

# Aeolus: ESA's Wind Mission using UV LIDAR

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US Wind Lidar Group Meeting,  
Boulder, Colorado, USA

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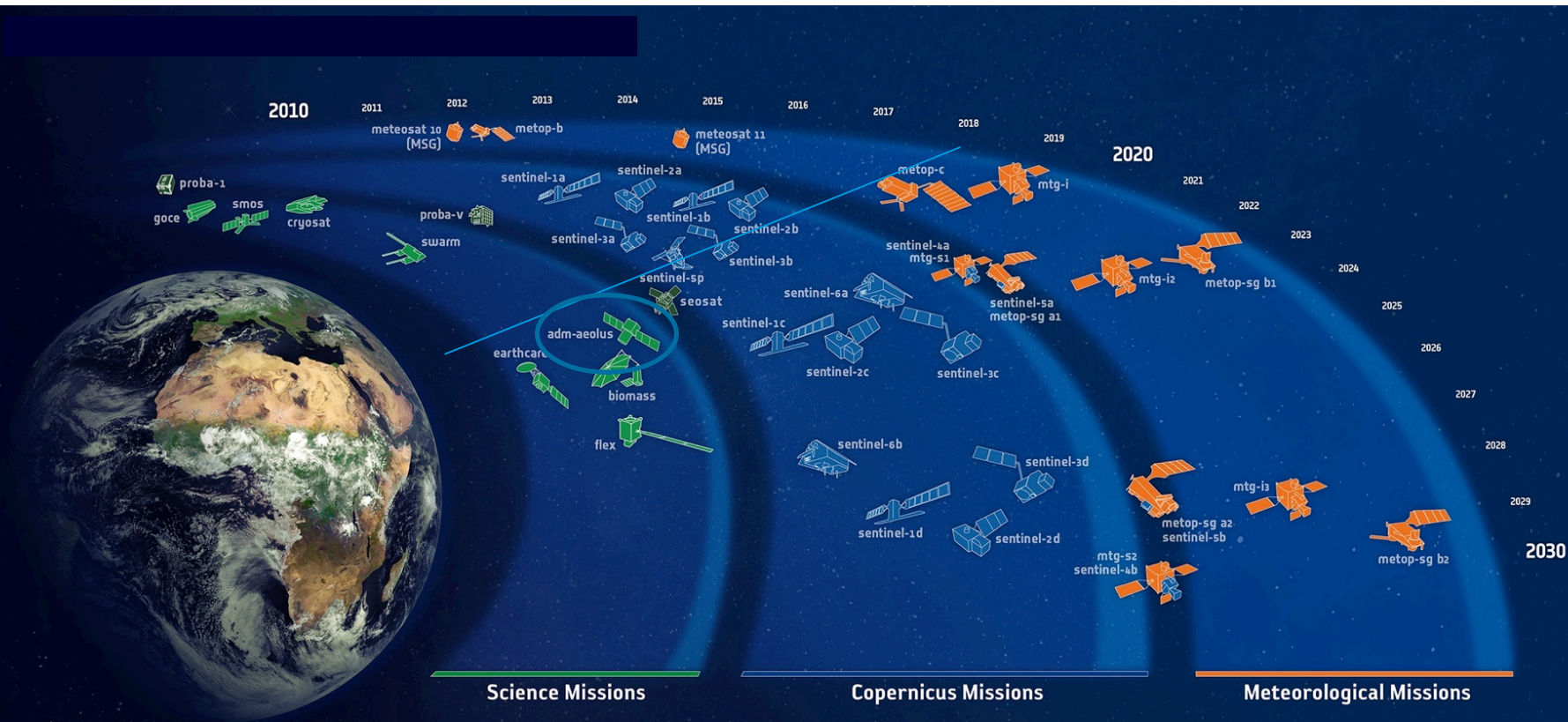
# Content of the Presentation



- Aeolus in ESA Earth Observation Context
- Mission Objectives & Measurement Principle
- Status of the Project
- Remaining Activities to Launch
- Conclusions



# ESA's Earth Observing Satellite Fleet



# Aeolus Mission Objectives

## Scientific objectives

- To improve the quality of weather forecasts;
- To advance our understanding of atmospheric dynamics and climate processes;

## Explorer objectives

- Demonstrate space-based Doppler Wind LIDARs potential for operational use.

## Observation means:

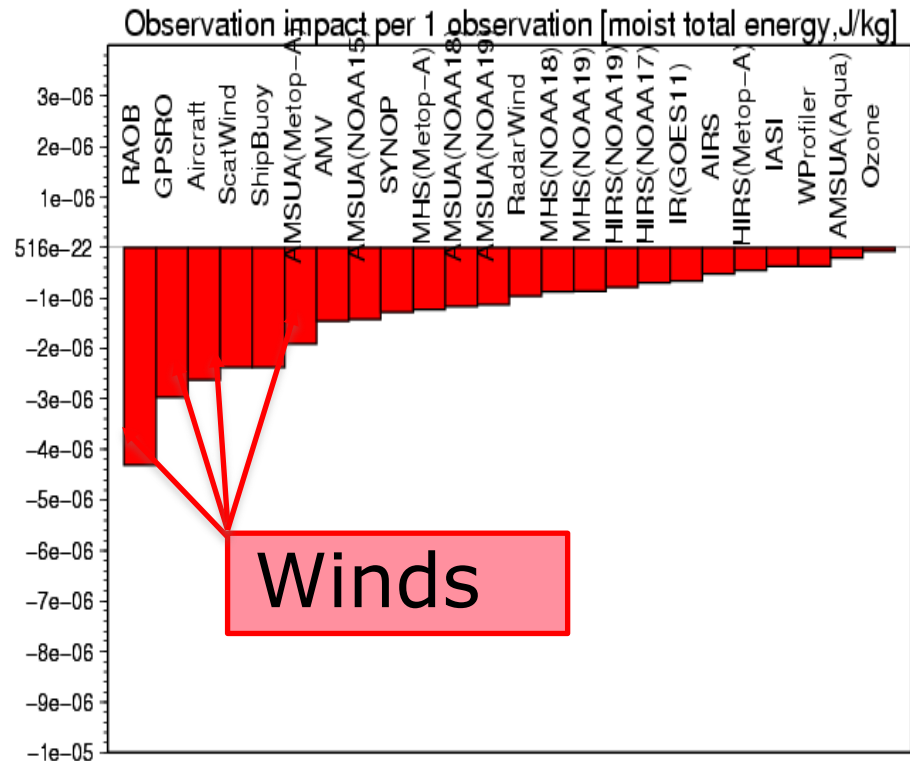
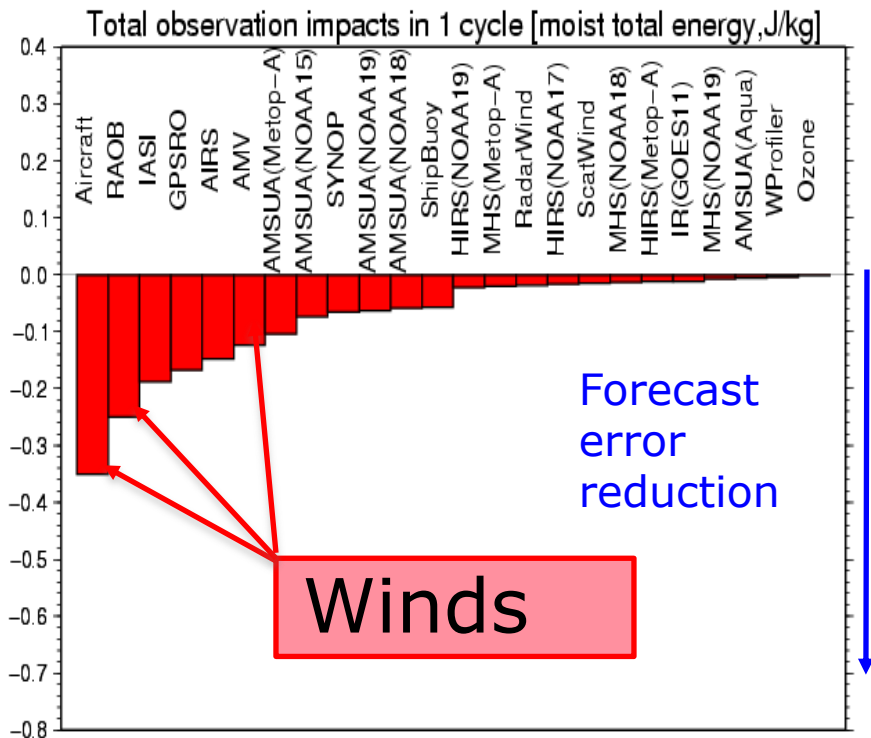
- Provide global measurements of horizontal wind profiles in the troposphere and lower stratosphere

