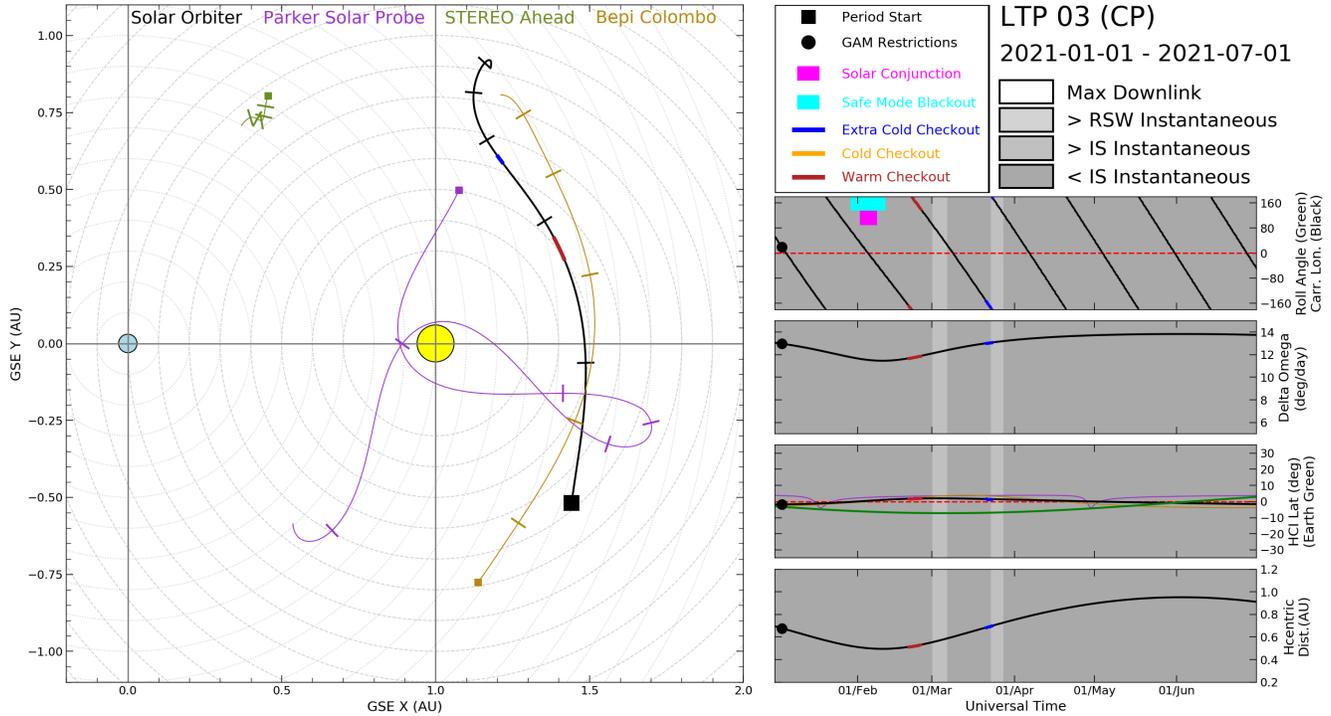


LTP03 Jan 2021-June 2021

Orbital context

Plots are in GSE (geocentric solar ecliptic) coordinates, so Earth is at [0,0], the Sun is at [1,0]. The plot is the projection of the orbit on the ecliptic plane.



