Geophysical Research Abstracts
Vol. 19, EGU2017-316, 2017
EGU General Assembly 2017
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# Influence of initial temperature perturbations on precipitation using WRF modelling system over the Southern Peninsular India

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A methodology based on Principal Component Analysis (PCA) is applied to quantify the magnitude of perturbations in the vertical temperature profiles to incorporate the effect of atmospheric stability. In this study, the PCA technique is used to obtain dominant eigen values of a particular temperature data set and then used to perturb the vertical temperature profiles. For this purpose, the National Centre for Environmental Prediction (NCEP) final analysis (FNL) data with 1x1 degree resolution (University Corporation for Atmospheric Research (UCAR) website: http://dss.ucar.edu/datasets/ds083.2/data) at 4 grid points over southern peninsular India (10N-76E; 10N-77E; 11N-76E; 11N-77E) at 0000 UTC in the month of April for 7 years (2003-2009) is utilized. The dominant eigen values in decreasing order of magnitude are deduced using the PCA from these vertical temperature profiles. Using the dominant eigen values, the temperature profiles in the FNL data are perturbed for initializing the WRF (Weather Research and Forecasting) modelling system version 3.6. To examine the influence of perturbed temperature in weather variables, the simulations are conducted for 24 hours on 02-Feb-2009, a day in winter, 23-May-2009, monsoon onset day, 12-Aug-2009, a day in the active monsoon season and 28-Oct-2009, a day in the north east monsoon season. Results computed from both with and without temperature perturbation are presented. The perturbation temperature plots show that the temperature perturbation using the PCA technique is a potential alternative for data assimilation. The simulated surface variables with the perturb initial temperature profiles are found to be relatively closer with observations. Also, perturbation in temperature increase the spatial rainfall and outgoing longwave radiation tendencies. These simulated results are comparable with those from TRMM (Tropical Rainfall Measuring Mission) and ERA-interim (European Centre for Medium Range Weather Forecasts (ECMWF) reanalysis) data.