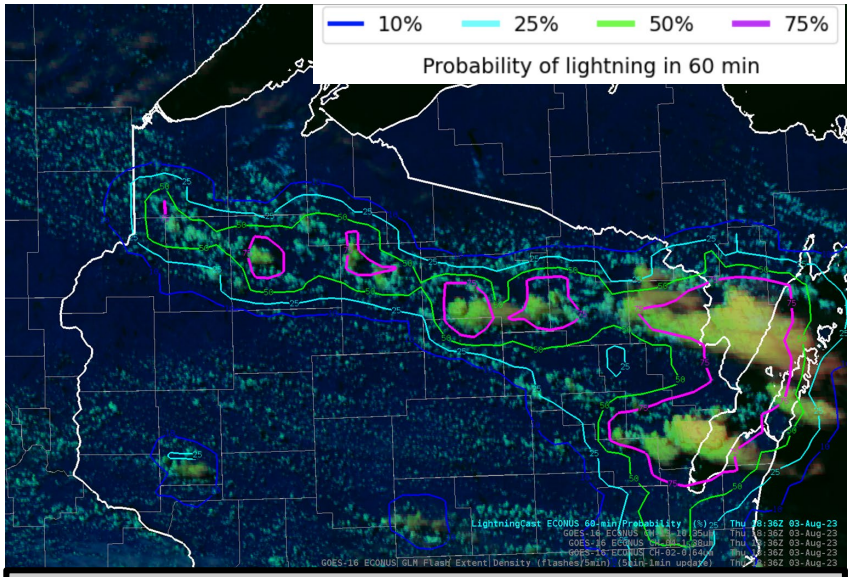
LightningCast

Quick Guide

What is LightningCast?

LightningCast is an AI model that uses *images* from GOES-R ABI to predict lightning in the next hour at any given location. It was trained using GLM flash-extent density as the target or "truth" data. LightningCast learned salient *multispectral* **and** *spatial* features from ABI data. The primary goal of LightningCast is to predict *lightning initiation* in developing convection in an automatic, quantitative, and objective fashion.



Day Cloud Phase Distinction RGB and LightningCast probability contours from GOES-16 ABI at 1836 UTC, 3 August 2023

Inputs

Band, wavelength	Physically relates to
C02, 0.64 µm	**Cloud optical thickness**
C05, 1.6 µm	**Cloud phase**
C13, 10.3 µm	**Surface or cloud-top temperature**
C15, 12.3 µm	**Cloud-top temperature/height**

Primary Applications

Lightning initiation: Used to assess when cumuliform clouds will soon become electrified. Probabilities in the 20-50% range often provide 20 minutes or more of lead time to initiation.

Convective maintenance: Used to monitor strengthening or weakening convection. Changes in probabilities often coincide with changes in storm-top appearance and properties.

Limitations

Convection under thick ice: Limited ability to monitor convection developing under a thick anvil.

Tropical Cyclones: Very tall, cold clouds that don't produce much lightning can cause false alarms.

Diurnal/Seasonal: LightningCast is more accurate during the day and during the warm season (Apr-Oct). It tends to over-predict convection in the cool season (Nov-Feb).

