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Predictability of global NWP model at KMA with respect to weather types for each season

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KMA(Korea Meteorological Administration) has been operating global NWP model, GDAPS(Global Data Assimilation and Prediction System), with horizontal resolution of 10 km at mid-latitude region from June 2018. It gives improved skill scores, for example, 120-hour forecast rmse error of 500hPa geopotential height is 5.8% lower than that of previous systems with 17 km grid length. Obviously the statistic score of forecast performances is improved in terms of seasonal averaged value, however we need to figure out systematic trends or characteristics of the NWP model's performance for each weather regime for better forecast guidance.
The goal of this research is to find out systematic biases or reliability with respect to forecast lead time of GDAPS for each weather type. First, we sorted into 24 weather types based on mean sea level pressure(mslp) patterns from ECMWF reanalysis with 1.5 degree resolution for 30 years(1981∼2010) over Korean peninsula region(24N∼51N, 114E∼141E) by using the K-means clustering method. Synoptic surface observation data for each weather type showed its own characteristics such as frequency of seasonal occurrences, mean temperature and precipitation amounts etc. After set the standard weather types, GDAPS analysis field is matched into each type based on 1-day mslp mean.
In order to explore the predictability with respect to weather regimes for each season, we made composite diagram with verified scores like rmse and mean error (4 variables, 6-hour to 288-hour forecast time), synoptic forcing and find out some remarkable forecast bust weather types. For example, Aleutian low over the East sea(7th type) usually occurs in spring and fall season and shows relatively higher rmse error even in short forecast lead time than other types in those seasons. This weather type was often accompanied by blocking in the upper level so that lower system showed delayed movement. The 19th type which occurs in summer season related with tropical convergence zone also shows lower predictability. With these characteristics of predictability of our global NWP model for each weather regime, we have plan to provide objective guidance for forecasters to make better decision of high impact weather warnings. Further studies and details will be included in the presentation session