

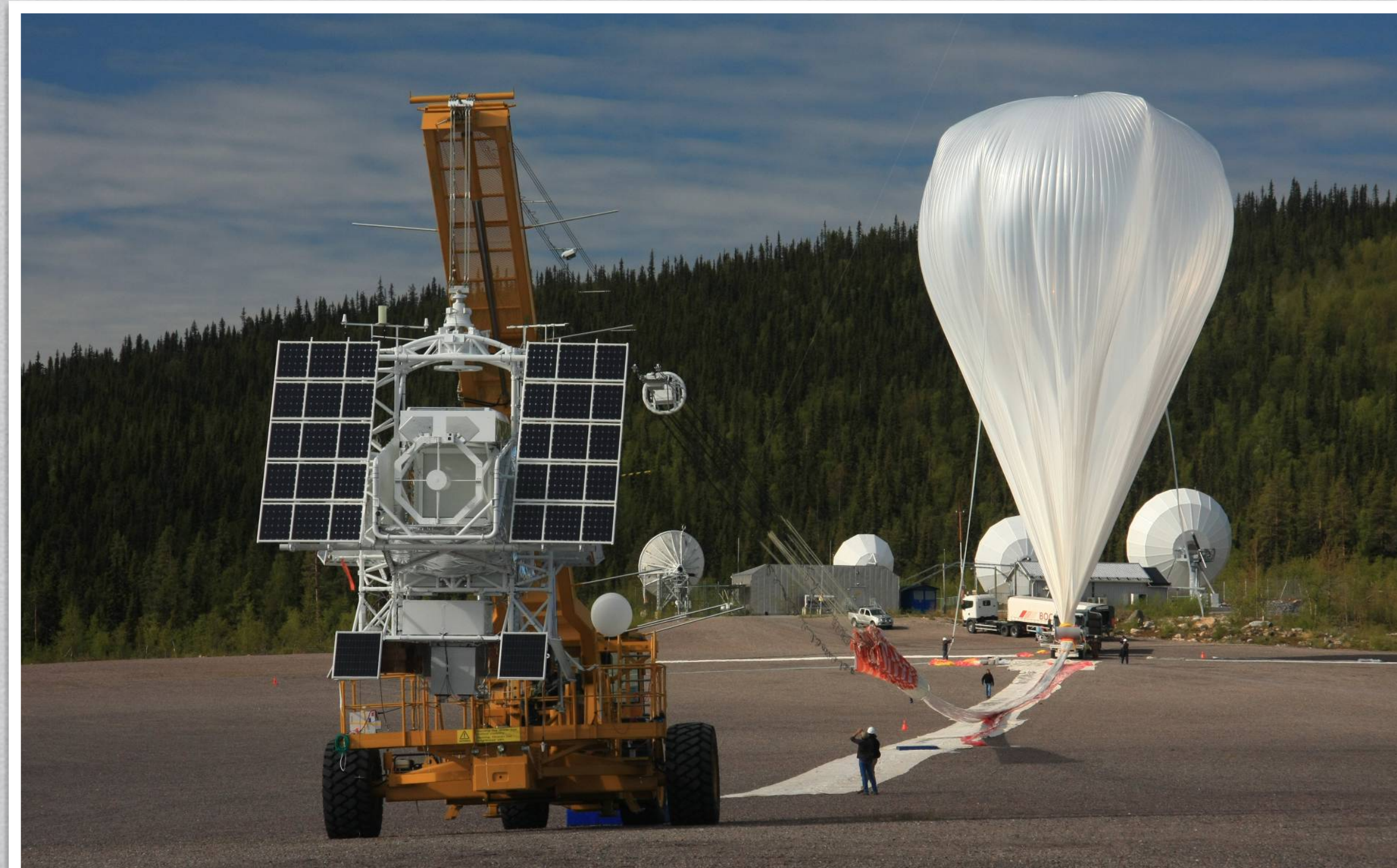
TRANS-NATIONAL ACCESS PROGRAMME

Dan Kiselman, EAST TAC Chair, dan@astro.su.se

- Open European research infrastructures across borders.
- Telescopes GREGOR, SST, THEMIS, VTT + supercomputer Piz Daint + SUNRISE III
- Selection made by the **EAST TAC** (w/help of external referees)
- **Nationality rules:** PI + $\frac{1}{2}$ Col:s from EU/assoc./UK (DE excepted). Ask me!
- **Acknowledge** support!
- **No travel** for SUNRISE III
- **Deadline** 17 November 2021

solarnet-project.eu/SUNRISE-3-Call-for-Proposals





SUNRISE-III: OVERVIEW & STATUS

ANDREAS LAGG
MPI FOR SOLAR SYSTEM RESEARCH, GÖTTINGEN
SUNRISE III CONSORTIUM





S.K. Solanki, A. Lagg + MPS Team

Max Planck Institute for Solar System Research, Germany

PM, Telescope, PFI
infrastructure, ISLiD, ICS, SUSI



T. Berkefeld + KIS Team

Leibniz Institut für Sonnenphysik, Germany

CWS



P. Bernasconi + APL Team

Applied Physics Laboratory, Johns Hopkins University, USA

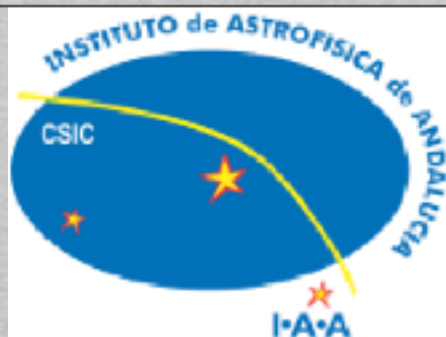
Gondola, Interface to CSBF



V. Martinez Pillet

National Solar Observatory, Boulder, USA

DKIST, Science



J.C. del Toro-Iniesta + TuMag Team

Instituto de Astrofísica de Andalucía, Spain, SIII consortium

TuMag



Y. Katsukawa + NAOJ Team

National Astronomical Observatory of Japan

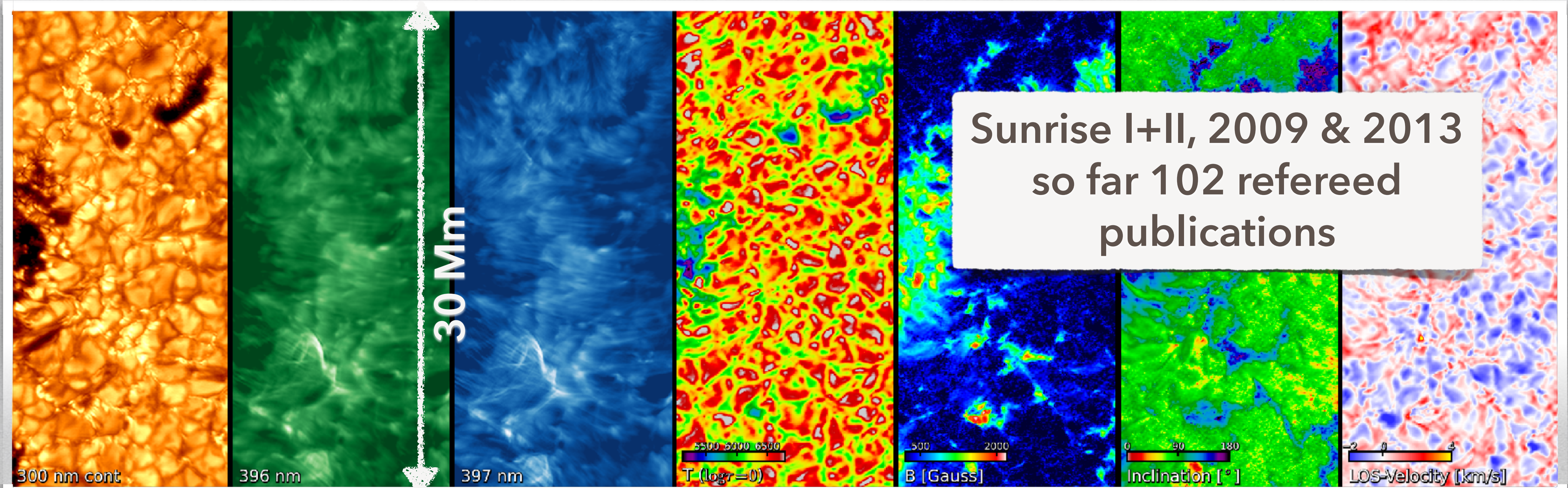
SCIP



Amy Canfield

Sunrise III Mission Manager at NASA BPO

Balloon



Intensity
image:
photosphere

Narrow-band
Ca-image:
chromosphere

Temperature
'solar surface'

