RPW Consortium Meeting #19
Solar Orbiter Status

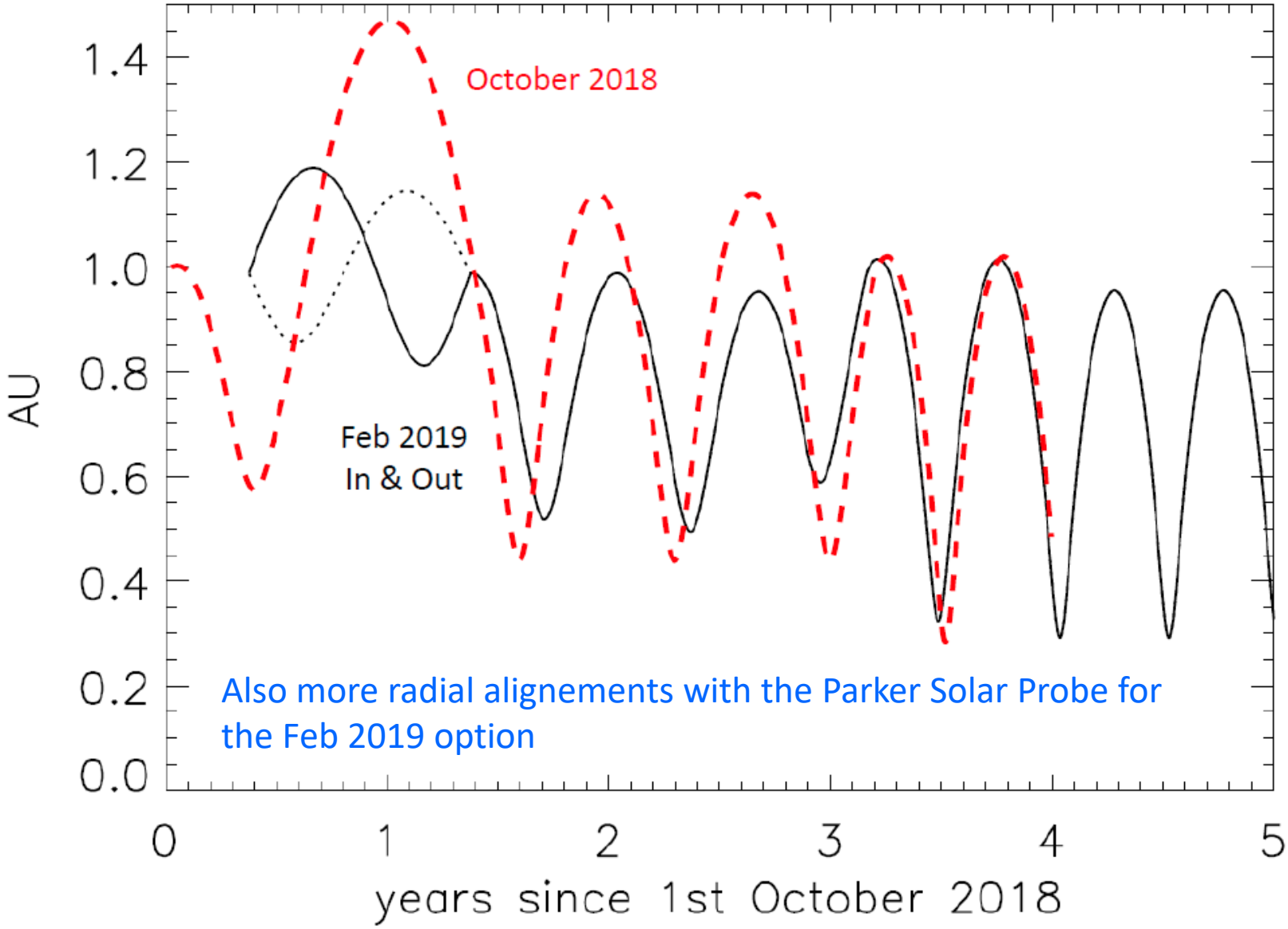
M. Maksimovic

19-21 June 2017,
KTH, Stockholm

- Project redirected for a launch in Feb 2019 but awaits formal NASA confirmation of launcher availability
- NASA's mission analysis confirmed feasibility of launch in February 2019 and February 2020
- Additional launch scenarii are studied by ESOC between these two dates