## Payload

- ALADIN: Atmospheric LAsER Doppler INstrument

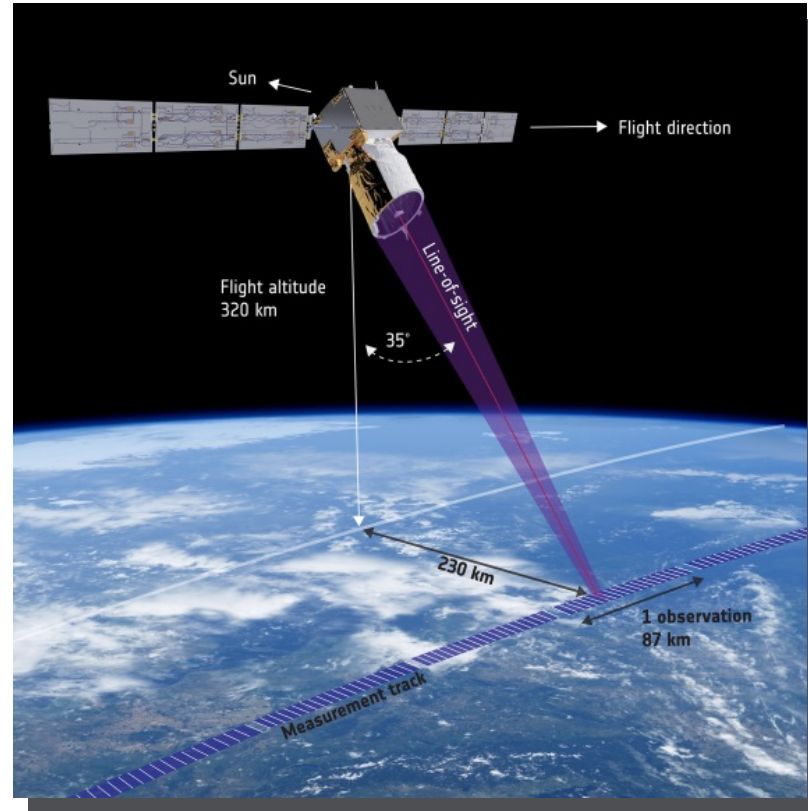
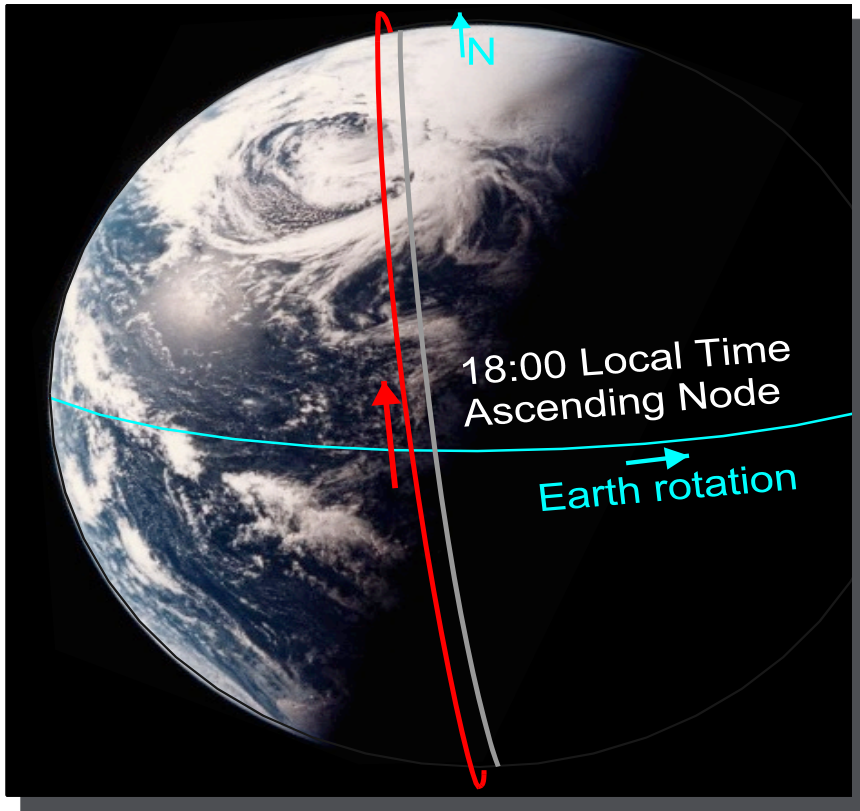


