

NextStorm CS (Convective Storm Initiation) Quick Guide

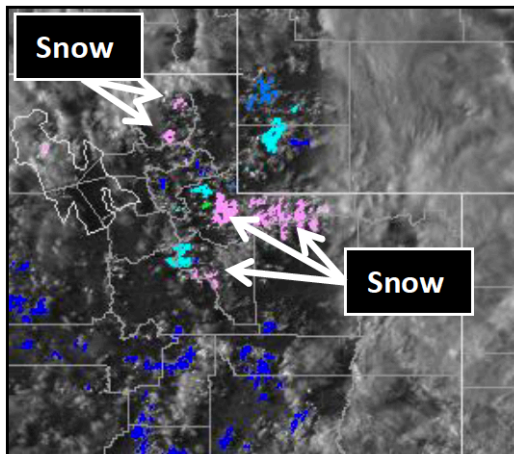
What is it? What are the input datasets?

The NextStorm Convective Storm (CS) product is a satellite-based convective initiation (CI) nowcasting (0-1 hour) product that fuses geostationary satellite data and numerical weather prediction model output within a machine learning model to produce a probability of CI, where CI is defined as a 35+ dBZ radar echo. Cloud objects are first identified by type, and growing cumulus clouds are tracked over consecutive 5-min resolution satellite scans.

The GOES data used 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. Model data used currently comes from the Rapid Refresh (RAP) model, and is used to determine environmental information which include Convective Available Potential Energy (CAPE), Convective Inhibition (CIN) and Lifted Index (LI).

What is the product's accuracy?

The CS products has an overall accuracy of 85%, while probabilities of CI at and above 50% have been shown to provide the longest nowcast lead times while retaining the highest accuracy. CS probabilities of 40% or less are often associated with small cumulus clouds that will never make rain, while CS probabilities >80% provide high accuracy, yet short CI nowcast lead times of ~10 minutes.



The CS product is also accompanied by polygon regions over which forthcoming CI is expected, in addition to a more raster-like image that can be directly displayed on satellite imagery. The polygon's orientation and size are determined by the size and velocity of the cloud object that is projected to begin

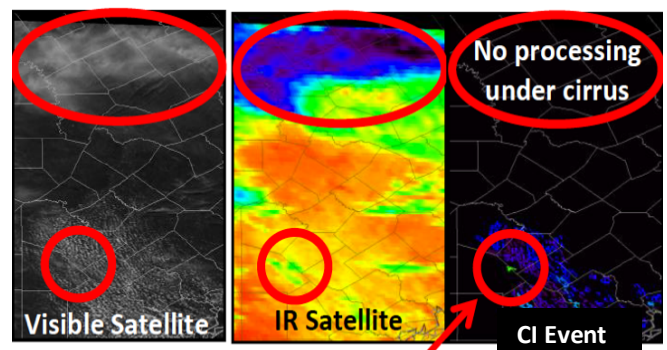
making rain in the coming 45 minutes, and can be colored according to probability.

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

The resolution of the CS product is 1 km during daytime and 2 km during the night on GOES-16 and -17. This enhanced daytime resolution is due to the cloud typing algorithm's use of 500 m visible data, which allows for more defined cloud objects. At night, the cloud typing 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 CS product is at times unavailable from 1 to 5 am Central Time. This product is available about every 5 minutes during normal GOES-East and -West operations.