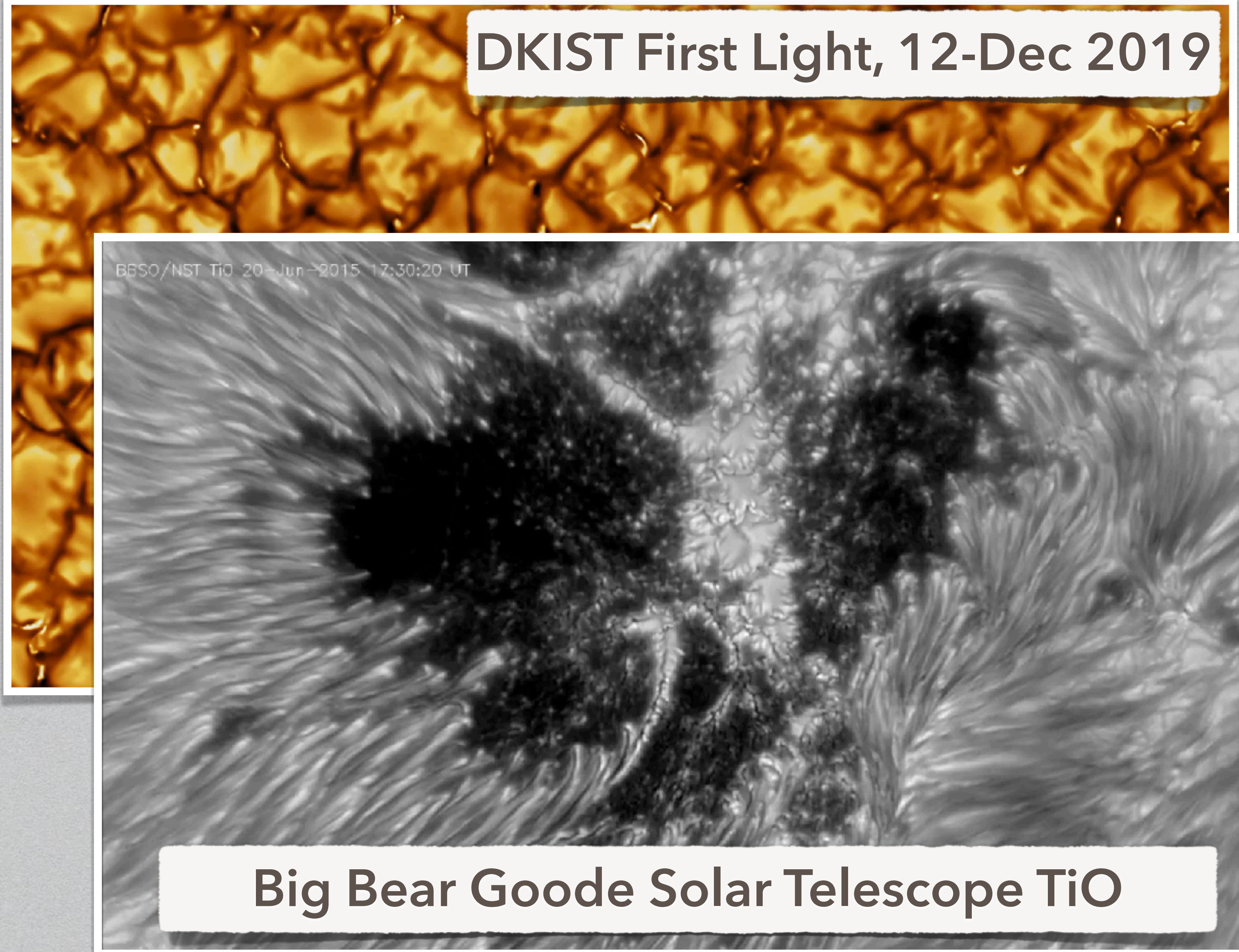
Magnetic field
strength

Magnetic field
orientation

Line-of-sight
velocity

WHY SUNRISE III?

- Seeing-free environment
- 24/7 sunlight
- long, constant-quality time series (>8 hr)
- access to UV
- no atmospheric dispersion
→ combine various wavelengths
- well-known PSF (high pol. S/N ratio, no noise increase from reconstruction)
- much reduced telluric lines
- low sky brightness



SUNRISE III - WHAT IS NEW? WHAT IS OLD?

Gondola: now with roll compensation

Light distribution unit (ISLiD): complete redesign

New E-units and E-racks

New pointing (CWS + gondola)

New ICS + DSS

New telescope hardware

New telescope mechanisms

3 new science instruments:

- TuMag
- SCIP
- SUSI

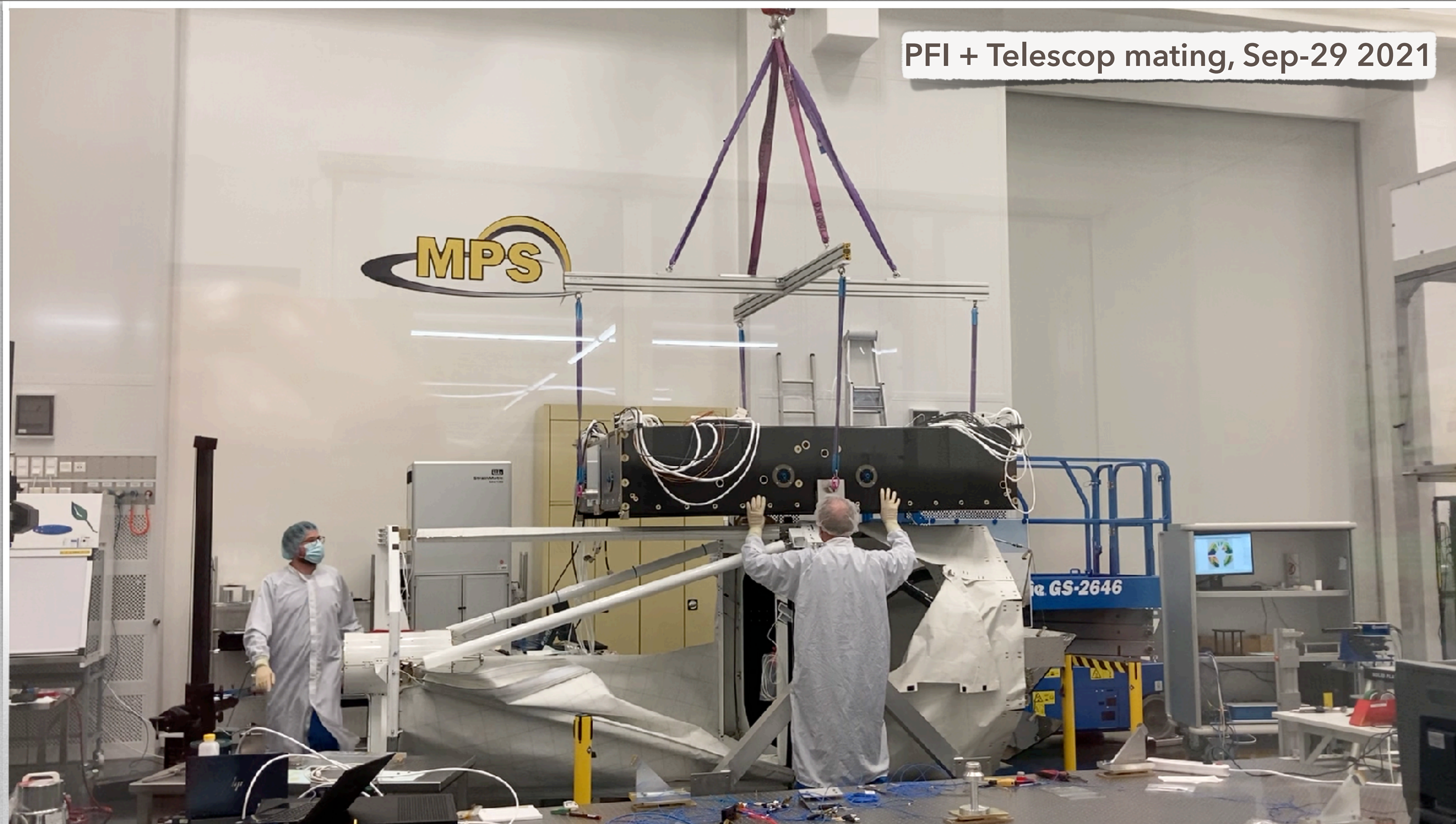
Telescope: M1, M2, some struds, central frame, PI





