

AstroBus S, the high performance and competitive Small Satellites platform for Earth Observation

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AstroBus product line initiative

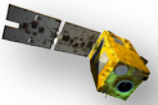
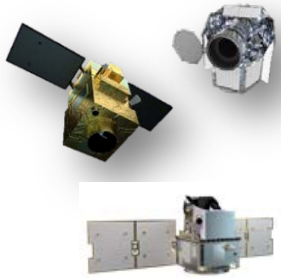
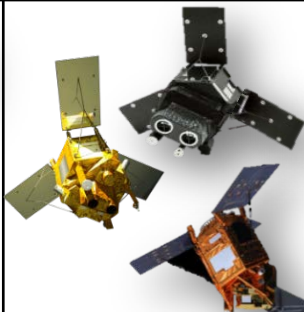
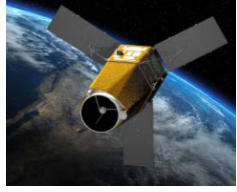
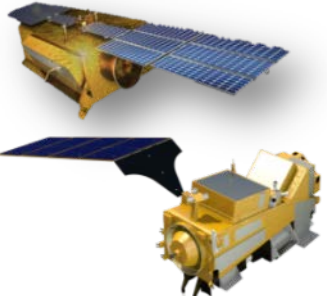
■ Airbus Defence and Space AstroBus platform product line

- From reuse of platforms, from one programme to the next one, on the same prime site with limited flexibility on design and supplier base...
- To technical and industrial solutions to be transferred from one mission to another, over a large variety of applications and delivered from any of Airbus Defence & Space ENS prime sites (France, Spain, UK, Germany) and offering flexibility to very diverse sets of constraints
- High performance, high quality and competitive platform product line
- Covers whole Low Earth Orbit mission range from 125kg/200W to 4000kg/6000W
- Generic Avionics across family:
 - AS250 Avionics with its AS400 evolution offering higher functionalities and power capabilities
 - Exception: for AstroBus XS the avionics proceeds from historical Myriade with evolutions
- Fully flight proven AS250 avionics through the SPOT 6 & SPOT 7 satellites in orbit
- Alternative sourcing of selected components to offer geographical distribution flexibility

■ AstroBus Small

- The AstroBus S platform is the extension of the AstroBus platform product line to the lower size range for a typical launch mass around 400 kg
- First instantiation is for PeruSat-1 satellite, based on key AS250 Avionics core units
 - Airbus Defence and Space will deliver PeruSat-1 only two years after the satellite was ordered
- Evolutions both through the CNES Myriade Evolutions initiative and Airbus Defence and Space developments

AstroBus product line family overview

Platform Segment	AstroBus XS*	AstroBus S*	AstroBus M	AstroBus L	AstroBus XL
Maturity	Validated in Flight	First Launch in 2017	Validated in Flight	First Launch in 2017	First Launch in 2018
Typical Launch Mass	125 kg to 200 kg *	400 kg	900 kg	1500 kg	3000 kg to 4000 kg
Lifetime	5 years	10 years	10 years	10 years	10 years
Selected for					

(*): cooperation with CNES (Myriade and Myriade Evolutions series)

AstroBus S Evolution through the CNES Myriade Evolutions Initiative

- Myriade Evolutions initiative is a tripartite partnership with CNES, Airbus Defence and Space and Thales Alenia Space
 - Financed through the French PIA (Projet Investissements d'Avenir) budget
- To develop, for next generation low Earth orbit (500 km to 800 km) missions, a platform built around each industrial partner core avionics (AS250 standardised core avionics for Airbus Defence and Space)
 - The AstroBus S platform reuses the On Board Computer (OBC), the Remote Interface Unit (RIU), the Hydra Star Tracker (STR) in a two optical heads configuration, the antennas, the Magneto-Torquer Bars and the Magneto-meters.
- Complemented by the Myriade Evolutions set of equipment specifically designed for this class of satellites
 - Structure concept providing a very compact platform solution
 - Propulsion module available in both hydrazine and green propellant configuration
 - Solar Arrays: 2 wings of 2 panels each, providing a minimum of 700 W at End-Of-Life
 - Power system composed of Batteries and Power Conditioning and Distribution Unit
 - Set of compact Reaction wheels
 - X band Payload data downlink chain / S band transceivers
 - GNSS unit receiving L1 band GPS signals
- Objective to achieve state-of-the-art performances within a low-cost, low-mass and low-volume envelope

