SOOP Coordinators Feedback meeting

Miho Janvier

09/12/2022

ESA UNCLASSIFIED – For ESA Official Use Only

Schedule of the meeting

14:00	Start of Meeting	
30 min (14:00-14:30)	Welcome & scope of meeting	ESA SO team
60 min (14:30-15:30)	SOOP Presentations (see below) + short questions	SOOP Coordinators
10 min	coffee break	
50 min (15:40-16:30)	SOOP Presentations (see below)	SOOP Coordinators
30 min (16:30-17:00)	Q/A, discussions	All
30 min	Contingency time if needed	
17:30	End of Day	

SOOP Presentations

Part 1:

D. Spadaro: Coronal Dynamics, Density Fluctuations, CH Boundary Expansion, Eruption Watch: **20'**
H. Peter: RS Burst **5'**
S. Parenti, D. Berghmans: Nanoflares **5'**
G. Valori, L. Bellot Rubio S. Parenti: AR Long term **5'**
A. Fludra, A. Zhukov: Polar observations **5'**
A. Fludra, D. Berghmans, J. Hirzberger: AR Heating, Bright points **10'**

Interchanged

Part 2:

L. Bellot Rubio: Atmospheric Dynamics Structure **5'**
D. Berghmans, F. Auchère: Full Disk mosaic **5'**
T. Appourchaux, J. Schou: Full Disk Helioseismology **5'**
A. Zhukov: PSP quadratures **5'**
S. Yardley: Slow Wind connection **5'**
A. Giunta, N. Zambrana Prado, D. Hassler: Connection Mosaic **5'**
F. Auchère, V. Andretta: Coronal He Abundance **5'**

WHY this meeting?

SCIENCE

- Are the observations made adequate to address a given SOOP's science objectives?
- What are the first/preliminary science outcomes from the SOOPs?
- What worked? What didn’t?

WHY this meeting?

SCIENCE

- Are the observations made adequate to address a given SOOP's science objectives?
- What are the first/preliminary science outcomes from the SOOPs?
- What worked? What didn't?

- **Expected feedback from this meeting:**
  - Make sure future SOOP instances have the right support to run for best outcome
  - What to expect for the next round of RSWs? (Most SOOPs repeated from LTP-6)
  - Decision to be made by the SWT in February for LTP-13: inputs will help decisions (e.g. necessary time intervals, orbit placements to run SOOPs, supports required between instruments + other assets, …)

WHY this meeting?

OPERATIONAL

SOOP coordination means **different degrees of involvement:**

- What SOOP to be run / what science data are we getting?
- What instruments to use / how to use them?
- Attending different meetings, e.g. SOWG, pointing decision meeting, …

What worked & what didn't from an operational perspective?

pVSTP in the Remote Sensing Windows of LTP09

David Williams

09/12/2022

ESA UNCLASSIFIED – For ESA Official Use Only

The pVSTP process (1/2)

1. **SWT** decides the timing of RS Windows and the rough placement of SOOPs within them, for a ~ 6-month period of time (usually 1st or 2nd half of a year).
    - This means we know what **types of targets** we will have for each SOOP
    - Informs when we need to ask Flight Dynamics to allocate pVSTP opportunities.

2. SOC prepares a **pre-LTP Technical Note** for a 3-month LTP inside that 6-month period, including the pVSTP requests
    - This lets the MOC prepare all the inputs we need for Long-Term Planning by the SOWG

