ProbSevere LightningCast Probabilities over Guam using Himawari imagery

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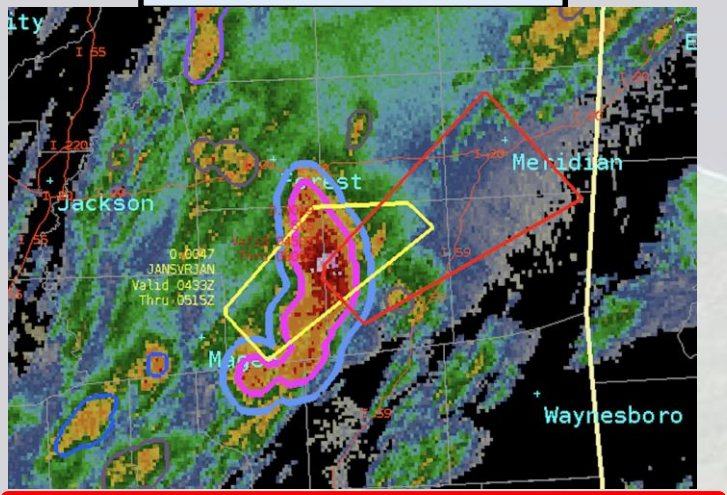
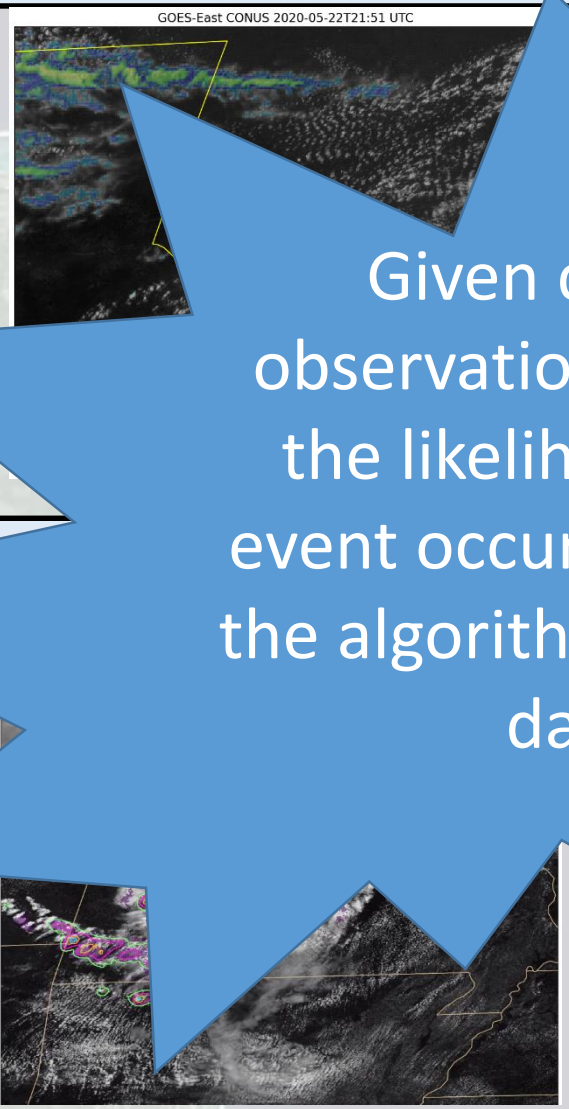
LightningCast is part of ProbSevere Portfolio