# Impact of Observation Types on Weather Forecast

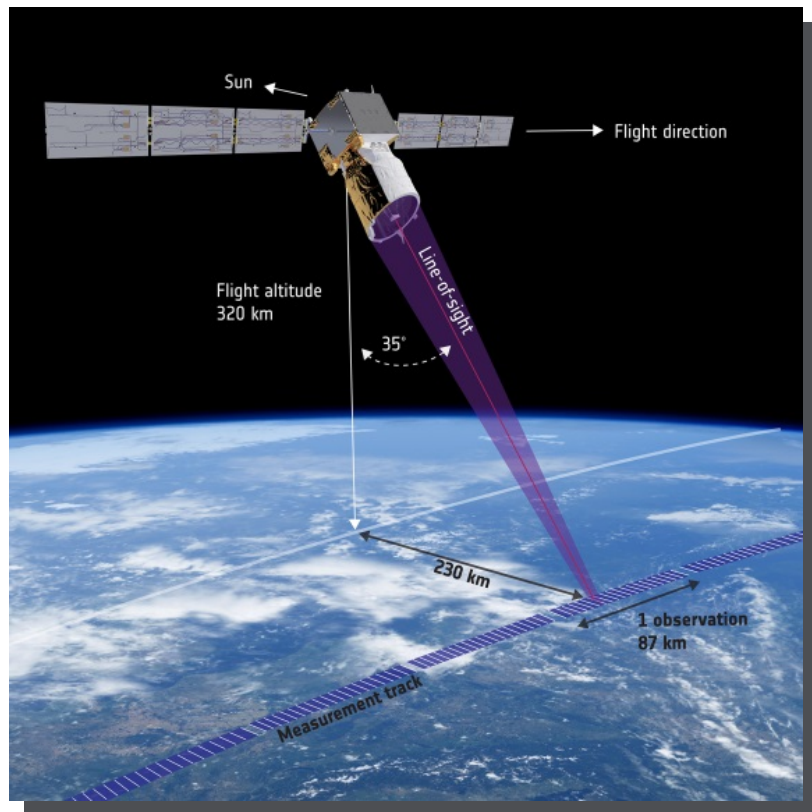


Courtesy, L.P. Riishojgaard

# Mission Design

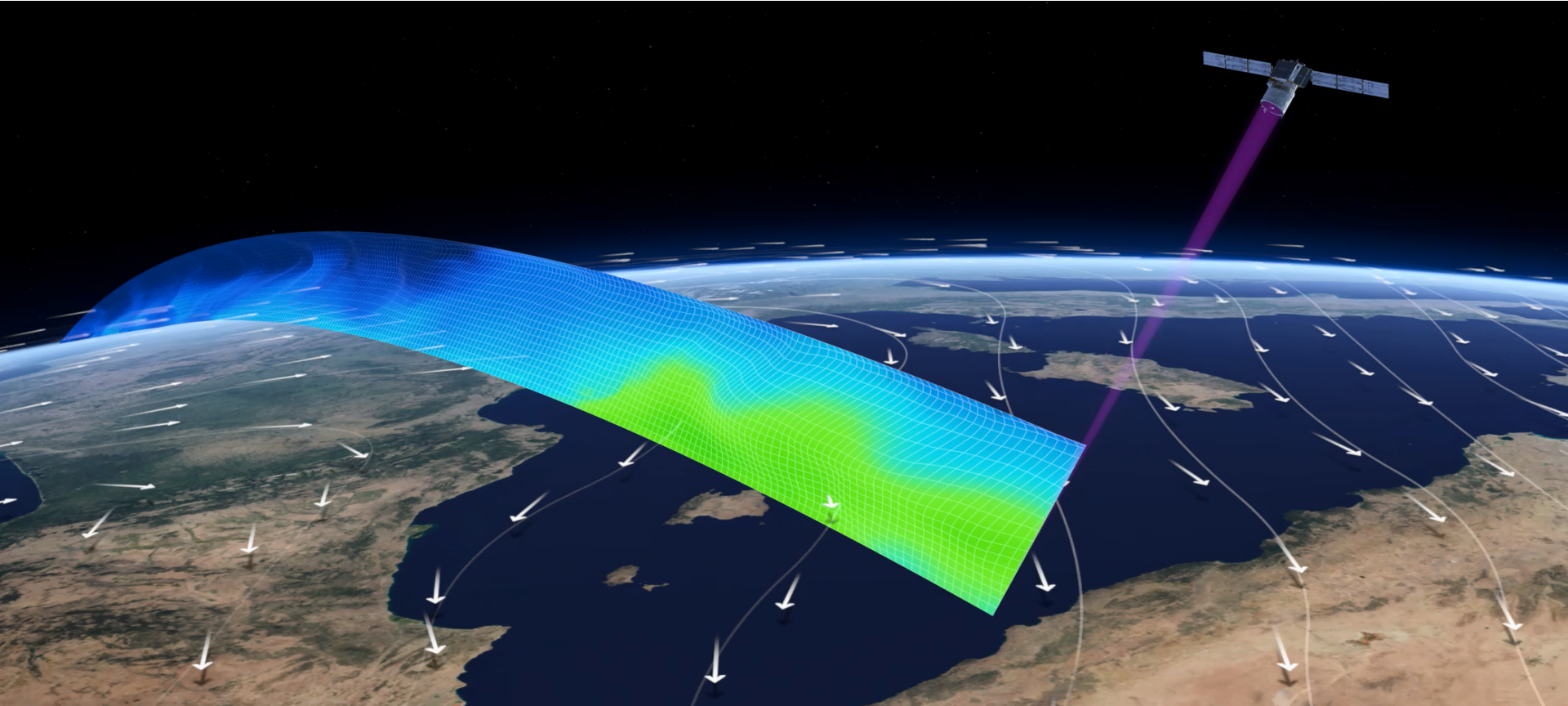


# Aeolus: Measurement Principle



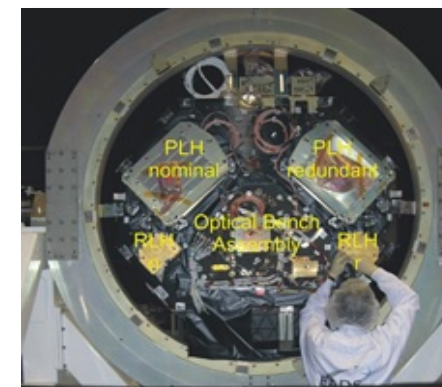
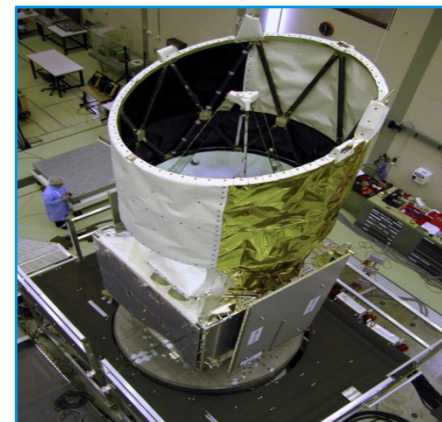
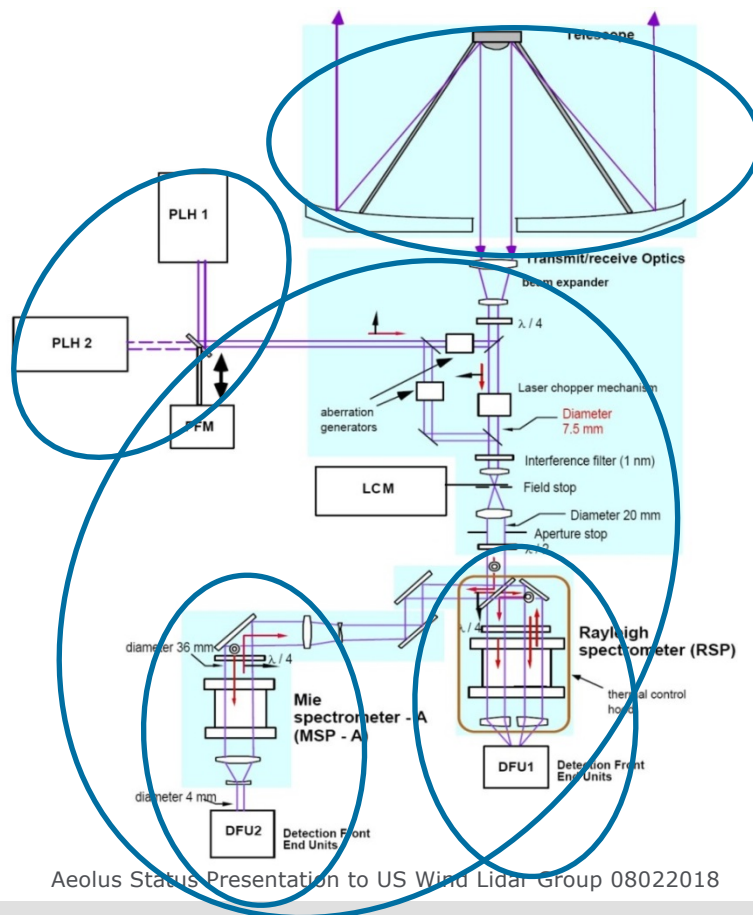
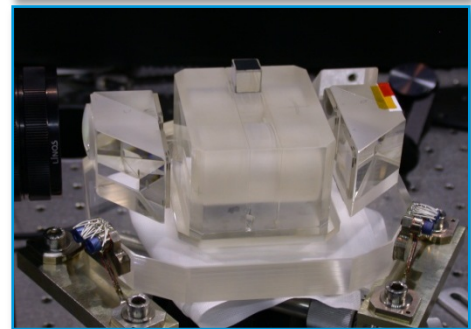
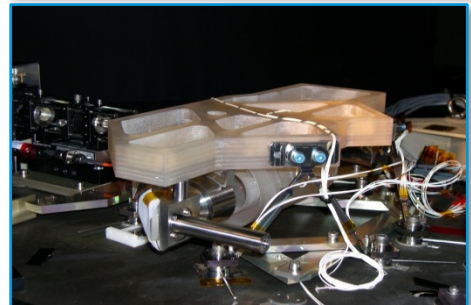
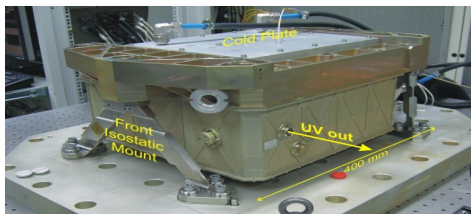
- Direct detection UV Doppler wind Lidar operating at 355 nm and 50 Hz PRF in continuous mode, with 2 receiver channels.
- Mie receiver to determine winds from aerosol & cloud backscatter.
- Rayleigh receiver to determine winds from molecular backscatter.
