Assessment of the Observation Impact on Forecast Error Reduction in North-West China Using FSO Method

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Abstract:

In order to evaluate the impact of various conventional observations on 24h forecast error reduction over North-West China, aiming at the Urumqi regional numerical forecasting system which is constituted of WRF and WRFDA driven by previous GFS forecast fields rather than the GFS analysis fields at the model's start time, and the conventional GTS and automatic observation data from the CMA Project 9210 System, the FSO toolkit in WRFDA3.8 is used in this study. The results are as follows based on the analysis of observation contribution to 6-hour cycle's forecast system from April to October in 2015: (1) The contribution is significantly positive at 1800 UTC, followed by 0000 UTC and 1200 UTC, either are they by their observation measure types respectively. However, there is a negative contribution at 0600 UTC, which is mainly caused by a significant degrade in June and July compared to the other period. (2) As for the observational elements, temperature fields produces the highest contribution, wind comes next, while pressure makes little difference. (3) The SOUND type exhibits the largest impact, followed by

SYNOP, AIREP and PILOT. (4) From the layout of the spatial contribution of all the elements of SYNOP at different model starting time, temperature makes also the highest contribution, followed by wind. The contribution of all kind of elements is mainly positive at 1800 UTC, even though the total station number, which could be absorbed by the model, is about two-thirds of the amount in any other starting times. Except 18UTC, the stations of negative contribution are mainly located in the southeast China where stations gather in higher density. Wherein, pressure and humidity make highest negative contribution. The SYNOP stations in the higher area of Xinjiang mostly have positive effects on reducing error except for the 06UTC starting time. (5) The SYNOP's contribution in reducing forecast error has a spatial-temporal variation character, which is possibly caused by the connection with the spatial-temporal variation of background forecast field, as well as links to the daily fluctuations of the observation error representation at some special located stations' surroundings.

Key words: Observation Impact; Forecast Error Reduction; North-west China