

A satellite image of Lake Michigan and the surrounding land. The lake is a dark blue shape on the right side of the image. The land is green with some brown patches, indicating vegetation and possibly some urban or agricultural areas. The text "THROUGH the ATMOSPHERE" is overlaid on the top left in white.

THROUGH *the* ATMOSPHERE

Lake Michigan
ozone impacts

Summer / Fall 2017

Space Science and Engineering Center | Cooperative Institute for Meteorological Satellite Studies | University of Wisconsin—Madison



Director's Note

Our global society is becoming increasingly concerned with maintaining carbon balances, controlling air pollution, and protecting water and food supplies for a world population that continues to grow. Now, satellite data are making these environmental challenges more visible, helping to quantify the problems.

This issue of *Through the Atmosphere* covers some recent advances in remote sensing that utilize GOES-16 and Suomi NPP data – advances realized with the ingenuity of SSEC and CIMSS researchers and the students working with them.

Satellite data have become essential for studying and addressing environmental issues, especially those that occur in less trafficked locations and on spatial scales that are difficult to monitor via conventional means.

The cover story explains this summer's Lake Michigan Ozone Study that was conducted to study pollution movement along the western shoreline of Lake Michigan. SSEC scientists partnered with federal researchers to deploy our mobile instrument lab and to gather measurements from ground, airplane, and satellite based instruments.

A recent dissertation characterizes progress in modelling the intercontinental transport of air pollution that affects human health, specifically Sahara Desert dust particles swept into the Mediterranean Basin.

In a study conducted closer to home, SSEC scientists are developing ways to predict the occurrence of severe thunderstorms in the Southern Great Plains by merging satellite estimates of convective available potential energy, known as CAPE, with ground observations.

Another new statistical merging of satellite and conventional data is showing promise for estimating the probability of severe weather hazards such as tornadoes. This NOAA and CIMSS collaboration highlights the value of the government-university partnership.

Finally, the SSEC-developed RealEarth application crystalizes the importance of making satellite images and the associated products available as soon as possible, in near real-time, especially to forecasters who predict hazardous weather conditions. RealEarth now offers integrated GOES-16 ABI spectral bands in layered composites and animations along with many other imagery products.

SSEC and CIMSS scientists, their colleagues and students, understand the societal value of developing research and applications using remotely sensed data. This issue provides a snapshot of our commitment – and contributions – to helping to solve the most pressing environmental problems.

Paul Menzel
Interim CIMSS Director

THROUGH *the* ATMOSPHERE

SUMMER/FALL 2017

CONTENTS

- 04 ProbSevere: New all-hazards model targets tornadoes, hail, wind
- 08 Thunderstorm potential: Predicting cell strength over the Great Plains
- 10 Publications & Awards
- 12 An atmospheric mystery: Lake Michigan ozone impacts
- 16 At the crossroads: Turkish student studies Saharan dust from Wisconsin
- 18 2017 Atmospheric, Oceanic, and Space Sciences photo contest
- 21 Education and outreach: CIMSS 2017 Student Workshop
- 22 Real Earth mobile app

Through the Atmosphere is a biannual publication featuring atmospheric, space science, and engineering research and education accomplishments of the University of Wisconsin-Madison's Space Science and Engineering Center (SSEC) and its Cooperative Institute for Meteorological Satellite Studies (CIMSS).

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Cover image:
Polar orbiting satellite
AQUA-MODIS captures a
nearly cloudless day over
the midwest. Credit: SSEC

PROBSEVERE



New all-hazards model targets tornadoes, hail, and wind

by Leanne Avila

Pinpointing severe weather and issuing timely forecasts is a critical part of the weather forecaster's job. Since 2011 researchers at the University of Wisconsin-Madison have been developing and improving a unique statistical model, known as ProbSevere, to help forecasters determine whether a particular storm will likely produce severe weather.

That model is getting a significant update this summer as the researchers have added the capability to target specific hazards, from tornadoes (ProbTor) to hail (ProbHail) to wind (ProbWind). Now the model can indicate more precisely the likelihood of whether a storm will produce a tornado (or hail or wind) – rather than simply “severe weather” – in the next 60 minutes.

Mike Pavolonis, a NOAA Advanced Satellite Products Branch (ASPB) scientist stationed at the Cooperative Institute for Meteorological Satellite Studies (CIMSS), leads the effort to make better use of data from Numerical Weather Prediction (NWP), geostationary satellites, radar, and lightning observations in the upgraded statistical model.

“It’s still the same core data sources [as the original ProbSevere]. It’s just different metrics from those core data sources. We utilize metrics that are especially tailored toward the individual hazards based on our understanding of the physics,” says Pavolonis.

Working with Pavolonis, CIMSS researchers John Cintineo and Justin Sieglaff have been



Credits: Dr. Cathy Finley, Giada Arlene, Terry Flick

investigating which metrics to combine and which combinations perform better in the model.

As with ProbSevere, ProbTor's output can be layered over radar in the form of color-coded contours based on the storm's potential to produce tornadoes. Forecasters can also see which storm characteristics, and their values, were used to produce the overall ProbTor value, designated as a percentage. Over the course of the storm, that information allows forecasters to follow and understand why the tornado probabilities change based on what is occurring in the storm. ProbTor and the various metrics can also be displayed as a function of time in a time series plot.

"ProbTor allows forecasters to really pick out the storms that they have to monitor most closely. And in busy situations, that's especially useful," says Pavolonis.

To assess its accuracy, researchers compare the ProbTor results with reports of tornadoes and post-damage assessments from the National Weather Service's database of Local Storm Reports. Pavolonis and his team pay close attention to the relationship between the timing of when the model indicates the potential for severe weather, when warnings are issued, and when the severe weather actually occurs.

"Our model is designed to have probabilities that increase ahead of the storm so that you get the



▲ Researchers Mike Pavolonis (NOAA), John Cintineo (CIMSS), and Justin Sieglaff (CIMSS), recently made an update to the ProbSevere statistical model to help forecasters target specific severe weather hazards, from tornadoes (ProbTor) to hail (ProbHail) to wind (ProbWind). Credit: SSEC

lead time to warn the public,” says Pavolonis.

For the last few years CIMSS researchers have been testing ProbSevere performance with help from NWS forecasters at the Hazardous Weather Testbed (HWT). For the first time this year forecasters had the opportunity to evaluate the newly updated ProbSevere with ProbTor, ProbHail, and ProbWind.