Parameter	Oct 2018 baseline	Oct 2018 Option E	Feb 2019	Feb 2020
Time from launch to NMP	3.2 yrs	2.3 yrs	2.8 yrs	1.8 yrs
Time to 1st perih. < 0.3 AU	3.5 yrs	3.5 yrs	3.68 yrs	2.68 yrs
Min perihelion (NMP)	0.28 AU	0.28 AU	0.28 AU	0.28 AU
Max solar inclination (EMP)	33.4°	33.9°	30.2°	33.4°
Time spent < 0.3AU	62 days	71 days	79 days	79 days
Time spent < 0.4AU	321 days	491 days	407 days	463 days
Total potential telemetry*	16432 Gbit	33576 Gbit	30520 Gbit	33400 Gbit
Total duration	9.5 yrs	10.5 yrs	10.7 yrs	10.6 yrs

*Source: SOC document SOL-SGS-TN-0016

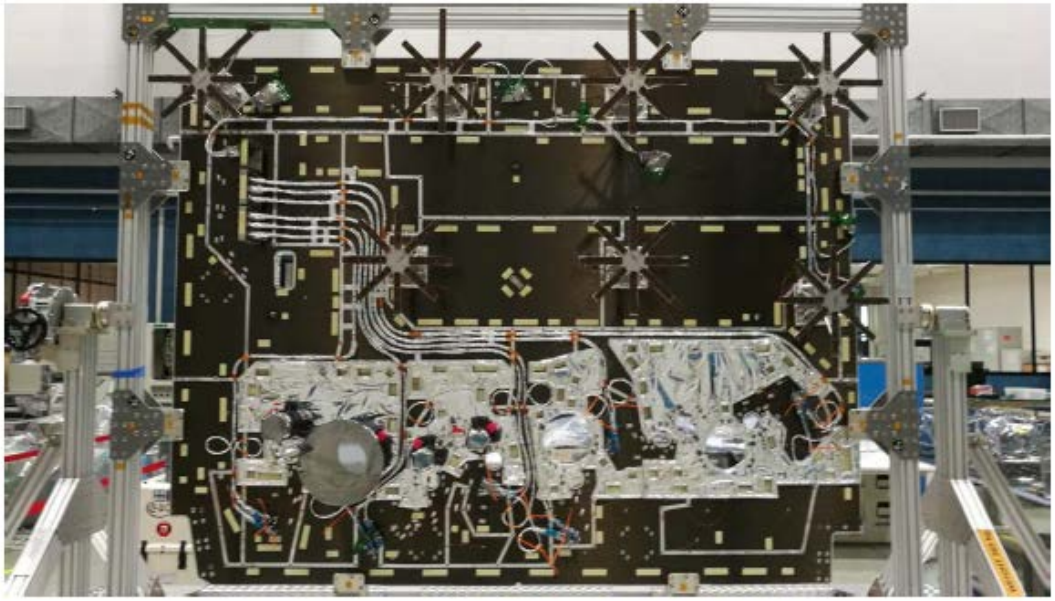

October 2018
Feb 2019
In & Out
AU
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
years since 1st October 2018
Also more radial alignements with the Parker Solar Probe for the Feb 2019 option

Schedule

- To secure the launch date in February 2019: supporting measures implemented
  - Increased working rhythm as from 1 May 2017
  - Keep industrial milestones in line with launch readiness for October 2018 (considering instrument deliveries as defined in March 2017)
  - Keep schedule contingency of about 3.5 months at ESA
  - Keep clear "last possible" delivery dates for each instrument, with the understanding that instrument might be disembarked if not delivered
- Detailed schedule had to often adjusted to accommodate "local" delays / implement workarounds at industry and instruments level
- Current schedule shows some loss of contingency – down to 3 months

