Experimental Assimilation of Spaceborne Cloud Radar and Lidar Observations at ECMWF

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Observations providing three-dimensional information on clouds from spaceborne active instruments as CloudSat and CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations) are already available and new missions, such as EarthCARE (Earth Clouds, Aerosols and Radiation Explorer) should appear in the near future. The challenge is to assimilate these novel sources of data into a numerical weather prediction (NWP) system to achieve a better knowledge about the atmospheric state, and possibly to improve the weather forecasts. Research activities are ongoing at the European Centre for Medium-Range Weather Forecasts (ECMWF) to exploit spaceborne cloud radar and lidar observations for monitoring and assimilation.

The presentation will summarise the developments and experimentations done to make use of these new observations in the ECMWF system. First, the forward operator used to transform model output into the equivalent radar and lidar observations will be briefly described together with other important components of the assimilation system (such as definition of observation errors, quality control and bias correction). Then, the results from assimilation experiments using variational technique to assimilate cloud observations from CloudSat and CALIPSO (separately or in combination) will be presented.