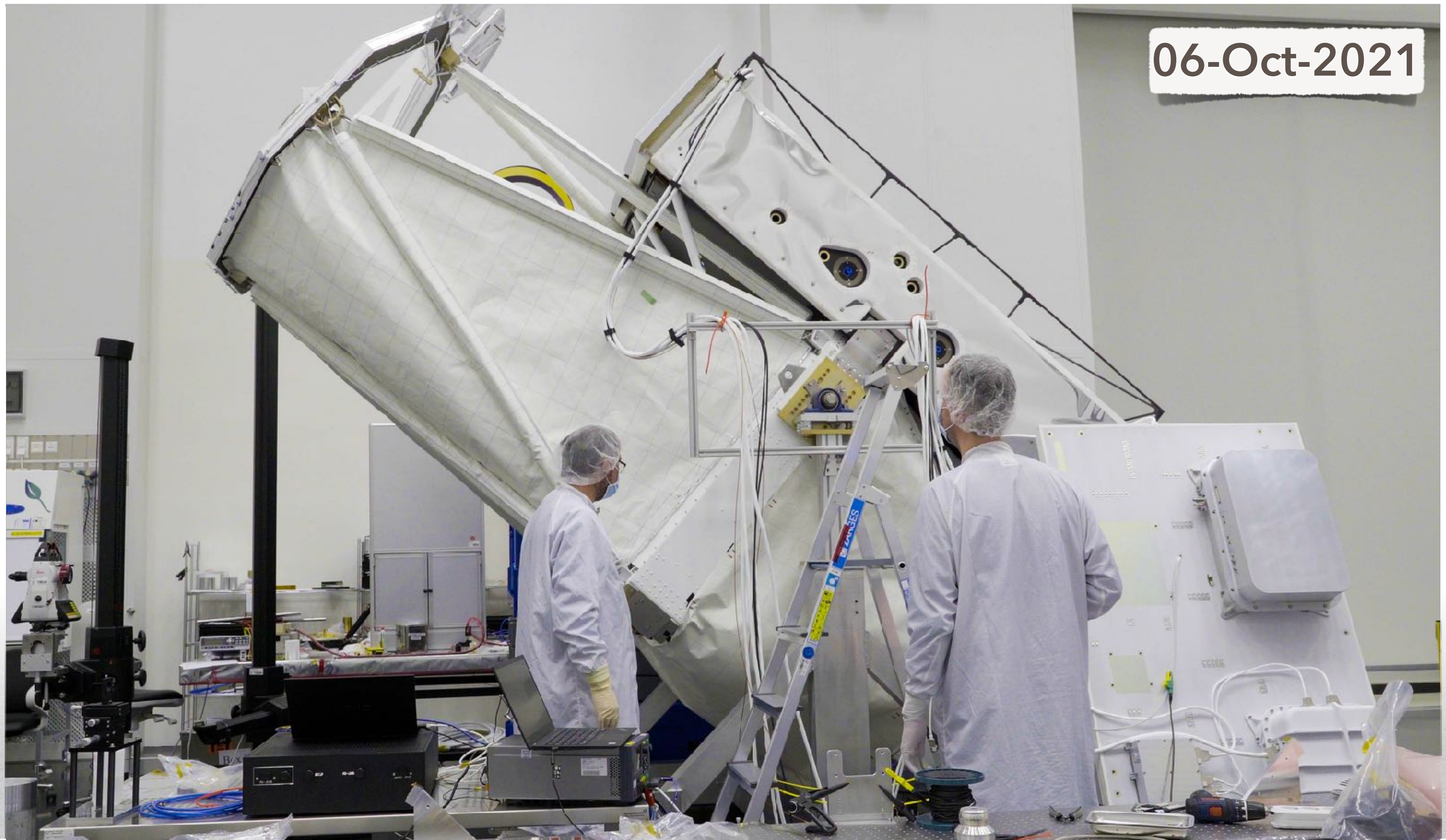
ISLiD assembly done, CWS integrated (March 2021)

TELESCOPE + PFI MATING (LAST WEEK)



TELESCOPE MASS BALANCING

06-Oct-2021



SUNRISE III - CURRENT STATUS

Preparing for hangtest!

- ISLiD: done
- PFI
 - SUSI, SCIP, CWS & ISLiD integrated
- Telescope + Mechanisms + Thermal Hardware: done
- E-racks & Harness: done
- Gondola: mounting in progress
- **Tomorrow / Monday:**
Telescope+PFI integration to gondola!
- Oct 23: 3-weeks hang test at MPS