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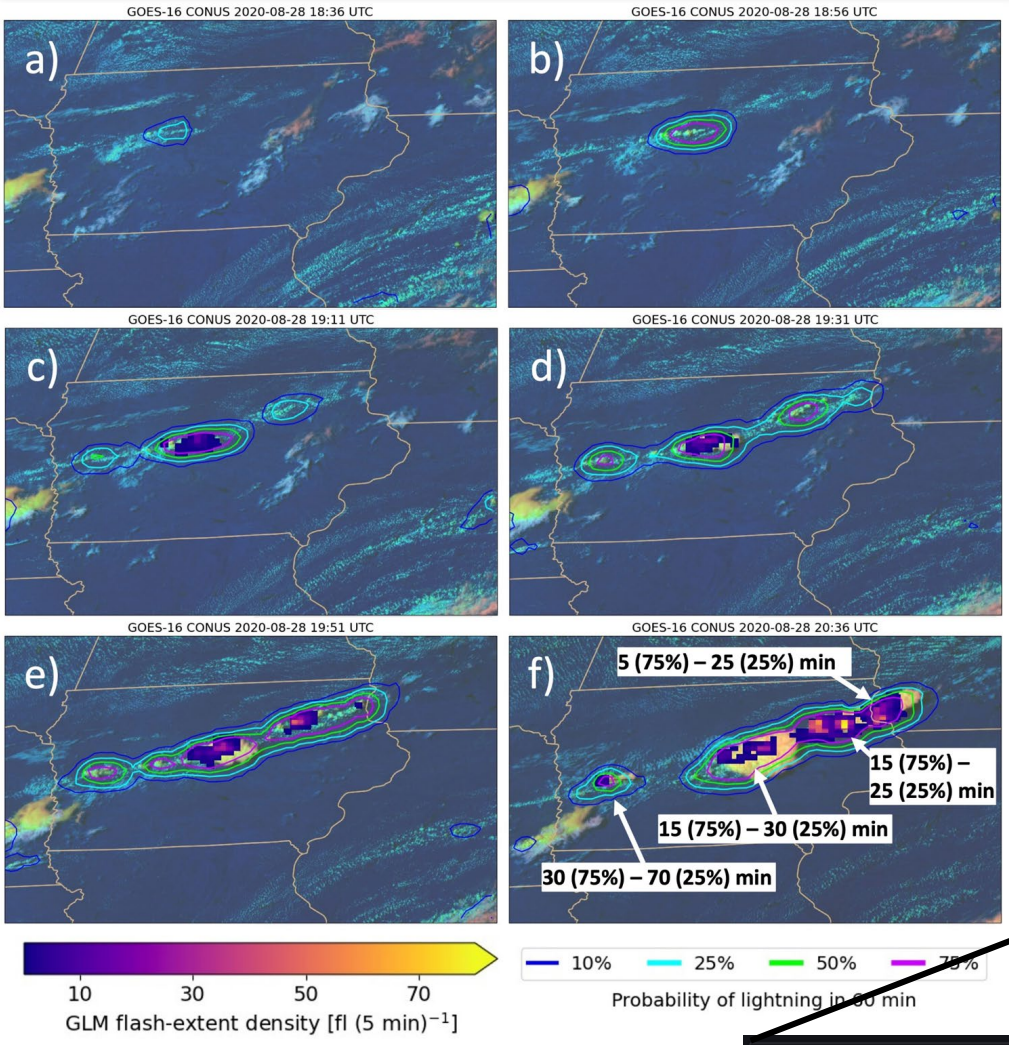
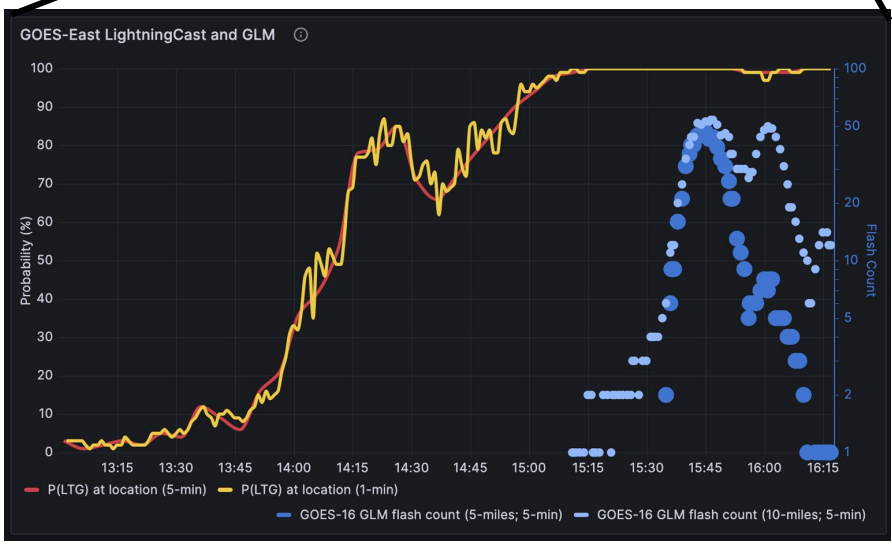


Left: A sequence of images depicting the evolution of LightningCast probabilities along a cold front in Iowa, superimposed on the day cloud phase distinction RGB and GLM flash-extent density from GOES-16. Lead times to the initial GLM flashes for several areas of interest are annotated in (f), showing lead times in minutes from both the 75% and 25% probability thresholds.

From webpage,
lightning dashboards
at airports, stadiums, wildfires.
Data is parallax-corrected.



Coverage

- GOES-West PACUS
- GOES-West Mesoscales 1 and 2
- GOES-West American Samoa
- GOES-West Alaska / west Canada
- GOES-East CONUS
- GOES-East Mesoscales 1 and 2
- GOES-East OPC/TAFB offshore zones
- Himawari Guam

LightningCast webpage: https://cimss.ssec.wisc.edu/severe_conv/pltg.html

Last updated: January 2024