“ProbTor allows forecasters to really pick out the storms that they have to monitor most closely. And in busy situations, that’s especially useful.”

Both Sieglaff and Cintineo participated in the HWT this year, first in the Probabilistic Hazard

Information (PHI) experiment and later in the Experimental Warning Program (EWP). The PHI is designed to help forecasters move from issuing “yes/no” warnings – that is, you are either in the warning area or not – to issuing warnings with swaths and percentages showing which areas are more likely to see severe weather and when. As Cintineo notes, “the threat doesn’t go [directly] from 0 to 90.”

The PHI adds an additional layer with the participation of emergency managers and broadcasters.

“A big part of it is the interaction between the forecasters and the information they give out, how the emergency managers use the probabilistic information, how do broadcasters use it or can they use it,” says Cintineo.

“Not everyone appreciates exactly what a probability means. Too many people, I think, still gravitate towards the yes or no,” adds Sieglaff.

At the EWP, the focus is on soliciting feedback from forecasters on the usefulness of ProbSevere and how it might be improved. The forecasters look at weather scenarios and see how new products complement and enhance the tools already at their disposal – specifically, radar imagery – when potentially issuing severe weather warnings.

“One of the reasons ProbSevere was so well received, beyond it being scientifically valuable, is how it’s displayed in AWIPS II [the processing system used by the NWS to create forecasts]. If you put something on top of radar data that obscures the radar data, then people aren’t going to use it. So you have to be smart in how you display the data to forecasters, especially since screen real estate... there’s not a lot of it. So if you can get something on their screen that integrates well into what they are already doing, that’s important,” says Sieglaff.

Sieglaff credited CIMSS researcher Lee Cronce for his expertise with AWIPS in helping to create a ProbSevere display that works rather seamlessly for the user.

“Our model is designed to have probabilities that increase ahead of the storm so that you get the lead time to warn the public.”

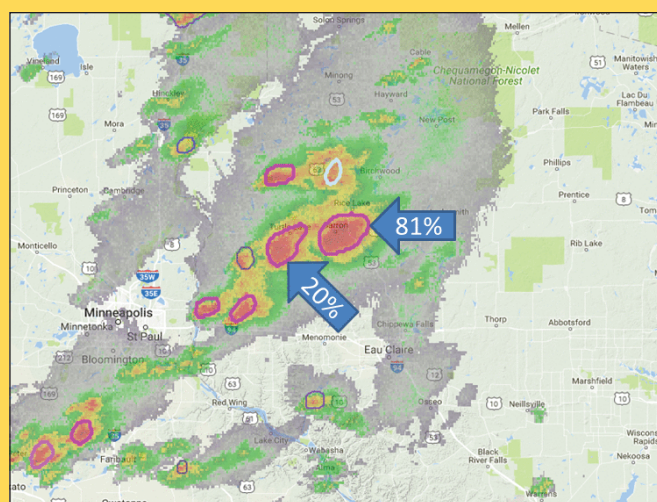
Having returned from the HWT, the team will be using the feedback and experiences of forecasters with the model to inform their continued research into improving the all-hazards ProbSevere. In addition, they have a to-do list of their own known issues to resolve. Last, but not least, they are preparing the model for the higher resolution GOES-16 data; as a statistical model, it will need to be retrained on GOES-16 data for optimum performance so that it will be ready in time for next year’s convective season.

This work was supported by NOAA Grant NA15NES4320001 and NOAA Grant NA15OAR4590188.

NEXT STEPS

TRANSITIONING PROBSEVERE TO OPERATIONS

Pavolonis and his team are currently producing a general version of ProbSevere (without the specific hazards) locally and then distributing it to NWS offices across the country. However, the NWS is eager for ProbSevere to make the transition from research to operations, where it would be routinely produced, distributed, and supported by the NWS. Pavolonis explained that the transition involves several steps, from adjusting ProbSevere to ensure compatibility with the operational system, to delivering documentation to evaluating ProbSevere’s operational performance. Pavolonis expects ProbSevere will become part of NWS operations within the next fiscal year, with the all-hazards version to follow.



NOAA/CIMSS ProbSevere product shows severe weather moving from Minnesota into Wisconsin on 16 May 2017 and the likelihood of storms producing tornadoes. Credit: CIMSS



Credit: Dr. Cathy Finley

Thunderstorm potential

Predicting cell strength over the Great Plains

by Jean Phillips

Severe thunderstorms are common in the Southern Great Plains. A promising new method to predict them in near real-time would provide another source of reliable information to forecasters in situations where every minute matters. The method matches satellite measurements to radiosonde, or weather balloon, measurements to construct a more accurate picture of convective available potential energy, known as CAPE.

CAPE is an estimate of the amount of instability in the atmosphere, which is closely related to updraft strength, says Jessica Gartzke, a recent graduate of the University of Wisconsin-Madison who worked with scientists at the UW Space Science and Engineering Center (SSEC) to conduct the study. It is calculated from vertical temperature

and humidity profiles in the atmosphere. Also taken into account are the speed and height of the updraft that forms in the pre-storm phase, which can be an indicator of the danger of a possible storm.

It is particularly applicable to the Great Plains, arguably a region that has the highest value of CAPE anywhere in the world.

"The technology of weather satellites has evolved so that researchers can use satellite observations along with ground observations to forecast severe weather in near real-time," says Gartzke. She, along with her advisor, SSEC scientist Robert Knuteson and co-investigators, showed that profiles of temperature and water vapor from polar orbiting satellites can be used in tandem with

surface measurements to more accurately predict when severe storms will form.

That extra step of merging satellite observations with ground observations is the topic of Gartzke's research.

"I showed that we can use the profiles of temperature and water vapor on polar orbiting satellites but you have to consider the surface measurements, too, otherwise you'll get some unusual results," says Gartzke.

Their article, "Comparison of Satellite-, Model-, and Radiosonde-derived Convective Available Potential Energy in the Southern Great Plains" was published this spring in the *Journal of Applied Meteorology and Climatology*.

Forecasters consider a range of information, including radar, when preparing a forecast, but according to Gartzke, one of the challenges of predicting severe weather in the central United States is that weather balloons are typically launched at 6:00 a.m. and 6:00 p.m., but most thunderstorms occur in the afternoon or evening, leaving a window without current data.

This is where polar orbiting satellites come in. If there is a satellite overpass during the window created by the balloon launch, at approximately 10:30 a.m. and 1:30 p.m., for example, "this can be beneficial to forecasters because it will provide current data to help them increase the lead time for getting information out about developing storms," says Gartzke.

