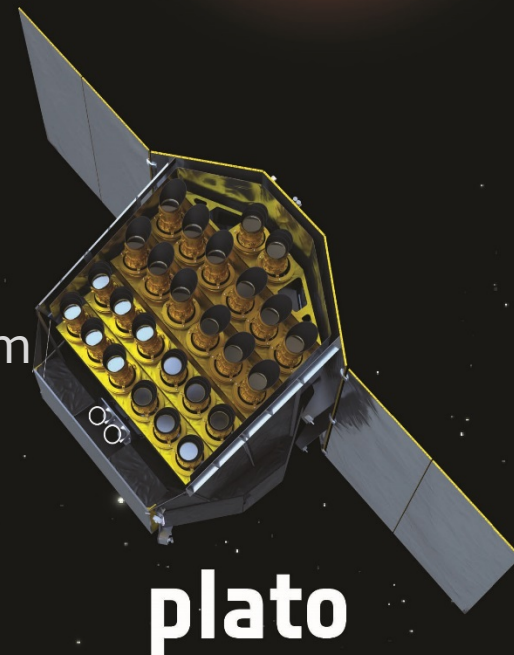


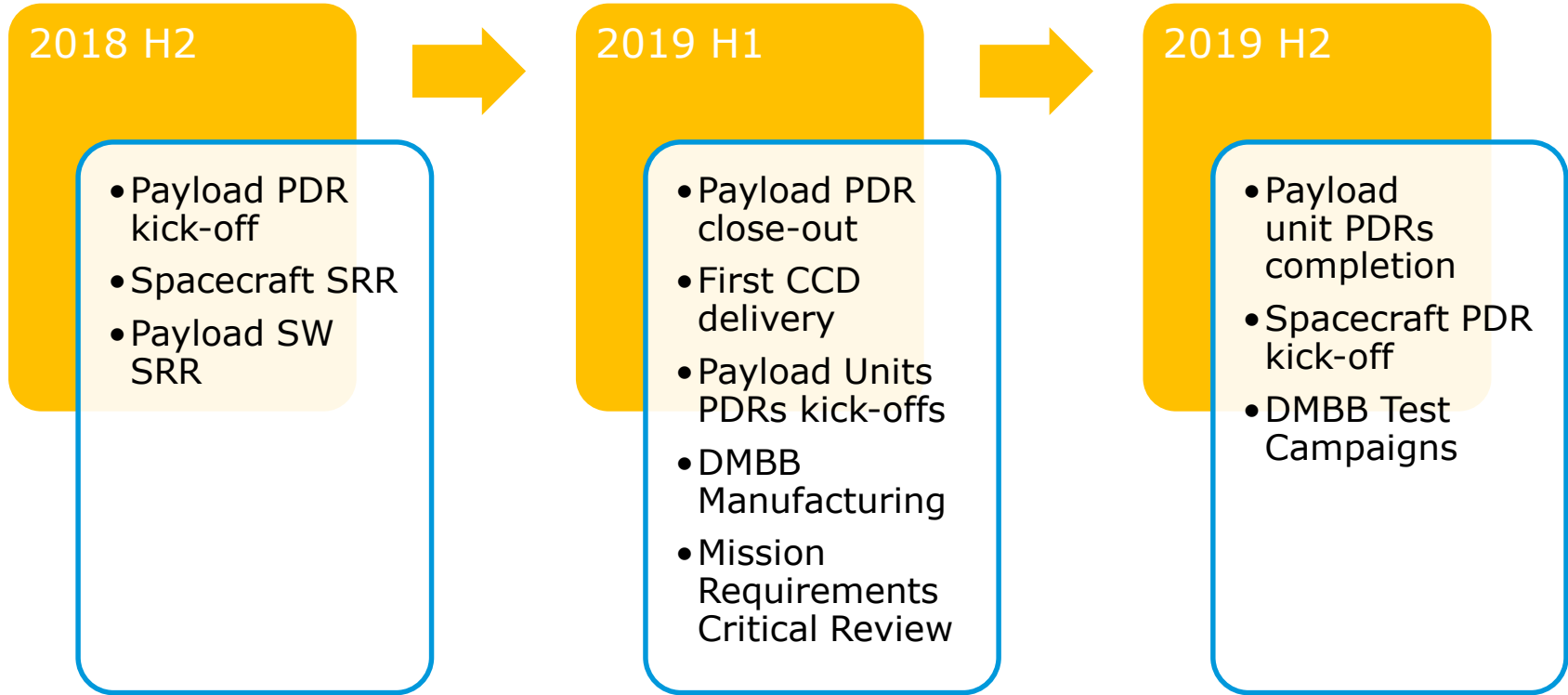
Mission status: the ESA perspective

A. Heras (Project Scientist) and the PLATO Team

19/11/2019



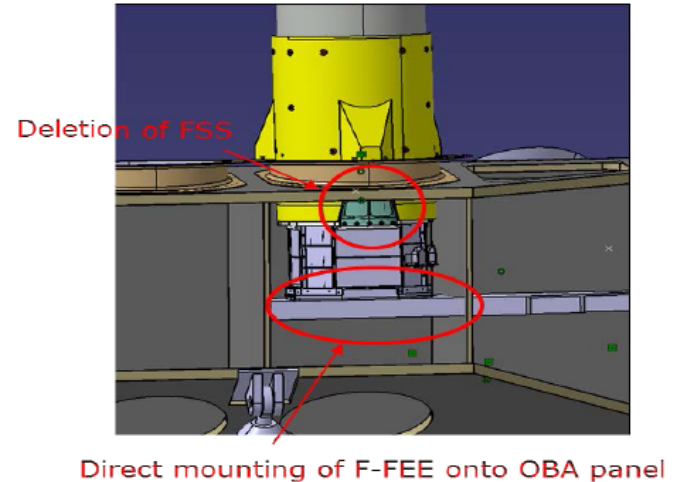
Project milestones



Spacecraft status – SRR successful

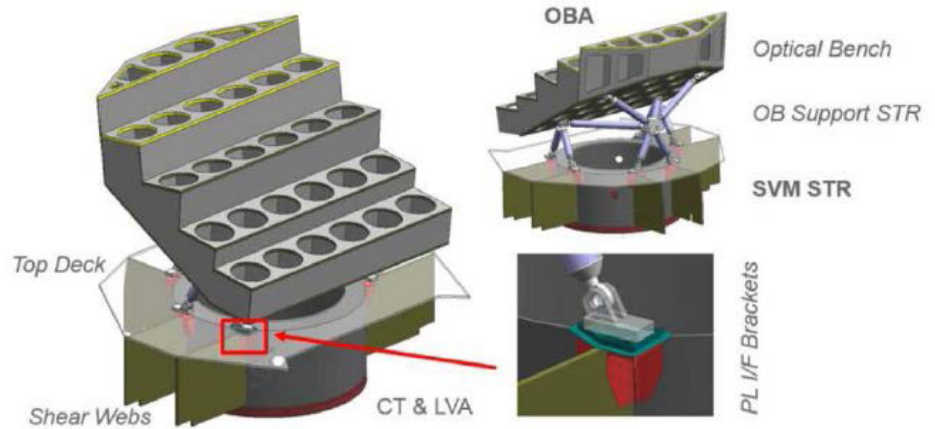
- Successful spacecraft System Requirements Review (SRR) (November 2018)
- Issue: Excessive power dissipation of Fast cameras Front-End Electronics (F-FEE)
 - Technical solution found, based on conductive coupling between F-FEE and Optical Bench Assembly
 - Significant design work is being done on both spacecraft and F-FEE, which will be finished for spacecraft PDR and F-FEE PDR respectively

