

Enhancement in CRTM Non-LTE Correction Scheme and Implementation of Scene-Dependent Observation Error in GSI for Assimilation of CrIS SWIR

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Abstract:

To assimilate the shortwave infrared (SWIR, 4.1–4.5 μ m) radiances into numerical weather prediction models. The effect of non-Local Thermodynamic Equilibrium (non-LTE) process needs to be accurately represented in the forward operator, otherwise the non-LTE emission may introduce up to 10K error in the simulated brightness temperature in the CO₂ 4.3 μ m band. Due the strong non-linearity in Planck function in shortwave region, the dependence of the brightness temperature observation error on scene temperature need to be taken into account as well. To support the assimilation of hyperspectral shortwave infrared observations from CrIS in the NOAA global data assimilation system, the non-LTE correction scheme applied in CRTM has been enhanced and scene-dependent observation error has been implemented in the GSI system. The details will be discussed in the presentation.