- The line-of-sight is pointing 35° from Nadir to obtain horizontal backscatter component
- The line-of-sight is pointing orthogonal to the ground track velocity vector to remove contribution from the satellite velocity.

# Aeolus measurement principle (3/3)

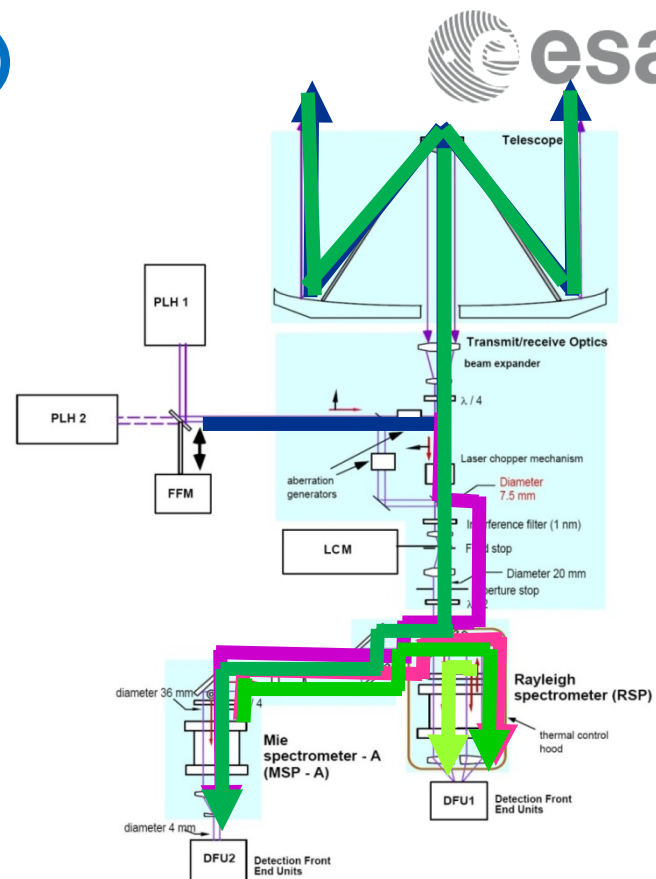




# ALADIN: Overall Architecture (1/2)



# ALADIN: Overall Architecture (2/2)



# Data Acquisition and Distribution

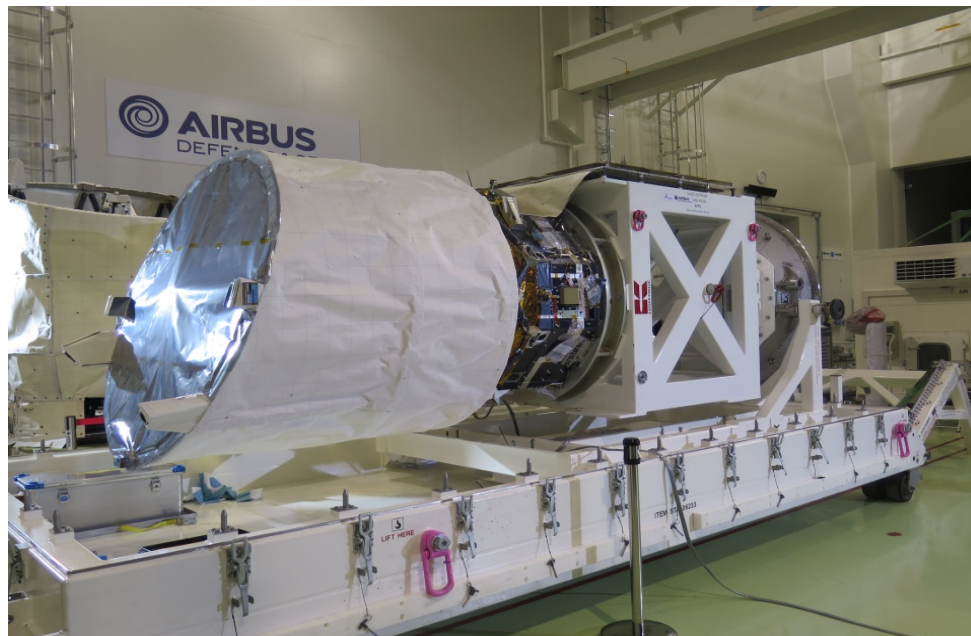


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# ALADIN Delivered: August 2016



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Aeolus Status Presentation to US Wind Lidar Group 08022018