Animated Version: [Orbit_LTP03.mp4](#)

New definition for the grey shading representing downlink rates:

- white = maximum downlink rate at which you can empty the SSMM in ~10 days
- light-grey = SSMM fill state decreases with everyone operating at EID-A rates
- mid-grey = SSMM fill state increases within RSW (10 instruments operating) and decreases outside RSW (IS-only breakeven rate < downlink rate < inside-RSW breakeven rate)
- dark-grey = SSMM fill state increases with just IS operating (downlink rate < IS-only breakeven rate)

RS checkout window placement

Period	Window /GAM	EXT Start	Start	End	Heliocentric Distance Range [AU]			Heliographic Latitude Range [deg]			SC-Sun-Earth Angle [deg]			Conjunction	Safe Mode Comms Blackout	Largest Comms Roll	GAM Restrictions
LTP 03	RSCW2 (warm)	n/a	2021-02-20T00:00:00	2021-02-25T00:00:00	0.5	0.5	0.5	2.172	2.22	2.22	145.04	140.22	135.70	no	no	0 (TBC)	no
LTP 03	RSCW3 (extra-cold)	n/a	2021-03-21T00:00:00	2021-03-24T00:00:00	0.6	0.6	0.7	1.31	1.23	1.15	107.79	106.82	105.92	no	no	0 (TBC)	no

GAMs and conjunctions

- Superior conjunction from 2021-02-01 to 2021-02-08 (in practice, there may be no SSMM dumps between 2021-01-29 and 2021-02-12)
- No GAM

Science and calibration planning

In blue: Updates made after MLP planning for LTP3 (MLP of Cruise during SWT#27). Red text refers to work to do during SOWG16.

IS science + second and third opportunity for RS payload to characterise and calibrate the instruments.

- IS modes: as in SOOP Kitchen plan (link below, confirmed by ISWG of 31 Mar '20), updated by SOC in Aug 2020 to use extra available downlink: all low rates removed +3 weeks of high rate MAG, RPW and SWA observations around perihelion. **More suggestions for optimisation are welcome.**
- Note that there will be a week-long gap in the IS science operations in January 2021, for the CSW update incl pointing stability updates. The exact dates are still TBC. SOOP Kitchen shows a placeholder for the CSW update in STP-131.
- MAG calibration roll on 2021-01-07T16:00:00 - 2021-01-08T05:16:40 (heliocentric distance ~0.65 AU).
- Specific calibration campaigns for PHI and Metis have been scheduled respectively in Jan 2021 (involving offpoints) and Feb 2021 (involving rolls).
- **RSCW2:** 5-day window of RS instrument specific characterisation and calibration campaigns (warm checkout, ~0.52 AU). **Currently Low-TM campaigns scheduled, to be optimised for higher downlink.**
- **RSCW3:** 3-day window of RS instrument specific characterisation and calibration campaigns (extra-cold checkout, ~0.7 AU). **Currently Low-TM campaigns scheduled, to be optimised for higher downlink.**

Coordinated campaigns:

- **Before RSCW2:** Discuss possibility to add a synoptic program coordinated between (some) RS instruments, close to perihelion, i.e between the conjunction and RSCW2 (Feb 2020).
- RSCW2: PHI+EUI coordinated **Offpointing Mosaic for Flatfielding** with FDT and FSI (campaign details in [TN-0019](#)) ★. This campaign is scheduled at 2021-02-21T06:00:00Z - 2021-02-21T07:00:00
- RSCW2: **S/C Rolls (8 roll positions)** for Metis and HI calibrations (campaign details in [TN-0018](#) Sect 2.2). EUI also plans to take part in the campaign. Scheduled at [2021-02-23T00:00:00 - 2021-02-23T07:20:00](#) ★
 - The campaign includes 8 rolls to angles 0, 45, 90, 135, 180, 225, 270, 335°. Dwell times will be set to 30mins (confirmed by Metis and SoloHI).
 - Campaign duration has been adjusted with confirmed rolling and dwell times. Each 45° roll takes about 25 mins + 30mins dwell time, so the full campaign takes 7hrs20mins.
 - Metis observations VL_POL, VL_SL1 and VL_SL2 all belong to the roll campaign.
 - After confirmation from PIs (telecon 30/4/20):
 - a dedicated EUI contribution was added to the timeline
 - an extra PHI contribution was added to the timeline
 - the whole campaign got moved from original start 2021-02-20T02:00:00
- (RSCW3: no coordinated activities)
- **After RSCW3: Coordinated Star Calibration campaign** ★ (context in [TN-0037](#)) between Metis, EUI/HRI, and SPICE, featuring Theta Ophiuchi. Has been scheduled tentatively on 2021-03-27 in SPKT, with Metis observations extending from 2021-03-24 to 2021-03-29 (exact times TBC at STP, **offpointing will happen during OFFPOI_CALIB_STAR event**).
- **After RSCW3: Star Calibration campaign**, limited to Metis (**), featuring sigma sgr. Scheduled in SOOP Kitchen with Metis observations extending from 2021-04-08 to 14 (**exact range TBC**).
- **After RSCW3:** Discuss possibility to add a synoptic program coordinated between (some) RS instruments, close to the PSP perihelion. SoloHI will observe PSP in FOV in April. EUI/PHI could potentially support later, close to PSP perihelion on April 29.