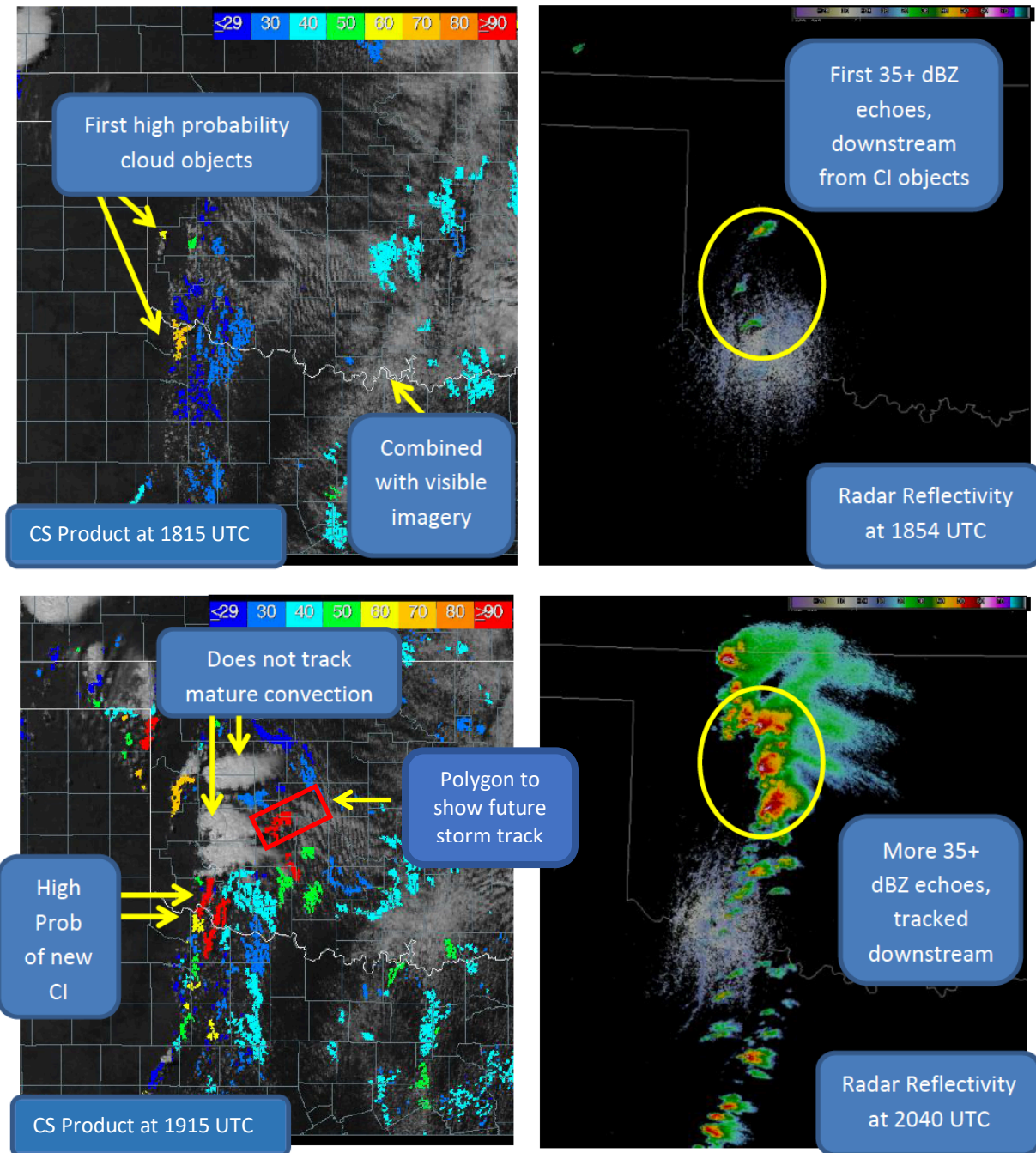
What should I look out for when using this product?

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. Thick cirrus cloud contamination is the major concern when using the CS product since cumulus clouds can be impossible to see beneath thick cirrus clouds (such as existing storm anvils), which means that no CI probabilities are made for clouds beneath thick cirrus.



Anomalously high probabilities of CI may be assigned to areas adjacent to thick cirrus clouds due to false cloud-top cooling rates. However, other satellite-based tests are done to avoid these situations.

Example:



Resources More information about the NextStorm Convective Storm (CS) Initiation product can be found at www.nextstorm.net.

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