Another advantage of satellites is that they capture data from a wide swath, as opposed to the single point data collection of the weather balloon, making it easier to extrapolate over a larger area – an important feature when forecasting severe thunderstorms.

The researchers used a decade of data, 2005–2014, from the Atmospheric Infrared Sounder (AIRS) on NASA's Aqua satellite in an area over the Southern Great Plains. AIRS is an infrared sounder that measures temperature and moisture, the two components necessary to compute CAPE.

The AIRS observations were compared to radiosonde observations from the U.S. Department of Energy Atmospheric Radiation Measurement program from the same region, around Lamont,



▲ UW-Madison graduate Jessica Gartzke worked with SSEC staff to better understand the convective processes involved in thunderstorms over the Great Plains. Credit: Andrea Reina

Oklahoma. Gartzke augmented an existing computer program with new code to merge the two types of data using a process consistent with methods used by the National Weather Service Storm Prediction Center.

"In our experiment, we had to account for the fact that polar orbiting sounders pass over the region at different times and at slightly different angles each time," said Gartzke. "We did a lot of quality control – qualifications that were provided by NASA – to account for these differences."

The challenge of comparing the data was further complicated because the 1km vertical data from the AIRS instrument are lower resolution than the ground instrument data, requiring some interpolation. The researchers processed the data more than once to ensure the accuracy of their results.

To Gartzke, the intensity of the scientific process was an introduction into how important it is to get things right. "There is a lot of making sure that everything is in order and correct; an element of perfection," she says.

"The near real-time applications of our work are very promising," says Gartzke. "This was my first big work and it was fascinating using the raw data and molding it into something that we could not only understand, but that could be used by others."

This work was supported by NOAA Grant NA10NES4400013.

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Fellow of the American Meteorological Society



TIM SCHMIT
2017 NOAA Administrator's and Technology Transfer Award



PEI WANG
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An atmospheric mystery

SSEC researchers converge to study
Lake Michigan ozone

by Eric Verbeten



Credits: SSEC

For several years air quality managers have identified higher than normal levels of ozone in the Sheboygan, Wisconsin area: an atmospheric mystery since high levels of ozone are usually associated with larger cities.

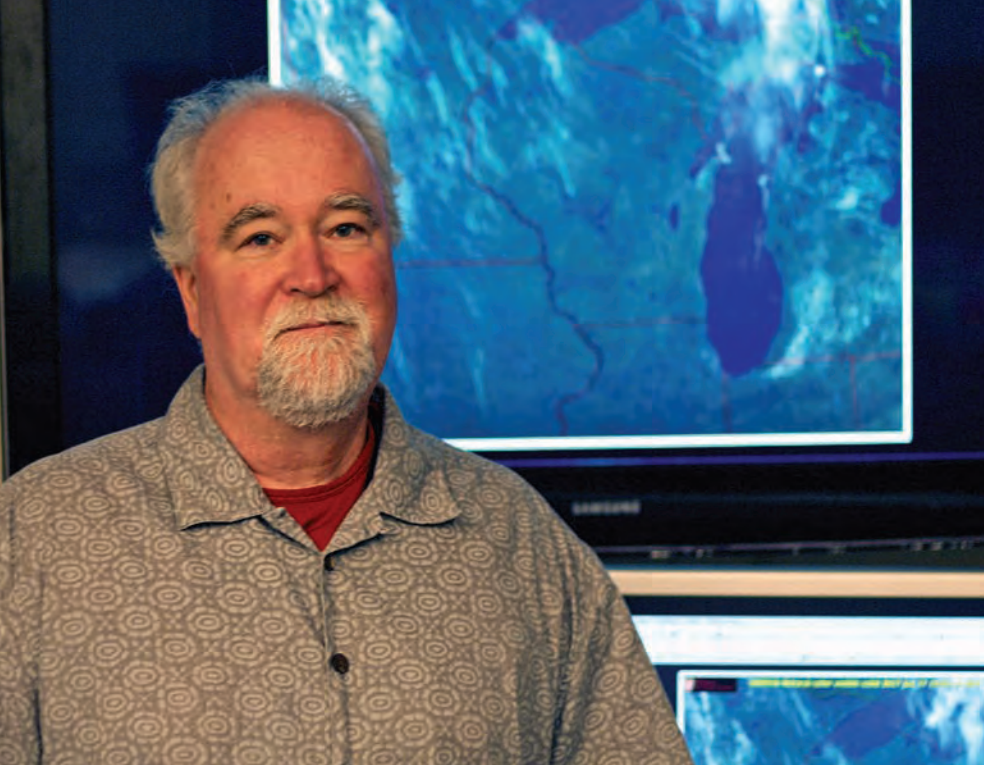
In an effort to unravel the mystery and understand how pollution moves along the western shoreline of Lake Michigan, University of Wisconsin-Madison Space Science and Engineering Center researchers joined an atmospheric study over Sheboygan and other cities along the coast.

The Lake Michigan Ozone Study (LMOS 2017) is a \$1.3 million multi-agency partnership with NASA, the National Science Foundation (NSF), the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), and the Electric Power Research Institute (EPRI), as well as other organizations and universities. Their goal is to understand how wind currents can transport pollution from one location to another, in particular ozone, which poses health risks when found near the Earth's surface.

"The plan is to collect data that will give us a comprehensive profile of the atmosphere along the shore of Lake Michigan," says Tim Wagner, SSEC assistant researcher.

Wagner oversees the research efforts for a suite of ground-based instruments, known as the SSEC Portable Atmospheric Research Center, or SPARC. Data gathered from the SPARC instruments will help construct a picture of the atmosphere over Sheboygan and surrounding areas through wind and temperature measurements, as well as resolving different types of particles like ice, dust, and other aerosols.

The SPARC is a customized, 35-foot trailer equipped with an array of sensitive tools used to measure the atmosphere, many of which were designed and built at SSEC. The main instrument aboard the SPARC is the Atmospheric Emitted Radiance Interferometer (AERI), a ground-based device that uses infrared waves to continuously collect precise and high-resolution temperature and moisture data from a vertical sliver of the atmosphere in the boundary layer. Other instruments like a Doppler-Lidar use a laser



◀ NOAA physical scientist Brad Pierce leads the SSEC research efforts for the Lake Michigan Ozone Study. Credit: SSEC

to record relative motion of the air, and can be used to create 3D images of the surrounding area. A High Spectral Resolution LIDAR (HSRL) is used to resolve the size and diameter of certain aerosols and particles that will then be compared with other data collected from partner agencies.

