
Progress towards a global hourly-updating data assimilation system

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Abstract

Currently, the US global forecast system (GFS) uses a 6-hour data assimilation window within a hybrid 4D-EnVar framework, providing analyses from which to initialize forecasts every 6 hours. This "long" window provides less accurate information on rapidly-evolving systems such as hurricanes and continental convective storms. In order to improve forecasts of these fast systems, more frequent analysis updates, and possibly shorter assimilation windows, will be necessary. To this end, we are testing different approaches to updating the GFS every hour. A challenge for hourly updating is data latency: many observations are not available for assimilation until 1-2 hours after the valid observation time. One method to overcome this challenge is the "catch-up cycle", in which an hourly cycling system is re-initialized 2-4 times per day and catches back up to real-time through a succession of rapid-update cycles. This procedure allows late-arriving observations, that would have otherwise been missed, to be included into the hourly system. Another possible solution is to implement overlapping assimilation windows, in which the system is updated every hour with observations that have arrived within the last hour, but that are valid in a longer window (3-6 hours), removing the need for a separate 6-hourly global system. Preliminary results suggest that the overlapping windows technique can improve upon short-term fit-to-observations in the GFS, relative to the current operational method. Comparisons with catch-up cycles are underway.

Keywords: data assimilation, rapid updates, global forecast system, hurricanes

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