- Currently the schedules for all instruments indicate deliveries on (more or less) due time !
- This is the case for RPW (with the associated risks)

Heat-Shield



Heat-shield end May 2017 at IABG (TAS-I)

Solar-Arrays

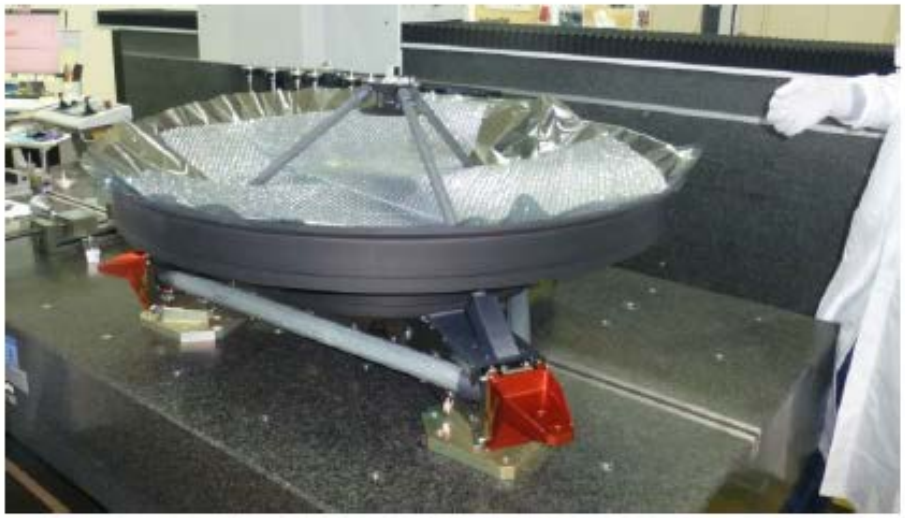
FM Equipment – Solar Array

Solar Generator
1st FM Wing
(front)

FM Equipment – Solar Array

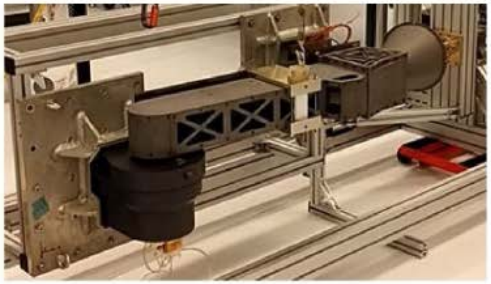
Solar Generator
1st FM Wing
(back)

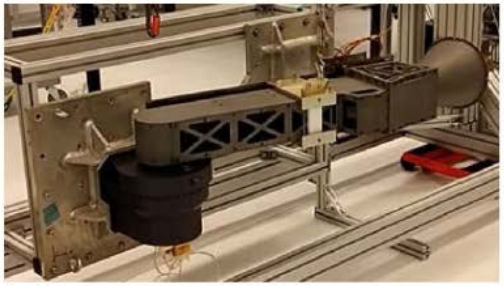
High Gain Antenna

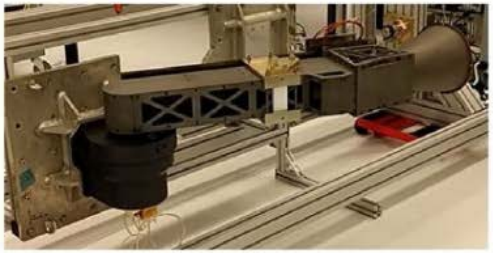


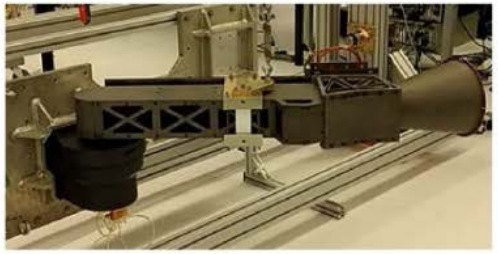
PFM Reflector before 3D metrology (March 2017)

HGA (Sener, 2017)