"By understanding the atmospheric structure, it gives context to the other data that are part of the whole campaign," says Wagner. "It's an important piece of the puzzle to understanding what's happening up there."

For other parts of the Lake Michigan coast not covered by the SPARC team, partner agency NASA took measurements from remote sensing instruments on an aircraft flying in specific patterns over the area – from Zion, Illinois to Sheboygan -- while a NOAA ship, equipped with EPA instruments, collected nearshore and offshore measurements. At the same time, ozone measurements via automobile were conducted by the EPA Region 5 and UW-Eau Claire professor Patricia Cleary.

Together, the aircraft, ship, and land measurements will help build a more complete atmospheric mosaic, Wagner says.

Why ozone?

Ozone is a known respiratory irritant that poses health threats to vulnerable populations, especially young and elderly groups and those with breathing problems, such as asthma. The data collected in

the LMOS study will later be integrated into ozone models used by air quality managers at agencies such as the EPA, the Lake Michigan Air Directors Consortium (LADCO), and the Wisconsin Department of Natural Resources.

"We want to help improve these models and better predict when ozone events will happen," says Brad Pierce, a NOAA physical scientist who is stationed at UW-Madison and is leading the LMOS campaign. "And in turn, protect health."

The EPA is responsible for setting ozone pollution standards nationwide and works with state agencies to monitor air quality conditions. If the air quality in an area does not meet certain standards, cities must undergo a planning process to outline ways of reducing pollutants like ozone. Pierce says that improving models will assist the EPA and cities as they plan for future air quality needs and requirements.

Tim Bertram, a professor of chemistry at UW-Madison monitored ozone and other pollution as part of the LMOS study at a site in Zion, Illinois. He says ozone is commonly found in Earth's atmosphere, but usually high up and away from people, where it protects surface dwellers from harmful solar radiation. However, anthropogenic sources like the burning of fossil fuels can escalate the production of ozone to unsafe levels, especially when it forms in cities or densely populated areas where people are more apt to be exposed to its harmful effects. Incomplete combustion creates what are known as



▲ Over the course of two months, researchers collected atmospheric data along the Lake Michigan coastline using a variety of instrumentation aboard different vessels, including SSEC's Portable Atmospheric Research Center (SPARC). Credits: Tim Wagner, Margaret Mooney, Brad Pierce

precursor molecules, like nitric oxide (NO) and volatile organic compounds, which through a chemical process involving sunlight, lead to the production of ozone. Ozone levels tend to be higher during the summer months because of the increased solar intensity.

Data collected from the study will also be used to validate observations from weather monitoring satellites like GOES-16. As satellite instrumentation has become more sophisticated and able to assist researchers in monitoring air quality from space, they still, however, need to be validated through ground measurements like those taken during the LMOS project. In addition, another geostationary spacecraft will include NASA's TEMPO (Tropospheric Emissions: Monitoring of Pollution) instrument that will measure air pollution over North America. It is scheduled to launch in 2018 or 2019.

Pierce, who has been studying ozone transport for more than 20 years, says the data collection portion of the study has been completed, but the study is slated to continue as SSEC and others will now start analyzing and integrating the data to improve ozone models.

"The field phase of the 2017 Lake Michigan Ozone Study has been an overwhelming success and we look forward to using the measurements collected during the campaign to help understand why coastal ozone monitors show higher ozone levels than inland and improve our ability to model ozone within this complex region," says Pierce.

This work is supported by NOAA/STAR GOES-R grant under NOAA-University of Wisconsin CIMSS Cooperative Agreement number NA15NES4320001, U.S. Department of Commerce.



Credit: SSEC

At the crossroads

Turkish student studies Saharan dust from Wisconsin

by Jean Phillips

The Mediterranean region is a crossroads for wayfaring travelers, but it is also a crossroads for the intercontinental transport of air pollution that affects human health.

Particle pollution—more specifically, Sahara Desert dust particles that are swept across Northern Africa to every corner of the globe, including the Mediterranean Basin—is linked to cardiovascular and respiratory diseases in humans, says Burcu Kabataş, a Turkish graduate student from Istanbul Technical University (ITU).

Kabataş has been working with researchers at the University of Wisconsin-Madison Cooperative Institute for Meteorological Satellite Studies (CIMSS) and her graduate advisor Alper Ünal at ITU for the better part of a decade to learn more about applying the latest remote sensing techniques to study current environmental problems.

This June, along with earning her Ph.D., Kabataş was honored with the best dissertation award from ITU for her thesis titled, Quantification of Saharan Dust Influences on Eastern Mediterranean Air Quality via Atmospheric Modeling. Dust that originates in the Sahara region, says Kabataş, is the largest naturally occurring source of particulate matter or

particle pollution in the Eastern Mediterranean and Western Turkey.

The fine bits of material, including grains of sand, that make up particulate matter (or PM10) are less than ten micrometers in diameter. If inhaled, they can cause serious health problems, especially in vulnerable populations like the very young and the very old.

“Other known sources of PM10 include industrial and vehicle emissions and burning coal,” says Kabataş. Teasing apart how much particle pollution is generated by dust and how much is anthropogenic, or contributed by man, and then, being able to accurately forecast it, is the crux of her research.

Kabataş constrained her study to April 2008, a month of unusually high readings of PM10 in Turkey. She retrieved surface air quality data from 118 stations across Turkey and compared it to satellite data across the region by using a computer model known as the Real-time Air Quality Modeling System (RAQMS). This global meteorological and chemical model was developed by NOAA scientist Brad Pierce who is stationed at CIMSS and is Kabataş’s research advisor in Madison.

She incorporated aerosol and cloud data from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument onboard NASA's Terra and Aqua polar orbiting satellites and the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) instrument on the U.S./French satellite, CALIPSO, another polar orbiting satellite.

CALIOP also provides key information on the altitude of aerosol layers, says Kabataş. Aerosols lofted higher in the atmosphere can travel farther—in this case, from the Sahara to Turkey.

Building on the RAQMS results, and to further analyze the April 2008 dust storm, Kabataş used a higher resolution regional Weather Research and Forecasting (WRF-Chem) model designed for chemical analysis along with the NOAA Gridpoint Statistical Interpolation (GSI) data system to assimilate the MODIS aerosol optical data. Hers is the first study to assimilate or aggregate observations with the WRF-Chem system to investigate natural dust influences on air quality over the Anatolian Peninsula, which makes up most of Turkey.

