Title: Weather forecasting and aviation – old bedfellows

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Metropolitan and aviation have a relationship extending back to the first man made flying machines. The earliest aviators understood the importance of appropriate weather conditions for safe and successful flight.

In fact, within 15 years of the Wright brothers first flight in December 1903 the US Post "Aerial Mail Service" was in receipt of a routine weather forecast covering the New York to Chicago route. Those weather forecasts were based on a relatively tiny dataset and barely extended beyond a simple description of current weather – yet their worth was quickly recognised by flyers. By 1928, W. B. Blair wrote a paper describing his attempts to create a chart of the USA depicting the climatology of weather phenomena hazardous to aviation.

In those early years weather forecasting was very limited in terms of accuracy and range. Meteorology was a developing science, observations were scarce and powerful supercomputers did not exist. Weather forecasting was in its infancy and limited to empirical techniques, ‘rules of thumb’ and forecaster experience. Indeed, much of the weather forecasters time was spent simply collecting and charting observations onto weather maps. I recall as a young boy, noticing that a foggy start to the morning often led to a pleasant sunny day. This realisation was not based on any knowledge of the ‘radiation night’ and its’ associated meteorological circumstances. Rather, it shows the value of observation and pattern recognition. In the pioneering days of aviation primitive weather maps coupled with some basic forecasting techniques, enabled weather forecasters to add real value to pilots decision making process.

That accurate weather forecasts could be beneficial to air transport provided significant momentum to the development of meteorology and weather forecasting as a science. In fact, it was the early trans-Atlantic flights of the flying boats that prompted the Irish State to develop its’ own national weather service with a forecasting centre located at Foynes in Co. Limerick. It is still the case that the aviation industry is a significant driver in the ongoing research activities of meteorological services in Ireland and globally.

Today’s commercial aircraft and the airports they use are sophisticated and allow for safe traffic movements even in conditions of poor visibility and low cloud ceilings. Yet despite great advances in aviation and avionics, weather is still a critical variable for pilots and their decision making. Commercial airlines concerned with safe and economic flight incorporate weather forecasts into their flight planning decisions - including whether to ‘go’ or ‘no go’, how much fuel to carry and which route to follow. For the general PPL holder, accurate weather forecasts retain an even higher degree of importance in terms of flight safety. In this age of global warming weather forecasts can be used to inform decisions that have the potential to
lessen the environmental cost of air transport.

The aviation weather forecaster is concerned with a different type of forecasting to his counterpart who forecasts for the general public. When one forecasts for the aviation community lines such as ‘rain spreading eastwards this evening’ simply do not cut the mustard. Aviation forecasts are specific in the information they provide. They are numerical in format and aim to give as precise a picture of expected weather conditions as possible. With regard to the example given above, the aviation forecaster will give a best estimate of visibility and ceiling conditions in the rain. They will be definitive in their timings of the frontal passage and identify any additional hazards relevant to the aviator such as turbulence, icing and embedded Cumulonimbus.

In recent decades the science of meteorology and its practical application in terms of weather forecasting has greatly improved. There have been incredible advances in the acquisition of remote sensed data through improvements in Satellite and RADAR technologies. The ability of supercomputers to model and accurately predict the future state of the atmosphere has improved exponentially. These developments have enabled the modern forecaster to achieve a higher degree of accuracy in weather prediction than would have been previously imaginable.

Despite scientific and technological advances we have not reached the point of the infallible weather forecast. Questions that aviation users want answered can provide the forecaster with a significant challenge. Pilots want to know will fog form and, if so, when will it clear?; Balloonists want to know wind speeds to a very high degree of accuracy (I have been asked for clarifications such as ‘Will it be 7 or will it be 8 knots?’); Flyers with different ratings (VFR/IFR) have different decision making criteria; Glider pilots are concerned with soaring forecasts and forecasts of local winds.......and so on. Answering those questions can sometimes prove tricky but now, more often than not, the forecasters are getting it right.

The worlds of meteorology and of aviation have evolved together over the past 100 years – with aviation being a primary driver of innovation in weather forecasting. The relentless growth of the airline industry and its desire to maximise capacity in the skies in a safe and efficient manner ensures that this symbiotic relationship is destined to continue.

My forthcoming series of articles for Flying in Ireland will provide an insight to the world of the aviation forecaster and weather forecasting. Next month, in a piece entitled ‘Weather forecasting: science or a stab in the dark’, I will describe the forecasting process and how the forecaster decides just what way the weather is likely to evolve.

In addition, I would be pleased to answer weather related enquiries from readers that may be of interest to the wider aviation community.

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