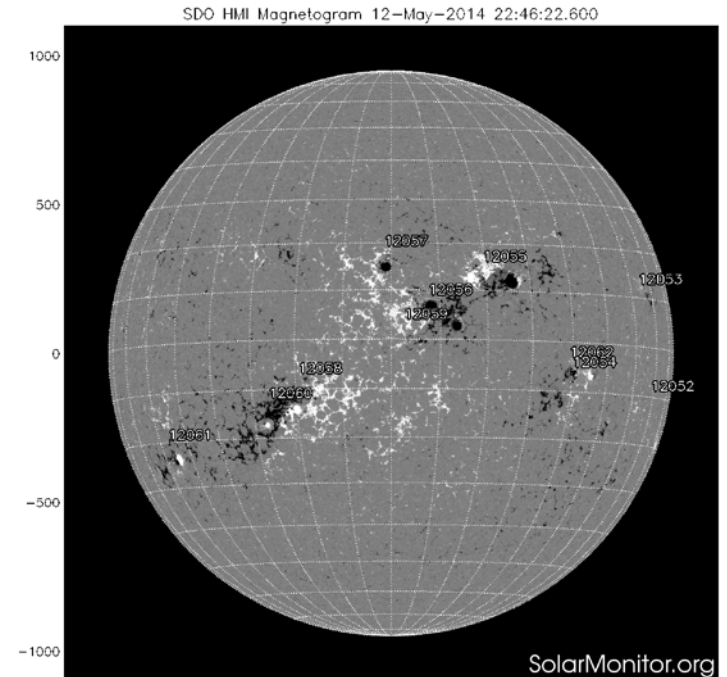


- number of subbands 16
- LCR and RCR
- frequency range 6.3 – 9.4 GHz (3.2 – 4.7 cm)
- width of subband 80 - 90 MHz
- antenna pattern HPBW 5.2 - 3.5 arc. min

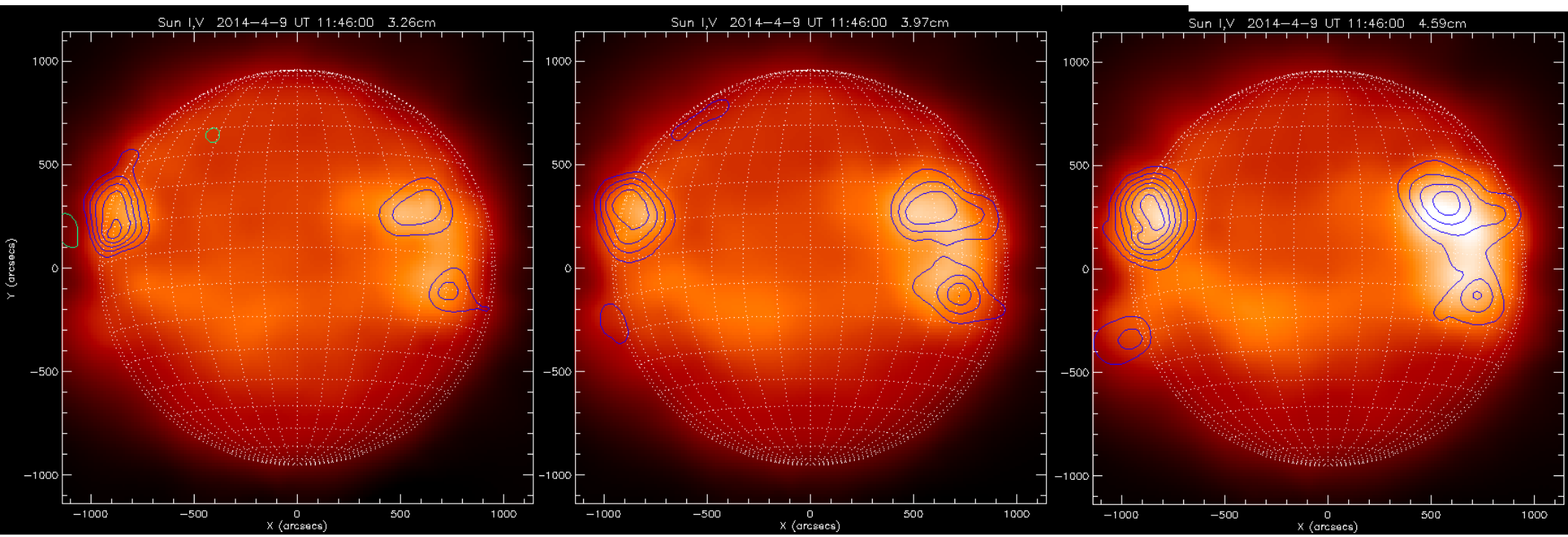
Radio map of the Sun on 2014-05-12 UT 13:08