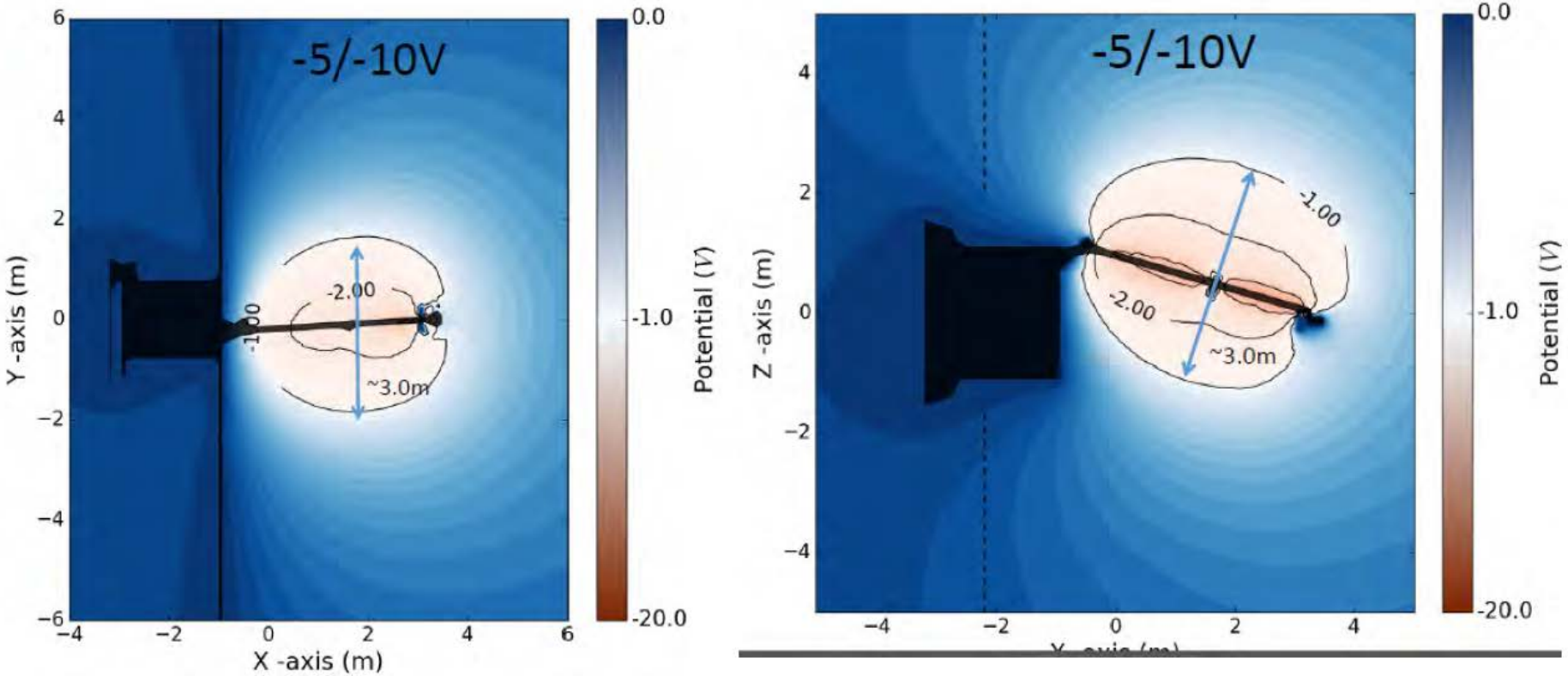


Medium Gain Antenna PFM Deployment

- Electro Magnetic Cleanliness Working Group
  - Characterization activities almost complete for S/C & payload
  - The final list of spurious frequencies is being processed
  - Largest impact is on TNR-HFR between 100 kHz & 1 MHz (the crystal controlled frequencies could be removed TBC)
  - Next important activity are the EMC test at S/C Level (next spring)
- Cleanliness & Contamination Working Group (CCWG)
  - The control board mandate is being terminated despite the uncompleteness of the contamination activities for the remote sensing instruments
  - The CCWG mandate and composition is being discussed (the project wants this WG to be « more efficient » in finding solutions
  - The main remaining issue for RPW is the potential impact of the icing on the instrument boom and creation of a non-condutive layer

