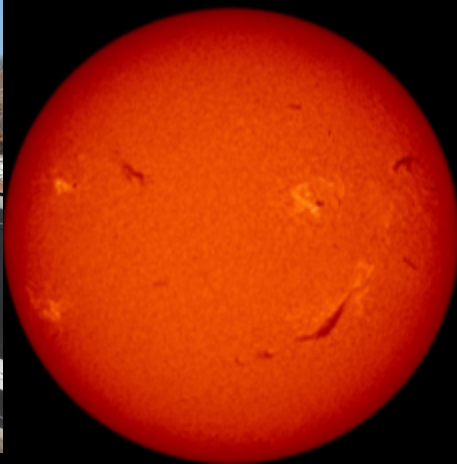
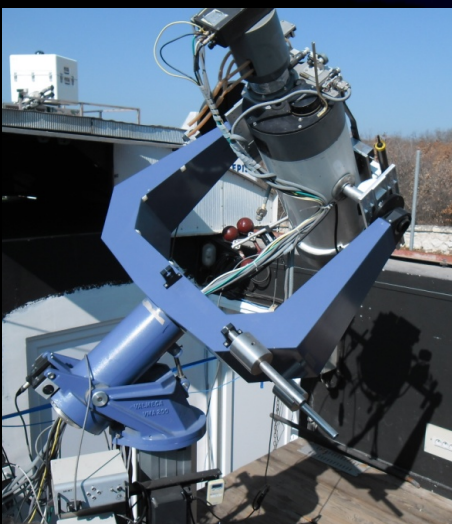
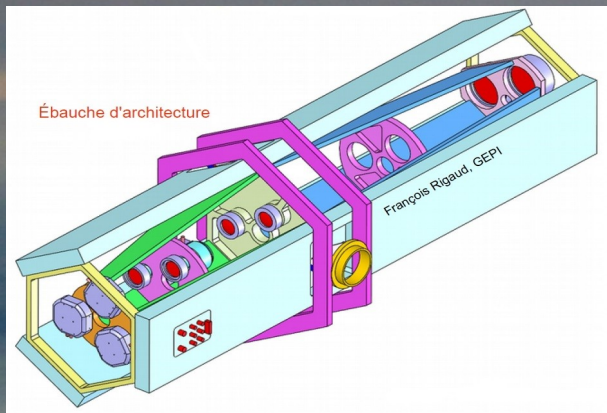


Automated and continuous optical observation of dynamical phenomena at the source of solar activity: flare, associated Moreton waves, Coronal Mass Ejection onset, filaments instabilities

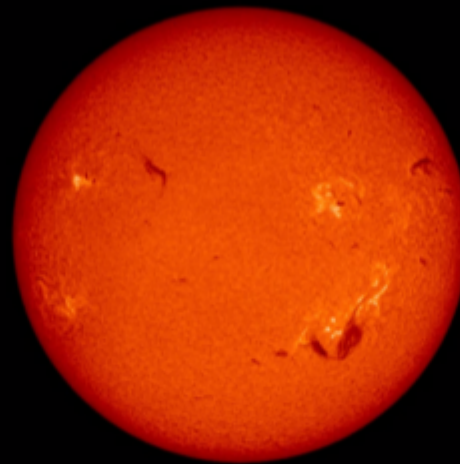
3 automated telescopes at Calern (OCA)

Chromosphere

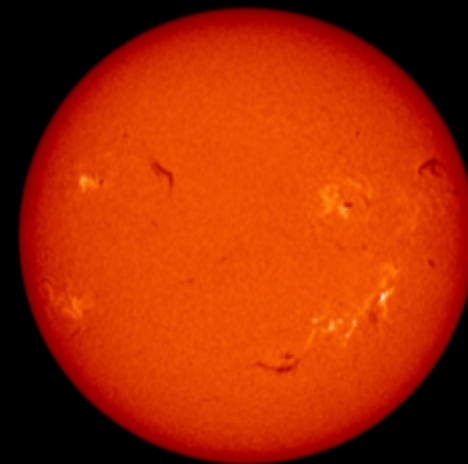
- H α , 10 s cadence, Fabry P \acute{e} rot DayStar 0.5 A
- CaII K, interference filter 1.5 A
- NaD1, Sodium line