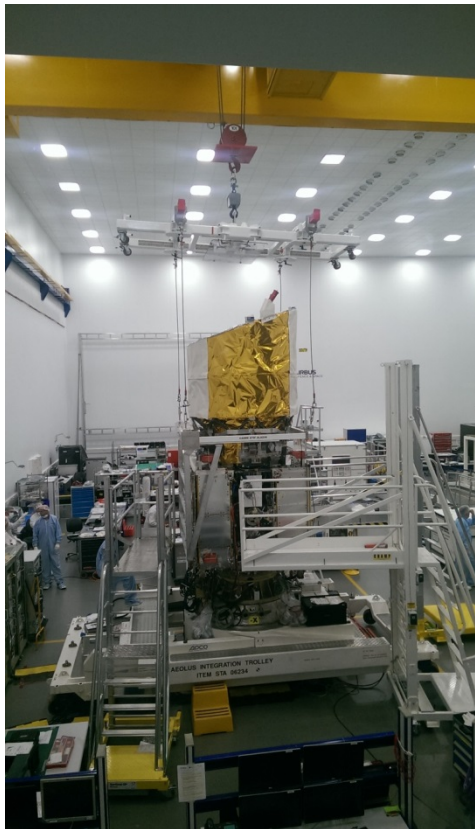


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European Space Agency

# ALADIN Mated with Platform

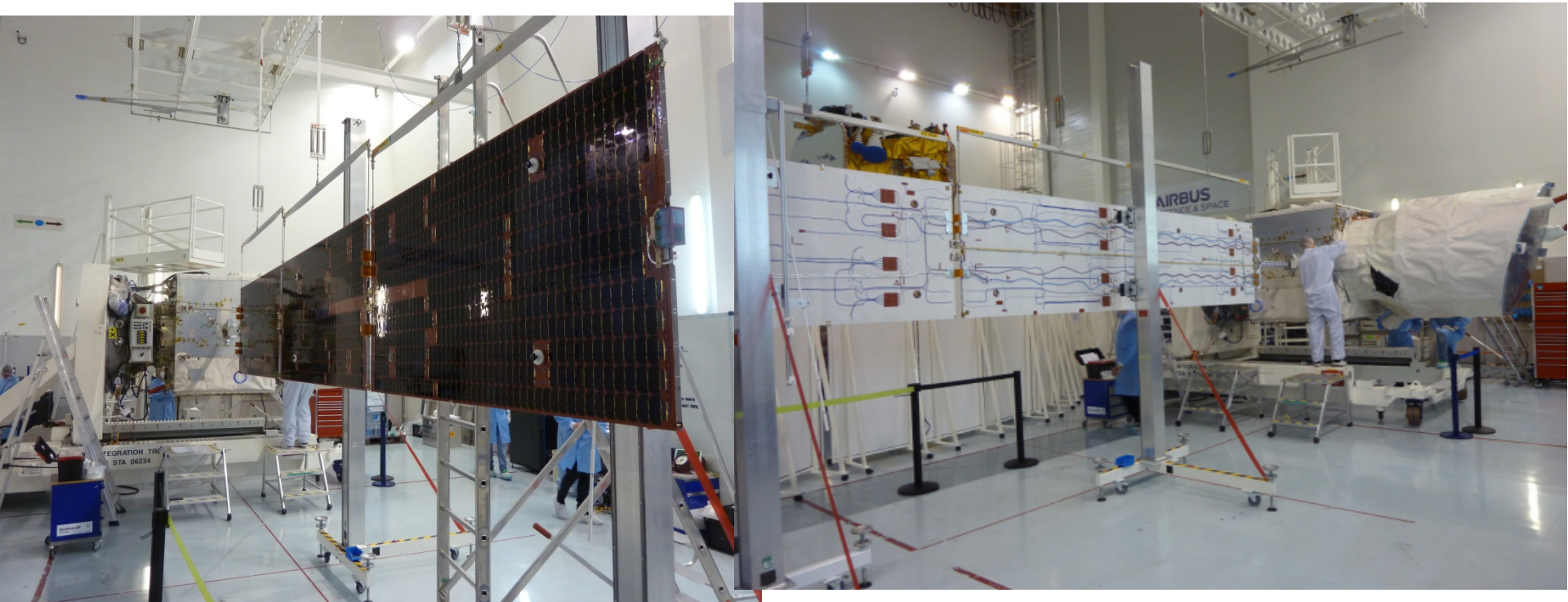


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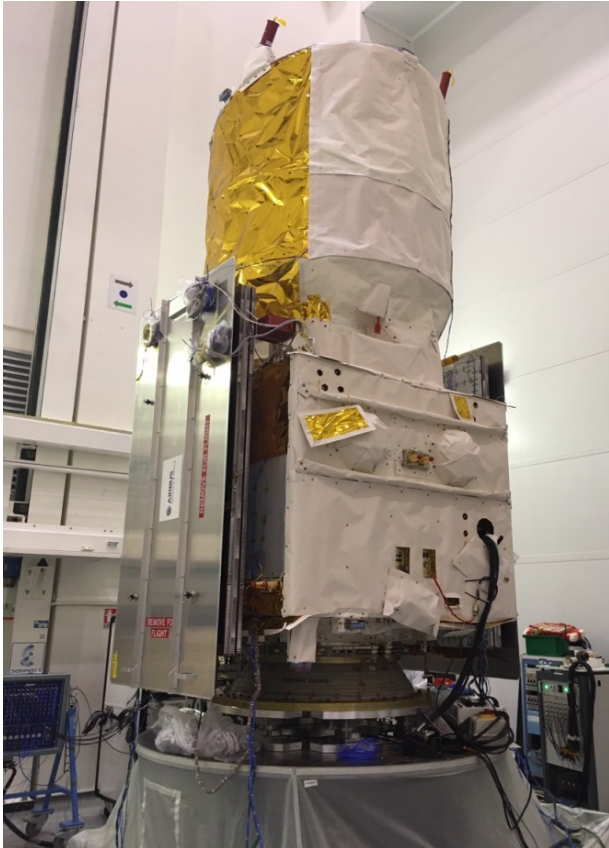
Aeolus Status Presentation to US Wind Lidar Group 08022018