Mounting principle

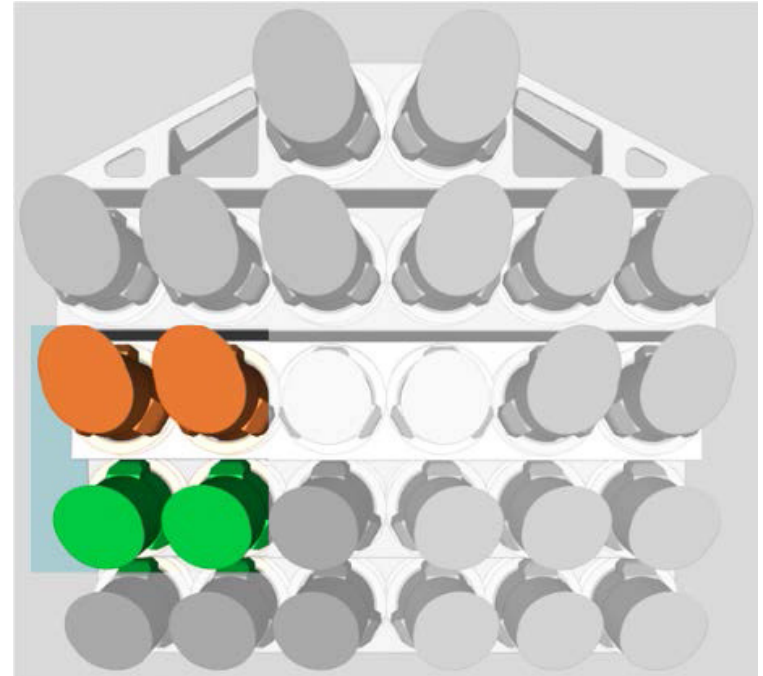


Spacecraft status – Isostatic decoupling

- Isostatic decoupling between Service Module and Optical Bench Assembly improved with flex joints (less risky solution with similar performance) instead of spherical bearings
- Characterization tests close to completion

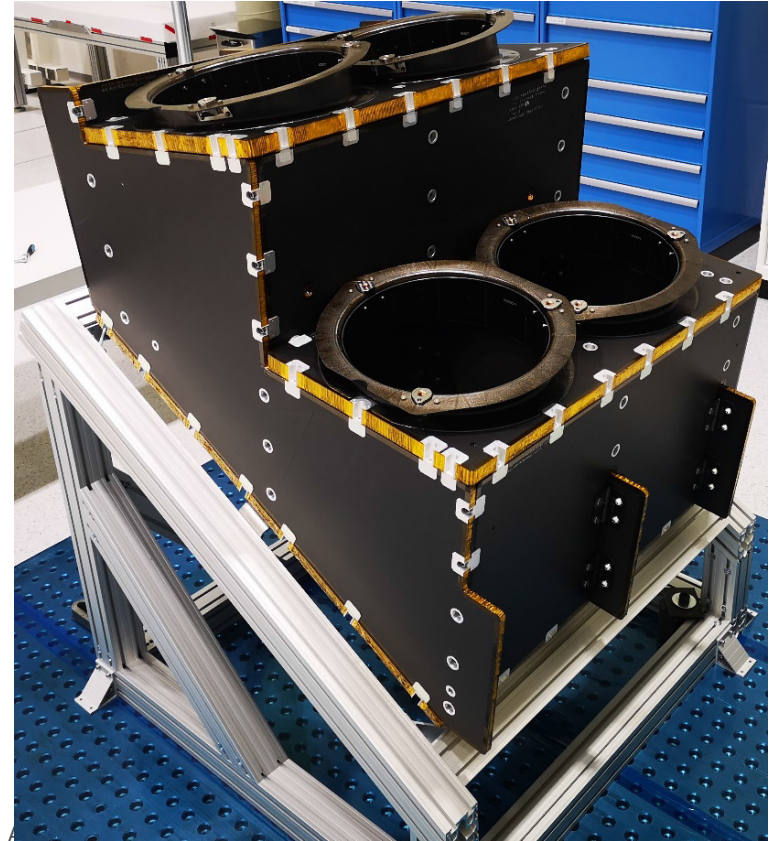


The investigation on the thermo-elastic distortion (TED) is considered one of the early key developments to confirm that the scientific requirements on the pointing stability of the instrument can be met.



