UtiliWeather®
New England

Scerbo 3-Tier Convective Risk Index ®

WESTERN CONNECTICUT STATE UNIVERSITY

Appendix

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Introduction

Overview

The Scerbo 3 -Tier Convective Risk Index ® (CR*i*) is a risk intelligence approach to forecasting the potential for the development and location of severe and non-severe thunderstorms (D. Scerbo, July 2014).

This index identified three "tiers" of risk that are necessary for forecasting thunderstorm potential and development: the location of development and movement, type and coverage, and the severity of convection.

Since the culmination of this index in 2014, it has been developed further and integrated alongside AI technology in order to improve the forecasting power of this index.

Research Team

Dominic Scerbo - Meteorologist/Founder of the CR*i* ®

Gary Lessor - Meteorologist/Administrator

Luca Di Carlo - Lead Developer/Data Analyst

Dr. Albert Owino - Consulting Meteorologist

Paul Taschereau - Consulting Meteorologist

An AI Approach

The latest development of the CR*i* ® builds upon the previous index structure using advanced machine learning techniques for enhanced forecasting accuracy. Since the integration of artificial intelligence, the AI-based model exhibited significant improvements in its ability to forecast the location and severity of thunderstorms.

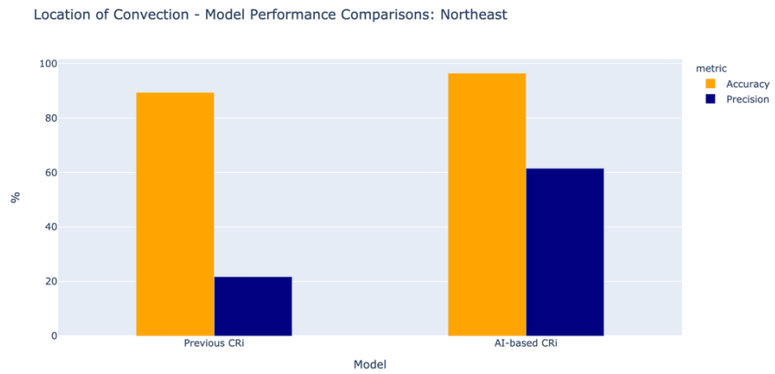


Figure 1

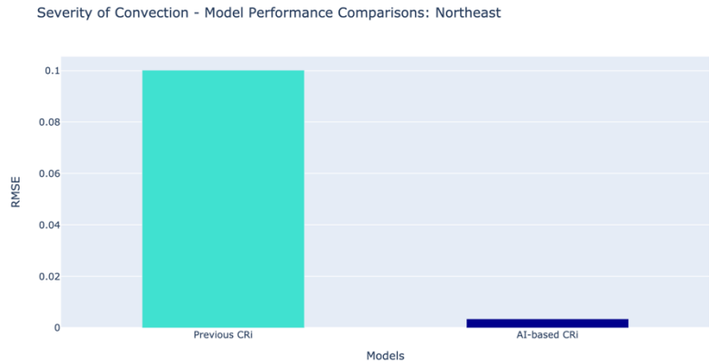


Figure 2

AI based methods:

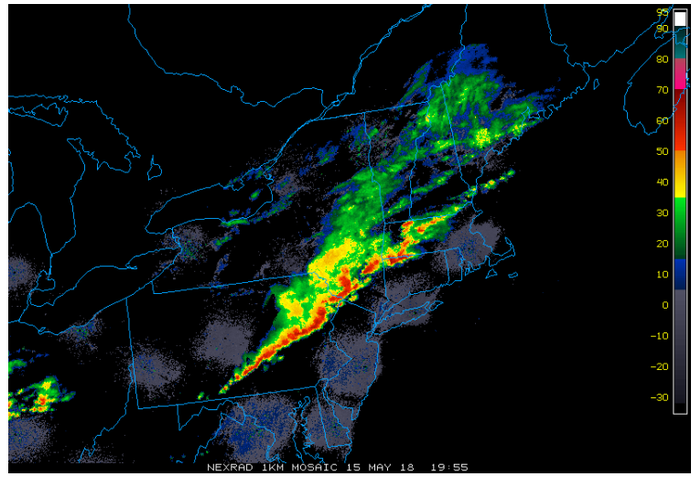
7 % increase in accuracy when identifying convection (Fig. 1)

