

## Global wind profiling with space-based Doppler wind lidar for improvement of numerical weather prediction

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Wind is one of fundamental meteorological elements describing the atmospheric state. Global wind observation is important to improve the initial conditions essential for numerical weather prediction (NWP), climate studies, and meteorological studies. Wind vector can be retrieved from cloud and water vapor motions derived from weather satellite images, which is called the atmospheric motion vector (AMV). AMV achieves a large coverage area and high temporal and horizontal resolutions but has a large height assignment error and a relatively low accuracy. Future infrared sounder installed on the next generation weather satellite are expected to provide us more fine vertical wind structure. Space-based passive sensor has a limit to the height-resolved wind measurement. It is necessary to make wind profiling with high vertical resolution. ESA launched a first space-based Doppler Wind Lidar (DWL), Aeolus, to make global wind profiling in August 2018. Aeolus demonstrated that global wind profiling provides us a great improvement of the accuracy of numerical weather prediction. Aeolus measurement coverage is limited. The design mission life of Aeolus, three years, has passed at end of December 2021. ESA started reviews and considerations on the Aeolus follow-on mission. The working group on Japanese space-based DWL is making feasibility study. To realize global 4-D wind observation with a high resolution, results of feasibility study of Japanese space-based DWL and the expected performance of the combination of DWL and infrared sounder wind observation are described in the paper.

Keywords: Numerical Weather Prediction, Doppler Wind Lidar, Wind Profiling, Lidar technology, Global 4-D wind observation, Earth Observation System