



Investigation of Sea Surface Temperature and local topography effects on coastal fog: Case study of 21-22 January 2008 event on the west coast of Morocco

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The life cycle of fog over coastal regions is very sensitive to the heterogeneity of the landform and to the vicinity to the Ocean. Thus, the influence of the sea surface temperature (SST) and local topography on the evolution of a coastal fog is assessed in this study by performing sensitivity experiments. To achieve this, the numerical simulations are performed with the three-dimensional research model Meso-NH. This fog event occurred at the Grand Casablanca region, in the northwest coast of Morocco, during the night of 21-22 January 2008 and last more than 12 hours. It was analyzed using standard meteorological observations from the two synoptic stations of the region, the observed radio-sounding at the coastal station, the MSG satellite imagery and the ECMWF ERA-Interim reanalysis. The numerical simulation reproduced well the main features of this fog event since its formation to its dissipation. The numerical results demonstrated that this fog event was of a radiation type over land, due to the nocturnal radiative cooling and the turbulence. And one hour later near the coast, the fog was resulting from base lowering of Stratus low cloud, due to the cloud top cooling and the vertical turbulent mixing. The sensitivity experiments to SST demonstrate that varying SST in space and time affects the spatial distribution of the fog layer over an area of about 20km around the coast. Besides, the SST governs the thermodynamic fluxes at the air-sea interface, and then affects the life cycle of this fog event, in particular in the mature and dissipation phases. On the other hand, the sensitivity experiments to local coastal topography demonstrated its impact on the speed and direction of wind in the boundary layer during the different phases of the life cycle of this fog event. Then, it was found that the heterogeneities of terrain over the coastal regions affect the horizontal extension of this fog event during the mature phase and its evolution during the dissipation stage.