Experimental Validation and Assimilation of Aeolus Wind Observations

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The earth explorer mission Aeolus from the European Space Agency for the first time worldwide opens up the possibility to directly observe Earths' wind profiles from space. Aeolus carries a Doppler wind lidar operating at 335 nm which measures the Doppler frequency shift of backscattered laser light from air molecules and particles up to 30 km accumulated in 0.25 - 2 km vertical range bins. It's expected that such global coverage of wind profiles helps to fill a gap in the global observing system.

As part of the German initiative EVAA (Experimental Validation and Assimilation of Aeolus observations) validation and monitoring activities for Aeolus are performed to determine and understand observation systematic and random errors. Independent ground-based measurements from radiosondes and tropospheric radar wind profilers are used as reference for the evaluation of Aeolus winds. In addition monitoring results from the global model ICON from the German Weather Service (DWD) are used to examine the results and investigate bias dependencies. An accurate understanding of the systematic errors of Aeolus wind observations is necessary for data assimilation processes. First impact experiments with an established bias correction for Aeolus wind data were run at DWD showing encouraging results for forecast improvements in upper tropospheric and lower stratospheric tropics and southern hemisphere.