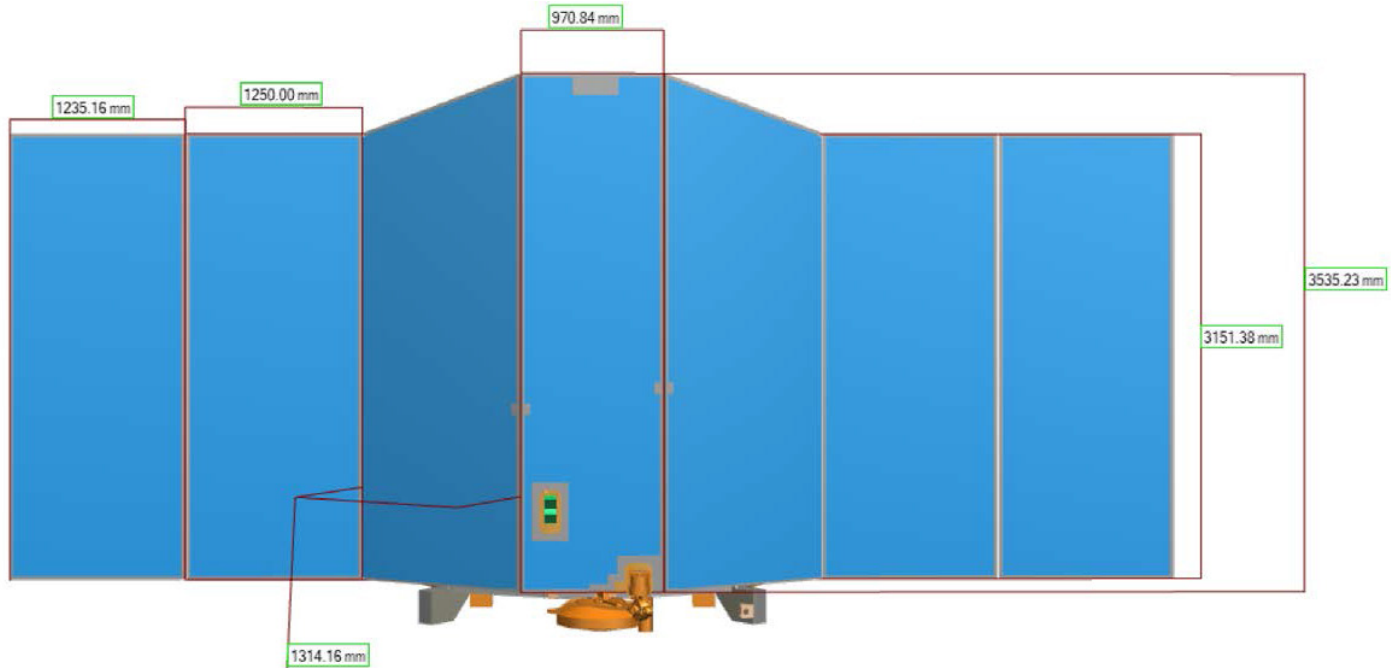
Manufacturing and test of an early Development Model Breadboard (DMBB):

1. to correlate the Thermal Mathematical Model of the Optical Bench
 2. to demonstrate the (novel) measurement technique and measure TED stability under as close as possible in-orbit boundary conditions.
- Interferometry tests carried out in August
 - Videogrametry tests in progress at ESTEC



