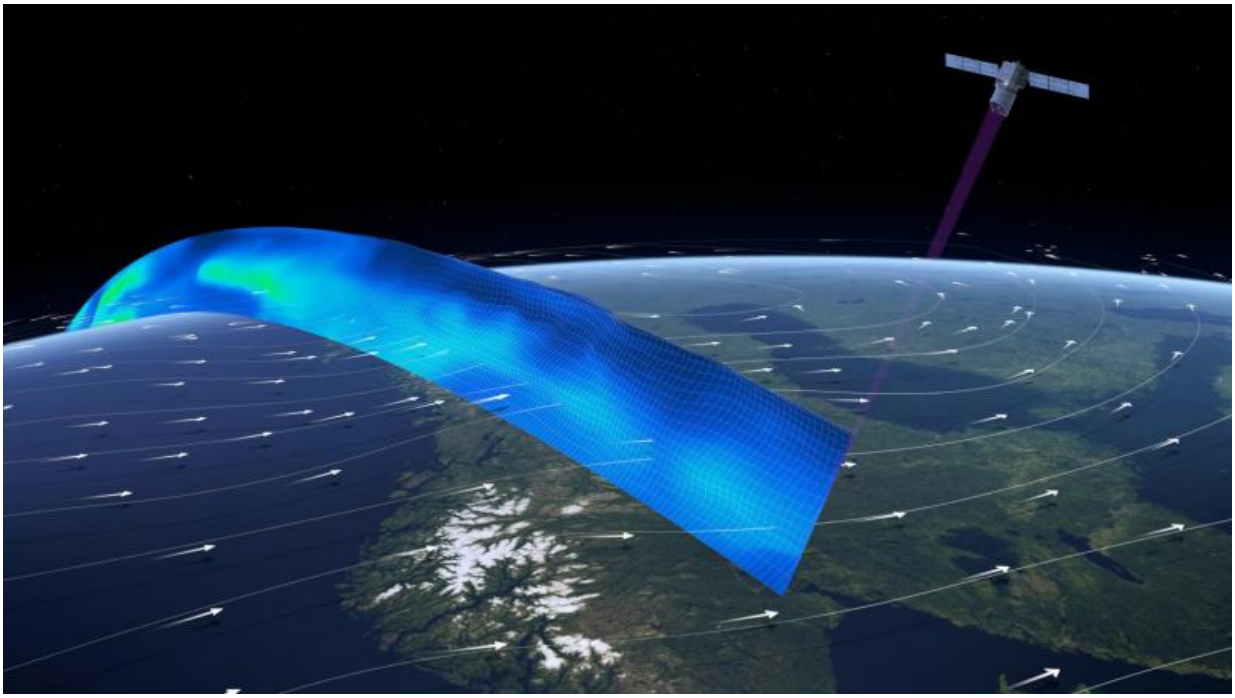
Aladin wind probe ready for Aeolus

August 3 2016



The ADM-Aeolus mission will not only advance our understanding of atmospheric dynamics, but will also provide much-needed information to improve weather forecasts. The satellite carries the first wind lidar in space, which can probe the lowermost 30 km of the atmosphere to provide profiles of wind, aerosols and clouds along the satellite's orbital path. The laser system emits short powerful pulses of ultraviolet light down into the atmosphere. The telescope collects the light that is backscattered from air molecules, particles of dust and droplets of water. The receiver analyses the Doppler shift of the backscattered signal to determine the speed and direction of the wind at various altitudes below the satellite. These near-realtime observations will improve the accuracy of numerical weather and climate prediction and advance our understanding of atmospheric dynamics and processes relevant to climate

variability. Credit: ESA/ATG medialab

It has been years in the making, but one of the trickiest pieces of space technology ever developed is finally ready to join its satellite for launch by the end of next year. With this milestone, we are another step closer to a better understanding of Earth's winds.

Carrying pioneering lasers, Aeolus will be the first satellite to probe the wind globally.