MPS balloon hall, Oct-06 2021

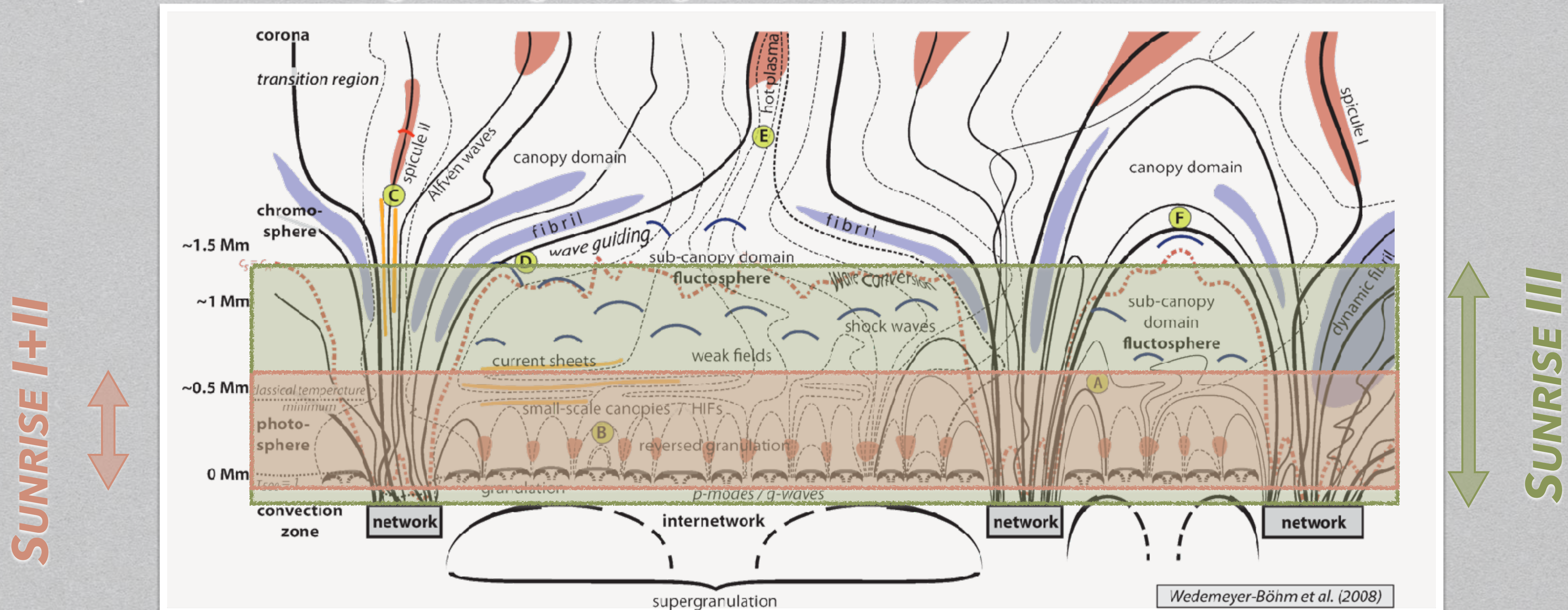
SUNRISE SCHEDULE

Date start	Duration	End	Activity
04/03/2021	59	02/05/2021	SUSI assembly
23/05/2021	28	20/06/2021	SUSI integration to PFI
20/06/2021	28	18/07/2021	PFI full functional test in vacuum setup (in air)
29/08/2021	5	03/09/2021	TuMAG mass dummy to PFI
03/09/2021	25	28/09/2021	SCIP integration to PFI
28/09/2021	10	08/10/2021	merging of PFI and telescope
08/10/2021	18	26/10/2021	Mating gondola & payload
26/10/2021	28	23/11/2021	Hangtest@MPS
23/11/2021	21	14/12/2021	Operation Training & Final tests
14/12/2021	31	14/01/2022	unmount gondola and payload
14/01/2022	28	11/02/2022	TuMAG integration to PFI
11/02/2022	7	18/02/2022	PFI Pol. calibration from F1 (all instruments)
18/02/2022	21	11/03/2022	PFI Vacuum test with Sun
11/03/2022	21	01/04/2022	packing + transport to Kiruna
01/04/2022	61	01/06/2022	Assembly & Verification @ ESRANGE
01/06/2022	0	01/06/2022	ready for launch

- 3D structure of photospheric and chromospheric field in different regions: how force-free is the field?
- How different is the quiet Sun (coronal hole vs. normal)?
- How efficient is field-line braiding (campfires)?
- How high is the wave flux travelling into chromosphere and corona?
- How common are small scale jets?
- How does magnetic flux emerge and how is it removed?

SUNRISE III - PROBING DEEPER AND HIGHER

- Sunrise I & II resolved elementary magnetic structures, uncovered chromospheric waves & a possible new way to heat the corona
- Sunrise III will use a new gondola with significantly enhanced stability
- improved science instruments and to probe the magnetic field & its influence on the plasma over larger height range



SUNRISE III: 3 NEW SCIENTIFIC INSTRUMENTS

SUSI (UV spectropolarimeter)

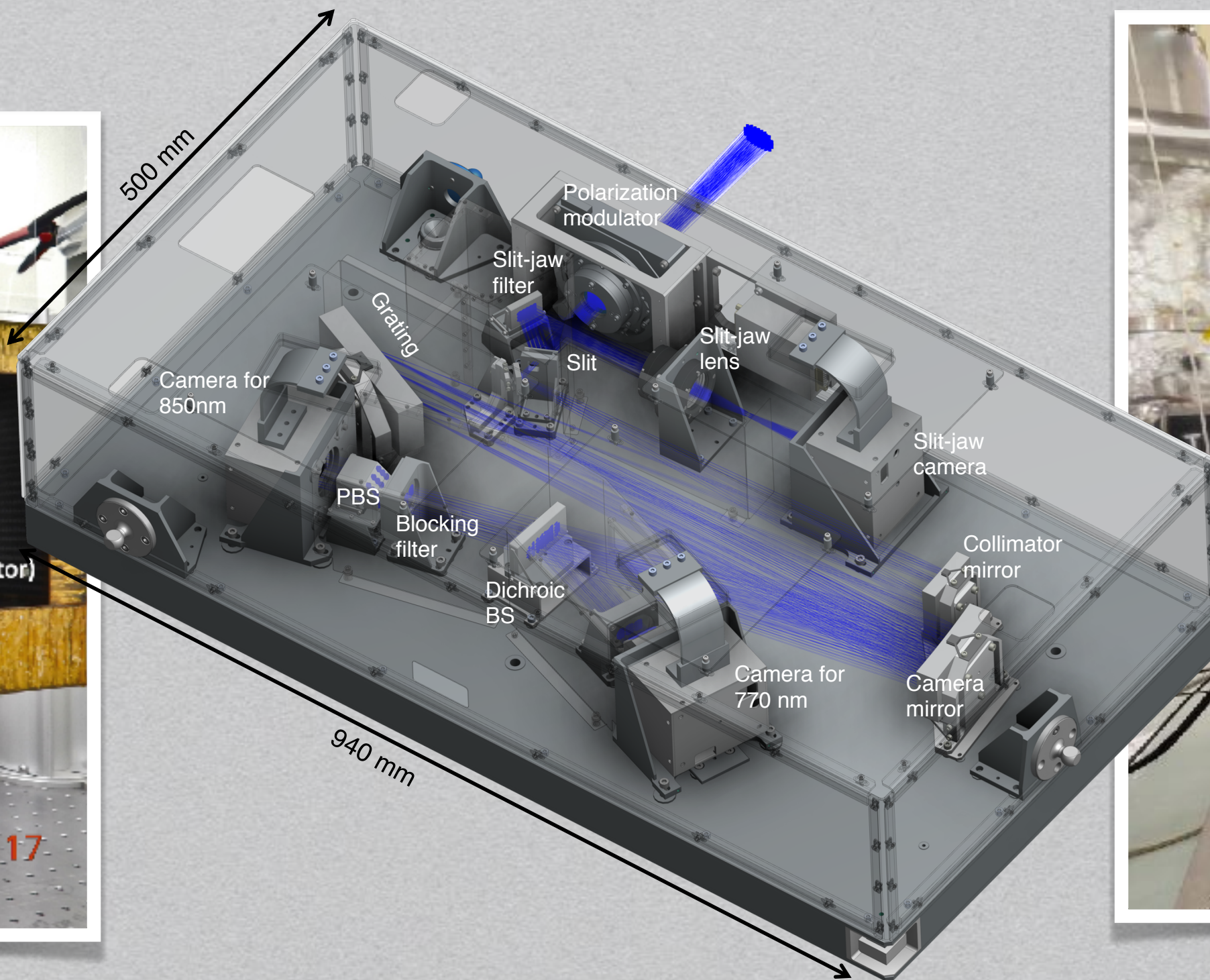
- slit spectrograph
- full stokes from 314-410nm
- unprecedented height & spatial resolution

TuMaG (imaging spectropol.)

