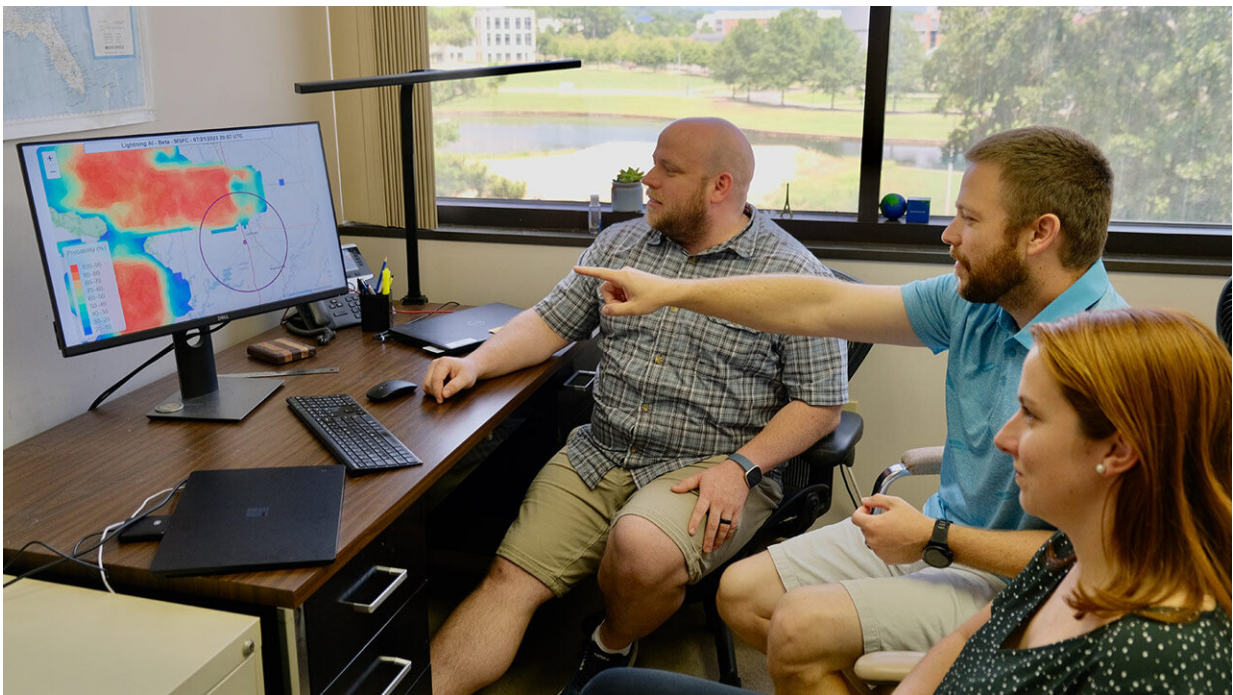


New lightning prediction tool provides critical weather forecasting support at Rock the South

August 9 2023, by Liz Junod



(L-R): Dr. Robert Junod, Dr. Andrew White and Kelley Murphy of UAH's Earth System Science Center analyze the risk of lightning over the Rock the South venue, Friday, July 21, 2023. Credit: Liz Junod | UAH

On July 21, 2023, over 35,000 people were denied entry to Rock the South's outdoor country music festival in Cullman, Ala., at 3 p.m. due to

the threat of lightning in the area. New lightning prediction technology developed by researchers from The University of Alabama in Huntsville's (UAH) Earth System Science Center was used for the first time to successfully forecast the threat at the event.

UAH Research Scientist Dr. Andrew White, through a cooperative agreement between NASA Marshall's Space Flight Center and UAH, a part of the University of Alabama System, developed the NASA Short-term Prediction Research and Transition Center's Lightning-Artificial Intelligence (AI) tool known as SPoRT which can predict the probability of the threat of lightning up to 15 minutes before an actual strike occurs.

The product was developed using [machine-learning techniques](#) along with consulting support from fellow UAH Research Scientist Dr. Robert Junod.

