



Verification and intercomparison of QPFs and PQPFs from TIGGE over East Asia

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Quantitative precipitation forecasts (QPFs) and probabilistic QPFs (PQPFs) are obtained from The Observing System Research and Predictability Experiment (THORPEX) Interactive Grand Global Ensemble (TIGGE) database during the 2008-2011 summer, including the data from six operational ensemble prediction systems (EPSs): ECMWF, UKMO, NCEP, CMC, JMA and CMA. Forecasts of 24-h accumulated precipitation are evaluated at 1° grid spacing over East Asia against new satellite-based precipitation estimate product TRMM 3B42 V7, which applies gauge relative weighting and is more accurate compared to its former version.

Ensemble mean of QPFs is compared using different kinds of verification scores. Results show that the gap of predictability between the best and worst EPS is about 3 days, while it becomes larger in the East Asian Tropics and smaller in the East Asian Subtropics. JMA and CMC have the least forecast errors for light to moderate rain, while ECMWF is more accurate for heavy rain. All EPSs overestimate light rain events and underestimate heavy rain events, while they can discriminate between light and heavy rain events about 3-day lead time in the East Asian Subtropics.

Various measures of PQPFs show that CMC is more skillful for light rain events, while ECMWF produces the best PQPFs for moderate to heavy rain events. All EPSs suffer from severe deficiency of ensemble spread except CMC, and PQPFs show a dry bias at the low end and a wet bias at the high end, indicating overconfident samples. Different EPS shows large variation in forecast performance. CMC is the most reliable but least sharp EPS. JMA is marked with a noteworthy wet bias of 1-2 day forecasts in the East Asian Tropics, which causes the discontinuity of skill with the forecast lead time.