Data quality of Aeolus wind measurements

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The European Space Agency (ESA)'s Earth Explorer Aeolus was launched in August 2018 carrying the world's first spaceborne wind lidar, the Atmospheric Laser Doppler Instrument (ALADIN). ALADIN uses a high spectral resolution Doppler wind lidar operating at 355nm to measure profiles of line-of-sight wind components in near-real-time (NRT). ALADIN samples the atmosphere from 30km altitude down to the Earth's surface or to the level where the lidar signal is attenuated by optically thick clouds.

The global wind profiles provided by ALADIN help to improve weather forecasting and the understanding of atmospheric dynamics as they fill observational gaps in vertically resolved wind profiles mainly in the tropics, southern hemisphere, and over the northern hemisphere oceans. In January 2020, the European Centre for Medium-Range Weather Forecasts (ECMWF) became the first numerical weather prediction (NWP) centre to assimilate Aeolus observations for operational forecasting.

A main prerequisite for beneficial impact is data of sufficient quality. Such high data quality has been achieved through close collaboration of all involved parties within the Aeolus Data Innovation and Science Cluster (DISC), which was established after launch to study and improve the data quality of Aeolus products. The tasks of the Aeolus DISC include the instrument and platform monitoring, calibration, characterization, retrieval algorithm refinement, processor evolution, quality monitoring, product validation, and impact assessment for NWP.

The achievements of the Aeolus DISC for the NRT data quality and the current status of Aeolus wind measurements will be described and summarized. Further, an outlook on future improvements and the availability of reprocessed datasets with enhanced data quality will be provided.

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