EMS Annual Meeting Abstracts
Vol. 8, EMS2011-605-1, 2011
11th EMS / 10th ECAM

Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

The Impact of Real-Time Observations on the WRF Model Surface Forecasts

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Improved accuracy of near-surface weather forecasts at scales below 10 km is directly related to more efficient decision making and resource management within a broad variety of applications in public and private sectors. These areas include transportation, renewable energy systems, agricultural applications, thermal control of residential and industrial buildings, air quality monitoring, and alert systems. Many operational local-scale forecasting systems are capable of providing high-resolution products with grid spacing below 10 km. Availability of surface observations has increased and significant efforts have been directed toward the development of robust quality control standards within surface networks. Data assimilation and more comprehensive verification using a combination of the latest advances in numerical weather forecasting and surface networks foster further improvements in forecast accuracy. Earth Networks operates the largest exclusive network of more than 8,000 weather stations providing live local weather conditions and real-time alerts to millions of users. Real-time surface observations including wind speed and direction, temperature, humidity and pressure are passed through rigorous quality control procedures and are used for the operational WRF model forecasts. Solar/light sensors continuously providing high temporal and spatial resolution data, with dense coverage in urban and suburban areas, are included as part of the Earth Networks nationwide network of weather stations. A database created in 1993 has accumulated large amounts of surface solar flux data including cases of severe weather events and typical overcast or cloud-free days. Earth Networks assimilates the surface observations using the WRF model to provide 0-24 hour operational forecasts for a variety of customers. The high density of the Earth Networks observational network enables the implementation of subnet-based verification and data calibration. These techniques can be used to account for site features that are not resolved in the model, and to upscale site-specific observed solar fluxes. The model assimilation and verification results show the impact of Earth Networks real-time observations on accuracy of high-resolution operational numerical weather forecasts in selected domains.