3. MOC sends SOC the FECS and PTEL event files, including real **times of the available VSTP_UPDATE slots**

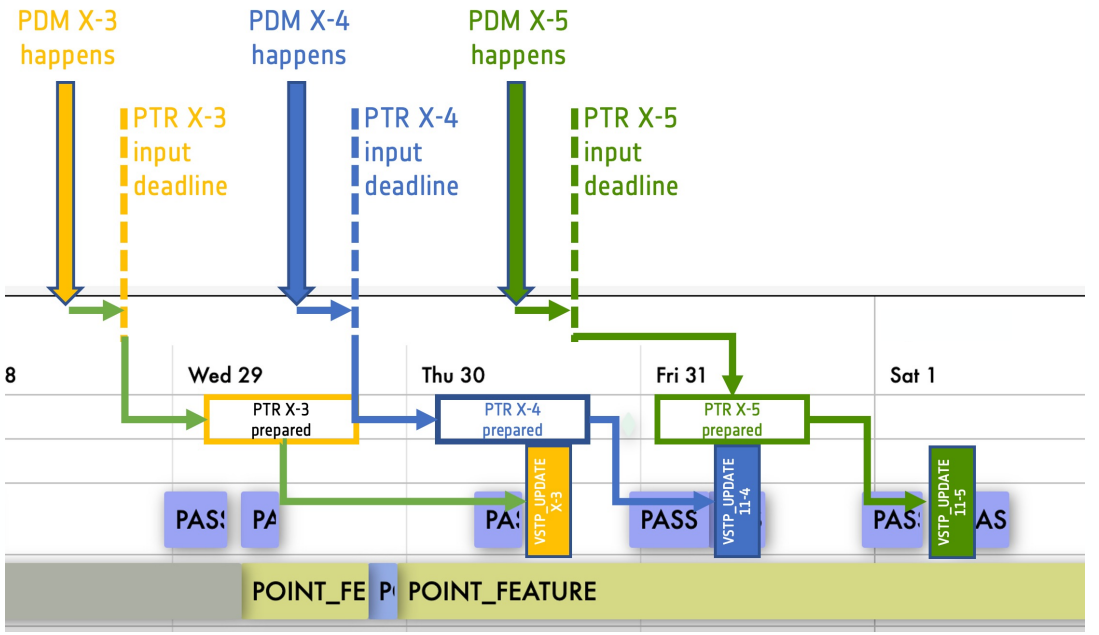
The pVSTP process (2/2)

4. **The SOWG agrees the LTP plan**, taking into account the VSTP_UPDATE slots so that pointings can be updated at the right times by pVSTP.

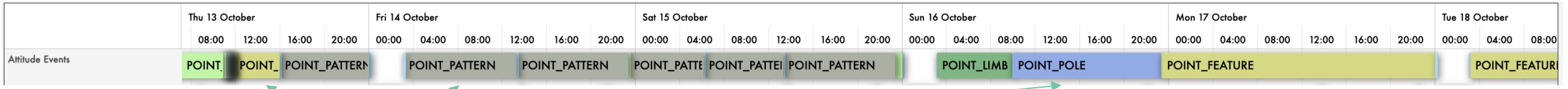
5. SOC prepares **schedule of Pointing Decision Meetings**
   - Each meeting has to take place so that we send a decision to Flight Dynamics (in a PTR file) ahead of the working day when FD will prepare it for upload.

6. **SOOP Coordinators** (or their designated replacement) attend all **meetings where their SOOP's pointing is to be decided.** SOC and MADAWG assist. Pointing decisions are taken and confirmed.

7. **SOC sends all relevant decisions** to ESOC in Carrington coordinates with an epoch as a PTR file.



What are we choosing the pointing *of?*



- Pointing type is always scheduled at LTP because it defines the type of scientific target and, thus, some of the observational parameters:

POINT_CENTRE	Disc-centre pointing
POINT_POLE	Pole pointing
POINT_LIMB	Pointing somewhere on the limb
POINT_FEATURE	Tracking of a feature
POINT_PATTERN	A single dwell within any grouped pattern of pointings
POINT_OTHER	Not yet used

- The pointing type in green is an easy case where this won't change. Those **in blue** are the main subject of the Pointing Decision Meetings (PDMs), with POINT_FEATURE the most common type in LTPs 06 and 09.

- A default pointing (in Carrington coordinates) must be given to Flight Dynamics, 1 month ahead of execution, as a backup in case pVSTP not make it on board in time.

