



0-6 hour Weather Forecast Guidance at The Weather Company

Todd Hutchinson

The Weather Company, An IBM Business, United States (todd.hutchinson@us.ibm.com)

As part of The Weather Company's Global Forecast On Demand system (Neilley et al., 2015), 0-6 hour forecasts are derived from a combination of 1) extrapolated radar-based nowcasts, 2) rapid-update convective-allowing regional NWP forecasts, 3) Global NWP forecasts, 4) surface observations and 5) government issued weather warnings. Forecasts of precipitation (intensity, probability and type) and other sensible weather parameters (e.g. , temperature, cloud cover, wind speed) are rapidly updated to provide forecasts to 6 hours. In areas where radar data is available (including North America and Europe), forecasts are updated every 5-15 minutes. In other areas, forecasts are updated at the frequency of available NWP forecasts.

Nowcasts of precipitation rate are derived from rapid-update mosaics of radar reflectivity that are cleaned of echoes from non-hydrometeor sources through automated and manual means. Precipitation motion vectors, calculated by cross-correlating subsequent radar mosaics, are used to extrapolate radar echoes forward in time to generate forecasts of precipitation rate.

NWP forecasts are run at convective-allowing scales (4 km) each hour over North America and Europe and at coarser resolution (13 km) globally every 6 hours. The NWP forecasts are temporally blended with the radar-based nowcasts to provide deterministic forecasts of precipitation rate throughout the 0-6 hour period. The temporal blending varies from favoring extrapolated radar forecasts early to favoring NWP forecasts later in the period. The weighting is dynamically adjusted based on local atmospheric instability.

Probabilities of precipitation (POP) are calculated by deriving POP independently from the radar-based nowcasts and NWP forecasts, then temporally blending the POP in the same way that the precipitation rate is blended. POP is calculated from both the radar-based nowcasts and the NWP forecasts at each forecast time by spatially analyzing the forecast precipitation rate. NWP-based POP is further refined by weighted averaging of POP forecasts with common valid times from subsequent NWP cycles within the previous 9 hours (i.e. time-lagged ensemble).

In order to provide a complete forecast of sensible weather, the NWP forecasts also provide temperature, dew point, wind speed and direction, cloud cover, visibility and precipitation type. To assure consistency with observations, forecasts of temperature, dew point, cloud cover and wind are corrected by subtracting an error value that decays from the total error at the observation time to nil several hours into the forecast.

Finally, government issued severe weather warnings are used to augment the 0-6 hour forecasts to assure that the near-term forecasts are consistent with critical warning information, and to include qualifiers (such as "severe") in worded 0-6 hour forecasts.