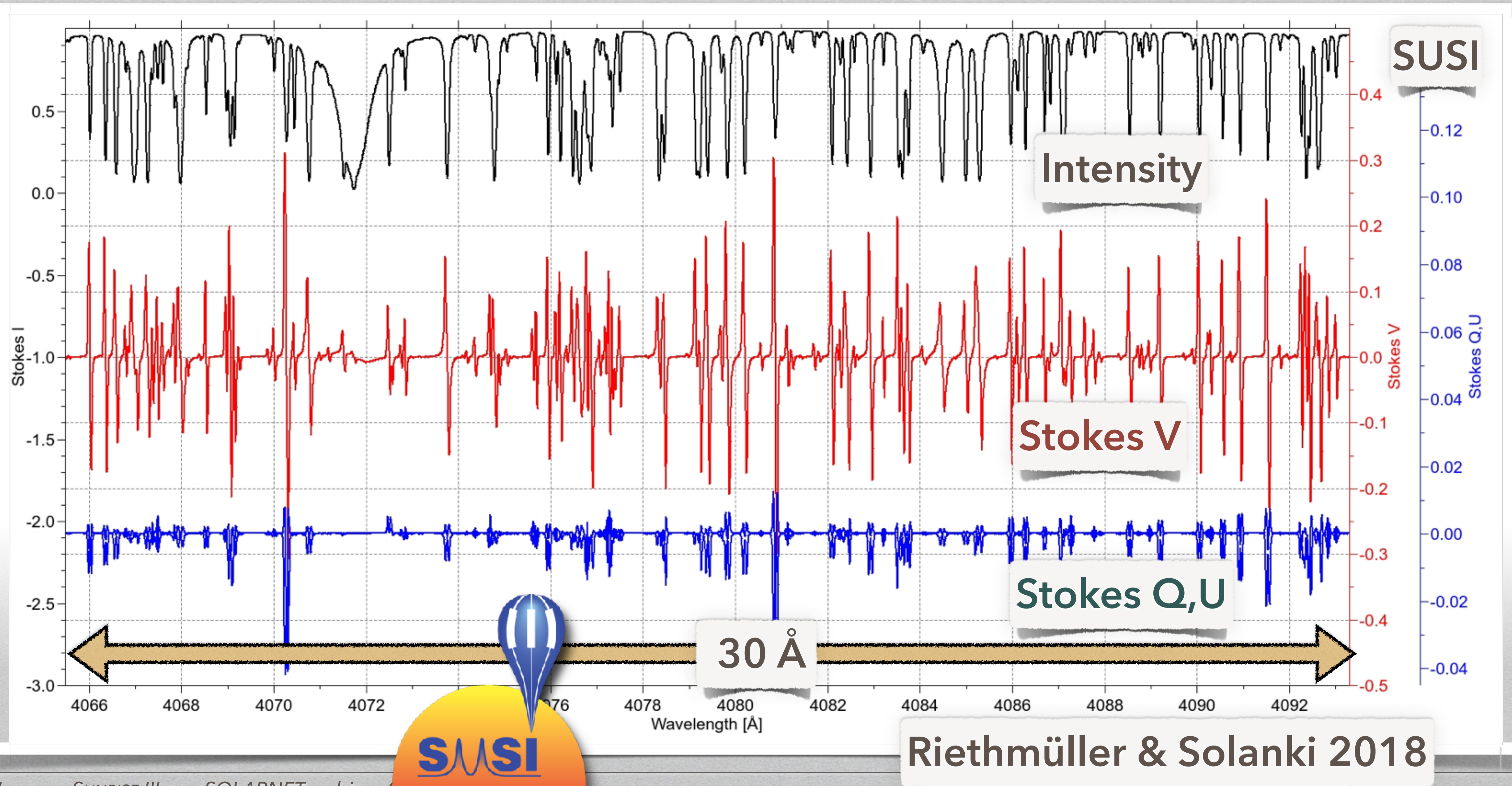
- 2D imaging Full Stokes
- photosphere: Fe 5250
- chromosphere: Mg Ib

SCIP (IR sepctropolarimeter)

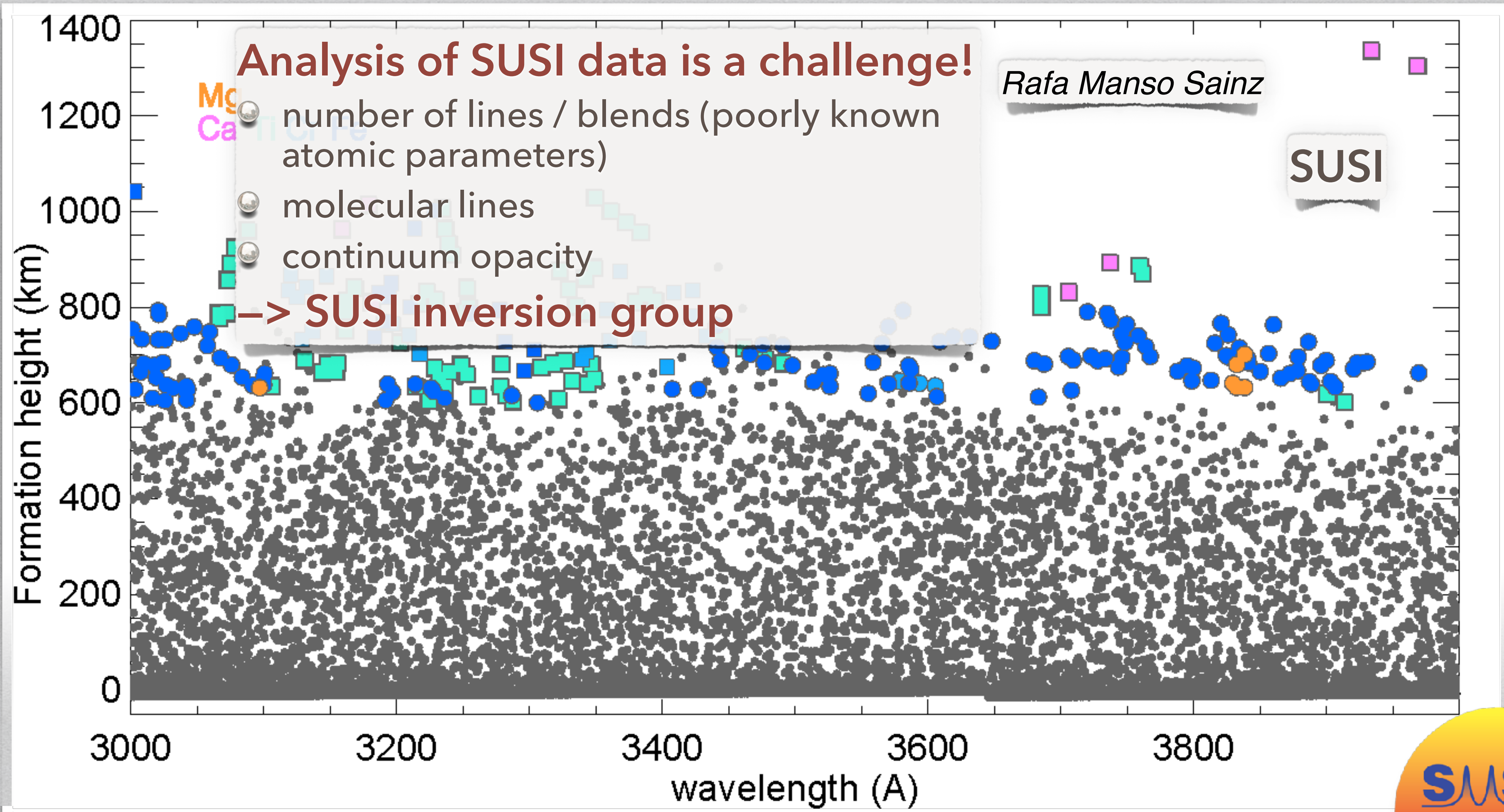
- slit spectrograph
- full Stokes 765-855nm
- incl. Ca IR, K, Fe