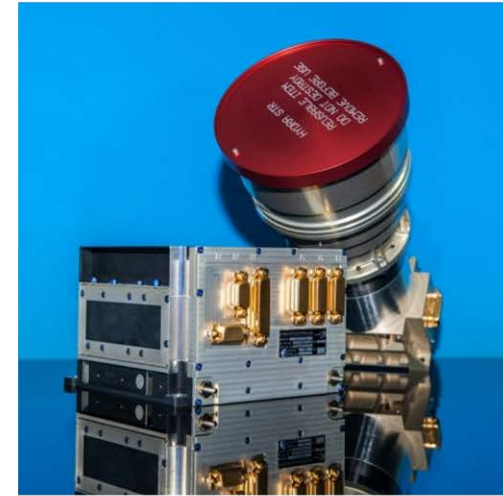
AS250 avionics core units reused for Myriade Evolutions platform



On-Board Computer (OBC)



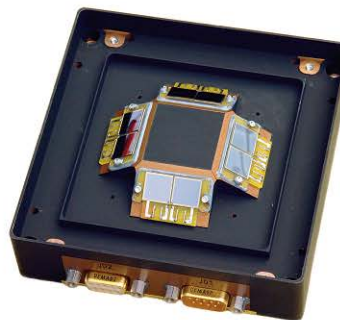
Remote Interface Unit (RIU)



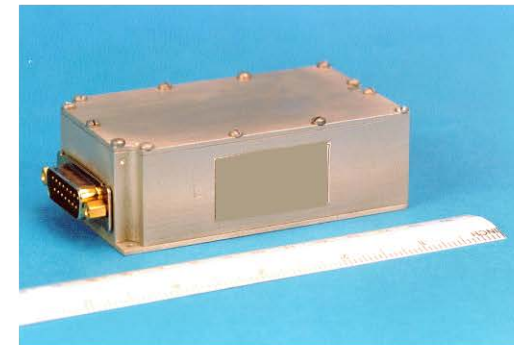
Star Tracker



Magneto-torquer



Sun sensor



Magnetometer

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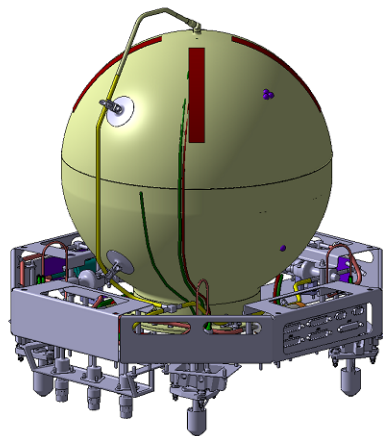
Myriade Evolutions Structure, Propulsion module, S band transceiver and X band transmitter