26/01/2016 12:12



26/01/2016 17:35



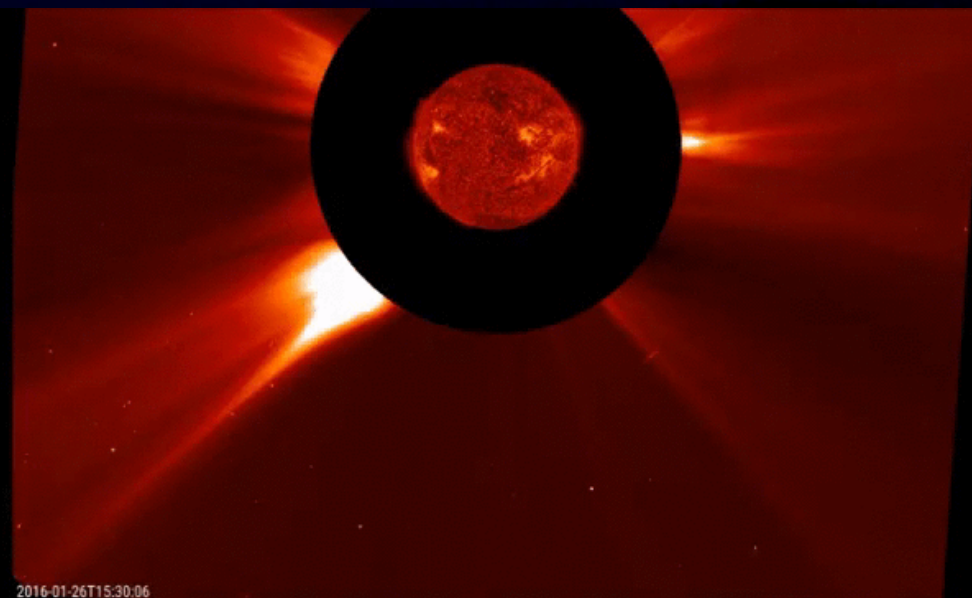
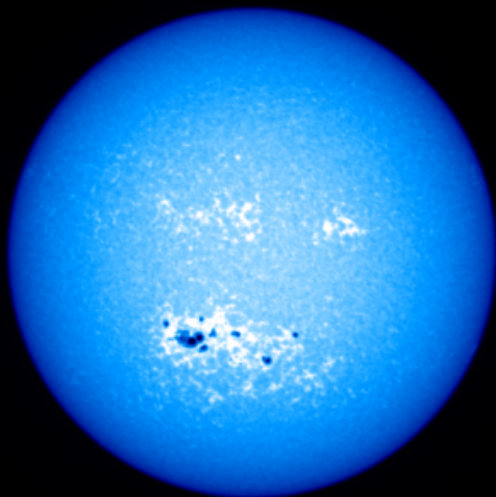
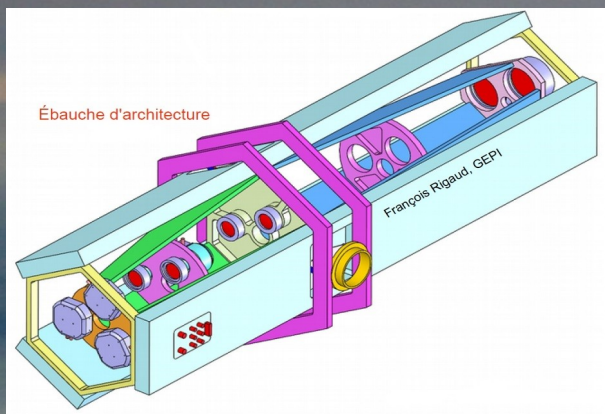
26/01/2016 18:07

Automated and continuous optical observation of dynamical phenomena at the source of solar activity: flare, associated Moreton waves, Coronal Mass Ejection onset, filaments instabilities

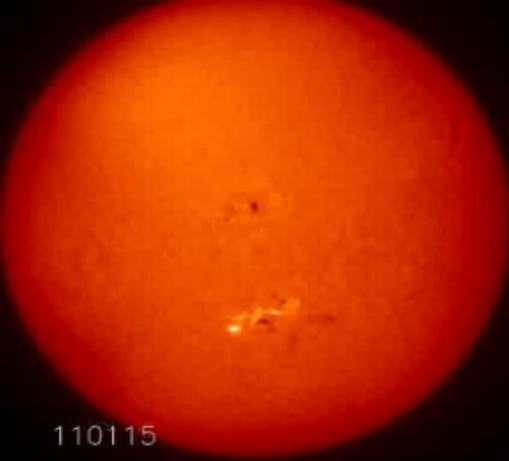
3 automated telescopes at Calern (OCA)