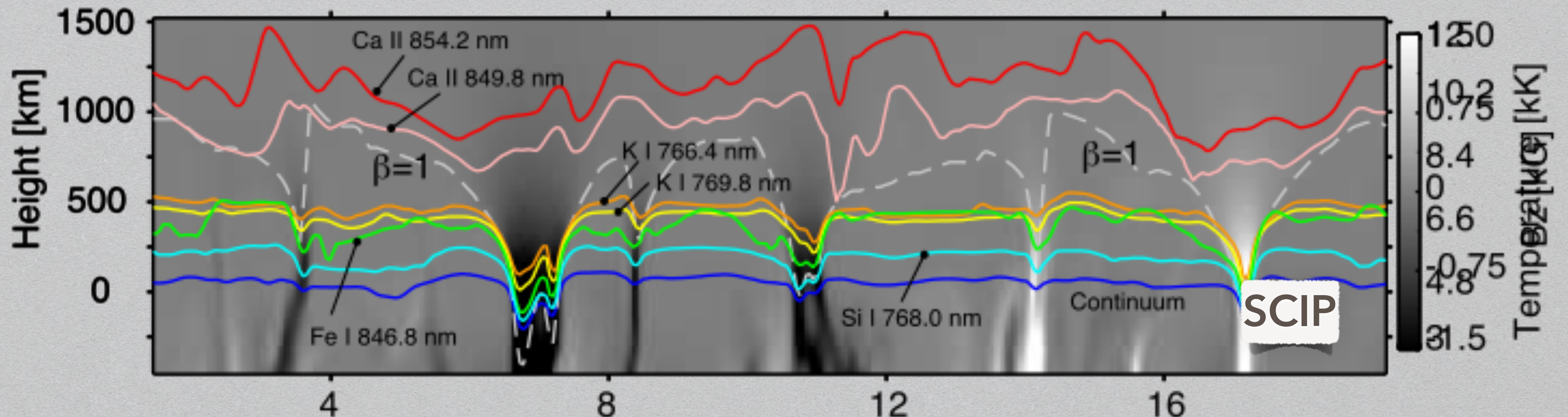
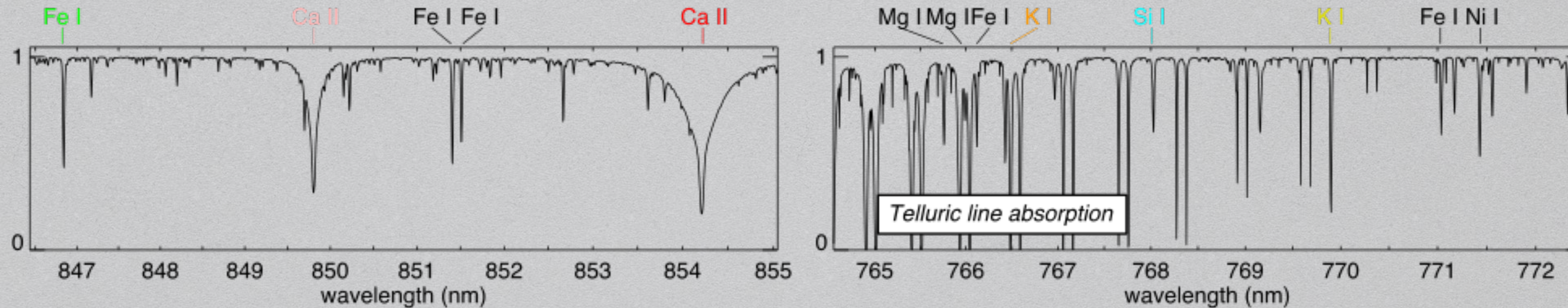
MANY-LINE ANALYSIS WITH SUNRISE III



