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A successful story in predicting NAM events by the operational NCEP's GFS model.

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It is customary to assume a two-week limit of predictability for weather in the earth's atmosphere. However, there are some exceptions. For example, atmospheric anomalies forced by external boundary conditions may survive much longer than 2 weeks. The QBO in the stratosphere has to be predictable over many months if not years. Here we report that the annular mode, a dominant low-frequency mode in the atmosphere, can be predicted remarkably well beyond a week by the NCEP's high resolution GFS model (T382L64).

The predictive skill of the Northern Annular Mode is examined using RMS (root mean square) error, AC(anomaly correlation) and bias for the period from September 2005 to March 2006. In terms of the stratospheric Polar Vortex Oscillation index, the GFS AC skill remains as high as 0.95 at the lead time of 15 days, much better than the persistent forecast. The prediction of stratospheric circulation anomalies shows scores above 0.8 level in terms of map AC skill (except for the rapid phase transition time) until the end of forecast at day 16, which is comparable to skill in the troposphere at about day 7. In the polar troposphere, the model prediction is well above the persistence forecast with up to 0.35 extra AC skill for the 1st week but deteriorating very quickly afterwards. From week_1 to week_2, the model's skill is nearly as bad as the persistence except in the polar stratosphere. In the polar stratosphere, the model forecast gradually becomes better than persistence in the 1st week, and tends to maintain the extra 0.28 AC skill over persistence in the 2nd week. We found evidence that the extra skill in the 2nd week in the polar stratosphere is due to the model's ability to capture poleward propagating anomalies. It is seen that large amplitude anomalies over the polar stratosphere are mainly originated from the tropics and it takes several weeks for them propagate into high latitudes. Therefore, having the signal in low/mid latitudes to begin with in the model initial state helps the model to predict the polar

stratosphere circulation anomalies beyond the traditional predictability by the dynamic model.

From our results, it appears that some aspects of atmospheric variability are not only predictable, but also already well predicted by current models.