One last point on target selection

- **This a process that starts EARLY**
  - It starts once the SOOPs, and their coordinators, have been selected for the Mission Level Plan by the SWT

- SOOP Coordinators must therefore be involved from that point… right through until pVSTP, a couple of days before execution of the observations.

Choosing coordinates for the target

- Pointing selection itself
  - **JHelioviewer** was used to select target pointings during the meetings
    - This will be the case during LTP11, too.
  - All pVSTP assumes that we have input image files with good metadata so that we can transform the target to Carrington (input) coordinates.

- The **scientific target is not always the same as the S/C pointing**.
  These exceptions chiefly fell into 1 of 2 categories:
  1. S/C pointing is tuned knowing the offset from the S/C boresight to the boresight of the instrument whose FoV is considered most important
  2. The projected FoV of the Solar Orbiter instrument(s) onto the Earth view is so long that the Coordinator considers it more useful for the Earth-based/-orbiting instruments to focus on a particular part of this projected FoV that is not best represented by the S/C or instrument boresight.

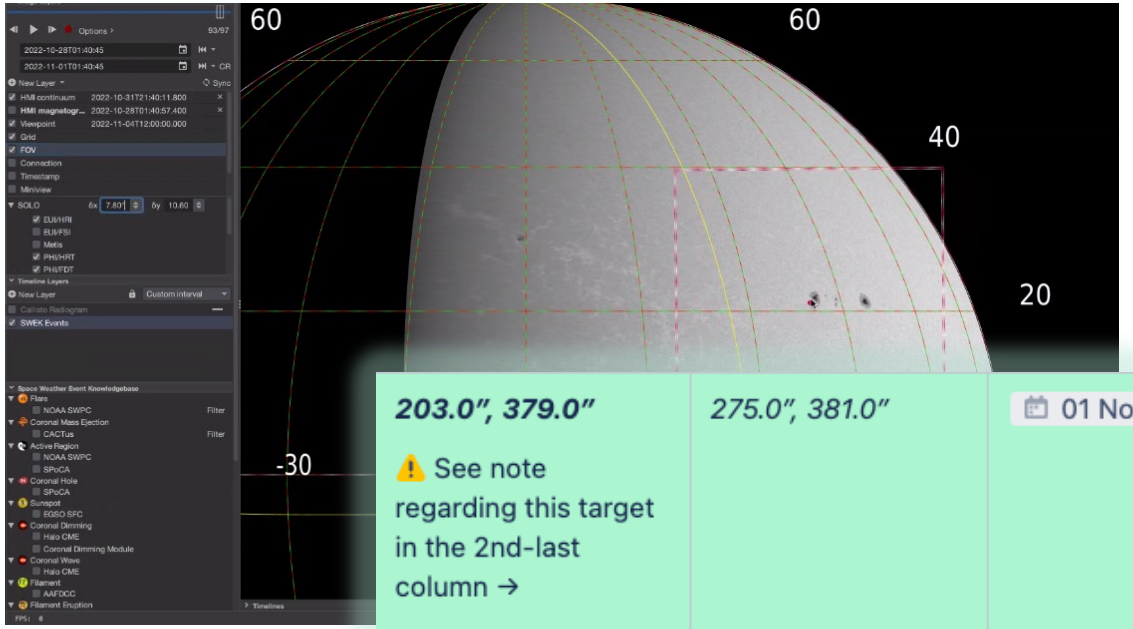
Exception #1

- An instrument can in principle be designated as the **prime boresight** for feature-tracking in a SOOP, such that SOC takes into account its offset from the S/C boresight.
  - *e.g.*, a high-resolution instrument sub-fields their FOV, and needs to make sure they don't miss the intended target