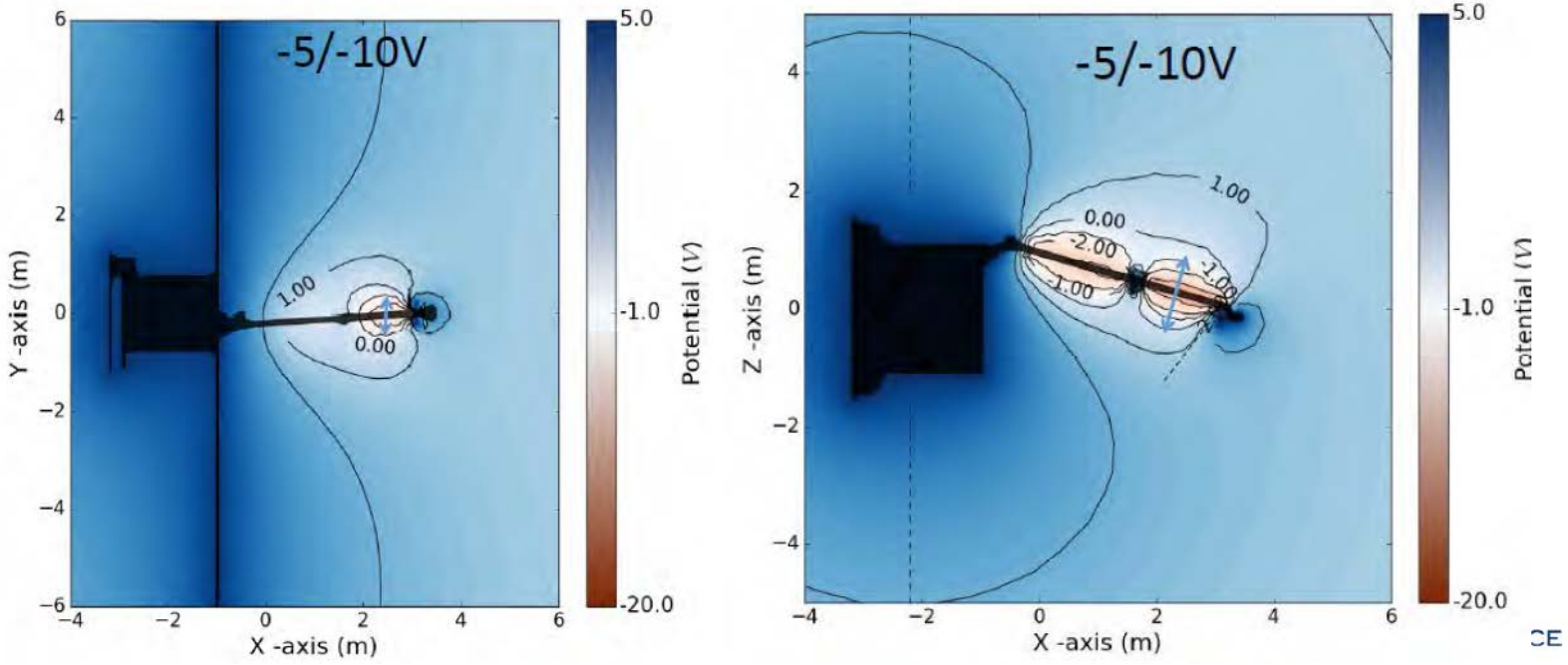
Voltage field predictions – Spacecraft at 0V

- Conservative case, spacecraft at 0V
- Configuration homogenous -10V on outer boom, -5V on inner boom, covering whole surface
- Close to EAS -10V assumed for bounding simulation, expect more like -5V
  - No impact at RPW
  - -2V contour largely encompassed by baffle or spacecraft FoV limitation in X-Y plane and EAS side of boom in X-Z plane