Slide 13

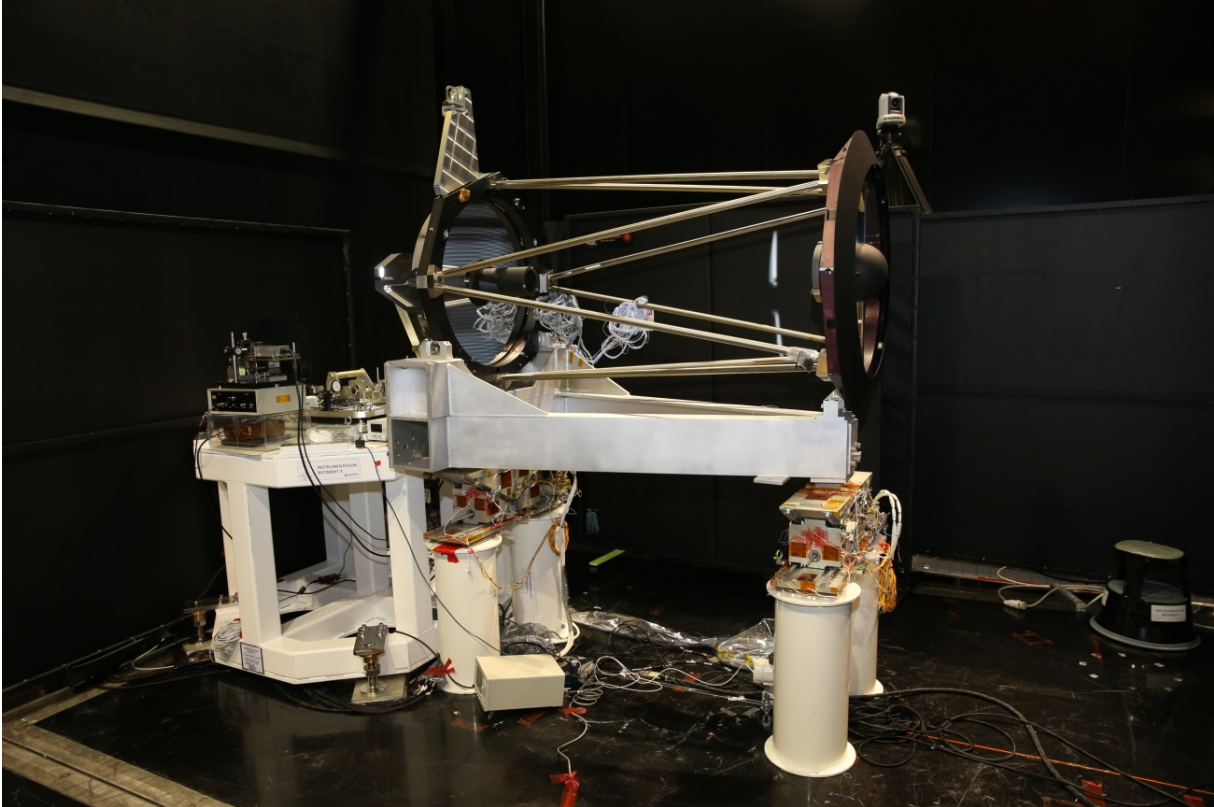
# Aeolus fully integrated



# Aeolus in mechanical and EMC test



# Aladin Optical Stimuli and Monitoring System



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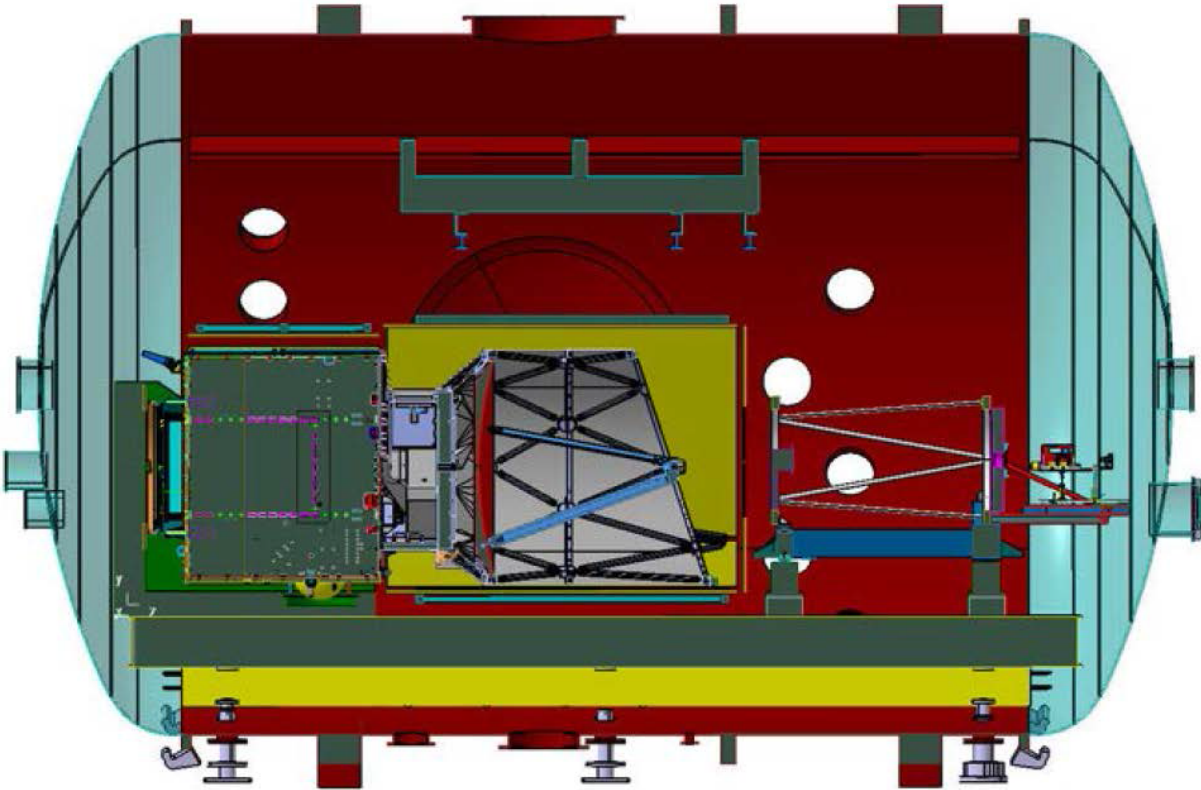


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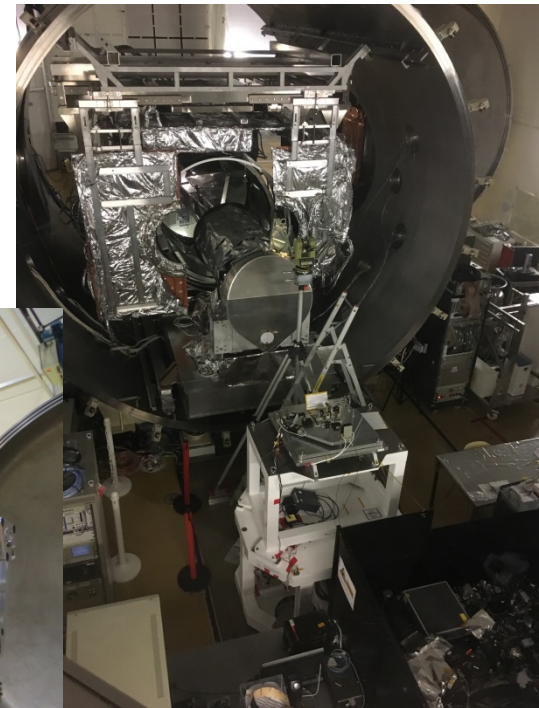




