

The effect of a surface data assimilation technique and the traditional four-dimensional data assimilation on the simulation of a monsoon depression over India using a mesoscale model

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Abstract The objective of this study is to investigate the impact of a surface data assimilation (SDA) technique, together with the traditional four-dimensional data assimilation (FDDA), on the simulation of a monsoon depression that formed over India during the field phase of the 1999 Bay of Bengal Monsoon Experiment (BOBMEX). The SDA uses the analyzed surface data to continuously assimilate the surface layer temperature as well as the water vapor mixing ratio in the mesoscale model. The depression for the greater part of this study was offshore and since successful application of the SDA would require surface information, a method of estimating surface temperature and surface humidity using NOAA-TOVS satellites was used. Three sets of numerical experiments were performed using a coupled mesoscale model. The first set, called CONTROL, uses the NCEP (National Center for Environmental Prediction) reanalysis for the initial and lateral boundary conditions in the MM5 simulation. The second and the third sets implemented the SDA of temperature and moisture together with the traditional FDDA scheme available in the MM5 model. The second set of MM5 simulation implemented the SDA scheme only over the land areas, and the third set extended the SDA technique over land as well as sea. Both the second and third sets of the MM5 simulation used the

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