Chromosphere

- H α , 10 s cadence, Fabry P \acute{e} rot DayStar 0.5 A
- CaII K, interference filter 1.5 A
- NaD1, Sodium line



Instantaneous Intensity



110115

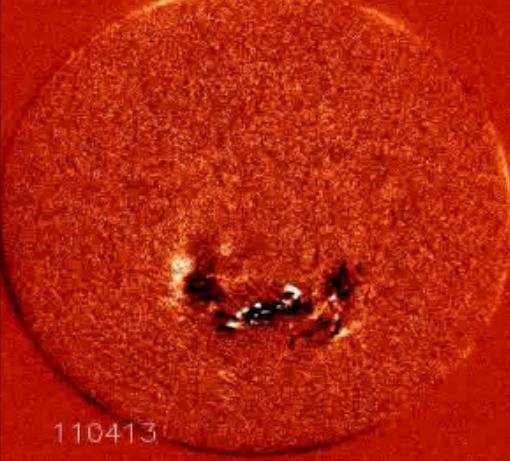


110115

Running difference



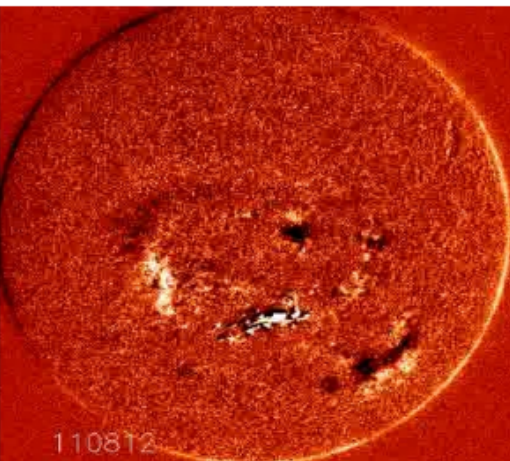
110413



110413



110812



110812

Moreton Waves observed in the blue wing of H-alpha With the old Lyot Filter at Meudon observatory



A collaborative project

Three main partners :

- Paris Observatory (OP)
- Côte d'Azur Observatory (OCA)
- LUNA technology

Dual Objectives

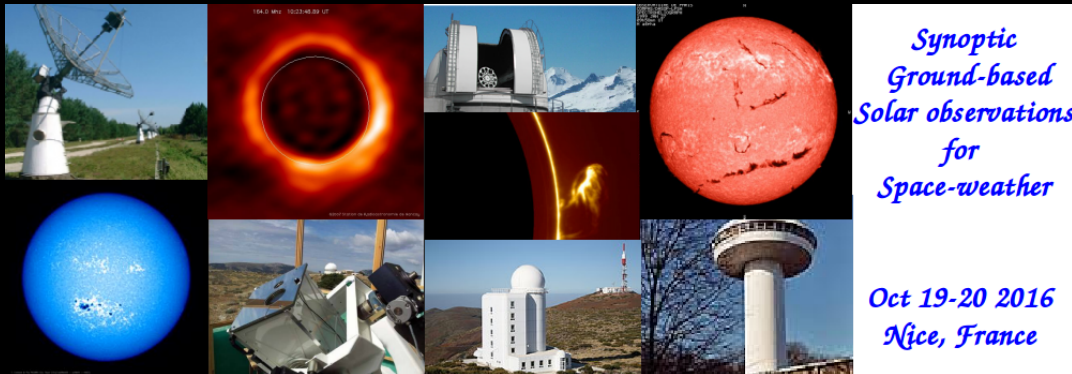
Research on solar activity
Operational aspects

Supported by

- French Air-Force (CDAOA) FEDOME project
- UCA JEDI
- French National Program on Sun-Earth connection (PNST)
- CNES

International context :

