

## **Weather and Climate Applications of an Automated Satellite-Imager Based Hazardous Storm Updraft Detection Product**

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Thunderstorms can produce a variety of hazards such as hail, damaging winds, tornadoes, heavy rain, lightning, aircraft icing, and turbulence, each of which represent a significant threat to life and property. Many hazardous storms have updrafts of sufficient intensity to penetrate through the tropopause and into the lower stratosphere, transporting tropospheric aerosols, chemical species, water vapor, and ice, which have a significant impact on the Earth's climate system. Hazardous storm updraft regions appear anomalously cold and turbulent in infrared and visible wavelength satellite imagery, signatures that can be detected using automated pattern recognition algorithms developed at NASA Langley Research Center (LaRC) in support of the GOES-R Advanced Baseline Imager program. Multispectral geostationary and polar-orbiting imager and reanalysis data are used to identify cloud tops associated with vigorous updrafts that have penetrated through the tropopause region. These so-called "overshooting cloud top" signatures are highly correlated with the hazards and cross-tropopause transports described above.

This presentation will describe the automated storm updraft detection products and will highlight a broad spectrum of recent product applications. These applications include 1) analysis of hazardous storms in GOES 1-minute and MSG SEVIRI 2.5-minute super rapid scan imagery, 2) identification of regions within storms where convectively-induced aircraft icing is likely to occur, 3) development of hail risk models by private industry, and 4) development of long-term climate data records of hazardous storm events.