

ABSTRACT

The prediction of fog occurrence, extent, duration, and intensity remains difficult despite improvements in numerical guidance and modeling of the fog phenomenon. This is because of the dependency of fog on microphysical and mesoscale processes that act within the boundary layer and that, in turn, are forced by the prevailing synoptic regime. Given existing and new technologies and techniques already available to the operational forecaster, fog prediction may be improved by the development and application of a simple conceptual model. A preliminary attempt at such a model is presented for the southern region of the United States (gulf coastal states) and requires information regarding cloud condensation nuclei, moisture availability (or saturation), and dynamic forcing. Each of these factors are assessed with regard to their extent and evolution with time. An illustration, and potential application, of how the model could be used is detailed as no extensive operational testing has yet been completed. Instead, the model is applied in hindcast to verify its application. Successful use of the model will require an operational forecaster to assimilate all available tools including climatology, numerical guidance, sounding analysis, model diagnostic software, and satellite imagery. These must be used to characterize and quantify the nature of the local and regional boundary layer in the forecast region according to macroscale forcing and moisture availability, the initial local settings and boundary layer, qualitative assessment of cloud condensation nuclei, and the interaction of these in time and space. Once identified, the evolution of the boundary layer may be forecast with regard to the overall environment for fog occurrence, its likely extent, intensity, and duration.