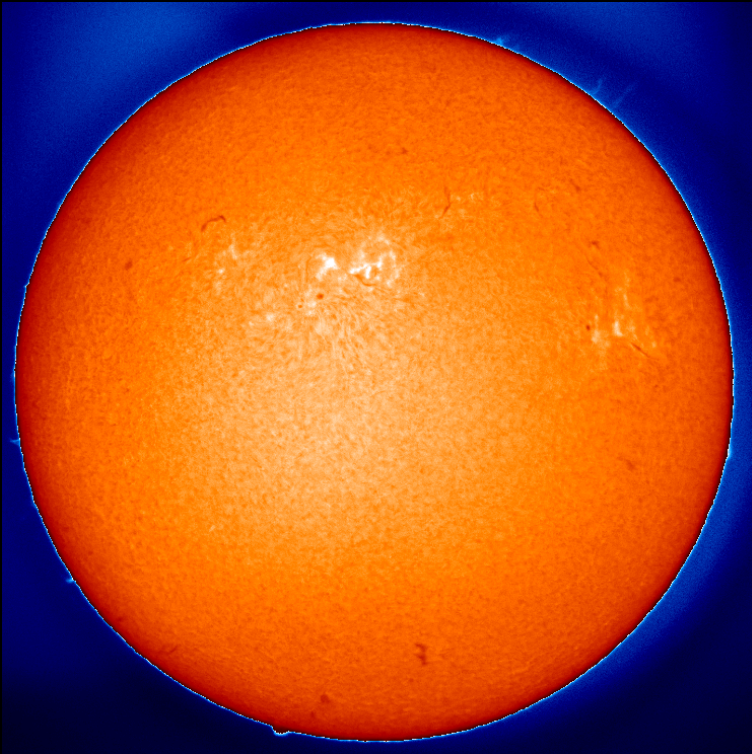
- Ground based network : GONG (USA) and Global H-alpha networks
- Space observatories : Solar Dynamic Observatory (USA) and upcoming Solar-Orbiter (NASA) but no chromospheric observations



+ New workshop organized in Nice (Autumn 2017)

- Federation of French Ground-based solar observations
- Ground-based Support to Solar Orbiter

Project completion schedule



2017

- First H-alpha image obtained at Meudon observatory
- The mount is built and ready for transfer at Calern observatory
- The construction of the shelter on-site started on July 3rd
- The automated system for its control will be developed during summer / autumn 2017 (Financed by UCA JEDI Academy 3)
=> Contribution of an engineering student for 2 months

2018

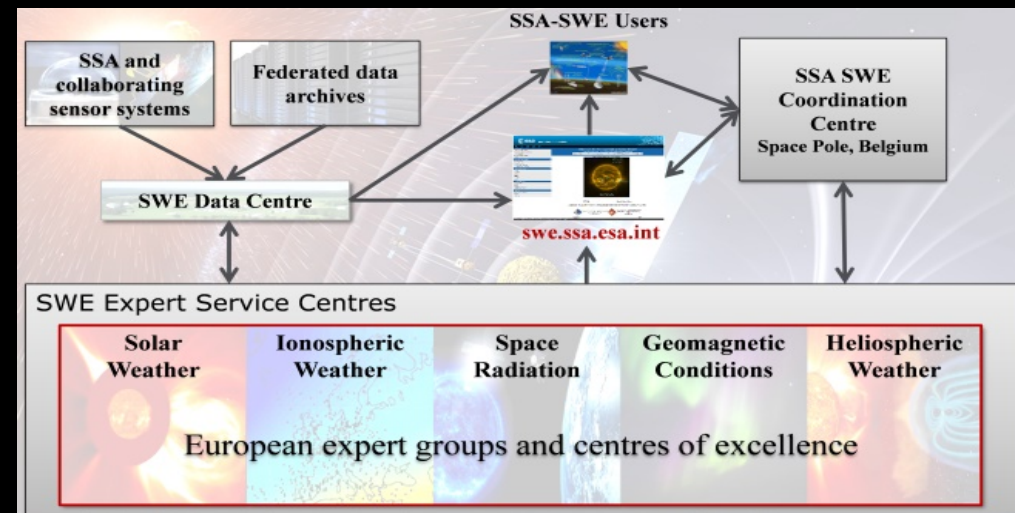
- Development of the full automated pipelines (open access data and real time distribution)
- Development of the remote control interfaces
- Integration and test of the instrument on-site scheduled for September 2018.

