

ADM-Aeolus, the First Doppler Wind Lidar Sampling Vertical Profiles of the Horizontal Wind from Space

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Brief Abstract:

The World Meteorological Organisation (WMO) states in an evaluation of user requirements and satellite capabilities that for global meteorological analyses, measurement of wind profiles remains most challenging and most important (WMO, 1998).

Our ability to observe and analyse winds is far from adequate, both in-situ as well as remote sensing observing systems suffer from being incomplete and in some cases the accuracy of the wind measurements is poor. Observations of temperature and pressure, defining the atmospheric mass distribution, can give us information about the wind field and vice versa. In the extra-tropics the physical coupling between the wind and the mass field is strong. In the tropics there is no such geostrophic coupling. Instead characteristic atmospheric wave features determine the time dependent coupling between mass and wind. In addition, the mass-wind coupling is also scale dependent, large-scale mid-latitude flow features are strongly geostrophically coupled while mid-latitude flow features on a smaller horizontal scale are uncoupled. It has been shown recently that the wind field information has a very strong impact on the quality of the atmospheric analyses. This is particularly true in the tropics as well as for small-scale circulation features in the extra-tropics such as fronts and orographically generated flow features. Additional wind information thus increases the accuracy of atmospheric analyses.

ADM-Aeolus will be the first Doppler wind lidar to globally measure vertical profiles of the horizontal wind from space. The instrument is the second ESA Earth Explorer Core Mission to be launched in 2008. Currently work is being performed on the contribution of ADM-Aeolus to tropical analyses, on the potential impact of line-of-sight (LOS) wind observations on model analyses and

forecasts using data assimilation systems and on the potential impact in stratospheric analyses and forecasts.

In this presentation, the ADM-Aeolus measurement concept will be presented. Furthermore an overview of the output from scientific studies performed to investigate the benefit of the ADM-Aeolus measurements will be given.

Reference:

World Meteorological Organisation, 1998: Preliminary Statement of Guidance Regarding How Well Satellite Capabilities Meet WMO User Requirements in Several Application Areas. WMO Satellite Reports SAT-21. WMO/TD No 913.