

AIRBORNE DOPPLER WIND LIDAR STUDIES FOR ADM CAL/VAL AND INVESTIGATIONS OF BOUNDARY LAYER ARCTIC WIND FIELDS

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Abstract

The launch of ESA's wind measuring Atmospheric Dynamics Mission (ADM) is currently scheduled for the latter half of 2015. Although ESA has conducted preliminary studies of the predicted instrument performance utilizing ground-based lidars (2006, 2007) and airborne lidars (2007, 2008, and 2009), they have also expressed a desire to conduct a series prelaunch exercises beginning next spring (2015) that would include joint USA-ESA airborne DWL flights near Greenland. The combination of ESA's airborne version of the direct detection technology being flown as ADM coupled with NASA's coherent detection DAWN (Doppler Aerosol WiNd lidar) would provide the critical combination of similar and dissimilar technologies appropriate for cross technology calibrations.

Partly in preparation for the spring 2015 collaborative effort and future cal/val studies, NASA has funded a two week Airborne Doppler Wind Lidar (ADWL) mission near the southern tip of Greenland (Kangerlussuaq) in November 2014 which will utilize NASA's DAWN on board a UC-12B aircraft. The primary objectives of this mission are: 1) Demonstrate the readiness of DAWN to participate in the joint ESA/NASA exercises in the spring of 2015 and beyond; 2) conduct underflights of currently orbiting sensors such as CALIPSO, ASCAT and MODIS (for Atmospheric Motion Vectors) to refine techniques for ADM cal/val between a space based lidar and an airborne set of sensors; and 3) collect data that will help establish expectations for comparisons using the DC-8 in 2015 and beyond.

An equally important motivation for the NASA funded November 2014 flights is to utilize the powerful DAWN ADWL to address some of the most critical issues of Arctic atmospheric science by: 1) providing validation of numerical model and reanalysis characterizations of airflow in the lower atmosphere over the open oceans, land, ice sheets and transition zones of the Arctic; 2) conduct detailed investigations into the importance of dynamic features such as the Greenland Tip Jet and organized large eddies to the transport and fluxes of heat and energy; and 3) characterize and study the wind regime of the lower atmosphere over marginal ice zones in the Arctic.

A review of the November 2014 mission will be provided, hopefully including preliminary looks at the DAWN data taken during the experiment. Preliminary thoughts and plans for the spring 2015 ADM cal/val mission and beyond based on the 2014 experience will also be discussed.

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