CICS Science Conference
November 29, 30 & December 1, 2016
College Park, MD, USA

Abstract: **Long-term HIRS-Based Temperature and Humidity Profiles**

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Temperature and humidity profiles for climate applications are derived based on High-resolution Infrared Radiation Sounder (HIRS) observations. The retrieval algorithm includes a neural network retrieval scheme, a two-tiered cloud screening method, and calibration using radiosonde and Global Positioning System Radio Occultation (GPS RO) measurements. As atmospheric profiles over high surface elevations can differ significantly from those over low elevations, different neural networks are developed for three classifications of surface elevations. The significant impact from the increase of carbon dioxide in the last several decades on HIRS temperature sounding channel measurements is accounted for in the retrieval scheme. The cloud screening method incorporates Advanced Very High Resolution Radiometer (AVHRR) observations to assess the likelihood of cloudiness in HIRS pixels. Calibrating the retrievals with radiosonde and GPS RO reduces biases in retrieved temperature and humidity. Comparisons with independent observations will be presented.