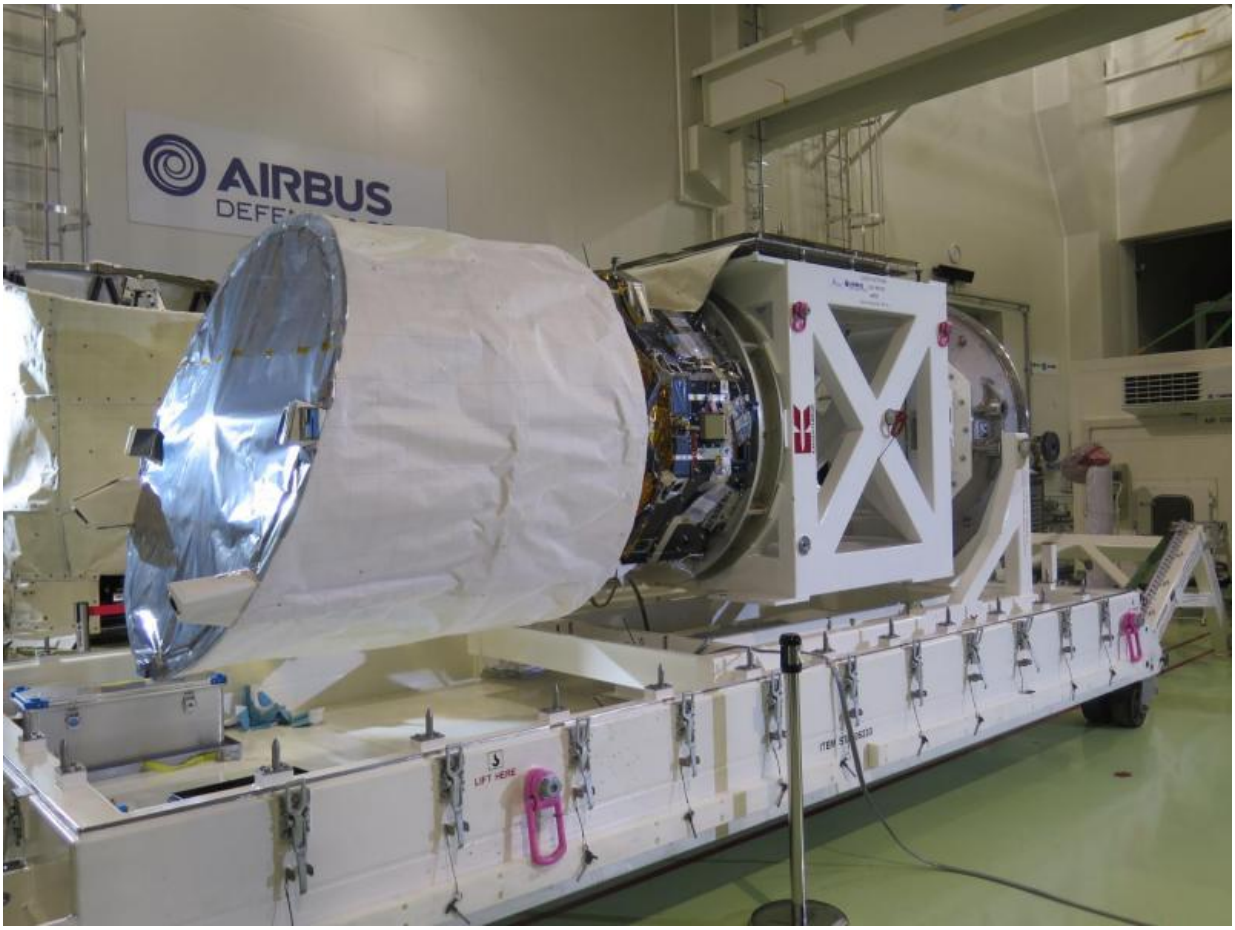
These vertical slices through the atmosphere, along with information on aerosols and clouds, will advance our knowledge of atmospheric dynamics and contribute to climate research.

