HEIGHT CORRECTION OF ATMOSPHERIC MOTION VECTORS USING SATELLITE LIDAR OBSERVTIONS FROM CALIPSO

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ABSTRACT

Atmospheric Motion Vectors (AMVs) provide valuable wind information for the initial conditions of numerical weather prediction models. However, height assignment issues and horizontal error correlations require a rigid thinning of the available AMVs in current data assimilation systems. The aim of this study is to investigate the feasibility of correcting the pressure heights of operational AMVs from the geostationary satellites Meteosat-9 and Meteosat-10 with cloud top heights derived from lidar observations by the polar orbiting satellite CALIPSO. The study shows that the wind error of AMVs above 700 hPa is reduced by 12-17% when AMV winds are assigned to 120 hPa deep layers below the lidar cloud tops. This demonstrates the potential of lidar cloud observations for the improvement of the AMV height assignment. In addition, the lidar correction reduces the slow bias of current upper level AMVs and is expected to reduce the horizontal correlation of AMV errors. Further research is planned on the assimilation of lidar-corrected AMVs and the development of situation-dependent AMV height correction functions.