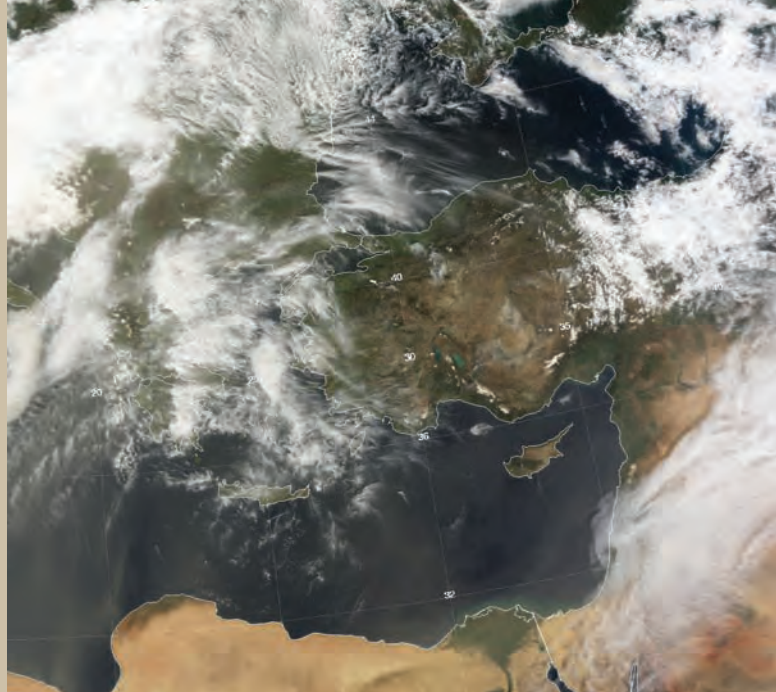
By assimilating satellite observations into atmospheric modeling systems, says Kabataş, "I could generate a picture of the atmospheric aerosols to get a sense of PM10 distribution and concentration over Turkey and eventually, for other locations around the globe."

When comparing the model data to the ground observations, notes Kabataş, "we found that the temporal and spatial distribution of PM10 seems to be correct and we are continuing our research to improve the representation of planetary boundary layer dynamics in order to make better predictions."

Kabataş concluded that the time of year may influence PM10 levels. PM10 concentrations tend to be higher during cold seasons when the boundary layer height is low and sources of pollution, other than dust, are higher. In addition, Sahara dust outbreaks are more likely to occur in the transition from one season to another, as in the outbreak of April 2008.

Other countries in the region with dust transport problems are interested in Kabataş's portable air quality forecasting system.

"By changing the domain from Turkey to another country, we can run the same model," says Kabataş. "I love how the model works, how efficient it is, and that it can help other people." Better and



▲ The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite captured dust plumes blowing from North Africa toward Turkey April 2008. Credit: SSEC

more accurate forecasting of dust events will give advanced warning to those with asthma, cardiovascular disease, and other health issues.

Dust is a natural source contributing to high levels of PM10 in Turkey and other regions, and cannot be prevented. However, says Kabataş, we can, and must, work on anthropogenic emissions, too. Through this model, she adds, we can let people know what we are seeing, and at the same time, begin to impress upon decision makers the necessity of addressing climate change.

Kabataş started down this research path thanks to CIMSS senior scientists Paul Menzel and Liam Gumley, who introduced her to Pierce, all three of whom "are like secret heroes of my life," she says. Kabataş met Menzel and Gumley at a remote sensing seminar they taught in Benevento, Italy in 2007 when she was an undergraduate engineering student. Inspired by them, she opted for a new course of study: satellite remote sensing. Menzel later invited Kabataş to come to Madison where he served as advisor for her master's degree.

"Meeting Paul changed my life," she says. "I remember him saying to me, 'When you see a fork in the road, take it.' I did. And it brought me to Madison. I am very thankful for that."

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1st place
Chris Niendorf
Summer Storm



AOSS 2017 photo contest

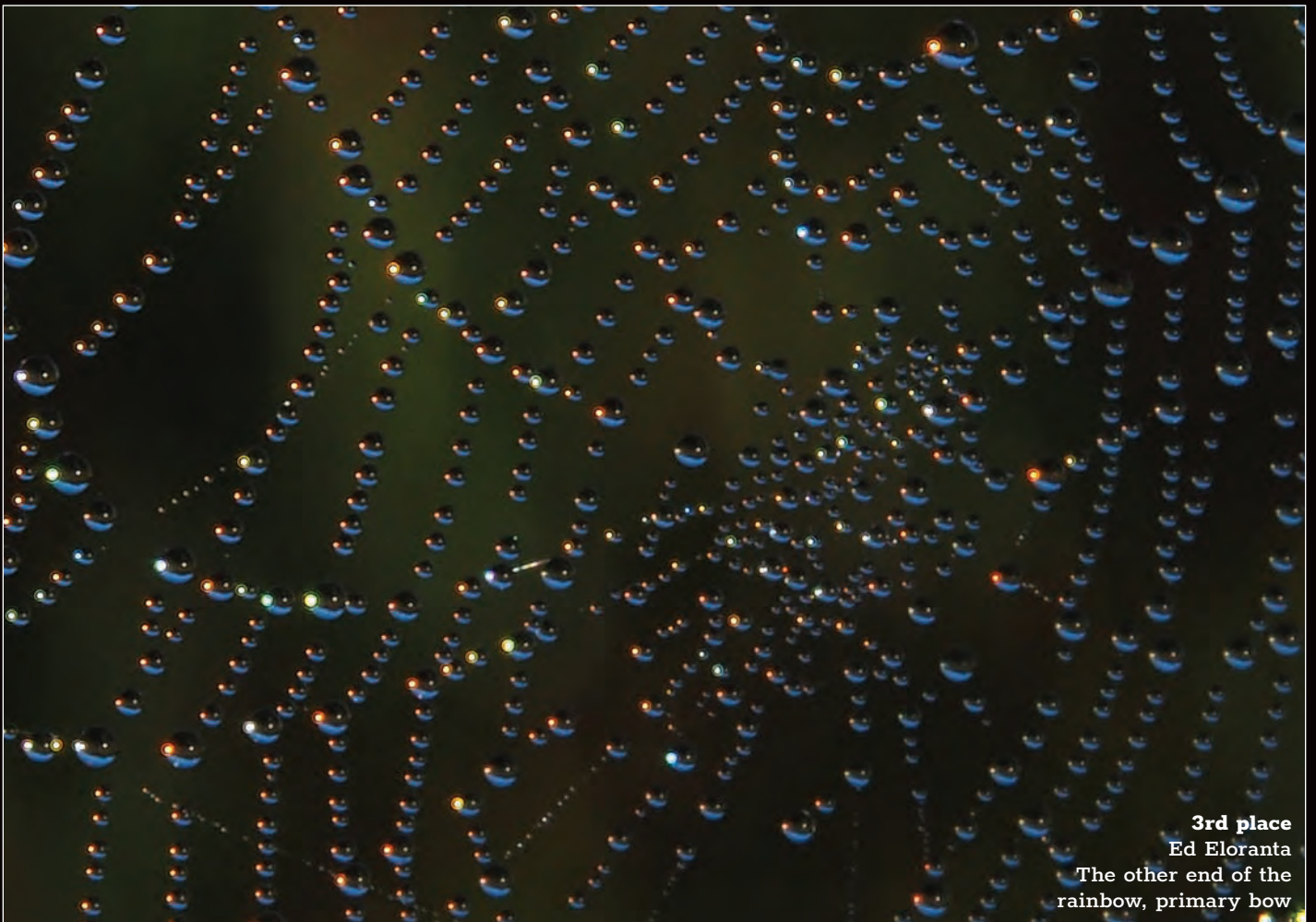
From the most energetic events to the calm and subtle, these captured moments reveal the complexity underlying our natural world.