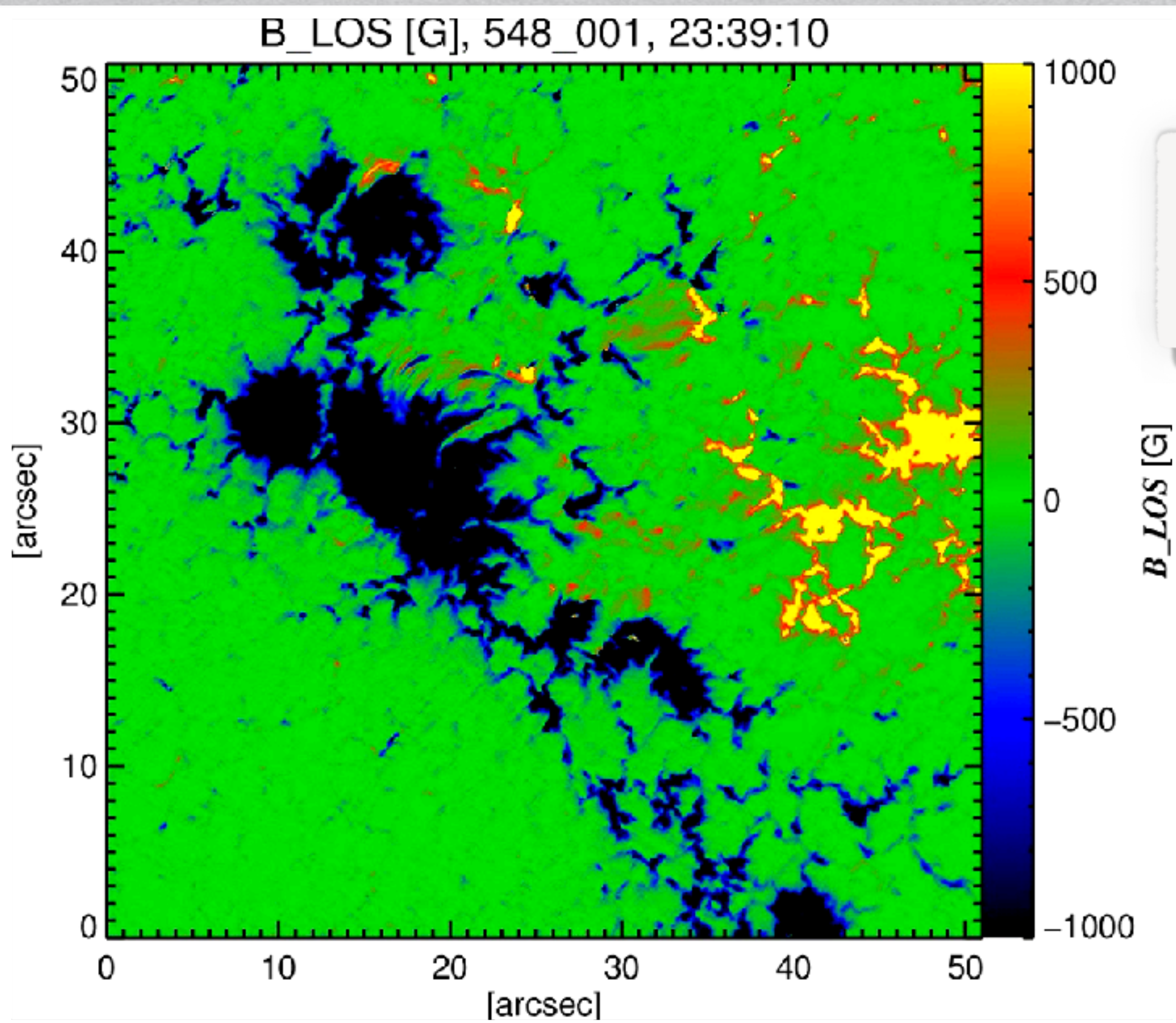
MANY-LINE ANALYSIS WITH SUNRISE III



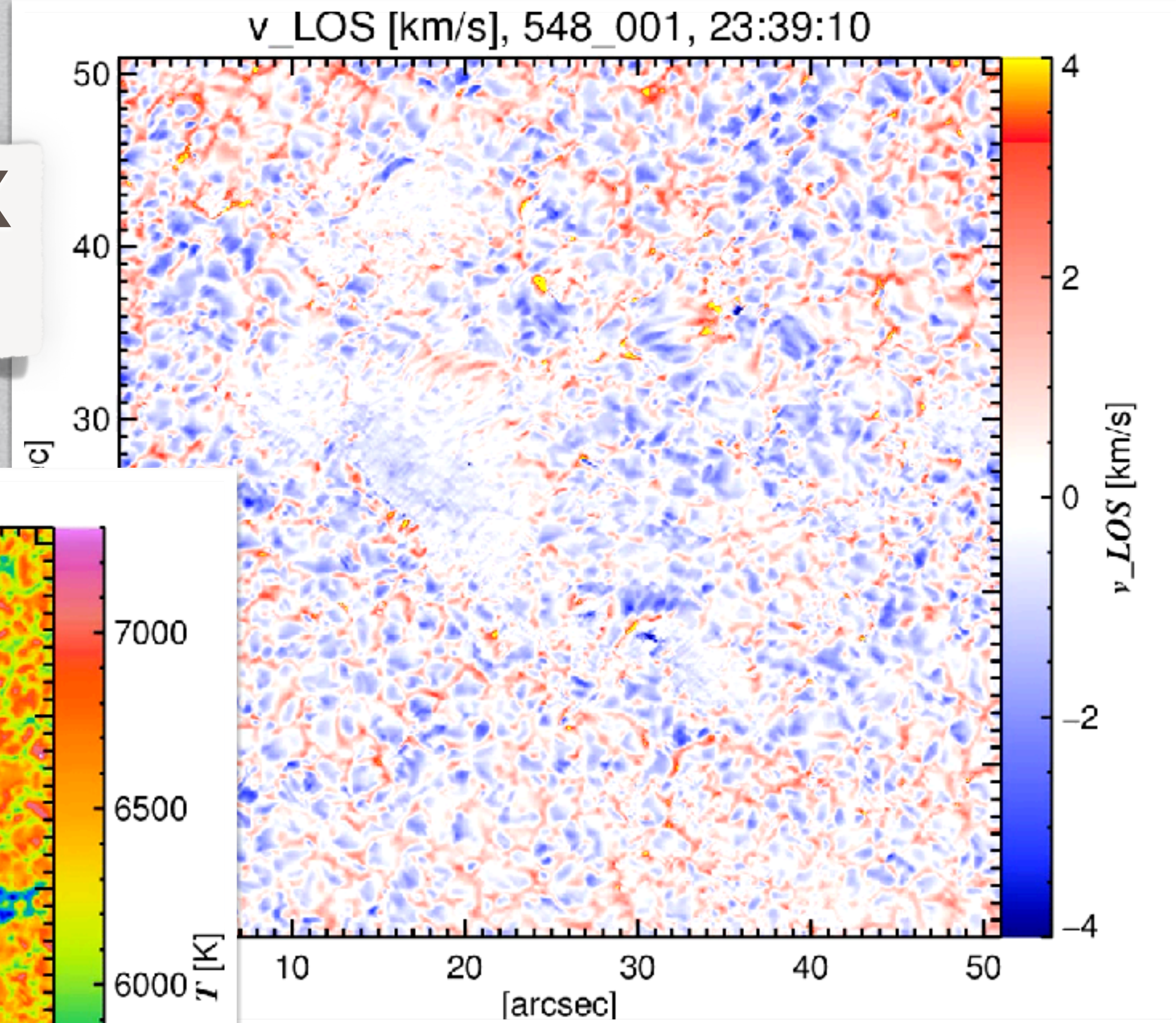
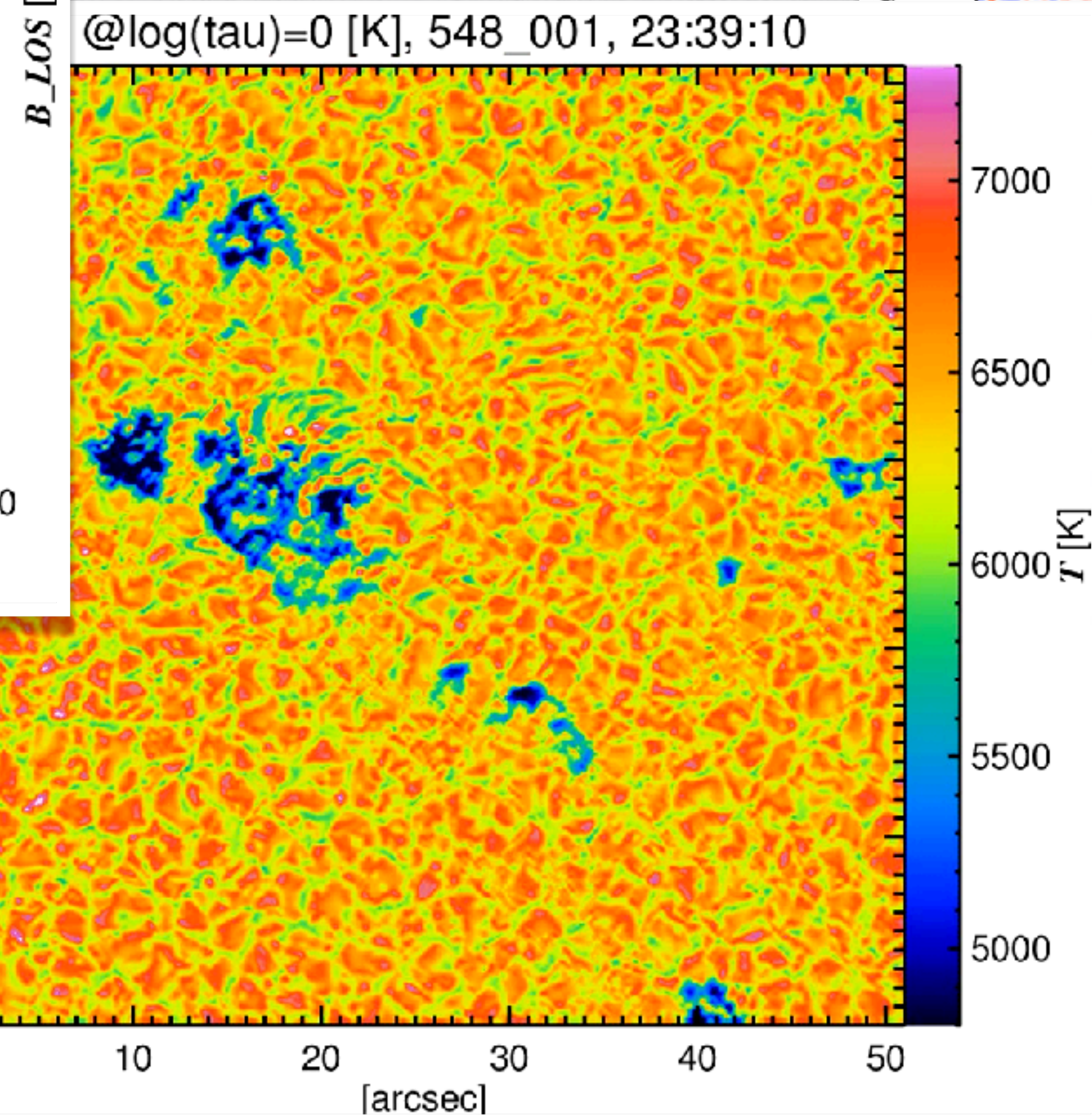
CHROMOSPHERIC 3D OBSERVATIONS IN THE NEAR-IR



TuMAG: 2D MAPS IN PHOTO- AND CHROMOSPHERE



2009 + 2013: IMaX
(photosphere)



TuMag

2022: TuMag
+ chromosphere

SCIP: Yukio Katsukawa (NAOJ)
<https://mps.iwww.mpg.de/6958817/SCIP.pdf>

SUSI: Alex Feller (MPS)
<https://mps.iwww.mpg.de/6958817/SUSI.pdf>

TuMag: David Orozco (IAA)
<https://mps.iwww.mpg.de/6958835/TuMag.pdf>

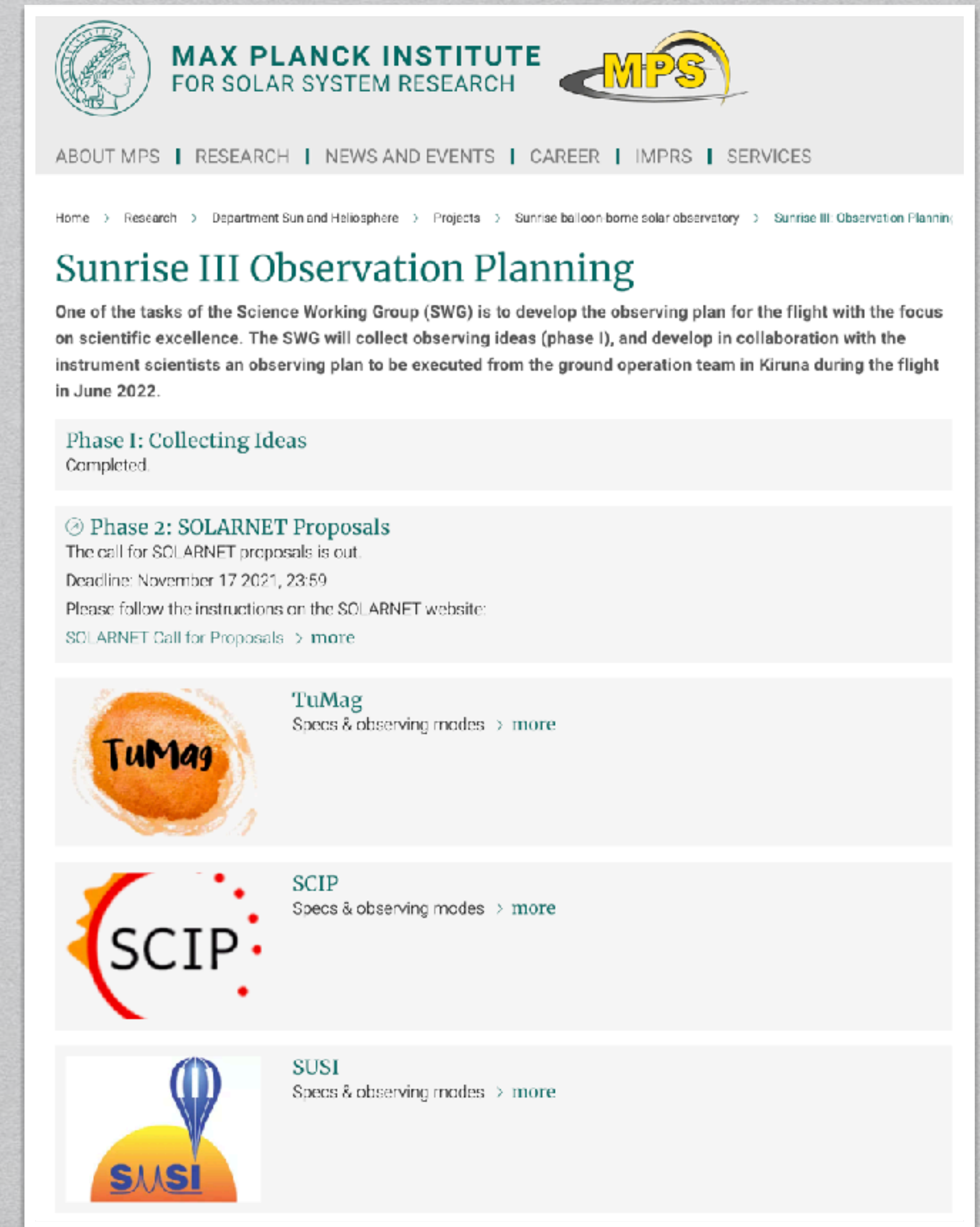
<https://solarnet-project.eu/SUNRISE-3-Call-for-Proposals>