French contribution to space-Weather: an extremely timely subject

The Space Situational Awareness (SSA) program of ESA :

- Survey and tracking of objects in Earth orbit
- Monitoring space weather (SWE segment)
- Watching for NEOs

France was not contributing to the phase 2 of the program but it has integrated the phase 3 in Dec. 2016



In 2017

- INSU has set up a group for developing a « National structure in space weather »
- CNES has created its own Working Group on Space-Weather

The International Civil Aviation Organization (ICAO) is planning to open an operational activity in Space-Weather in 2018. DGAC has provided the following table (extract)

French space weather services and tools that are relevant for the OACI (status: June 2017)

Service	Name, Institution	Type (Observation / model / Tools / Database)	Domain (solar activity , cosmic rays, geomagnetic activity, ionosphere / thermosphere	Products (useful parameters for space weather)	Data access (open ; non commercial ; restricted)	Sustainability (1: secure until 2020; 2 : not secured)	Relevant for 1) HF radio communications, 2) GNSS-based navigation and surveillance; and 3) radiation exposure at flight levels 4) other (specify)	Observations of i) CME, high speed streams, ii) geomagnetic storms, iii) solar radiation storm, iv) solar flares, v) solar radio bursts, vi) ionospheric activity, vii) other (specify)	Details	Web site
Observations to support operational space weather activities (present users: research, FEDOME space weather centre of the French Air Force)										
Solar activity monitoring	Meudon spectroheliogram (Obs. Paris)	Observation	Solar activity, solar cycle, optical long term variability	Images of the photosphere and chromosphere in optical wavelengths: H-alpha, CaII K and CaII H since 1909; line profiles also available since 2017	Open	1 (SNO-INSU)	4) (Monitoring of solar activity)	i), iv), vii) CME onset in the chromosphere and solar flares, filaments and prominences	Two series of images per day together with full line profiles provided for each point of the sun (0.1 to 0.167 Å spectral resolution)	http://bass2000.obspm.fr
Solar activity monitoring	CLIMSO (IRAP Toulouse)	Observation	Solar activity, solar cycle	Images of chromosphere and corona in optical and IR wavelengths: H-alpha disk and limb, CaII K disk, He 10830 limb and Fe XIII. Magnetic and velocity fields of the corona	Open	1 (SNO-INSU)	4) (Monitoring of solar activity)	i), iv), vii) CME onset in the chromosphere and solar flares, filaments and prominences	One image per minute for bands except Fe XIII. 2 images/hour in Fe XIII	http://bass2000.bagn.obs-mip.fr
Solar activity monitoring	METEOSPACE (Obs. Côte d'Azur, Obs. Paris)	Observation	Solar activity	Full disk images of the photosphere and chromosphere in H-alpha CaIIK and NaD1	Open	1	1), 2), 4) (Monitoring of solar activity)	i), iv), vii) CME onset in the chromosphere and solar flares, filaments and prominences	Automated monitoring in the three bands with very high cadence (10 s) functionality and real time distribution of the images	
Solar activity monitoring	Obs. Paris, French Air Force	Observation	Solar activity	Dynamic spectra of radio bursts, 140-1000 MHz	Open but non-commercial	1	1), 2), 4) (Monitoring of solar activity)	i), iv), v)	Dynamic spectra (flux density) in the band 140-1000 MHz, 0.1 s time resolution	http://secchirh.obspm.fr
Solar radio imaging	NRH (Obs. Paris)	Observation	Solar activity	Images of the quiet and active Sun in the range 150-450 MHz	Open but non-commercial	1 (SNO-INSU)	1), 4) (Monitoring of solar activity)	i), iv), v)	Radio imaging at 10 frequencies, cadence > 1/s/frequency	http://secchirh.obspm.fr
Geomagnetic activity monitoring	Bureau Central du Magnétisme Terrestre - BCMT with international collaborations to a wider International system (Intermagnet and	Observation (level 0) / Database	Geomagnetic activity		Open but non-commercial (license CC BY-NC)	1 (National level: SNO TS created in 1921 by decree)	1), 2), 3)	ii), vi)	measurement of the magnetic field at Earth's surface at magnetic observatory's positions on long-	http://intermagnet.org/

THANKS FOR YOUR SUPPORT !!

