

Hyperspectral infrared sounders, such as AIRS (Atmospheric Infrared Sounder) on EOS-Aqua, IASI (Infrared Atmospheric Sounding Interferometer) on MetOp-A and MetOp-B, and CrIS (Crosstrack Infrared Sounder) on Suomi NPP (S-NPP), measure the top-of-atmosphere radiance emitted by the Earth system with very high spectral resolution using several thousand channels. This enables precise and accurate determination of atmospheric temperature and humidity profiles, as well as coincident surface, trace gas and cloud parameters. Accurate real-time retrievals under both clear and cloudy sky conditions critically benefit many applications (e.g., regional weather now- and forecasting) by providing a means to characterize and quantify environmental conditions and changes over time.

## Atmospheric instability associated with the 2013 Moore, OK Tornado



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## **Enhancing Weather Monitoring and Forecasting with Polar-Orbiting High Spectral Resolution Infrared Sounders**

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• Atmospheric profiles, surface and cloud products are simultaneously retrieved from AIRS, IASI or CrIS radiance measurements at single field-of-view resolution using the hyperspectral Dual-Regression retrieval algorithm<sup>1,2,3</sup>, which is freely available at http://cimss.ssec.wisc.edu/cspp/.

• Hyperspectral sounder retrievals represent an indispensable source of independent information which can be used in complement with traditional data (e.g., visible satellite imagery, model forecast/analysis, radiosonde observations) to enhance regional weather prediction capabilities.

• Real-time profile, cloud and surface information is provided anywhere on globe, at least twice per day (per instrument), even in regions where traditional data is sparse. In higher latitudes the high temporal frequency of satellite overpasses resembles geostationary observations.

• A time-series of retrievals derived from multi-instrument radiance measurements adds valuable information on the dynamics of pre-convective and convective environments. If utilized in the analysis of severe weather events hyperspectral data will support a fast response in real-time decision-making and forecasting.

