



An unusual fog episode at Lisbon airport (Portugal): Performance of ECMWF and AROME models

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The 7–8 January 2015 fog episode at Lisbon international airport is analysed. Its persistence was atypical (second longest episode since 2004) and caused significant air traffic disruptions. The performance of two operational models (European Centre for Medium-range Weather Forecasts (ECMWF) and Applications of Research to Operations at Mesoscale (AROME)) used at the Portuguese Weather Service is assessed not only for the selected fog episode, but also for the extended winters (November to March) of 2013/2014 and 2014/2015. This fog episode developed under the following conditions: (1) the occurrence of a strong and persistent midwinter anticyclone over Iberia, driving favourable conditions for the formation of radiation fog; (2) a short interruption of the anticyclonic circulation by a kata-cold front on the day before, favouring the development of fog/low stratus clouds, which persisted until dawn on 7 January over the Tagus valley; (3) low-tropospheric easterly/northeasterly winds, favouring the drift of fog patches from the Tagus towards Lisbon. At Lisbon airport, both ECMWF and AROME were able to capture fog occurrence, but were unable to predict its persistence throughout the episode. Low cloud cover and horizontal visibility from ECMWF revealed higher skill in fog prediction than that derived from AROME. Nonetheless, a modified version of the Fog Stability Index based on AROME was proven to be a more skilful fog predictor, also outperforming other predictors based on ECMWF. These conclusions are also supported by an objective verification over a two-winter period