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 PerùSat-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

<table>
<thead>
<tr>
<th>Platform Segment</th>
<th>AstroBus XS*</th>
<th>AstroBus S*</th>
<th>AstroBus M</th>
<th>AstroBus L</th>
<th>AstroBus XL</th>
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<td>Maturity</td>
<td>Validated in Flight</td>
<td>First Launch in 2017</td>
<td>Validated in Flight</td>
<td>First Launch in 2017</td>
<td>First Launch in 2018</td>
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<td>Typical Launch Mass</td>
<td>125 kg to 200 kg *</td>
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<td>900 kg</td>
<td>1500 kg</td>
<td>3000 kg to 4000 kg</td>
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<tr>
<td>Lifetime</td>
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<td>10 years</td>
<td>10 years</td>
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(*) - 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
Myriade Evolutions Structure, Propulsion module, S band transceiver and X band transmitter

Propulsion module available in both hydrazine and green propellant configuration
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
MERLIN satellite in launch configuration

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

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

- 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?