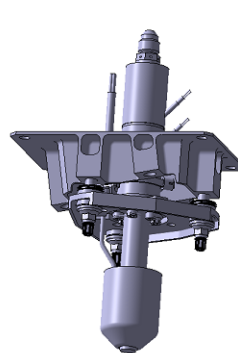
AstroBus S optimized platform



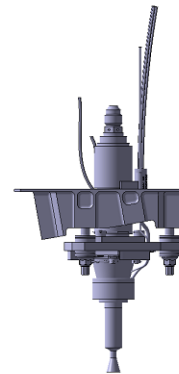
S band transceiver



Overview of the Propulsion module without its baseplate



Hydrazine thruster



Green propellant (ADN) thruster



X band transmitter

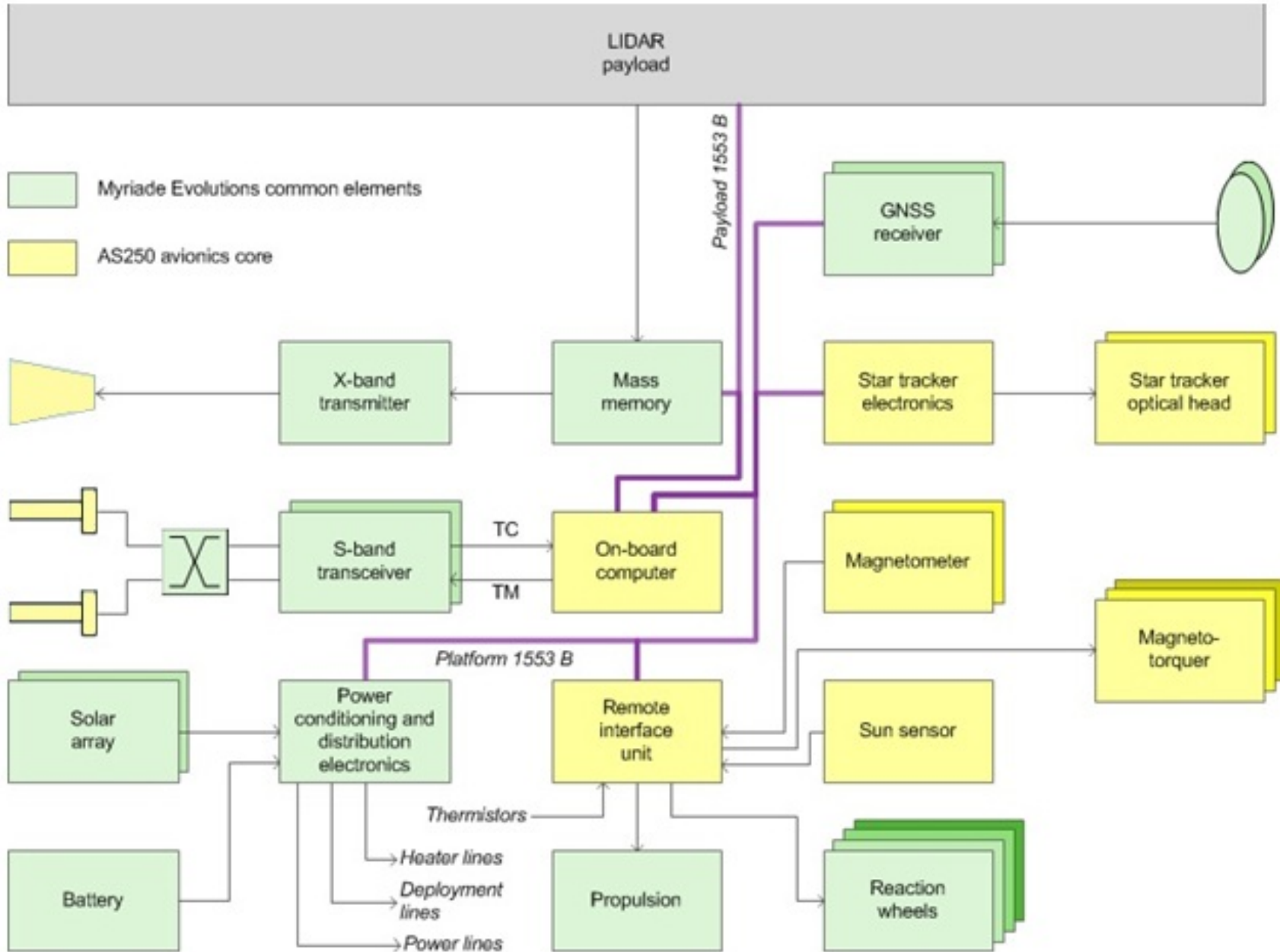
Propulsion module available in both hydrazine and green propellant configuration

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MERLIN First application of Myriade Evolutions

- MERLIN is the joint climate mission by DLR and CNES for monitoring the greenhouse gas methane in the atmosphere
 - Germany is developing and building the methane LIDAR ((Light Detection And Ranging) instrument
 - France is providing the satellite platform Myriade Evolutions and the mission control
 - The primary objective is to obtain spatial and temporal gradients of atmospheric methane (CH₄) columns with high precision and unprecedented accuracy on a global scale
- MERLIN is the first application of Myriade Evolutions and the second instantiation of AstroBus S platform
- MERLIN satellite architecture is then based on AS250 avionics core and integrates all Myriade Evolutions common units
 - The resulting evolution of AstroBus S platform will be qualified for the MERLIN satellite

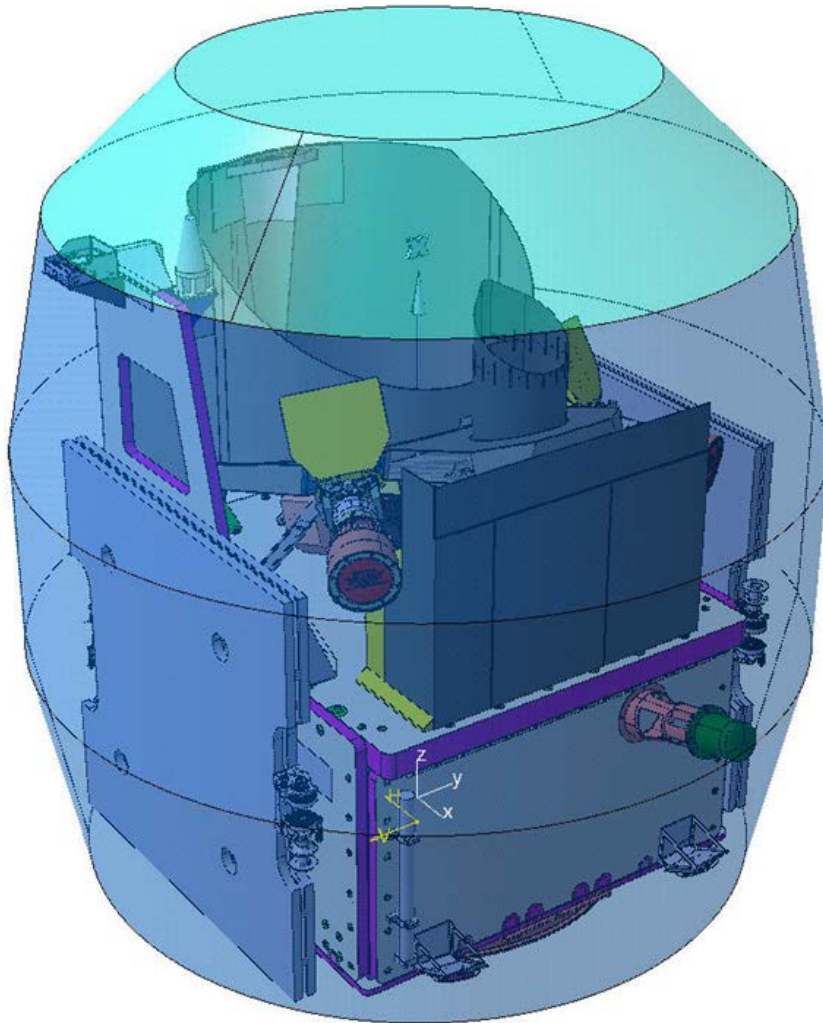
MERLIN instantiation of AstroBus S functional architecture