3.97 cm



Radio maps of the Sun on 2014-04-09 UT 11:48



3.26 cm

3.97 cm

4.59 cm

Data multilevel archive

Level 0

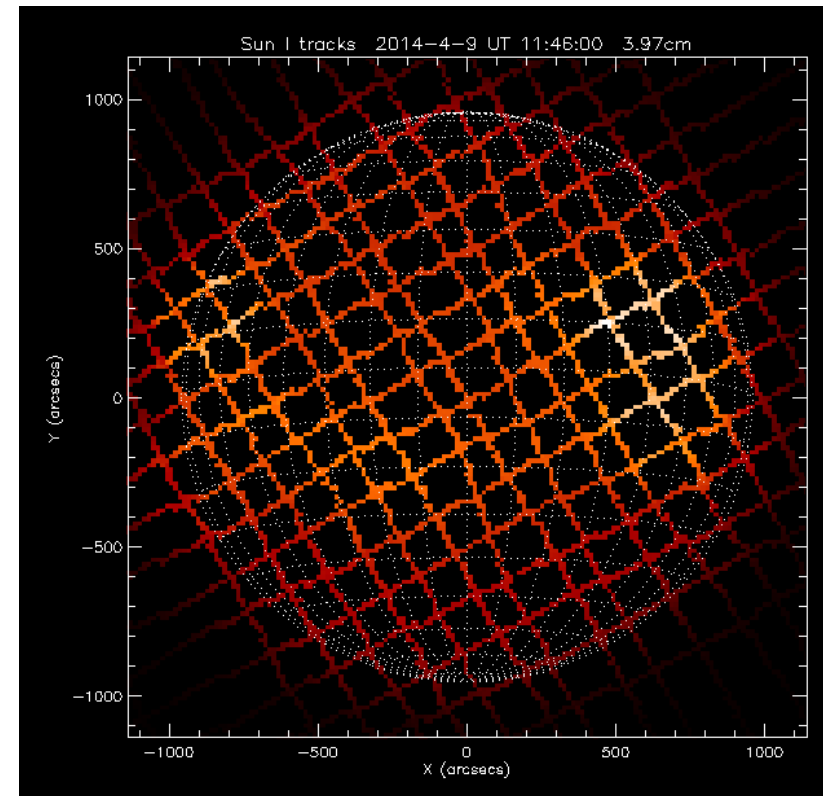
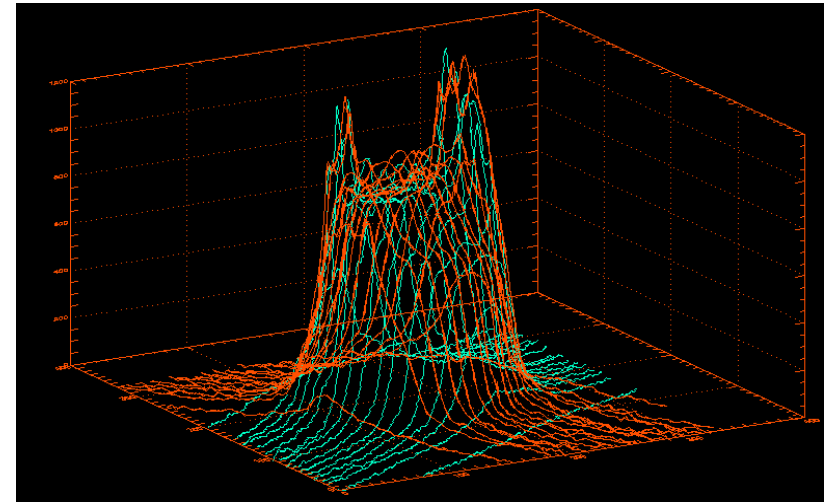
- observations files
- antenna positions files
- calibrations
- service information

Level 1

- separate scans and positional information

Level 2

- antenna temperatures spatial distribution



Map calibration

- by “quiet” Sun brightness temperatures
- by total solar emission flux

Map construction and “cleaning”