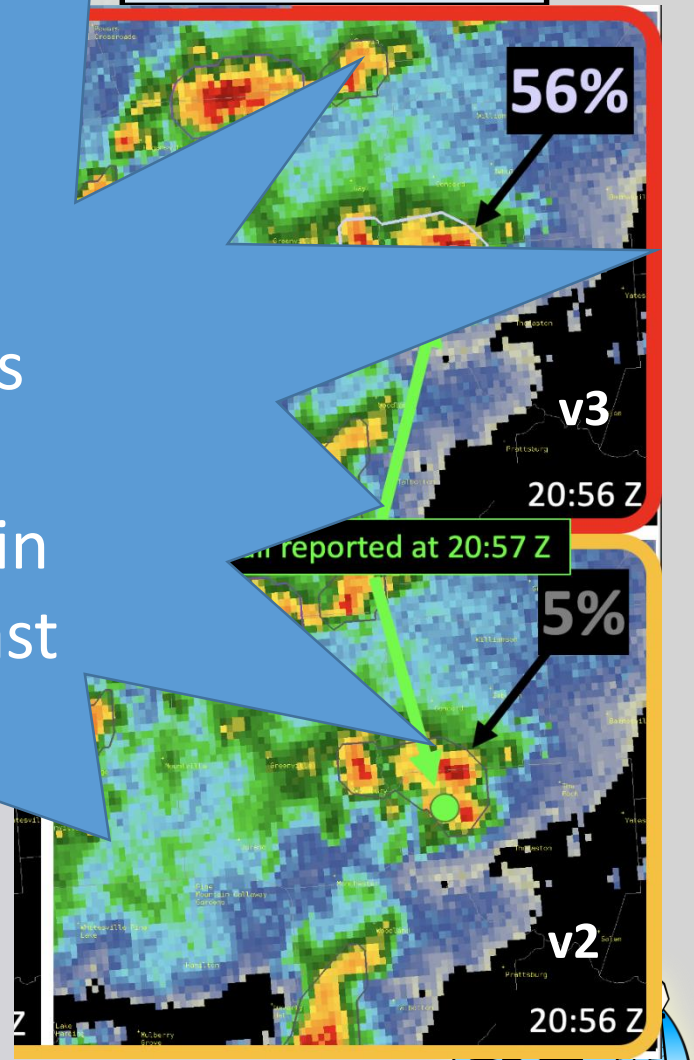
1. ProbSevere v2



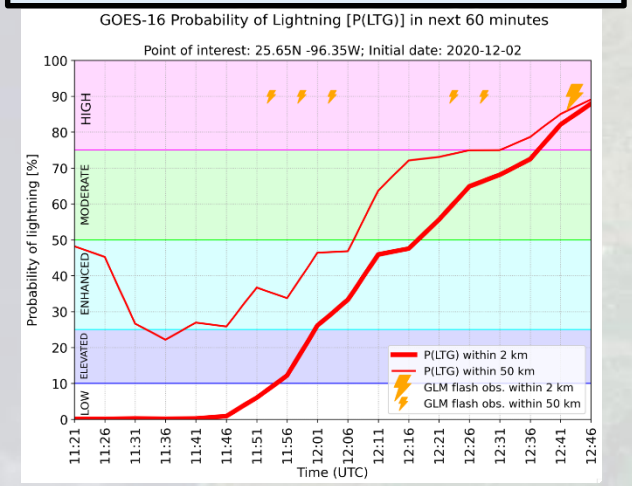
2. Intense Convection Nowcasting



3. ProbSevere v3



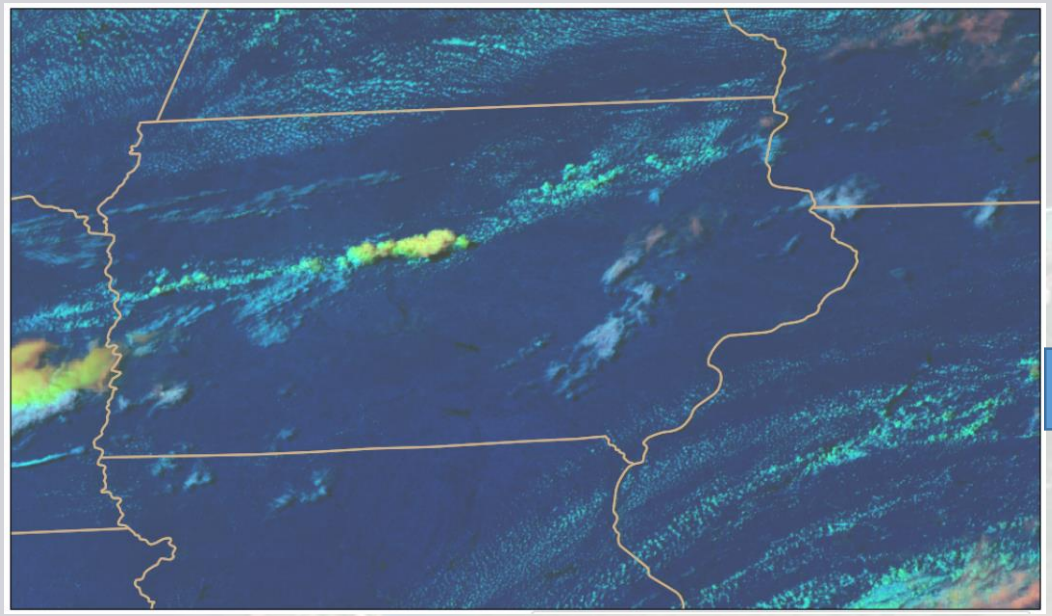
4. Lightning Nowcasting

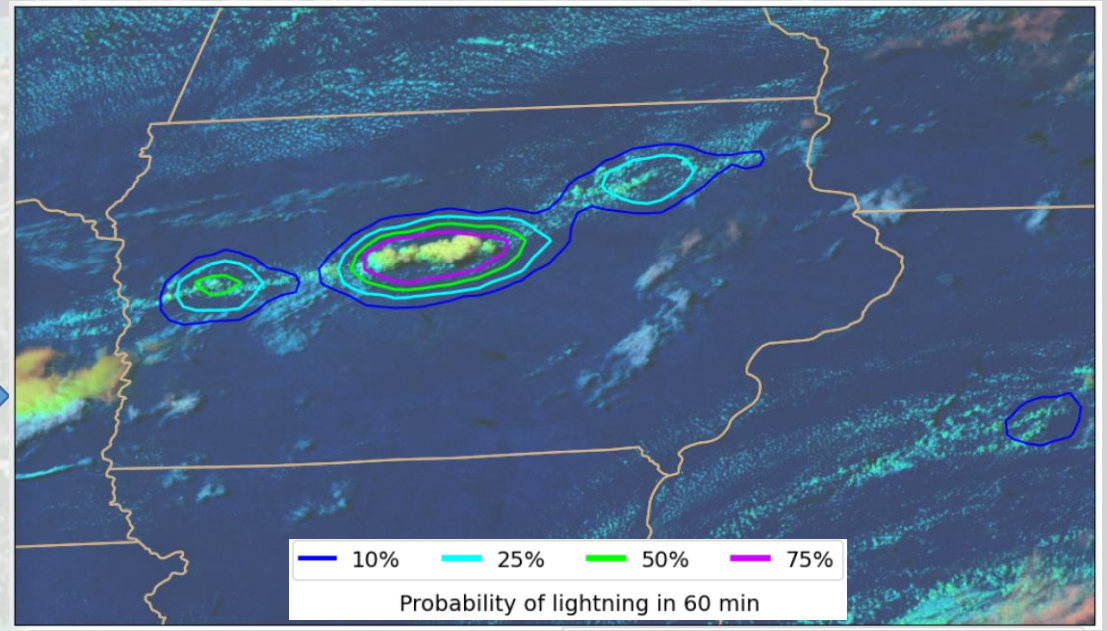


Given current observations, what is the likelihood of an event occurring? Train the algorithm with past data

CIMSS

How does ProbSevere LightningCast work?





GOES-16 Input:

-0.64 µm reflectance (band 2)

-1.6 µm reflectance (band 5)

-10.3 µm brightness temperature (band 13)

-12.3 µm brightness temperature (band 15)

Output:

-probability that GLM will observe lightning in the next 60 minutes

Works day and night; Applicable to any domain (subject to computing resources)

CIMSS

Do AHI v. ABI differences mean much?