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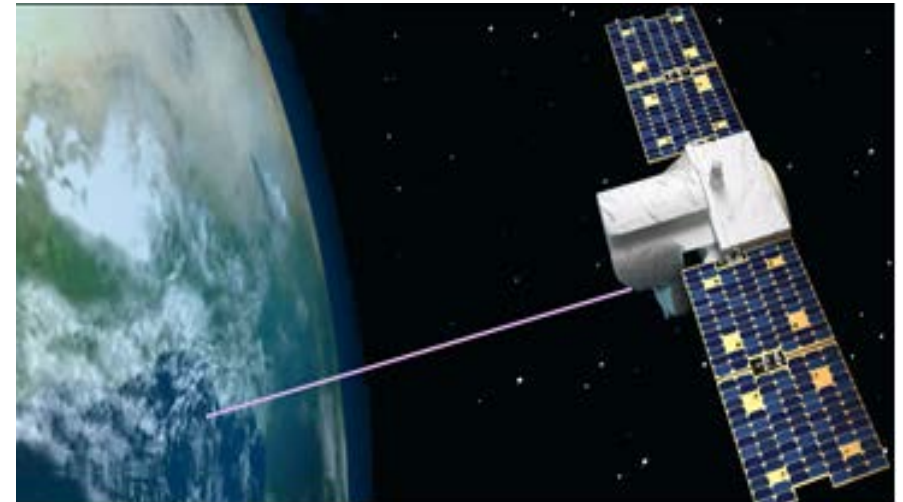
MERLIN satellite in launch configuration

- MERLIN satellite launch mass of 377 kg is compliant with margins with SOYUZ ASAP-S inner position



MERLIN satellite inside ASAP-SOYUZ mini-satellite inner volume

MERLIN satellite in operations



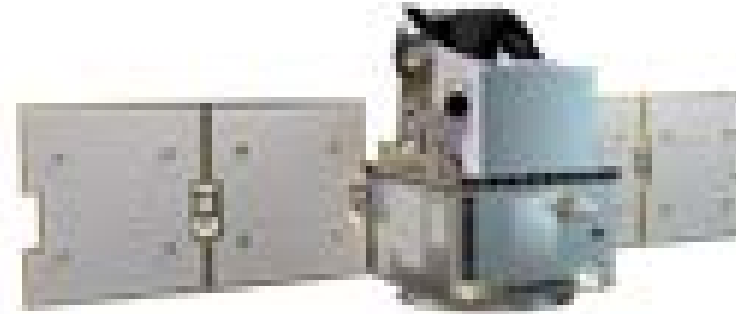
- At the end of its nominal operational life, the MERLIN satellite will be de-orbited and passivated after transfer to disposal orbit, fuel venting, functions deactivation, battery discharge and solar arrays disabled, for uncontrolled re-entry within 25 years

Conclusion

- PerùSat-1 materialised the past years developments and opened the path to the AstroBus S product line allowing a fast and safe development thanks to the flight proven background of the Airbus Defence and Space AstroBus product line family
- MERLIN is the first programme taking full advantage of the Myriade Evolutions initiative



PeruSat-1 satellite



MERLIN satellite

- The resulting platform will be the basis for next Earth Observation programmes requiring satellites in the 400kg range, answering both the institutional and the export markets
 - Fully secured platform developments allow customers to focus on payloads

Thanks for your attention!

Any questions?