33x better at predicting thunderstorm severity (Fig. 2)

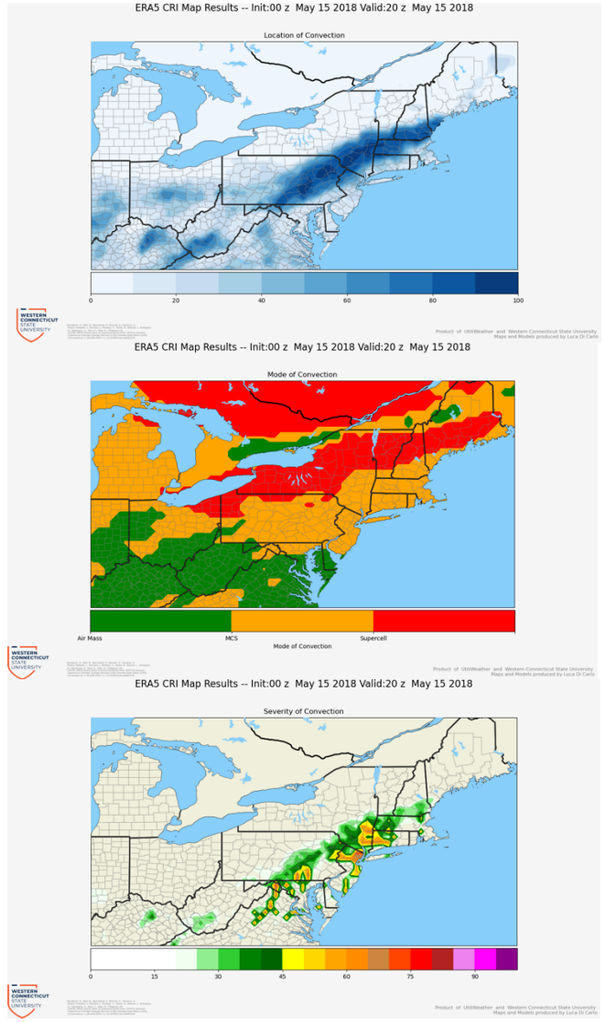
Maps

May 15, 2018 severe weather developed across New England, bringing severe hail and embedded weak tornadic activity into the Hudson Valley. This is a snapshot of peak thunderstorm activity using ERA5 Re-Analysis data from the ECMWF Copernicus Climate Data Store (C3S). A mesoscale convective system is properly identified in the AI-based CR*i* ®, in addition to the areas of enhanced thunderstorm risk and severity.

Composite Radar



AI-based CR*i*® forecast - Tier 1, Tier 2, and Tier 3 (top down)



Links to Severe Events

The following are severe weather events that have been re-modeled using the AI-based CR*i* ®

May 15, 2018 Event

https://docs.google.com/presentation/d/1twywyCPUMOxScenRiwWOhV2jMVhLkcGbWX97a0rfNTw/edit?usp=sharing

July 1, 2016 Event

https://docs.google.com/presentation/d/11-WSgSkyAtY7Bb3bB1W9tu3fSsxWY6COWcMHGZOlddM/edit?usp=sharing

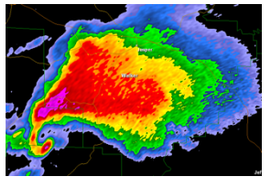
September 4, 2019 Event

https://docs.google.com/presentation/d/1X-j0lBuCD2mzdHaWlGT6dJfPJ5b0G161ciCVhPPAlgE/edit?usp=sharing

Future Work

This product is currently in the process of being transitioned into an available operational forecasting product for commercial use. In order to do so, first this product will be tested on higher resolution convective-simulating mesoscale models in order to adjust for the change in geographic resolution. It is expected that this should greatly improve the forecasting potential of this product and pave the way to providing end-users with a state-of-the-art intelligent thunderstorm forecasting model.

The end goal of this research and development is develop this product to include the entire contagious United States at a 5-10 km grid resolution.



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