Airborne direct-detection and coherent wind lidar measurements over the North Atlantic Region during the WindVal campaign in 2015 supporting ESA’s Aeolus mission

The launch of the Aeolus mission by the European Space Agency (ESA) is planned for early 2018. The satellite will carry the first wind lidar in space, ALADIN (Atmospheric Laser Doppler Instrument). Its prototype instrument, the ALADIN Airborne Demonstrator (A2D), was deployed during several airborne campaigns aiming at the validation of the measurement principle and optimization of algorithms. In 2015, flights of two aircraft from DLR & NASA provided the chance to compare parallel wind measurements from four airborne wind lidars for the first time.

DLR-ESA-NASA WindVal Flight Campaign 2015
- 1st time worldwide with 4 wind lidar instruments flown on 2 aircraft in parallel
- Rehearsal of airborne Cal/Val activities after launch of Aeolus
- Datasets for testing calibration and wind retrieval algorithms

Payload of the DLR Falcon

Comparison of 2-µm lidar to dropsondes
- Dropsonde data from DC-8 available for 10 collocated flights with Falcon
- Valid measurement within < 3 min and < 5 km difference
- Measurements with differences > 5 m/s or > 25° (direction) are considered to be gross outliers and removed from comparison
- Std dev. is higher than for previous comparisons: 0.92 m/s (Chouza et al. 2016) 1.2 m/s (Weissmann et al. 2005)

Overall wind speed comparison of WindVal campaign:
A2D vs. 2-µm lidar
- A2D winds from molecular backscatter
- small Median Absolute Deviation
- comparison to 2-µm coherent detection lidar: precision < 1 m/s, bias < 0.1 m/s (Witschas et al. 2017, Chouza et al. 2016, Weissmann et al. 2005)

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