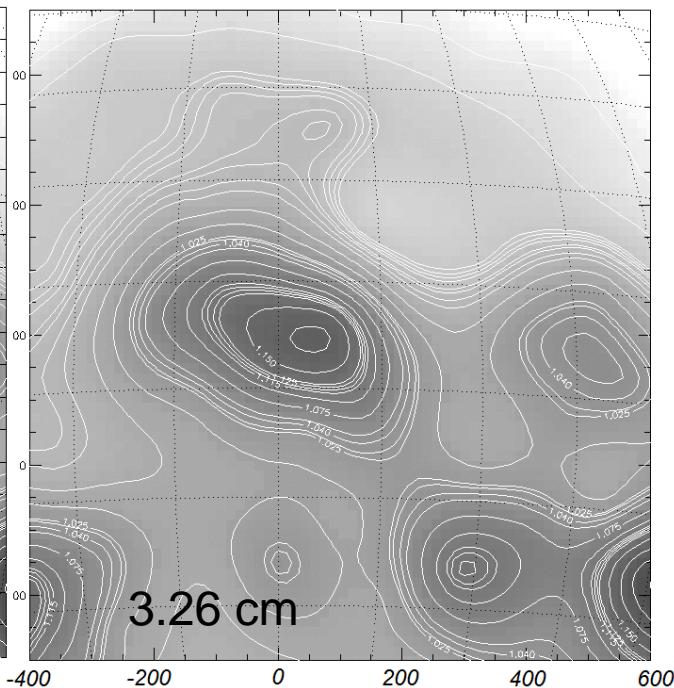
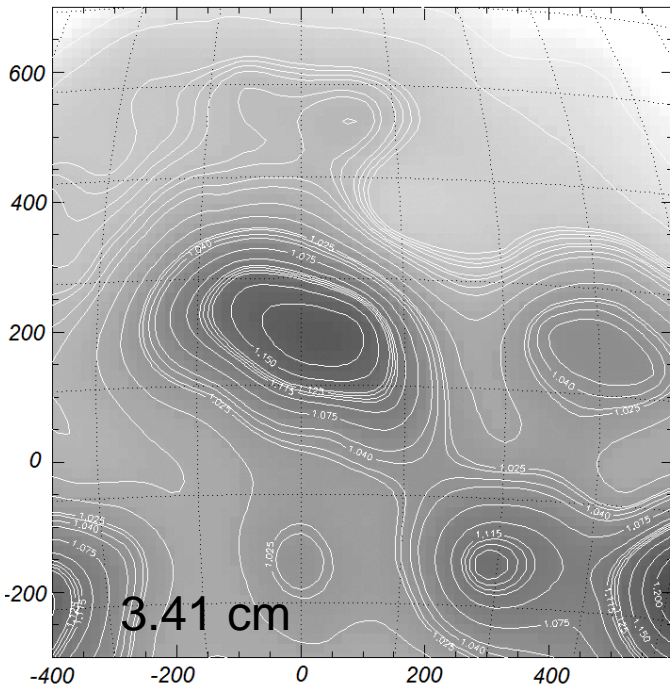
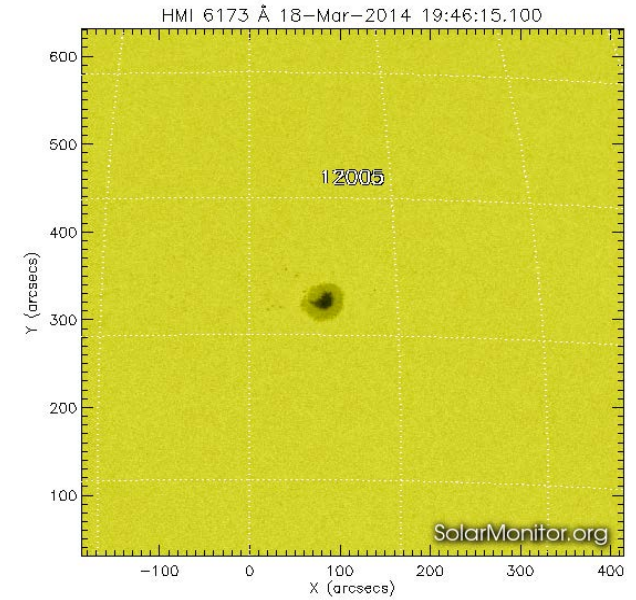
