

Assessment of fog predictability in the Mexico Basin

Pohema de Jesús González Viveros (1), Fernando García García (2), and Ernesto Caetano (3)

(1) Programa de Posgrado en Ciencias de la Tierra, Universidad Nacional Autónoma de México, Mexico City, Mexico (pj.gv03@gmail.com), (2) Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México, Mexico City, Mexico (ffgg@atmosfera.unam.mx), (3) Instituto de Geografía, Universidad Nacional Autónoma de México, Mexico City, Mexico (caetano@unam.mx)

The numerical weather prediction of fog is challenging, as many models typically show large biases for the timing of the onset and dispersal of the phenomenon, as well as for its depth and low liquid water content. With the purpose to understand the role of the various physical processes involved – such as radiation, land-surface coupling, and microphysics – the fog skill prediction of the Weather Research and Forecasting (WRF) model was evaluated for the period between 1999 and 2018 in the Mexico Basin, where Mexico City’s International Airport (AICM) is located.

First, a climatology for the study period was realized using *Météorologique Aviation Régulière* (METAR) reports issued for the AICM. Individual events were characterized in terms of their most common formation mechanisms in the region: radiation, advection and frontal fog types. The WRF model results suggest that the boundary-layer formulation is critical for forecasting fog onset. For fog type, the choice of the microphysical scheme is a key element: for radiation fogs, a double-moment scheme outperforms any of the single-moment schemes, whereas the opposite occurs for advection and frontal fogs. Also, the WRF model results appear to be relatively sensitive to the initial time condition, since a 24-hour lead time has a much better skill than the 12-hour lead time forecasting.

Finally, statistical dichotomous analyses – using a simple 2 X 2 contingency table – showed that the WRF model, with the configurations and settings used, has good forecasting skills for each of the different fog types occurring in the Mexico Basin.