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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

High resolution forecasts over a complex terrain area in Southeast coast of Brazil

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CPTEC has used in its operational suite the Eta Model to produce weather forecasts over South America since 1997. A new version of the model, including the introduction of piecewise-linear vertical advection of dynamic variables; vapor and hydrometeor loading in the hydrostatic equation, and changes aimed at refining the convection schemes available in the Eta, was developed and applied to produce forecasts from weather to climate forecast ranges. In order to prepare the model for operational higher resolution forecasts, the model is configured and tested over a complex topography region along the coast of Southeast Brazil. The Eta Model was configured, with 5-km horizontal resolution and 50 atmospheric layers. The Eta-5km is a second nesting, it is driven by Eta-15km, which in its turn is nested in the CPTEC T213L42 Global model. The initial conditions are taken from NCEP daily analyses. The model domain includes the two Brazilians cities, Rio de Janeiro and Sao Paulo, urban areas, preserved tropical forest, pasture fields, and complex coastline. The region suffers frequent events of floods and landslides. In this work, verification of model experiments focuses on observations taken from a nuclear power plant. Near-surface wind direction and magnitude are major concerns of the plant emergency plan; the variables are also highly sensitive to model spatial resolution. Verification of one week period, which changed from an unperturbed to a perturbed, frontal passage, regime shows that model has weak diurnal cycle signal for wind in that region. The wind direction is followed by the model but differs by about -40 degrees. The area is characterized by weak winds which makes the forecast more difficult. The forecast wind magnitude is about 1.5m/s, which is close to observations; however, the changes in wind strength along the day are not followed by the forecasts. Forecast temperatures follow closely the observed diurnal cycle. Experiments changing some surface conditions such as the sea surface temperature and land cover show forecast error reduction and improved diurnal cycle. Increased horizontal experiments will be shown.