Since Aeolus will deliver measurements almost in real time, it is also set to provide much-needed information to improve weather forecasts.

Its state-of-the-art Aladin instrument, which was designed by Airbus Defence and Space in France, incorporates two powerful lasers, a large telescope and very sensitive receivers.

The laser generates ultraviolet light that is beamed towards Earth. This light bounces off air molecules and small particles such as dust, ice and droplets of water in the atmosphere. The fraction of light that is scattered back towards the satellite is collected by Aladin's telescope and measured.

Prof. Erland Källén, Director of Research at the European Centre for Medium Range Weather Forecasts, said, "The Aeolus mission will provide wind observations that are unique with respect to the current global observing system capabilities.



After many years in development, Aladin – the Doppler wind lidar to be carried on the Aeolus satellite – is ready to be shipped from Toulouse, France, to the UK to be installed on the satellite in preparation for liftoff by the end of 2017. Aeolus will be the first satellite mission to probe the wind globally. These vertical slices through the atmosphere, along with information on aerosols and clouds, will advance our knowledge of atmospheric dynamics and contribute to climate research. Its state-of-the art Aladin instrument incorporates two powerful lasers, a large telescope and very sensitive receivers. The laser generates ultraviolet light that is beamed towards Earth. This light bounces off air molecules and small particles such as dust, ice and droplets of water in the atmosphere. The fraction of light that is scattered back towards the satellite is collected by Aladin's telescope and measured. Credit: Airbus Defence and Space

"The observations fill a gap in the global observing system and despite the many years of delay there is still a need for the mission and we expect it to have a big impact on weather forecasting.

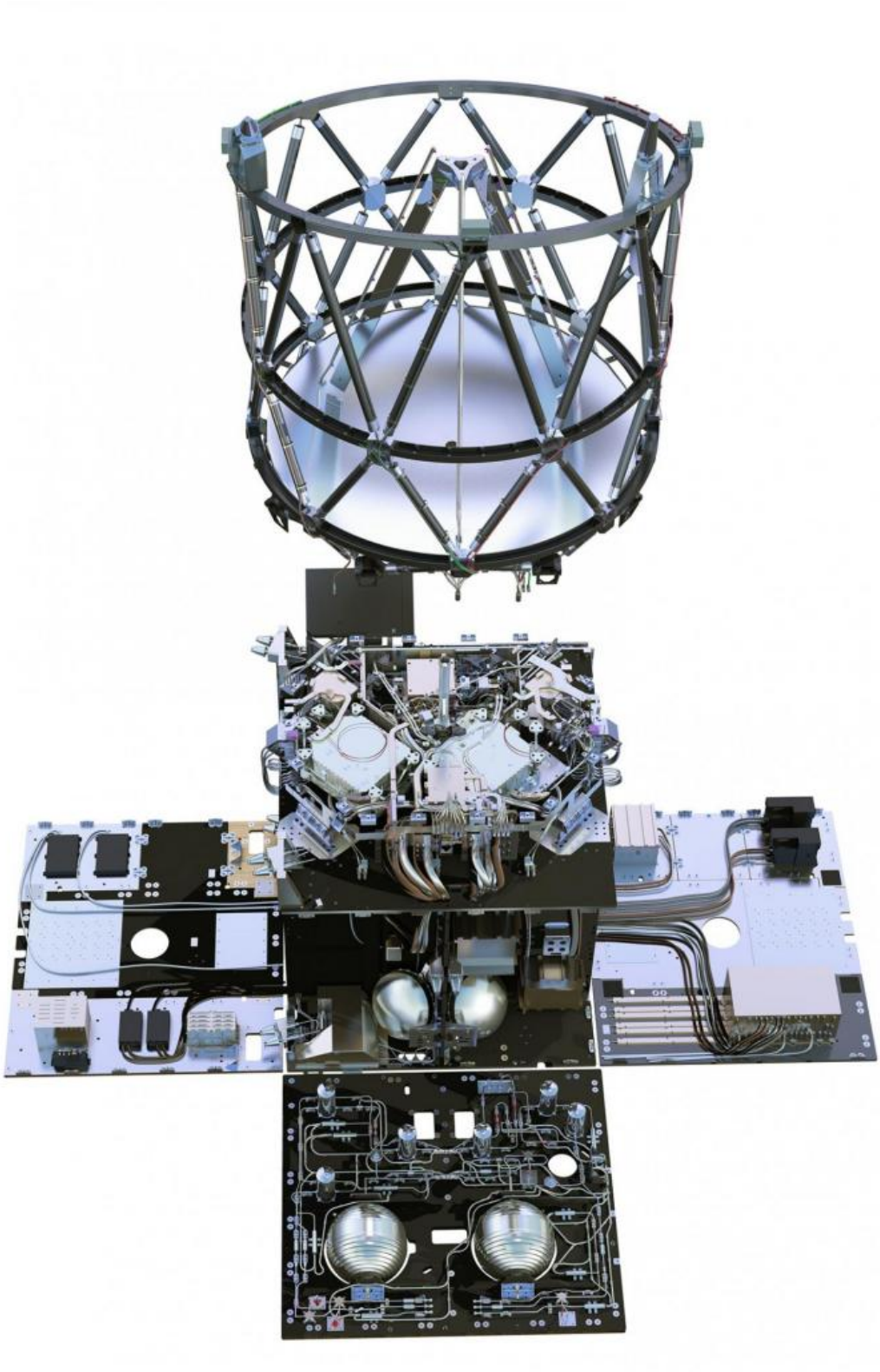
"In the Tropics, wind information dominates atmospheric analyses and this influences the quality of weather forecasts for Europe for the week ahead.