# Aeolus in Thermal Vacuum Configuration



# Aeolus in Thermal Vacuum Preparations



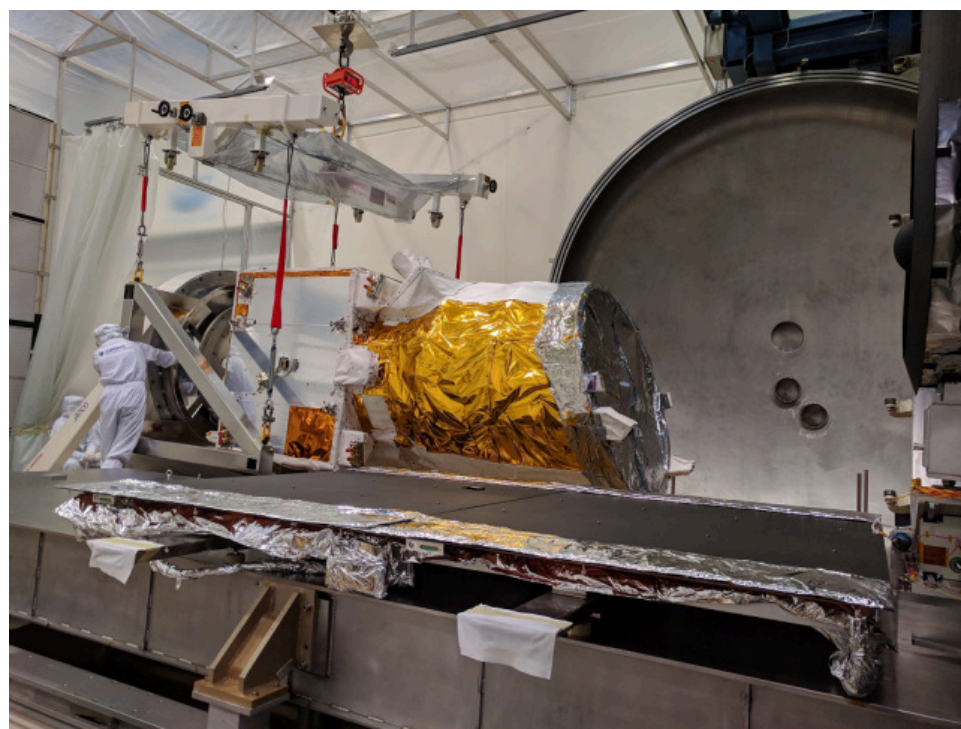
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Aeolus Status Presentation to US Wind Lidar Group 08022018

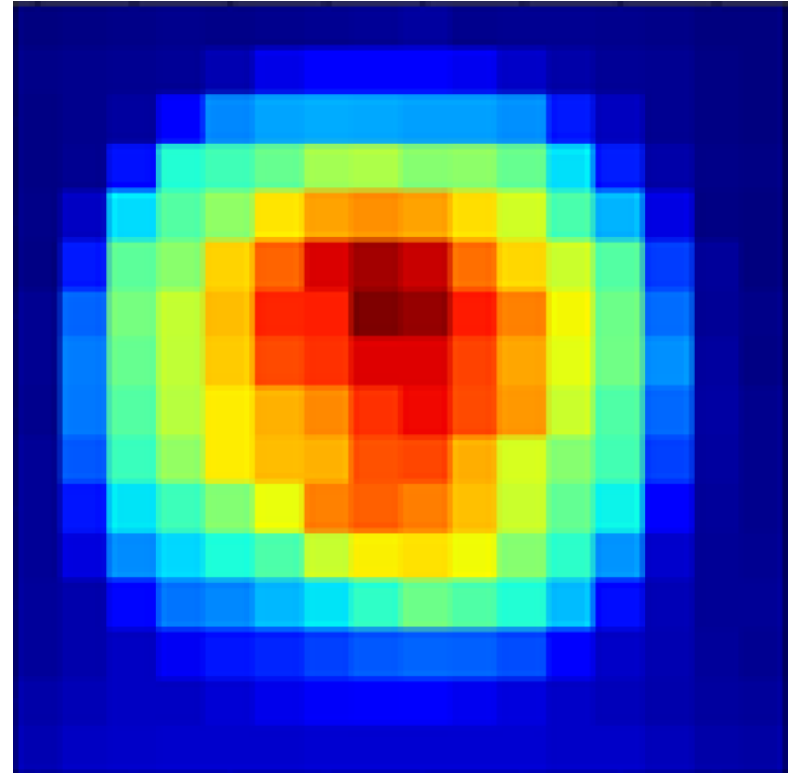
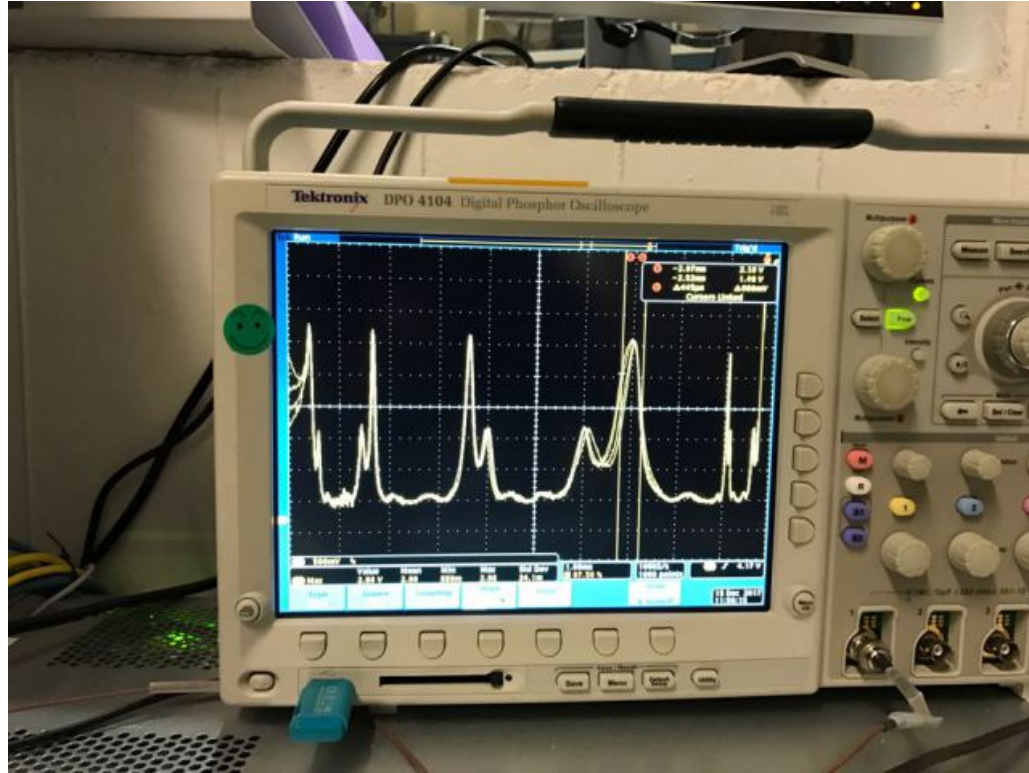
# Aeolus in Thermal Vacuum Chamber



