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Mesoscale OSSE for the potential impact of a geostationary hyperspectral infrared sounder

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The potential impact of a hyper spectral infrared sounder on a geostationary satellite (GeoHSS) is investigated in a regional numerical weather prediction system, assuming the Himawari follow-on satellite. A reanalysis-based observing system simulation experiment (OSSE) technique is applied to the Baiu seasons of 2018, 2017, and 2020 including heavy rainfall cases. Temperature and relative humidity pseudo-observations are generated by a 1D-Var retrieval scheme based on the spectral characteristics of the GeoHSS. Clear-sky radiances computed from the pseudo-truth atmospheric profile, ERA5, are used as observations in the 1D-Var.

Statistical verifications and case studies show that the impacts on precipitation are seen especially at the longer lead times, which are often accompanied by improved small lows on the Baiu front and upper-level troughs. These are due to large-scale increments from pseudo-observations with a wide coverage over clear-sky areas, propagating to precipitation areas through the data assimilation cycle and forecasts.