★ Note that off-pointing sequences and rolls were requested to MOC (flight dynamics) *before* LTP planning and timing/details cannot be changed anymore at time of Long Term Planning. **Final consolidation has been done at SWT 27 (spring 2020).** Off-pointing, roll and dwell events are now part of the [LTP plan in SOOP Kitchen - link below](#).

(**) Note that originally we planned to coordinate observations of Sigma Sgr, but analysis with new orbit file revealed that we don't get an actual occultation, and as the star does not approach the limb to within 10 arcmins, the high-res telescopes cannot observe it. See attached [figure](#): Y axis is angular distance from the limb in radians.

Opportunities for Coordination with PSP

During this planning period there are several interesting opportunities for coordinated observations with Parker Solar Probe:

- 19 January: Quadrature soon after PSP perihelion #7 (17 January). PSP is at +Y SOLO SRF relative to Solar Orbiter (towards Solar East). At this time Solar Orbiter is at around 0.6AU heliocentric distance. Note that the CSW might be updated during this period.
- 3 February: Solar Orbiter & PSP at same radial distance (0.5 AU) Separated by ~15 degrees in longitude. Note this is likely to be during a conjunction for Solar Orbiter
- 29 April: PSP Perihelion #8, Radial alignment. Quadrature (Solar Orbiter -Y / Solar West side) soon after. Solar Orbiter in quadrature with Earth at 0.8AU. Likely to be a Parker spiral alignment during this interval as well. STEREO-A half way between the Solo & Earth. **This is a good opportunity (STP-145).**

More details on [SO-PSP Coordination WG](#)

SOOP Kitchen plan

High-level (=MLP) plan of whole cruise:

- Original, pre-launch version was: <https://solarorbiter.esac.esa.int/soopkitchen/#/planning/plan/MLP%20Feb%202020> (archived)
- Updated with new orbit file and new observation definitions to: https://solarorbiter.esac.esa.int/soopkitchen/#/planning/plan/MLP_Cruise (baseline 5 is the version at end of MLP for LTP3)

Starting point for LTP03 planning in SOWG#16: https://solarorbiter.esac.esa.int/soopkitchen/#/planning/plan/LTP03_Jan2021-Jun2021

Final plan LTP03: https://solarorbiter.esac.esa.int/soopkitchen/#/planning/plan/LTP03_Jan2021-Jun2021_PostSOWG

Date of original distribution of LTP products (v 04) to GFTS: 27 Nov 2020 The released version (v04) corresponded to baseline 14 / version 332 and included the changes listed here: [changes made to LTP03 post-SOWG 16](#).

Date of distribution of latest products (v 05) to GFTS: 19 Feb 2021 (The released version (v05) corresponds to baseline 15 / version 353.) This version is designed to further add RSW_EXT_METIS and HSD opening/closing for Metis around urgently needed UV calibration measurements of standard stars between 15th and 17th March 2021 (in STP-139), along with associated disturbance events ATT_DIST and EMC_PREF_NOISY.

Changes made to the LTP03 plan after the SOWG:

You can find a list of the [changes made to LTP03 post-SOWG 16 here](#).