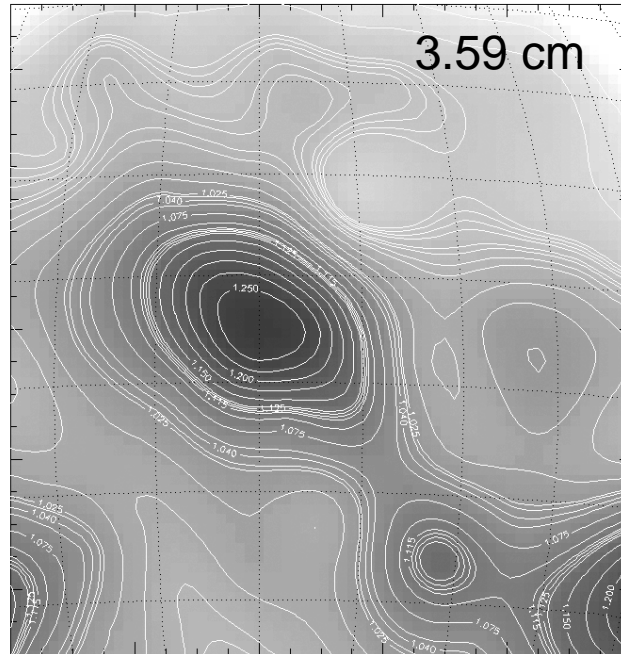
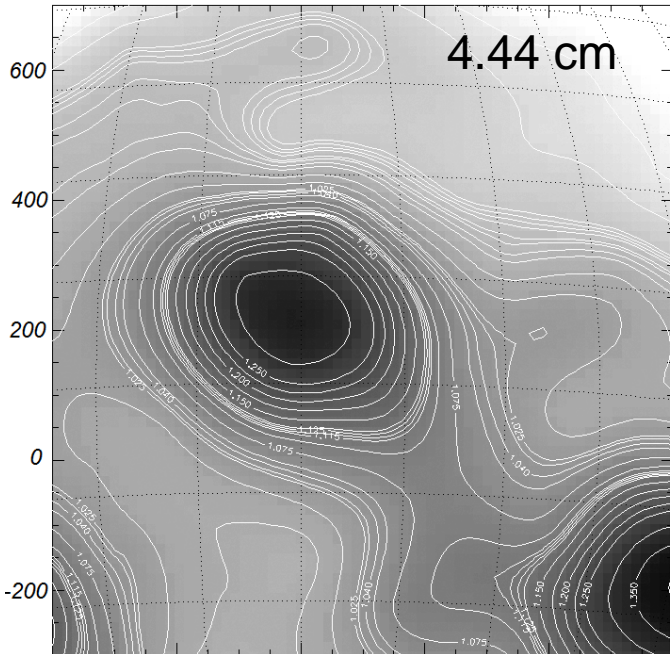
Relative antenna temperatures 2D distribution