Each year, the Atmospheric Oceanic and Space Sciences photo contest encourages scientist-photographers to share their impressive and inspiring photos from around the world; photos that capture natural events and the weather at its finest and most intense moments.

Honorable mentions
Peidong Wang-Burning sunset;
Dave Mikolajczyk-Fog flows on
McMurdo Ice Shelf pressure ridges



2nd place
Peidong Wang
Rainbow at Yosemite
National Park



3rd place
Ed Eloranta
The other end of the
rainbow, primary bow



CIMSS student workshop 2017

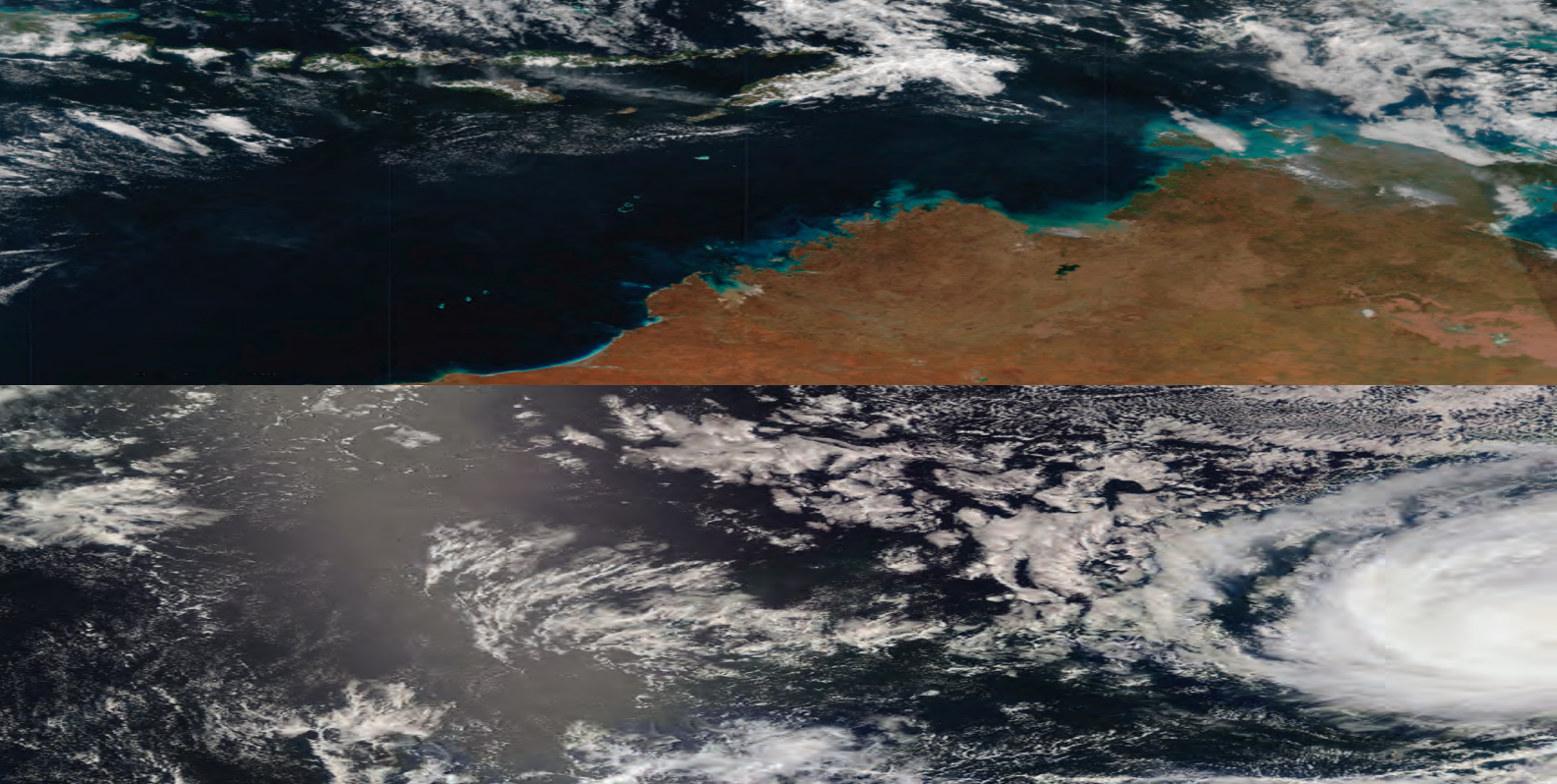
The 2017 annual CIMSS student workshop was another success with a great group of 14 young aspiring scientists.

Each year, the CIMSS Student Workshop on Atmospheric, Satellite, and Earth Sciences features an exciting five-day agenda in meteorology, astronomy, remote sensing, and geology.

Participating students experienced science education, research and technology through hands-on activities, working directly with scientists, graduate students, and professors. Trips this year included tours of a local news station weather lab, Devil's Lake State Park, and the UW-Madison Atmospheric, Oceanic, and Space Sciences building.