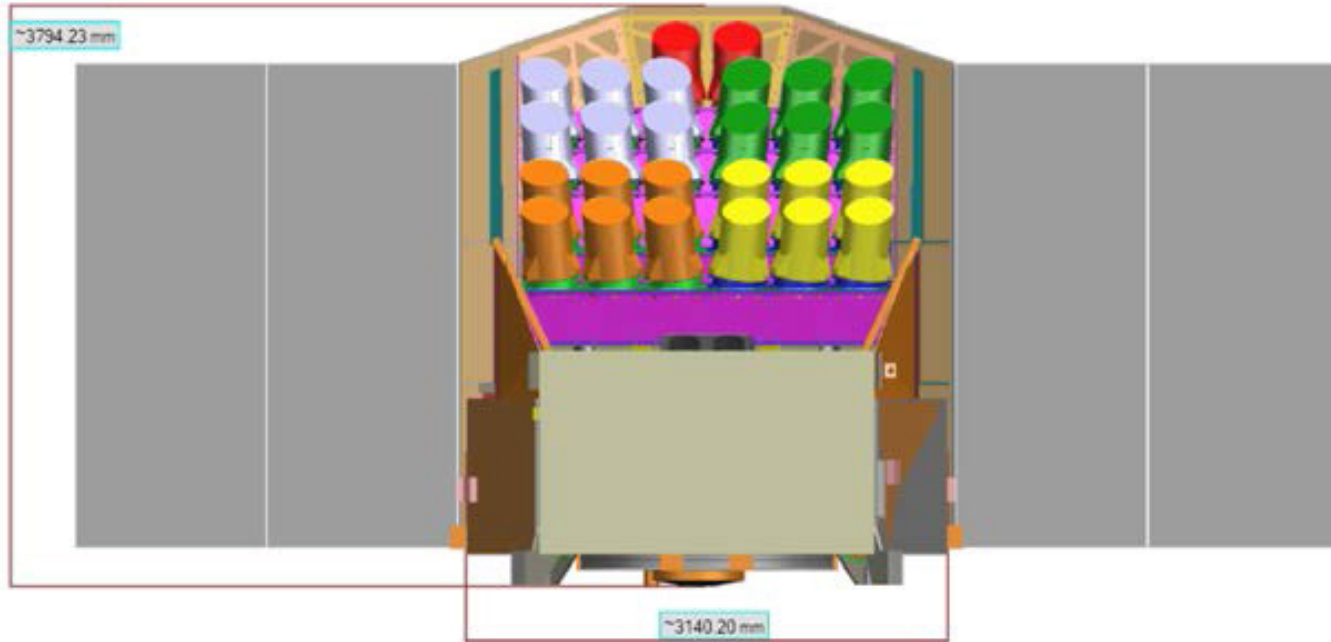
Spacecraft status – Power budget

Sunshield concept under revision to allow power increase: Sunshield/solar array envelope of 8.61 m length



Spacecraft status – Power budget

Sunshield concept under revision to allow power increase: Sunshield/solar array envelope of 8.61 m length



Mission Critical Requirements Review



Mission level review assesses:

- Mission Requirements flow-down and consistency
- Mission Performance (against Mission Req. Doc. requirements)
- Mission Architecture and development status
- Mission segment interfaces
- Mission Operations and Calibration
- Launcher progress and interfaces

The Review was declared successful

- The objectives of the Mission RCR are all **achieved**. A number of recommendations were issued
- No major issue identified. Ariane 6.2 considered as the only viable launcher in the PLATO launch date



- Successful Payload Preliminary Design Review (PDR, March 2019), with actions:

Improve performance budget top-down definition	Refine optical design and check feasibility and manufacturability of the Telescope: Feasibility and manufacturability of the L1 aspheric lens was shown via prototyping
Reinforce interface management and system engineering	Reinforce MAIV and organise an AIV review with test houses: MAIV Coordination group formed
Close follow-up of payload elements not yet funded	Reinforce schedule management: Schedule Coordination group established

Payload Unit PDRs



Unit	Status
FEU	Review successful
AEU	In progress
MEU	Review successful
N-FEE	Review declared not successful; delta-PDR necessary. New data package received in November.
ICU	Board meeting by end November.
FPA	Review successful
F-FEE	In progress
Camera MLI	Review successful
TOU PDR#1	Report under finalisation for Part 1 Board
TOU PDR#2	Kick-off in Jan 2020
MAIV Review	In progress
SW PDR	In progress

