Integrating Wind Profiling Radars and Radiosonde Observations with Model Point Data to Develop a Decision Support Tool to Assess Upper-Level Winds for Space Launch

William H. Bauman III
NASA Applied Meteorology Unit / ENSCO, Inc.
Cape Canaveral Air Force Station, Florida

Clay Flinn
USAF 45th Weather Squadron
Patrick Air Force Base, Florida

On the day-of-launch, the 45th Weather Squadron (45 WS) Launch Weather Officers (LWOs) monitor the upper-level winds for their launch customers to include NASA's Launch Services Program and NASA's Ground Systems Development and Operations Program. They currently do not have the capability to display and overlay profiles of upper-level observations and numerical weather prediction model forecasts. The LWOs requested the Applied Meteorology Unit (AMU) develop a tool in the form of a graphical user interface (GUI) that will allow them to plot upper-level wind speed and direction observations from the Kennedy Space Center (KSC) 50 MHz tropospheric wind profiling radar, KSC Shuttle Landing Facility 915 MHz boundary layer wind profiling radar and Cape Canaveral Air Force Station (CCAFS) Automated Meteorological Processing System (AMPS) radiosondes, and then overlay forecast wind profiles from the model point data including the North American Mesoscale (NAM) model, Rapid Refresh (RAP) model and Global Forecast System (GFS) model to assess the performance of these models.

The AMU developed an Excel-based tool that provides an objective method for the LWOs to compare the model-forecast upper-level winds to the KSC wind profiling radars and CCAFS AMPS observations to assess the model potential to accurately forecast changes in the upper-level profile through the launch count.

The AMU wrote Excel Visual Basic for Applications (VBA) scripts to automatically retrieve model point data for CCAFS (XMR) from the Iowa State University Archive Data Server (http://mtarchive.geol.iastate.edu) and the 50 MHz, 915 MHz and AMPS observations from the NASA/KSC Spaceport Weather Data Archive web site (http://trmm.ksc.nasa.gov).

The AMU then developed code in Excel VBA to automatically ingest and format the observations and model point data in Excel to ready the data for generating Excel charts for the LWO's. The resulting charts allow the LWOs to independently initialize the three models 0-hour forecasts against the observations to determine which is the best performing model and then overlay the model forecasts on time-matched observations during the launch countdown to further assess the model performance and forecasts.

This paper will demonstrate integration of observed and predicted atmospheric conditions into a decision support tool and demonstrate how the GUI is implemented in operations.