

Analysis and High-Resolution Modeling of a Dense Sea Fog Event over the Yellow Sea

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A ubiquitous feature of the Yellow Sea (YS) is the frequent occurrence of the sea fog in spring and summer season. An extremely dense sea fog episode was observed around the Shandong Peninsula of China in the morning of 11 April 2004. This fog patch, with a spatial scale of several hundreds kilometers, reduced the horizontal visibility to be less than 20 meters in some locations, and caused a series of traffic collisions and 12 injuries on a coastal stretch of major highway. In this paper, almost all available observational data including Geostationary Operational Environmental Satellite (GOES)-9 visible satellite imagery, objectively reanalyzed data of Final run (FNL) issued by National Center for Environmental Prediction (NCEP) and sounding data of Qingdao and Dalian, as well as the latest 4.4 version of Regional Atmospheric Modeling System (RAMS) model were employed to investigate this sea fog case. Its evolutionary process and the environmental conditions that led to the fog formation were examined by using GOES-9 visible satellite imagery and sounding observations. In order to better understand the fog formation mechanism, a high-resolution modeling of 4 km x 4 km using RAMS model was designed. The modeling was initialized and validated by using FNL data. A 30-h model simulation that started from 18 UTC 10 April 2004 reproduced the main characteristics of this fog episode. The simulated lower horizontal visibility area agrees reasonably well with the sea fog region identified from the satellite imagery.