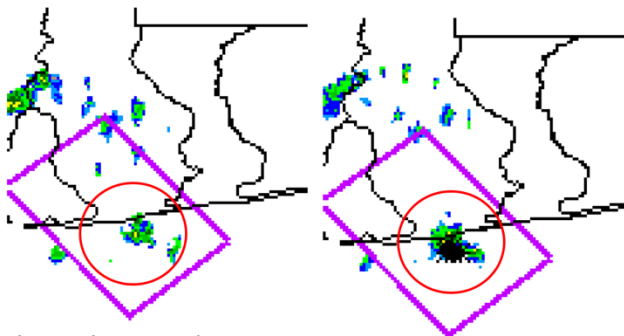


## NextStorm LT (Lightning Threat) Quick Guide

### What is it? What are the input datasets?

The NextStorm Lightning Threat (LT) product is a first-lightning strike nowcast (0-45 min) product that combines geostationary satellite data and National Weather Service/NEXRAD radar fields within a fuzzy logic decision model to produce a probability of a lightning flash from a newly formed thunderstorm. The LT product does not differentiate between an in-cloud or cloud-to-ground flash. As with the NextStorm Convective Storm (CS) product, cloud objects are first identified, and growing cumulus clouds are tracked over consecutive 5-min satellite scans, and then tests are performed to predict the LT.

GOES data used in the LT product include visible and infrared channels, which are used for cloud typing and determining cloud properties, such as growth, glaciation, height, and temporal trends in these properties. The NEXRAD radar data used is mainly the reflectivity at the  $-10^{\circ}$  C altitude. The LT product is made for a polygon region over which forthcoming lightning is expected. The polygon's orientation and size are determined by the size and velocity of the CS cloud object that is projected to produce lightning in the coming 45 minutes.



Lightning Threat issued at 5:42 PM

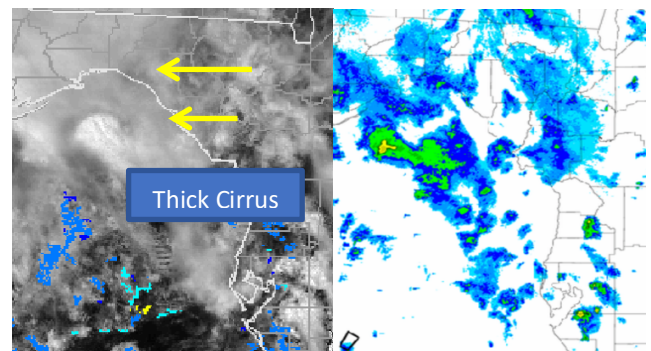
Lightning began at 5:58 PM

### What is the product's accuracy?

LT product accuracy is a function of how a LT nowcast is made: (1) If the LT nowcast is made solely from satellite, it has a peak accuracy of  $\sim 75\%$ , with a valid time out to 45 min. (2) If the LT nowcast is made using radar data, it has a  $\sim 90\%$  accuracy, yet is only valid for 5-10 min in advance of a strike. A flag is included with the product to denote if the LT nowcast is made using satellite or radar data. Hence, users are encouraged to display the LT product's polygon in two different colors, depending on how the LT nowcast is made (from satellite or from radar).

### What is the LT product's resolution? On what domains, and when, is it available?

The base resolution of the LT product is 1 km during daytime and 2 km during the night using GOES-16 and -17, yet the product produces a polygon LT region that is typically 20 km x 50 km in size. The daytime resolution is from the cloud typing algorithm's use of 500 meter visible data, which allows for more defined cloud objects. At night, the algorithm's dependence on 2 km infrared data for object identification results in blockier cloud objects. This product is available in both the GOES-East and GOES-West domains. Given nighttime thermal problems with GOES-17, the LT product is at times unavailable from 1 to 5 am Central Time. The LT product is available every 5 minutes during normal GOES-East and -West operations.



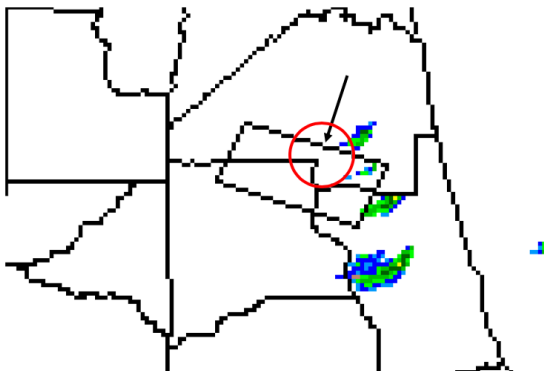
No LT Polygons Generated Beneath Thick Cirrus

### What should I look out for when using this product?

As with the NextStorm CS product, the NOAA National Weather Service Operational Hydrologic Remote Sensing Center SNOw Data Assimilation System (SNODAS) is used to help identify locations of ground snow cover. Snow covered ground is misidentified by the cloud typing portion of the algorithm as a cumulus cloud, so can be given its own identifying color (pink in this case) in the display. Also, thick cirrus cloud contamination is the major concern when using the LT product since cumulus clouds can be impossible to see beneath thick cirrus clouds. Hence, regions of thick cirrus are flagged (such as existing storm anvils), which means there will be no LT polygons formed.

**Example:**

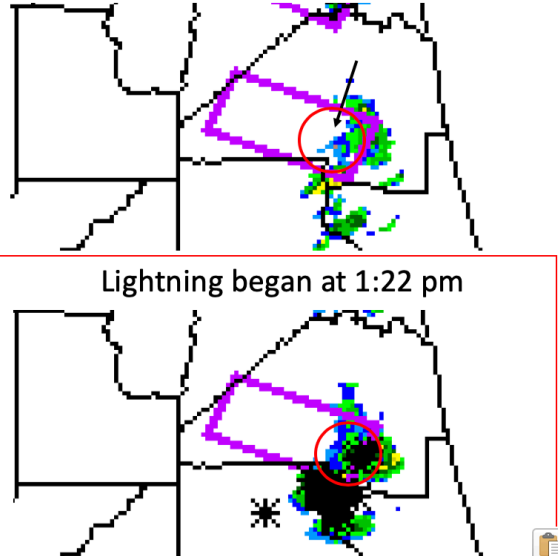
Initial Lightning Threat began at 12:00 pm



\* = Lightning Strikes

**NextStorm provided a 1 hour 22 minute lead-time to first lightning.**

Enhanced Lightning Threat issued at 1:00 pm



**Note:** For first lightning lead times longer than 45 minutes the LT algorithm is identifying growing cumulus clouds that are in environments favorable for lightning to occur and this should be considered for interpretation. Although it does not take much more than 45 minutes for a growing cumulus cloud to produce rain, it can sometimes take longer for clouds to organize enough to produce lightning, thus giving a longer first-lightning lead time from the LT product. In the example above, a **black** polygon (generated using satellite data) was issued at 12:00 pm, while radar generated (**purple** colored) polygons were subsequently generated at 1:00 pm and 1:22 pm, in advance of lightning at the original satellite-generated polygon location.

**Resources** More information about the NextStorm Lightning Threat (LT) product can be found at [www.nextstorm.net](http://www.nextstorm.net).

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