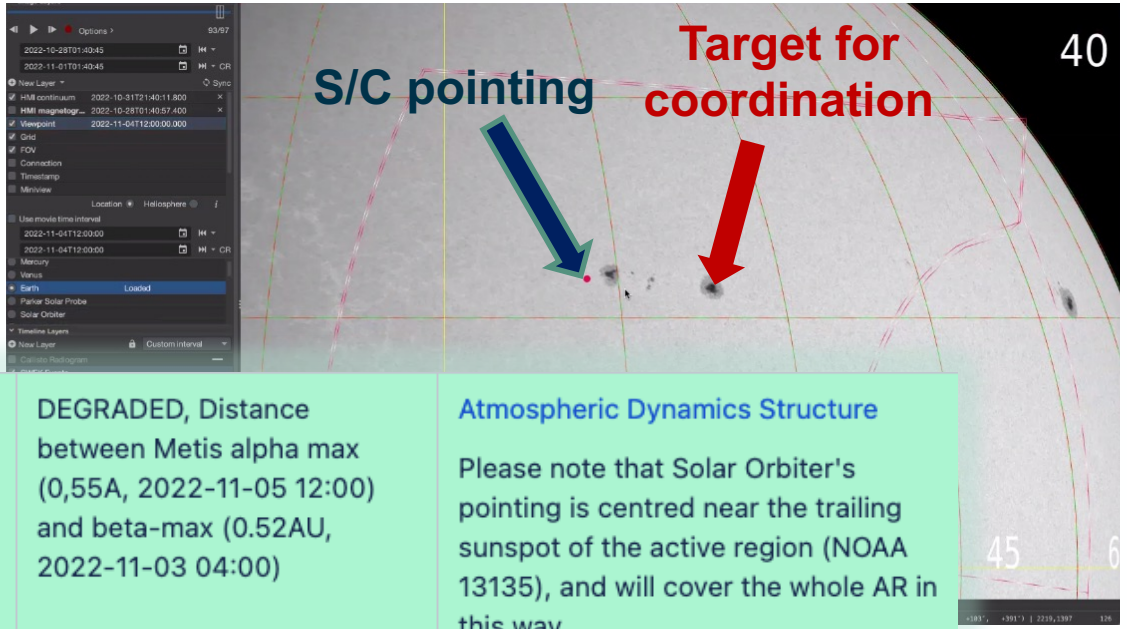
- In practice, this time around we had no boresight offset information via the formal route (Boresight Update files), so we manually adjusted S/C pointing to try and account for this offset.
  - This will be done *more* transparently from LTP11