Voltage field predictions – Spacecraft at +5V

- Spacecraft assumed at +5V, per current charge charging predictions
- Configuration homogenous -10V on outer boom, -5V on inner boom, covering whole surface
- Close to EAS -10V assumed for bounding simulation, expect more like -5V
  - No impact at RPW
  - -1V contour very significantly encompassed by baffle or spacecraft FoV limitation in both X-Y plane and X-Z plane



Various manoeuvers are being discussed (including at Vgams) in order to remove the ice

Solar Orbiter Mission Book Table of Contents

(inspired from SOHO, STEREO, Cluster, SDO Mission books & SWT discussions)

- Foreword (TBD Senior Scientist - 2-3 pages)
- Preface (PSs - 2 pages)
- The Solar Orbiter Mission - An Overview (PSs - 30 pages)
  - Introduction
  - Science objectives
  - Coordinated RS+IS science
  - Instrument quick overview
  - Orbits and mission phases
  - Instrument operations (introduction) & instrument data volumes
- The Solar Orbiter spacecraft (ESA Project Team - 30 pages)
  - Spacecraft overview
  - Spacecraft subsystems
  - Instruments accommodation
  - Contamination Control Plan
  - EMC Control Plan

Solar Orbiter Mission Book Table of Contents

- Instrument papers (20 or 30 pages each)
  - EPD (Rodríguez-Pacheco et al.)
  - EUI (Rochus et al.)
  - MAG (Horbury et al.)
  - METIS (Antonucci et al.)
  - PHI (Solanki et al.)
  - RPW (Maksimovic et al.)
  - SPICE ("SPICE Consortium" + Alphabetical list of authors)
  - SoloHI (Howard et al.)
  - STIX (Krucker et al.)
  - SWA (Owen et al.)

Solar Orbiter Mission Book Table of Contents

- Coordination between In Situ instruments (ISWG chair: Horbury et al. - 10 pages)
- Coordination between Remote Sensing instruments (RSWG chair: Auchère et al. - 10 pages)
- Coordination with Space (SPP, BepiColombo) and Ground Observatories (Velli, PSs et al. - 20 pages)
- Theoretical modeling for the Solar Orbiter mission (MADAWG chair: Rouillard et al. - 20 pages)
- Solar Orbiter data analysis tools (AMDA, JHelioviewer, SunGlobe, SunPy) (Details to be discussed in MADAWG - 20 pages)
- Solar Orbiter Ground Segment, Science Operations, Data Products and Data Archive (SOC Manager, SOC team, PSs - 20 pages)
- Science Activity Plan (Zouganelis, SOC scientists, PSs, PIs, anyone with a modicum of contribution - 20 pages)

- Aim: book ready for launch and to be published in an open source / low-cost journal (as discussed at SWT-16).
- Astronomy & Astrophysics (agreed at SWT-17).
- Papers to be submitted by 31 december to the Project scientists and by January 2018 to to A&A
- Detailed outline with sections responsibles by 15 September
- Let's have a first discussion on this on Wednesday !

start time	duration	topic	Presenter
Monday 19 June 2017			
10:00	00:10	Welcome	Vaivads & Karlsson
10:10	02:20	**Science session (including coffee break) see https://goo.gl/f3MZXf for the detailed program**	
12:30	01:30	*Lunch break*	
14:00	00:20	Solar Orbiter Status	Maksimovic
14:20	01:00	RPW General status including antennas & MEB	Bellouard, Danto, Chaintreuil
15:20	00:30	System status	Guilhem
15:50	00:00	**Antenna Performances in DC/LF**	
15:50	00:30	*SPIS simulations for RPW*	Maksimovic
16:20	*00:30*	*Coffe break*	
16:50	00:30	*Determination of the DC/LF Efield & S/C potential - lessons learned from Cluster & MMS*	Khotyaintsev
17:20	00:00	**Antenna Performances in HF**	
17:20	00:15	*Measurements in free field in July 2017*	Guilhem
17:35		*end of day 1*	