



Recent developments in predicting atmospheric instability with MODIS profiles using real time direct broadcast data over the Indian region

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Summary of the Working Paper

National Satellite Meteorological Center (NSMC) of IMD installed three real time direct broadcast ground receiving and processing system. These systems currently receives Earth observation data from polar orbiting satellites, such as NOAA (National Oceanic and Atmospheric Administration) meteorological satellite series, METOP and the MODIS (Moderate Resolution Imaging Spectroradiometer) Terra and Aqua satellites for New Delhi, Chennai and Guwahati stations. The potential of MODIS temperature and moisture profile in assessing atmospheric instability using real-time direct broadcast data receiving stations installed at India Meteorological Department (IMD) is examined. MODIS provides temperature and humidity profiles for twenty isobaric levels. MODIS temperature and moisture profile over the Indian region has been used to compute, a new index as MODIS profile instability (MPI), for clear and convective weather conditions during the period March to June 2011. The formulation of MPI and its comparison have been examined with well established traditionally used K index (KI), Lifted index (LI) and total totals (TT) index derived from radiosonde profiles of temperature, pressure and humidity. It has been observed that in most of the cases MPI has well correlated with those derived from ground truth observations. The results indicate that MPI can be used as a sensitive measure for the occurrence of extreme events such as thunderstorm and rainfall because no single stability index can provide a distinct threshold value for these events. The study suggests that inclusion of MPI as stability parameter in physical or statistical modeling can improve local severe storm predictions.