

AMS Board on Enterprise Communications -to discuss development of weather forecasting capabilities  
06 Sept 20`12 Meeting in Boulder -  
Tom Fahey, Delta Air Lines comments during the meeting  
& some added clarification.

Comments were made in response to the topic Betsy Weatherhead raised :  
“What is currently not working regarding weather forecasting capabilities?”

Tom Fahey proposed that the following airline needs be identified as:  
Opportunities for Computer modeling Improvement, rather than what is not working.

1. Observations: Automated weather data measurements from aircraft:
  - a. Wind velocity & Temperature
  - b. Turbulence
  - c. H<sub>2</sub>O Vapor

Since the late 1980's airlines have been providing automated reports of wind velocity and temperature for computer model ingest. This data was used to help develop the Rapid Update Cycle (RUC) Forecast Model in the 1990's. Currently all three categories of observational data are automatically being collected from aircraft and are being used to varying degrees by a number of different US government funded models that are operational .

Currently data collection efforts and processes for obtaining access to the data are not well coordinated between the airlines and the model developers and those responsible for running the operational models at the NWS.

There are opportunities here to optimize the amount and geographical (vertical & horizontal) locations of data collected for model ingest & initialization. There are also opportunities to clarify which individuals as well as which organizations can obtain access to a feed of current data as well as access to the archived, historical data.

Suggested Solution:

The establishment of a process that facilitates a coordinated effort between airline data contributors, private industry weather data providers, researchers, academia and government (NWS organizations running operational models) could potentially benefit all.

Items # 2 & 3 were organized by time scales based on conceptual model A. E. MacDonald introduced during the meeting titled “NOAA Global Model Research & Development – Initial Value Time Scales :

2. Short Range (model run every hour for a forecast period out to 24 hrs) &  
Medium Range (model run every 6 hrs for a forecast period out to 2 weeks) Airlines data needs:
  - a. Winter or Tropical Activity with Significant Impact at Airport(s).  
Airlines currently make decisions regarding a reduction in volume of aircraft operating in & out of an airport 12 hour to 36 hours in advance when winter or tropical weather is anticipated to hamper safe or efficient

airport operations. Impact on other local infrastructure and transportation capabilities are also taken into account.

Airline Request: A major effort be devoted to improving the accuracy of computer weather model forecasts in the 24 hour to 72 hour forecast period.

b. Convective Initiation and Impact on En Route Operations

Airline operations during thunderstorm activity can be severely limited, especially in the NE U.S. Continued efforts on perfecting methods to anticipate the development of thunderstorm activity in the 1 to 6 hour time period as well as it's evolution once developed in the 6 to 12 hour period could be very beneficial. Improvements in the ability to forecast convection would allow airlines and the FAA Air Traffic Managers to plan more efficiently. Increased confidence in the location and timing of airspace that will be impacted would hopefully increase the number of aircraft that the FAA would agree to handle in a volume of airspace. Currently due to the level of uncertainty, congestion develops very rapidly once convection develops and as the areas of storms then move and finally diminish, available airspace goes unused because there is a lag in getting aircraft back in the air and routed thru the now available airspace.

3. Medium Range (model run every 6 hrs for a forecast period out to 2 weeks) & Long Range (model run every 24 hrs for a forecast period out to 3 months ) Airlines data needs:

a. Hot Surface Temperatures & Planning Aircraft Operating capability

The higher the air temperature the less thrust an aircraft engine can produce. As a result, on an unusually hot day, airlines cannot carry as much weight in the same aircraft as they can on a cooler day. This requires airlines to limit the amount of cargo and sometimes even passengers that can be carried on the flight, at the last minute. Or the week prior, reduce the number of seats that can be sold. More accurate forecasts of the maximum temperature for the day and the hourly values, two days to one week in advance would allow an airline to more accurately estimate the maximum allowable take-off weight and then maximize the amount of cargo space and seats sold.

b. Cruise Altitude Wind Velocities & Length of Flying Time

Airlines build their schedules a number of months in advance. The average wind speed and direction as well as the average temperature at cruise altitudes for the geographical area and time of year are currently used to estimate flying time. Flying times can vary significantly between summer and winter. A forecast of wind patterns 3 to 6 months in advance, if more accurate than the average values could be used to more efficiently plan flying times.