***Generalised
Maximal
Entropy
Method
(GMEM)***

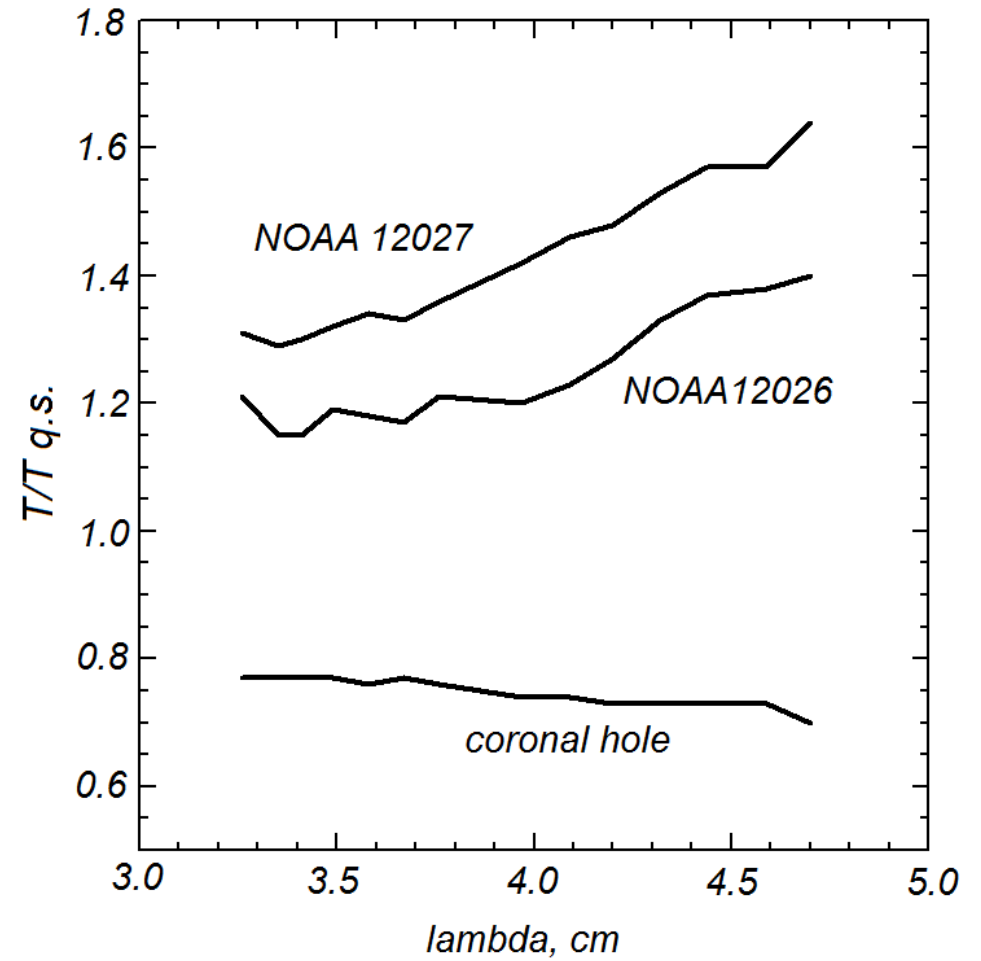
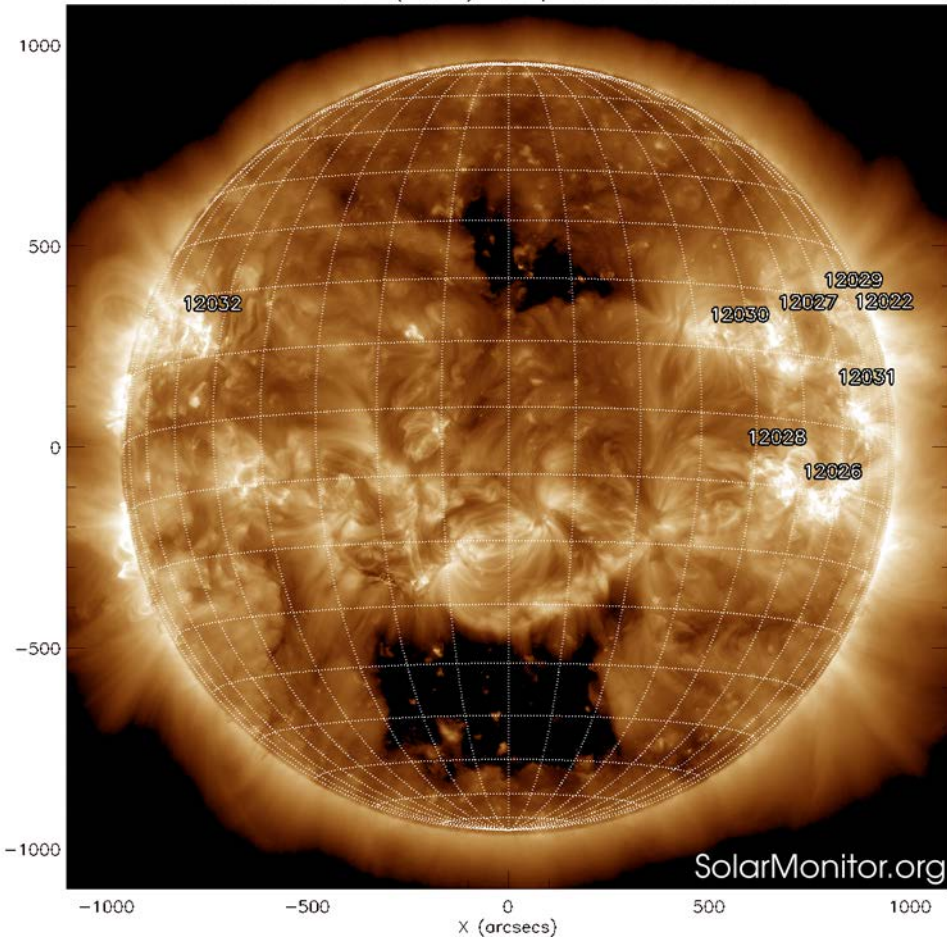
***Absolute
brightness temperatures 2D distribution***

RT-32 antenna pattern via AR NOAA 12005



Microwave spectra of ARs and the coronal hole on 2014-05-09

SDO AIA Fe XII (193 Å) 9-Apr-2014 23:32:42.840



Feasible tasks

Observations of large-scale coronal structures in the microwave range

- ***Search for radio brightness of coronal holes and the quiet Sun through the microwave range***
- ***Analysis of active regions associated with large isolated sunspots***
- ***Revealing and analyzing the large-scale coronal loops as immediate relatives of distant active regions so as to reproduce sympathetic solar flares***

Observations of radio flux fluctuations in local microwave sources

- ***Analysis of the radio flux fluctuations resulting from the magnetic field emergence in active regions***
- ***Analysis of the radio flux fluctuations preceding a solar flare***

Coronal magnetography

- ***Analysis and transformation of microwave maps of the Sun to those of the coronal magnetic fields***

Thank you!