

Pre-Launch Validation of ADM-Aeolus over Greenland using Airborne Lidar's

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The global observation of atmospheric wind profiles remains to be the highest priority need for weather forecast. A satellite Doppler LIDAR (Light Detection And Ranging) is the most promising candidate to meet the requirements for global wind profile observations with high vertical resolution and accuracy. The Atmospheric Dynamics Mission ADM-Aeolus from ESA's Earth Explorer program is currently under development and satellite launch is foreseen for end 2013. The objective of ADM-Aeolus is to improve the quality of numerical weather prediction with global wind profile measurements. ADM-Aeolus will carry for the first time a Doppler lidar instrument on a satellite platform.

An airborne prototype of the instrument on ADM-Aeolus was developed by DLR to validate the instrument concept, calibration and retrieval algorithms before satellite launch. It is the first airborne direct-detection Doppler lidar for atmospheric observations worldwide. In 2009 the airborne prototype and a second well-established coherent lidar were deployed during a field campaign over the North Atlantic with the Falcon aircraft based in Keflavik, Iceland. The satellite instrument will be calibrated over ice using its high albedo in the ultraviolet spectral region. This calibration concept was validated with the airborne prototype. Wind profile measurements were obtained during high wind speed conditions within the jet stream region of the upper troposphere. These were used for a comparison of the winds measured by the ADM-Aeolus prototype and the second reference wind lidar.