EMS Annual Meeting Abstracts
Vol. 14, EMS2017-439, 2017

Understanding the Cause of False Alarms in Observational Fog Prediction

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Fog is a hazard to air, land, and marine navigation. Accurate prediction of fog, however, remains elusive due to the complex interplay of many different processes. Often, numerical models are incapable of representing the conditions necessary for fog formation. Observational-statistical methods, on the other hand, have been shown to have great potential for prediction with the possibility of achieving very high hit rates above 95%. The high hit rates, however, are accompanied by impractically high false alarm rates (nearing 40%). In order to better understand why the prediction fails, the causes of false alarms are assessed for radiative fog events using observations from 2012-2016 from the CESAR Observatory in the Netherlands. Both local and non-local influences are identified along with strategies to reduce the false alarms in prediction, while maintaining the high hit rates. Reduction of false alarms to 10% with hit rates still above 90% is shown to be possible, significantly increasing the value and confidence of the forecasting method. The implications of the observational analysis for future numerical simulation and forecasting will also be discussed.