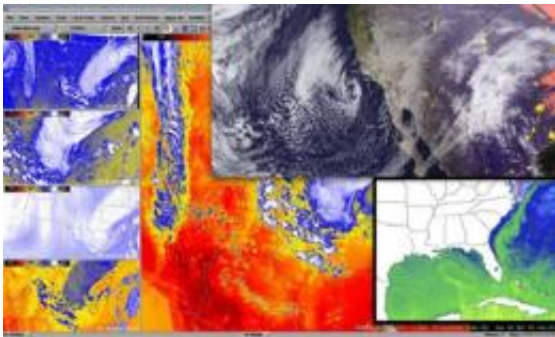


Beating the radar: Getting a jump on storm prediction

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Sample meteorological satellite images like those analyzed during this year's annual Hazardous Weather Testbed, held from May 4 through June 5. The HWT is organized by the National Oceanic and Atmospheric Administration to accelerate the transition of new meteorological technologies into advance forecasting and warnings for hazardous weather events throughout the U.S. UW-Madison Space Science and Engineering Center.

Satellite observation of cloud temperatures may be able to accurately predict severe thunderstorms up to 45 minutes earlier than relying on traditional radar alone, say researchers at UW-Madison's Space Science and Engineering Center.

Scientists from the Cooperative Institute for Meteorological Satellite Studies (CIMSS) have developed a way to measure temperature changes in the tops of clouds to improve forecast times for rapidly growing storms.

"The value of detecting and analyzing these changes is that we can get up to a 45-minute jump on radar detection of the same storm system. A 'nowcast' becomes a 'forecast,'" says CIMSS scientist Wayne Feltz.

Clouds start cooling long before radar can identify them as storms. As a warm cumulus cloud grows and expands upward into higher altitudes, it will rapidly cool. Rapid cloud-top cooling indicates that a cloud top is rising into the frigid upper reaches of the atmosphere and can reveal the formation of a severe storm.

Cloud temperatures can be measured by the wavelengths of light they radiate in the near-infrared and infrared frequencies. Current geostationary satellites — satellites that stay over the same location on Earth — over the U.S. can discern five different bands in these frequencies, each band revealing a different state of cloud development. Looking down from space, the satellite can determine whether the cloud top consists of liquid water, supercooled water or even ice.

By running high-speed five-minute satellite scans through a carefully designed computer algorithm, the scientists can quickly analyze cloud top temperature changes to look for signs of storm formation. "We are looking for transitions," says Feltz. "Does the cloud top consist of liquid water that is cooling rapidly? That could signal a possible convective initiation."

Feltz and other CIMSS colleagues, including Kris Bedka and National Oceanic and Atmospheric Administration (NOAA) scientist Tim Schmit, demonstrated their "Convective Initiation Nowcast" and "Cloud Top Cooling Rate" products at NOAA's annual Hazardous Weather Testbed (HWT), held May 4-June 5 at the Storm Prediction Center in Norman, Okla.

The HWT is designed to accelerate the transition of promising new

meteorological insights and technologies into advance forecasting and warnings for hazardous weather events throughout the United States.

"The Hazardous Weather Testbed brings in outside experts in all areas, a melting pot of people to encourage collaboration and interactions and proposal opportunities," Feltz says. "The point of this is working with forecasters in the field — the Weather Service, the Storm Prediction Center, the Hurricane Center — whoever is interested in looking at more advanced satellite products."

Source: University of Wisconsin

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