# Aeolus exiting Thermal Vacuum Chamber

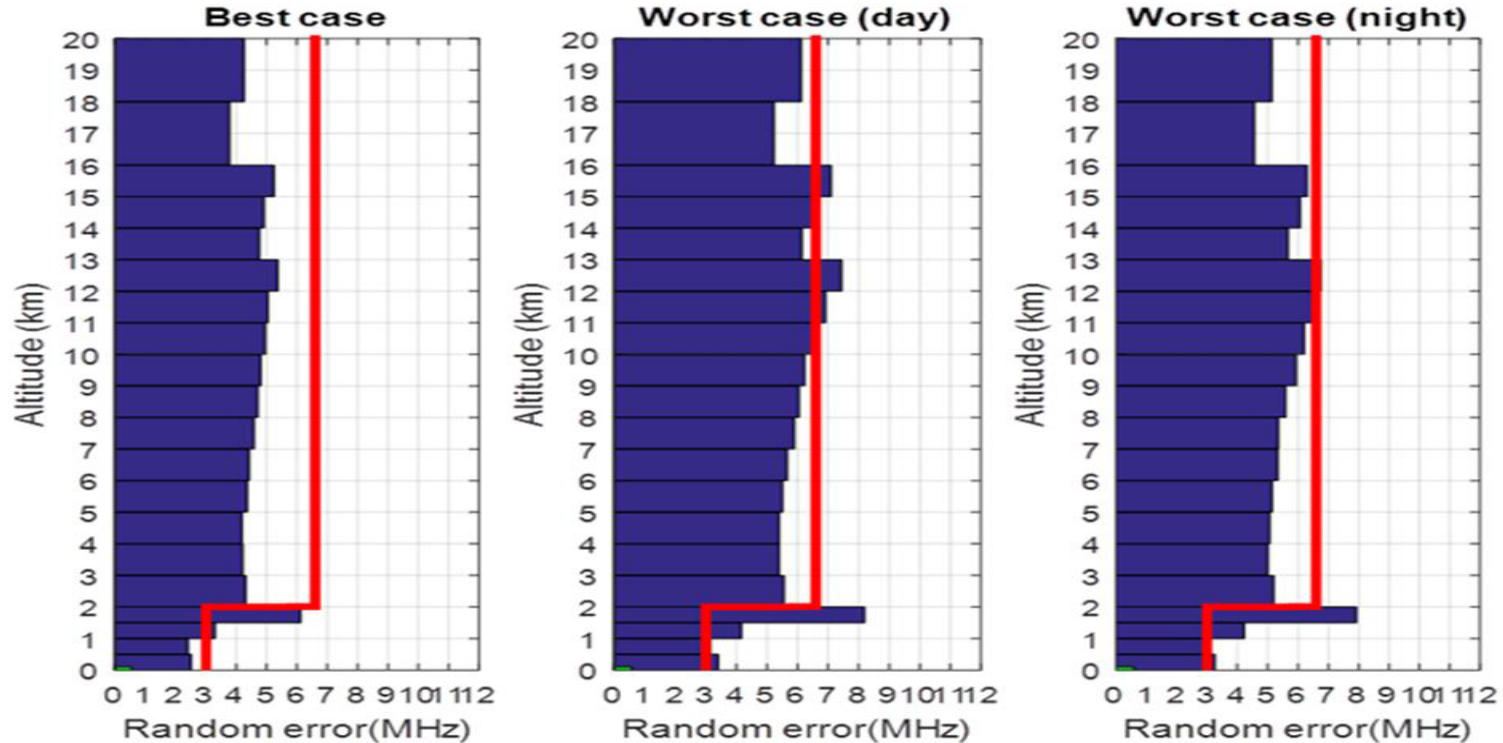


# Laser Performance in TVAC



# Latest Performance Predictions: Random errors

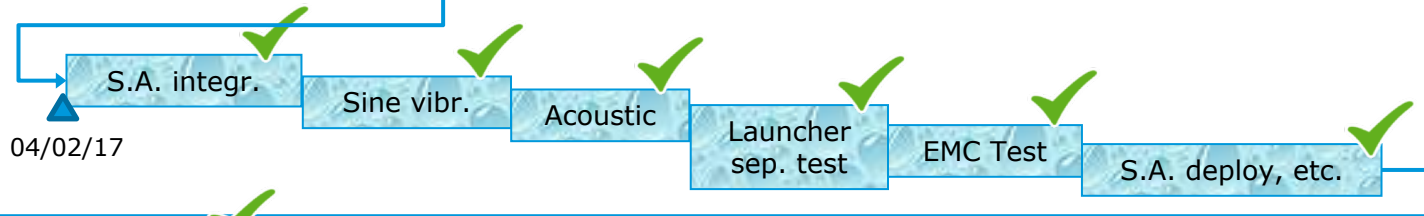
## 320 km orbit, 80 mJ setting



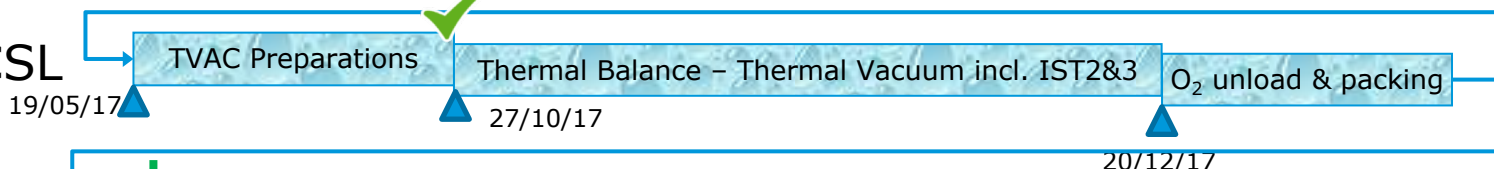
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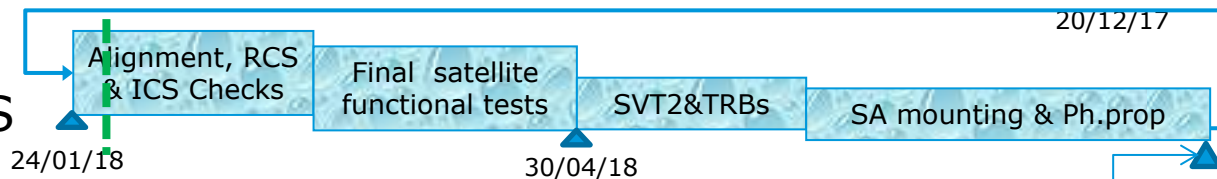
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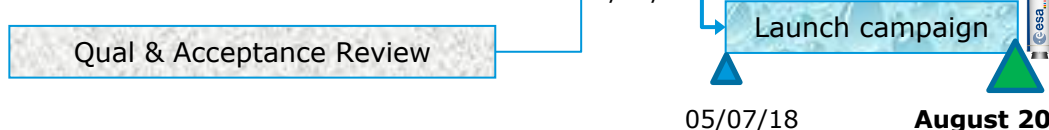
@CSL



@ITS



@CSG



**August 2018**  
**VV13 Aeolus Launch**

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# Remaining Activities and Planning





# Conclusions

- ✓ **More than 12 years of development challenges**
- ✓ **Invaluable experience has been gained**
- ✓ **Laser and LIDAR modifications are very time consuming**
- ✓ **The mission remains worldwide unique**
- ✓ **Enthusiastic user communities anticipating break-through in weather forecast and climate research**
- ✓ **The Project and the Industrial team committed to complete Aeolus by **November (QAR)** and be ready for launch in August 2018!**



# Launch from Kourou



ESA's Launch Centre (CSG), Kourou, French Guiana



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*"The real voyage of discovery  
consists not in seeking new  
landscapes, but in having new eyes."*  
Marcel Proust

Thank you for your attention