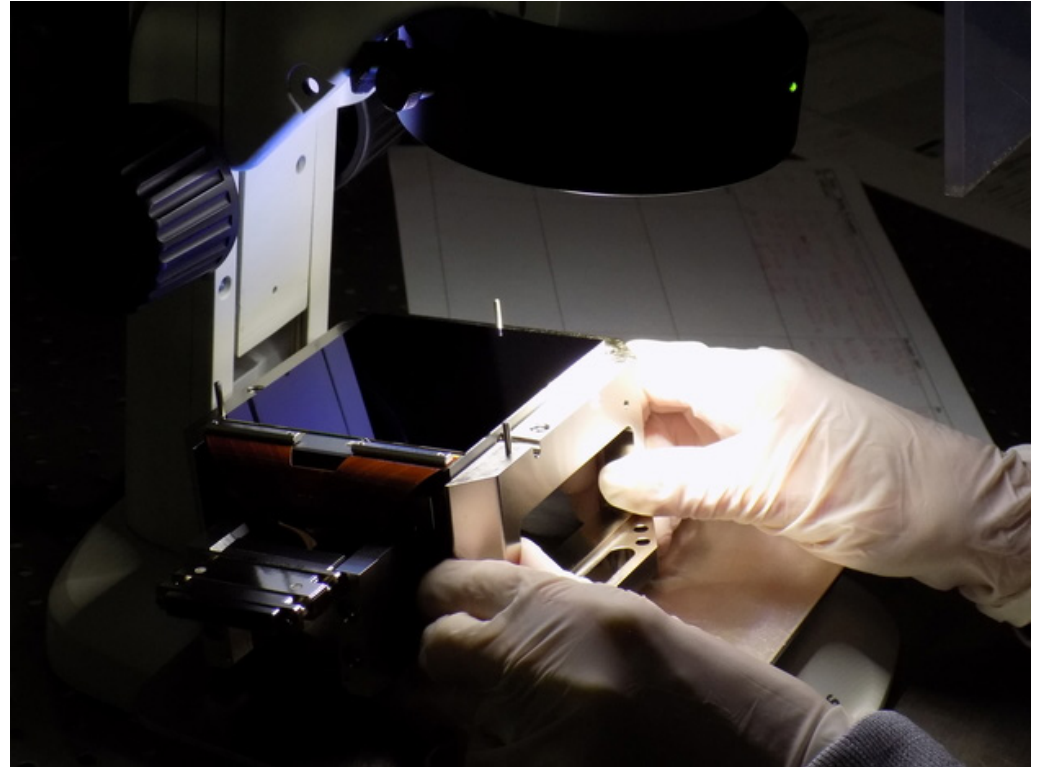


PLATO CCDs

104 CCDs (4 CCDs per camera)
4510 x 4510 pixels

First flight model CCDs delivered
by Teledyne-e2v to ESA:

- CCDs for 10 N-cameras have
been received



Main requirement change:

- R-SCI-600 The total number of targets in stellar sample 1 to be observed simultaneously in each Long Duration Observation Phase sky field shall be at least 7 500 dwarf and subgiant stars of spectral types from F5 to K7 and magnitude lower than $m_V = 11$, with a goal of 10 000.
- R-SCI-620 The random noise for each star's light curve of sample 1 shall be lower than **3450** ppm in one hour.

Reasons for change:

- Improved evaluation of system noise contributions and performance
- Contaminants model improved
- Possibility of losing 2 cameras included
- Better knowledge of the star spectral classes with Gaia DR2 catalogue

Stellar samples – Modified definitions



		Core sample		Statistical sample		Colour sample
		Sample 1	Sample 2	Sample 4	Sample 5	
Stars		≥ 15,000 (goal 20000)	≥ 1,000	≥ 5,000	≥ 245,000	300
Spectral type		Dwarf and subgiants F5-K7	Dwarf and subgiants F5-K7	Cool late type dwarfs	Dwarf and subgiants F5-K	Anywhere in the HR diagram
Limit m_v		11	8.5	16	13	-
Random noise (ppm in 1 hour)		≤ 50	≤ 50	-	-	-
Observation sampling times	Imagettes	25 s	25 s 2.5 s for a subsample	25 s for > 5,000 targets	25 s for > 9,000 targets	2.5 s
	Light-curves	-	-	-	≤ 600 s	-
	Centroid measurements	-	-	-	≤ 50 s for 5% of targets	-
	Transit oversampling	-	-	-	≤ 50 s for 10% of targets	-
Wavelength		500-1000 nm				Red and blue spectral bands

Ground Segment status



- Ground Segment Customer Requirements Review (GSCRR) closed (Top level ESA documents for Mission and Science Operations)
- Consolidation of Science Implementation Requirements Document (SIRD) on-going
- Ground Segment WGs with MOC, SOC, and PMC are now meeting on regular basis:
 - Ground Segment System & Operations Engineering WG (GSEWG)
 - PLATO Calibration and Operations Team (PCOT)
 - Data Management Working Group (DMWG)
- Overall Ground Segment Progress meetings (2-3 per year) started



- Ground Data Processing L0/L1 URD scope definition agreed between SOC and PMC – Joint document
- Top level system drawings of L0, L1 process flows made in collaboration SOC/PMC
- Consolidation of requirements for the Calibration Parameter Derivation System
- Common Infrastructure for S/W development in place at ESAC (SCIP)
- Product Definition WG (PMC and ESA) agreed Terms of reference

- SOC System Design Activities on-going
- SOC Checkpoint#1 (internal ESA review) successful
- Definition of the top level SOC Subsystems
- Review of the SOC Database & file storage
- Review of the Pipeline Framework infrastructure
- Definition of QLA/RTA system requirements
- Initiating the software & infrastructure at ESAC for the PLATO Mission Parameter Database.
- Ad-hoc participation of SOC in PMC coordination bi-weekly telecons

Future Project milestones