- Proposal Submission Deadline: 17 November 2021, 23:59 UT
Send proposals to: east-tac@astro.su.se
- SOLARNET Trans-National Access Programme
- evaluated by the EAST TAC
- The Nationality rules: PI and at least half of the Co-I's with affiliations in the European Union (not Germany) + associated countries + UK.
- same data policy rules as all other Sunrise data:
 - 12-month period of exclusive usage of the data by the consortium members, including the SOLARNET PIs
 - After this, all Sunrise data will be publicly available.
- Amount of data (expected):
 - planned flight time of 4 to 5 days.
 - planned operation: all 3 instruments simultaneously
 - 10% of observing time (incl. calibration, commissioning).
Expected time: ≤ 4 hrs.

SOLARNET PROPOSAL SUBMISSION

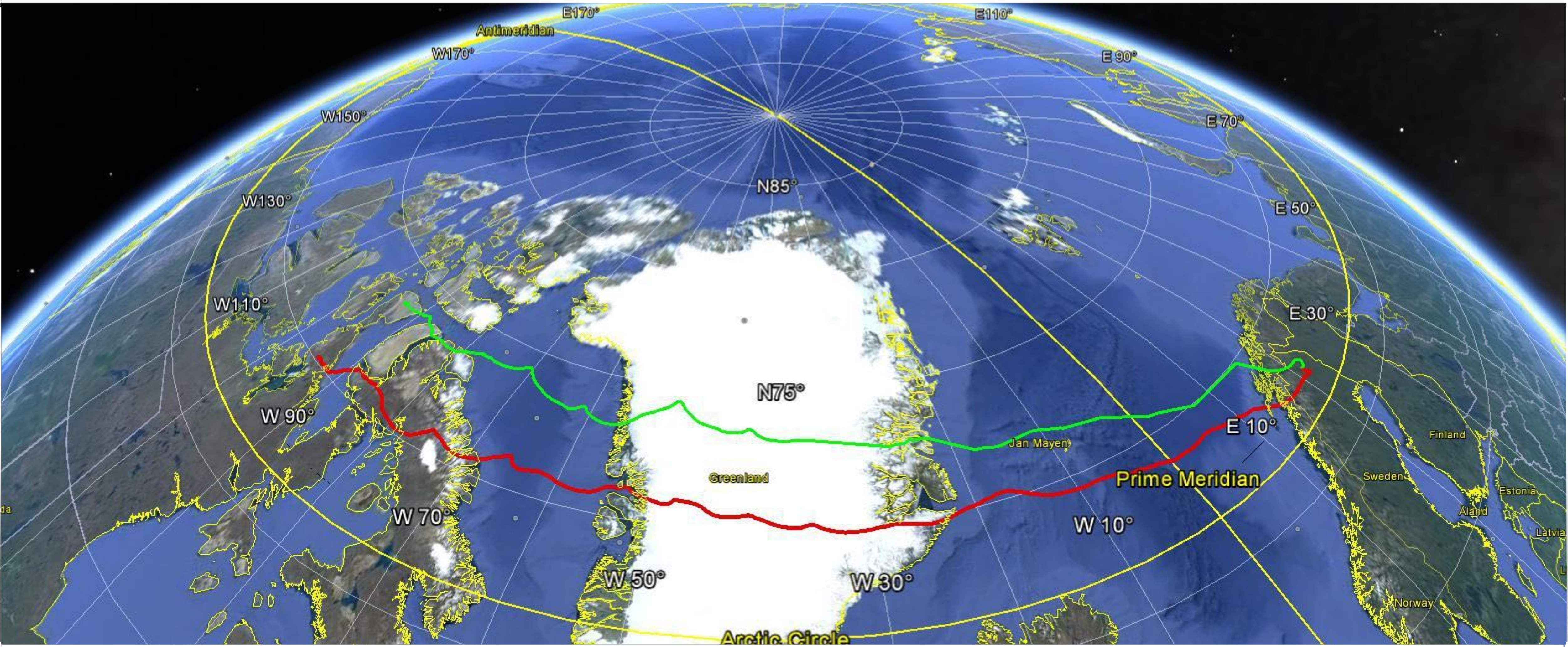
- Use proposal form
- The scientific relevance should be presented in 1-2 pages. Please also include references
- Observing plan
 - Target and location (mu)
 - Instruments (SCIP, SUSI, TuMag), all three will be available all the time
 - For SCIP: mode (IQUV or I), FOV, and integration time
 - For SUSI: mode (IQUV or I), FOV, wavelength (filter number), slit scan speed, scan repeats
 - For TuMag: choose one (or more) of the seven predefined observing modes
 - Observing time: how long must the observation be (minimum success / optimum)?
 - Do you need coordinated observations (Hinode / GREGOR / DKIST)?

<https://www.mps.mpg.de/sunrise-obs-plan>



The screenshot shows the 'Sunrise III Observation Planning' page from the Max Planck Institute for Solar System Research (MPS). The page header includes the MPS logo and navigation links: ABOUT MPS | RESEARCH | NEWS AND EVENTS | CAREER | IMPRS | SERVICES. The breadcrumb trail reads: Home > Research > Department Sun and Heliosphere > Projects > Sunrise balloon borne solar observatory > Sunrise III: Observation Planning. The main heading is 'Sunrise III Observation Planning'. Below it, a paragraph states: 'One of the tasks of the Science Working Group (SWG) is to develop the observing plan for the flight with the focus on scientific excellence. The SWG will collect observing ideas (phase I), and develop in collaboration with the instrument scientists an observing plan to be executed from the ground operation team in Kiruna during the flight in June 2022.' The page is divided into three main sections: 'Phase I: Collecting Ideas' (Completed), 'Phase 2: SOLARNET Proposals' (The call for SOLARNET proposals is out. Deadline: November 17 2021, 23:59. Please follow the instructions on the SOLARNET website: SOLARNET Call for Proposals > more), and three instrument-specific sections: 'TuMag' (Specs & observing modes > more), 'SCIP' (Specs & observing modes > more), and 'SUSI' (Specs & observing modes > more). Each instrument section includes a small logo and a link to more information.





Balloon-Borne Solar Telescope "Sunrise"
Launch Preparations

Esrange Space Center, Northern Sweden
May/June 2013

Video courtesy: HP Doerr