Exception #2

Solar Orbiter view



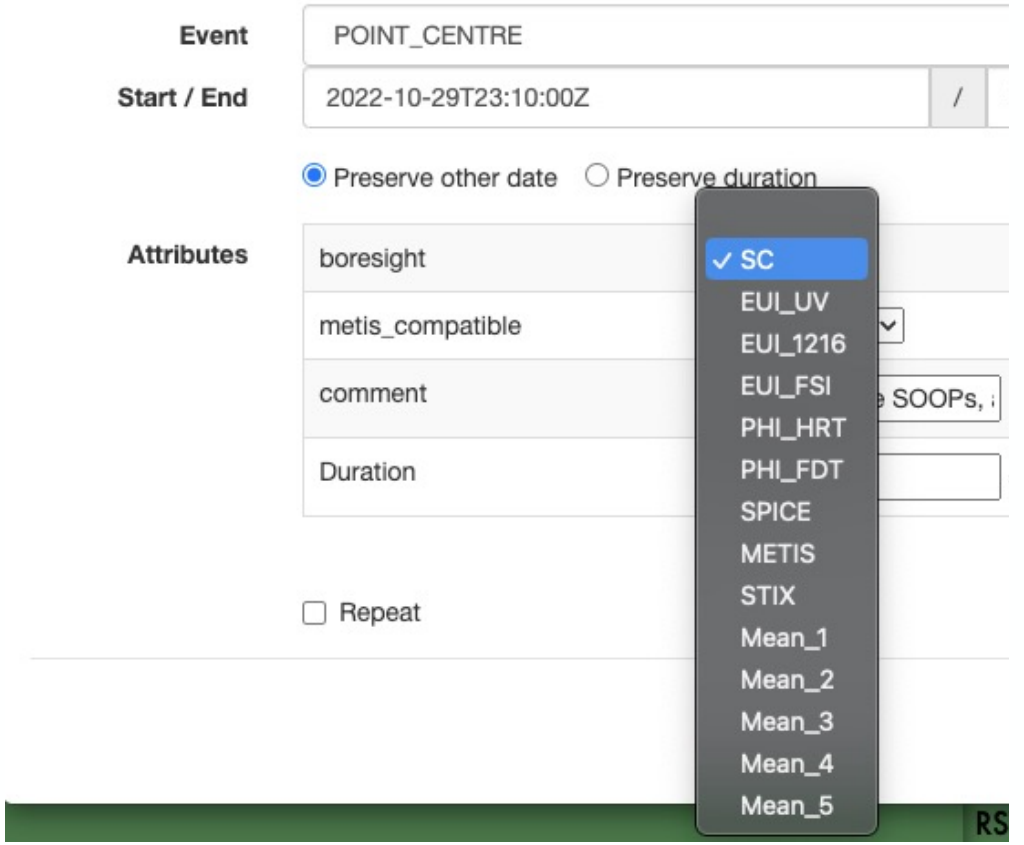
Earth view



203.0", 379.0" ⚠ See note regarding this target in the 2nd-last column →	*275.0", 381.0"*	01 Nov 2022	DEGRADED, Distance between Metis alpha max (0,55A, 2022-11-05 12:00) and beta-max (0.52AU, 2022-11-03 04:00)	Atmospheric Dynamics Structure Please note that Solar Orbiter's pointing is centred near the trailing sunspot of the active region (NOAA 13135), and will cover the whole AR in this way. ⚠ **For collaborating observatories/instruments**, particularly those with a smaller field of view, please focus primarily on the **centre of the umbra of the leading sunspot** (or as best you are able to determine the centre when preparing your instrument commands).

Challenges & Improvements (1/2)

1. The communication of target pointings to outside teams (observatories on the ground and in Earth orbit) was done via a table that contained the pointing times and coordinates in Carrington and Earth (Helioprojective-Cartesian) systems.
    - A lot of manual correction was needed in this process, and we discovered bugs in the interpretation of the end Carrington coordinates. (Now fixed.)
    - To correct for other instruments' boresight offset from S/C, we will ultimately need them as BSUP files (see SOL-SGS-ICD-0010).
    - In the future, we should record the prime boresight choice instrument in the LTP plan (opposite)
    - We will also be able to offset the S/C boresight after the target is selected at pVSTP to account for this. (Useful if things evolve.)



Challenges & Improvements (2/2)

2. During LTPs 06 and 09, we relied heavily on EUI LL02 images, as well as *SDO*/HMI+AIA
    - EUI data still have to be limb-fitted to correct residual pointing errors
        - When this could not be done by ROB, because of EDDS connection problems, we had no EUI data for pointing. Fortunately, Earth view was similar to *Solar Orbiter*'s at this point.
    - Use of PHI was not yet practicable (focus issue)
        - Will we have this in time for the RSWs of LTP11?

3. In general, the meetings became rather efficient, but at the start of the 1st RSWs there was a lot of discussion, even confusion, among participants about the process and the meaning of certain terms (*e.g.*, the *target*).
    - One suggestion is to provide a step-by-step manual for SOOP Coordinators, so that they know:
        - what to attend
        - what information to prepare
        - how to select pointings,
        - *etc.*,
    - …from start to finish.

Looking into the future:

On the SOOP coordination side, few things will be implemented to provide a ‘standardised’ system

(but please know that this is always a work in progress!)

- SOOP overview roadmap (how to get involved, who to contact, what’s the timeline)
- SOOP pages updated: useful for future coordinators + can serve as a repo page for scientific outcomes

Demo of Roadmap Page will be presented

- SOOP coordinators will be contact for *Hinode* coordination (at least) so that HOP will be sent as a whole from the SO side.