Results of the Fog Forecast Verification in TAF Forecasts for Zagreb Airport

Jadran Jurković, Marko Zoldoš, and Igor Kos

Croatia Control ltd., Meteorological, Velika Gorica, Croatia (jadran.jurkovic@crocontrol.hr)

Forecasting of fog events is always challenging. Conditions that lead to fog are well known but uncertainties in operational models and statistical methods are still quite large. In contrast, the accurate forecast of fog is highly desirable, especially for aviation. Fog events at airports can cause delays or cancellation of flights, depending on the technical equipment of the airport and airplane. Therefore, Terminal Aerodrome Forecast (TAF) is important in decision-making during the flight planning process. TAF Verification procedures are still not standardized, but one of the leading approaches is proposed by Mahringer (2008). It is based on verifying the best and worst conditions for each hour, between observed and forecast states.

The data used for the verification is visibility from TAF and METAR reports during the period 2009-2016 for Zagreb Airport. They contain hourly values of short-range forecasts (24 hours), and observed reports every half-hour. Zoldoš and Jurković (2016) showed that at Zagreb airport fog is most frequent in the period between September and February and there are approximately 60 fog events per year. However, the occurrence of fog is about 8% in terms of hours yearly, hence fog can be regarded as a rare event. When verifying visibility, a multi-categorical contingency table with class limits arising from criteria for change groups in a TAF forecast is calculated. For analyzing multi-categorical contingency table, Juras and Pasarić (2006) suggested the diagram with bias and tetrachoric (or polychoric) correlation coefficient (TCC).

The verification results confirm that forecasting of fog events is challenging. Forecasted worst conditions (minimum forecasted visibility in hours) in TAFs are better correlated with the observed values than the forecasted best conditions. During the year, results are better in the fog season. During the day, hours with forecasted fog follow observed ones (climatology). It is clear that the forecasting of the onset of fog is more challenging compared to the dissipation. Verification indices decrease sharply with increase of the forecast lead time, especially in the first hours of forecast.

Detailed results of this verification were presented to the forecasters and adopted to customers through a regular audit session, which is part of the quality management system.