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Uncertainties in the initial temperature perturbations over the southern peninsular India using WRF model

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Notice that the numerical models are initialized from the reanalysis data. Nowadays atmospheric analyses and reanalyzes are providing physical realistic fields for many variables, though predictions are still not completely realistic. Physical initialization (PI) of the numerical models plays a key role in the prediction of meteorological fields. It is well known that a slight change in the initial conditions drastically changes the whole prediction (Lorentz, 1963, McNider, et. al, 1995). In addition, a slight change in the stability of the initial temperature profile could also influence the computation of near-surface meteorological variables including the precipitation. The question arises how to quantify the perturbations in the initial temperature profile without altering the stability much. Here, a systematic approach is proposed to quantify the extent of perturbation to be used in the initial temperature profile. This allows us to modify the nature of vertical temperature profiles and in turn the stability. For this purpose, the FNL reanalysis data with 1x1 degree resolution 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 modified temperature profiles are used for initializing the WRF model. Results computed from both with and without temperature perturbation simulations are presented. The simulated temperature profiles are found to be improving with time. Also, perturbation in temperature increases the spatial rainfall and decreases the outgoing longwave radiation tendencies. This has been supported by high CAPE and low CIN in the perturb temperature simulations. The simulations indicate that the temperature perturbation using the systematic approach can be a potential alternative for data assimilation.