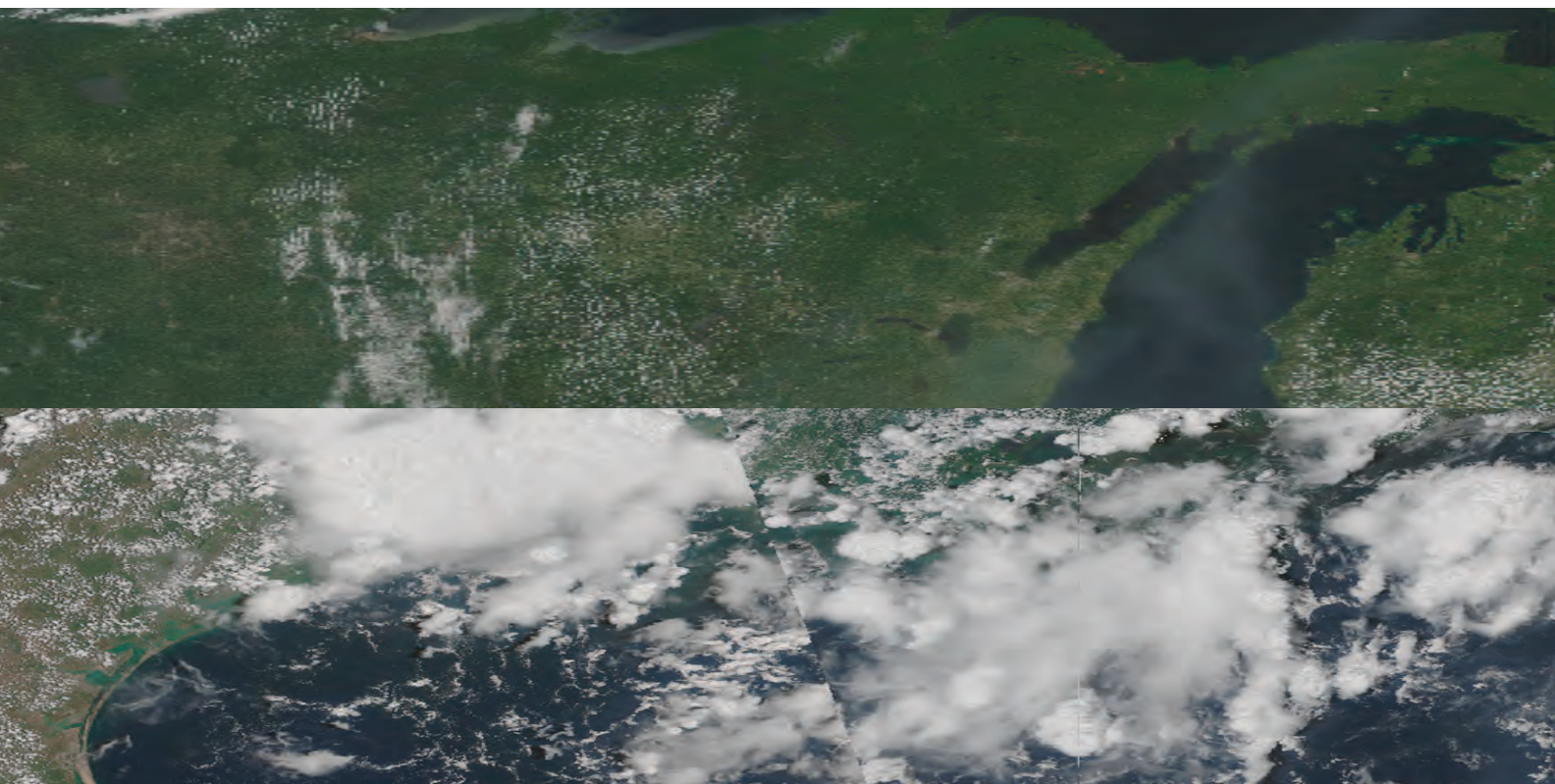
Credit: SSEC, Kevin Van Schoyck

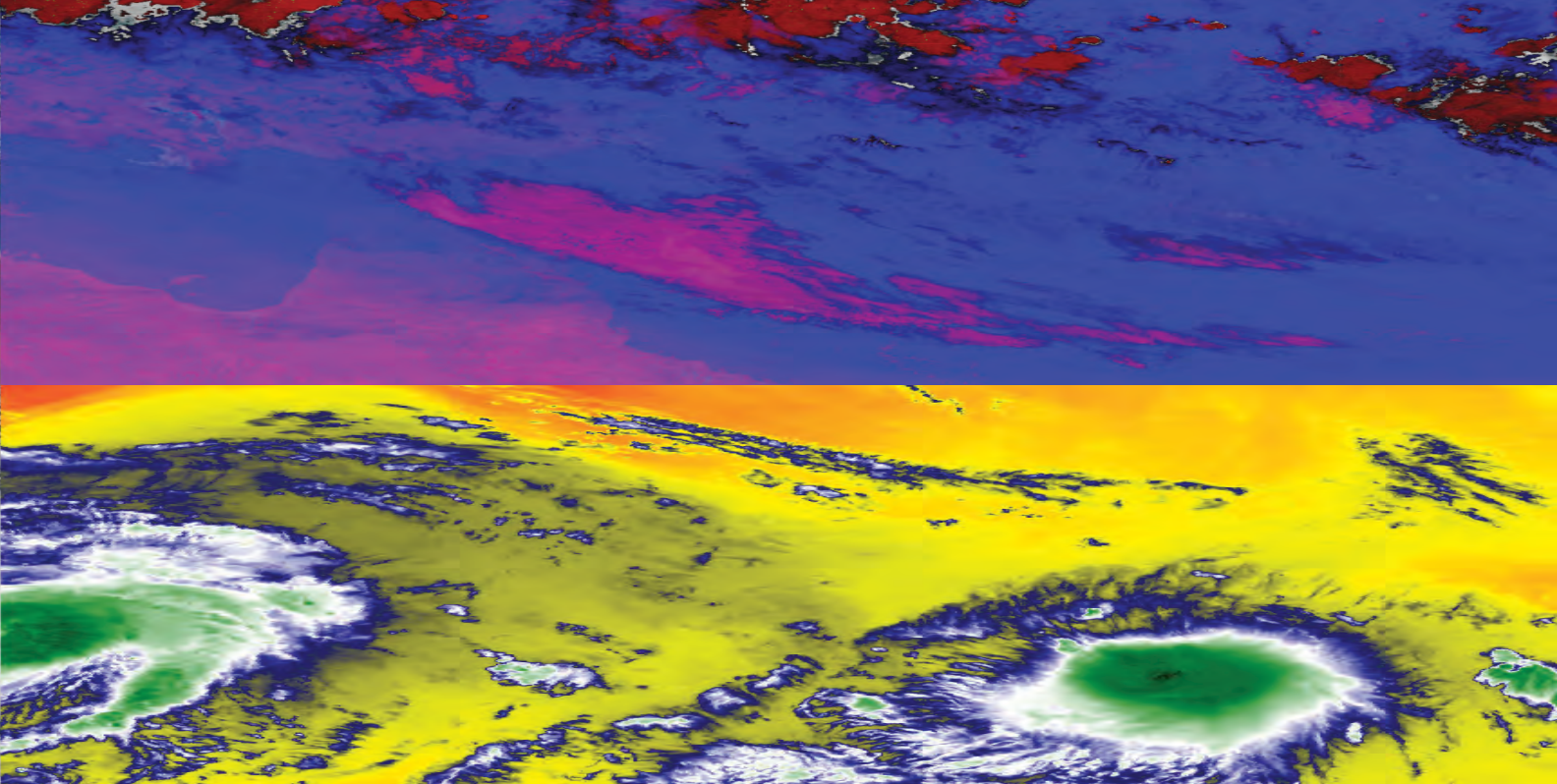


Real Earth Welcomes GOES-16 and launches new app

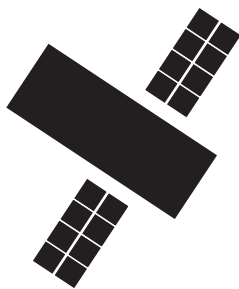
Since 2010, SSEC's RealEarth satellite visualization application has been a go-to for free access to near real-time and archived satellite products. Since the launch of GOES-16 in late 2016, RealEarth has integrated the satellite's preliminary data throughout the testing phases and will continue when the data are operational. Users can