"Wind information from Aeolus is also expected to be important over oceans in both hemispheres for determining the position and evolution of jet streams and atmospheric fronts."

Developing advanced new space technologies is never easy and the Aeolus mission has certainly faced its share of challenges.

For instance, the optics have to survive exposure to high-intensity laser pulses for at least three years in the unforgiving environment of space. Developing optics that could withstand these extremes took much longer than anticipated.

Nevertheless, recent tests have shown that such technical problems have been resolved.



The ADM-Aeolus mission has been designed to provide timely and accurate

profiles of the world's winds along with information on aerosols and clouds to advance our understanding of atmospheric dynamics and to provide information for weather forecasts. To do this, the satellite carries a complex instrument: Aladin, the first wind lidar in space. A lidar uses the phenomenon of light scattering and the Doppler Effect to acquire data on wind. A lidar works by emitting a short, but powerful, light pulse from a laser through the atmosphere and then collects light that is backscattered from particles of gas and dust and droplets of water in the atmosphere. The time between sending the light pulse and receiving the signal back determines the distance to the 'scatterers' and thus the altitude above Earth. As the scattering particles are moving in the wind, the wavelength of the scattered light is shifted by a small about as a function of speed. The Doppler wind lidar measures this change so that the velocity of the wind can be determined. Credit: ESA/ATG medialab

Frederic Fabre, Project Manager for Aladin at Airbus Defence and Space, said, "This is very good news for the meteorologists and scientists who have been waiting some time for Aladin data to improve weather forecasting.

"The completion of the instrument is a result of the day-to day-involvement of the whole Aladin team including ESA, Airbus Defence & Space and several subcontractors throughout Europe."

Denny Wernham, ESA's Aladin Instrument Manager, remarked, "The very successful results on Aladin are testimony to the dedication, determination and expertise of the team in Toulouse, who have overcome many technical hurdles to deliver the instrument to their UK colleagues.

"It is a really tremendous achievement and we would like to congratulate them for all their efforts."

Provided by European Space Agency