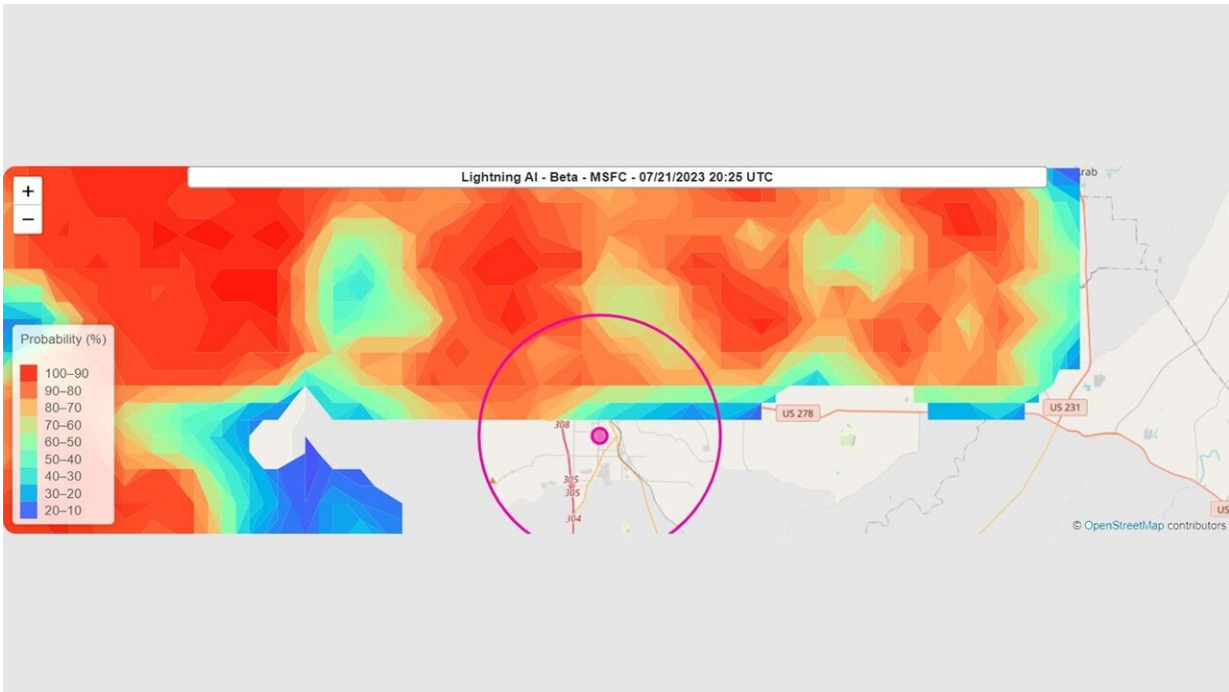
"The machine-learning model was trained on a lot of data from previous events to learn the trends and patterns that lead to lightning initiation," Dr. White explains. "It then applies what it has learned to make predictions on future events."

Meteorologists Huntir Cramer and Dan Dixon from the National Weather Service of Huntsville were stationed at the Cullman County Emergency Management Agency Mobile Emergency Operations Center at Rock the South to provide operational weather support for the event. Both Cramer and Dixon utilized SPoRT's Lightning-AI product to specifically forecast the threat of lightning on Friday afternoon.

"Summertime pop-up convection can happen very quickly, so having any type of advance warning is extremely helpful, especially with large outdoor events taking place," Cramer says.

SPoRT's Lightning Viewer houses a suite of lightning products,

including the Lightning-AI that enabled Cramer and Dixon to establish a defined mileage perimeter around Rock the South by employing the viewer's range ring tool.



NASA SPoRT's Lightning-AI product at 3:25p.m. CST, which indicated a 70% increase in confidence lightning would occur within five miles of the Rock the South venue. Credit: NASA SPoRT

"One storm that developed to the south-southwest of the venue ended up congealing with a storm just to the north of it and started generating a lot of lightning," Dixon says. "As we saw the product's probability of lightning increasing closer to the range ring around the venue, we knew this would cause a risk to the public's safety."

Dixon and Cramer quickly alerted Cullman County's Emergency

Management Agency that SPoRT's Lightning-AI product was indicating a 50% chance of lightning striking close to the venue near 3 p.m. The information led event coordinators to bar concertgoers from entering the venue so they could shelter in their vehicles instead.

Lightning was noted within five miles of the Rock the South venue during the time the venue was closed. Cramer and Dixon continued monitoring the area using the SPoRT technology until it was determined the threat of [lightning](#) was substantially decreasing by 6:00 p.m., which led the event coordinators to open the venue at 6:30 p.m.

After the event concluded, NASA SPoRT's Engagement Training and Assessment (ETA) team, comprised of UAH research associate Kelley Murphy and the National Weather Service's Application Integrations Meteorologist Kris White, worked with Cramer and Dixon to collect valuable feedback on how well the product performed.

"We can use feedback from Huntir and Dan to tailor the product to their operational needs," Murphy notes. "We value their input and want to make sure that products like Lightning-AI are easy to use and help them with their forecasting and decision support tasks."

From the feedback provided, Murphy and Kris White will work with SPoRT's Data Production team to determine if changes to SPoRT's Lightning Viewer need to be made. Murphy and White will also be hosting additional assessments with other NASA stakeholders to gain more insight to optimize the system to benefit multiple entities of the operational weather community.

Currently, NASA SPoRT Lightning-AI is only active near NASA Centers in support of NASA emergency managers. Its utility, however, has grown outside of the NASA ecosystem to support local National Weather Service offices and their partners in areas near NASA facilities.

Provided by University of Alabama in Huntsville

Citation: New lightning prediction tool provides critical weather forecasting support at Rock the South (2023, August 9) retrieved 29 April 2024 from <https://phys.org/news/2023-08-lightning-tool-critical-weather-south.html>

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