access all 16 bands to create layered composites along with more than 500 other products.

In summer 2017, the RealEarth team launched the GOES specific app, featuring imagery only from the Geostationary Operational Environmental Satellites, including GOES-13, 14, 15, and 16. This slimmed down version with a simplified, mobile friendly interface is available for download now: ssec.wisc.edu/realearth



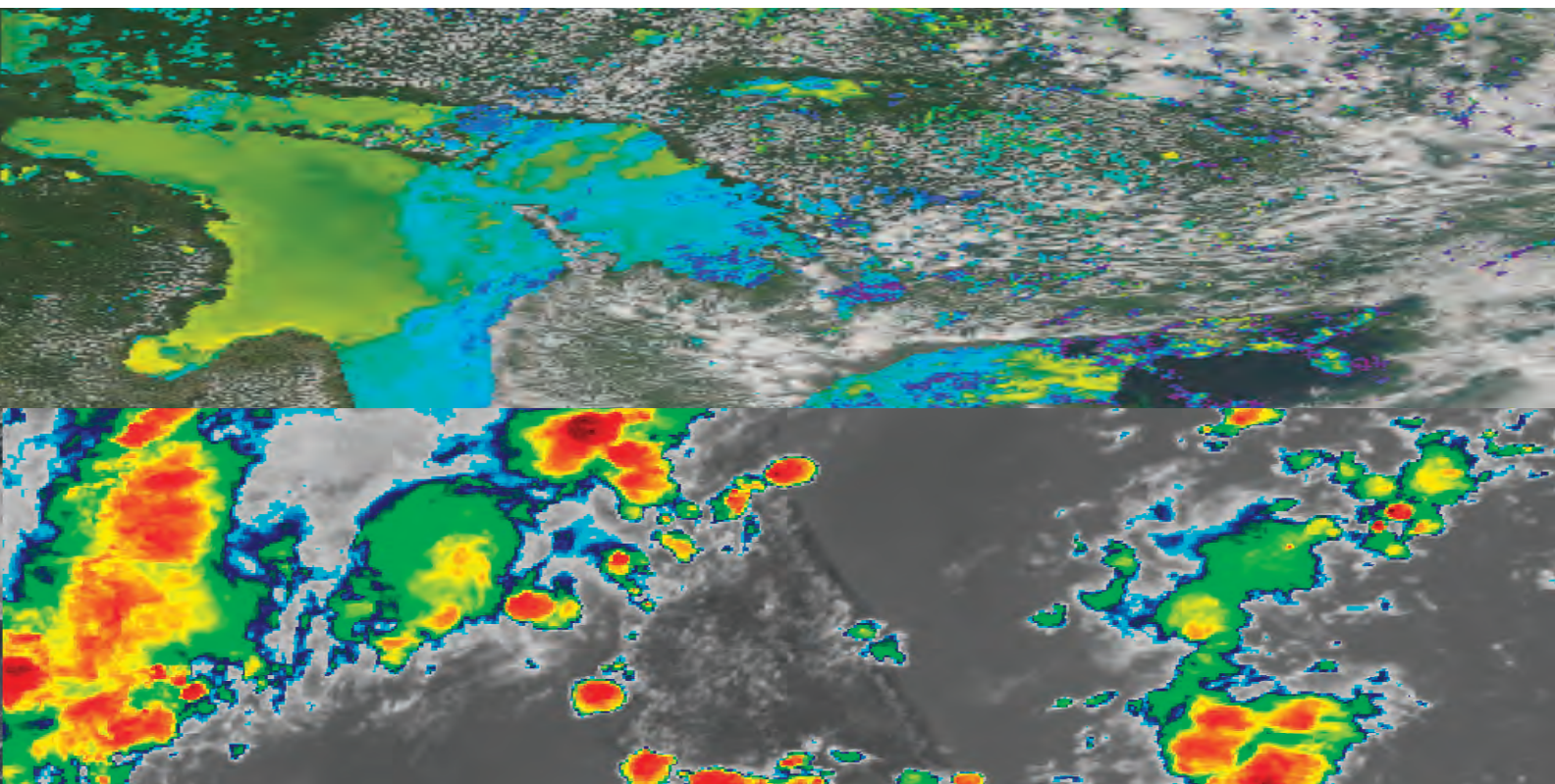
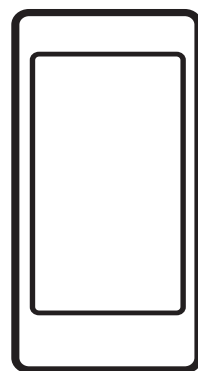


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