- Big difference in resolution
  - ABI Band 5 (1.61 μm) has 1-km resolution
  - AHI Band 5 (1.61 μm) has 2-km resolution
- Slight differences in central wavelength
  - ABI Band 13 (10.3 μm)
  - AHI Band 13 (10.4 μm)

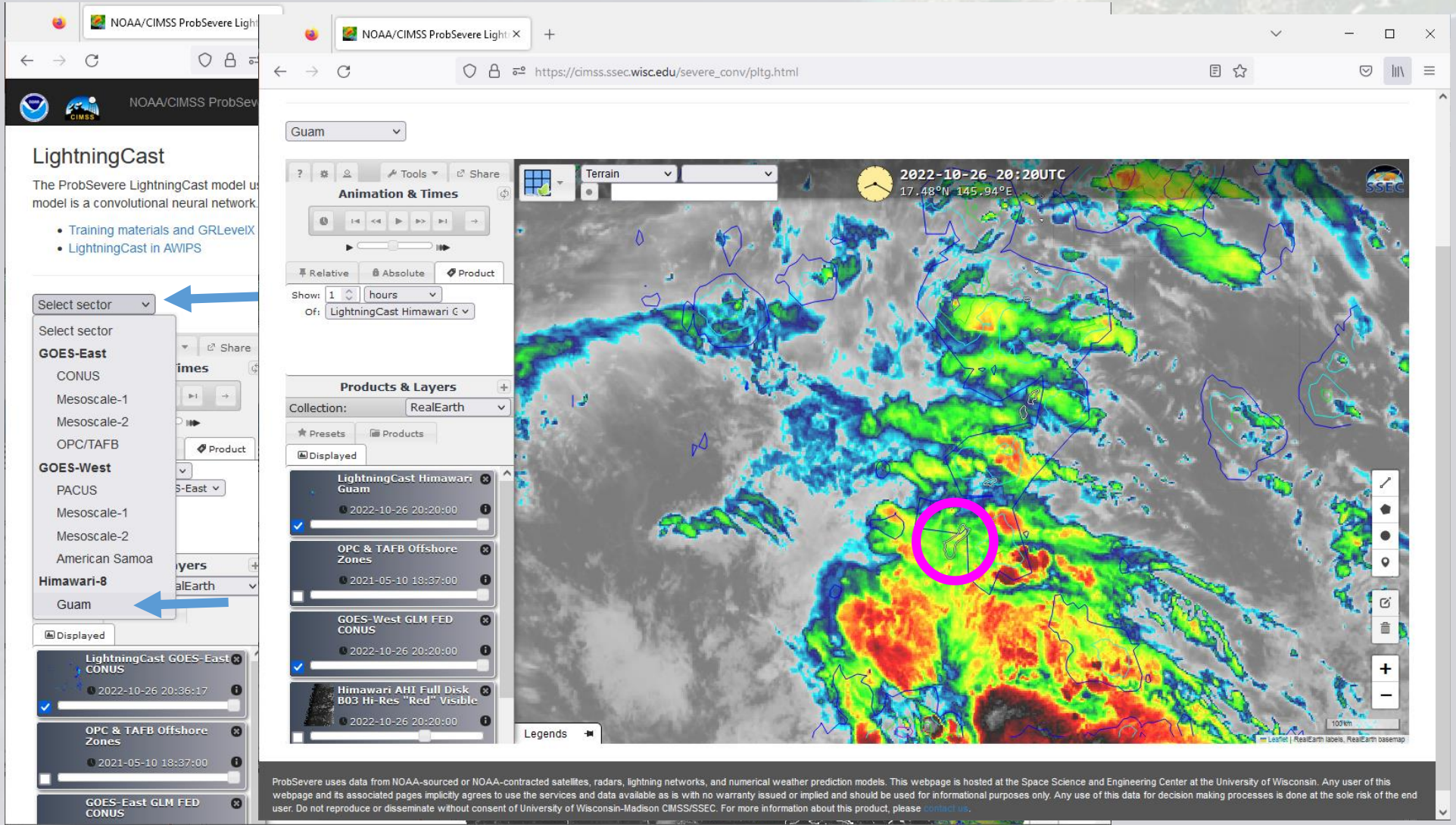
- Does this mean anything? No evidence (yet)

Why is this product needed?

- Watches and Warning are issued for Guam International Airport
  - Lightning is a hazard for those working on the tarmac
  - Other Lightning-prediction products show limited skill

- What's been used in the past? Radar interrogation

RealEarth instance of LightningCast created at request of WFO GUM

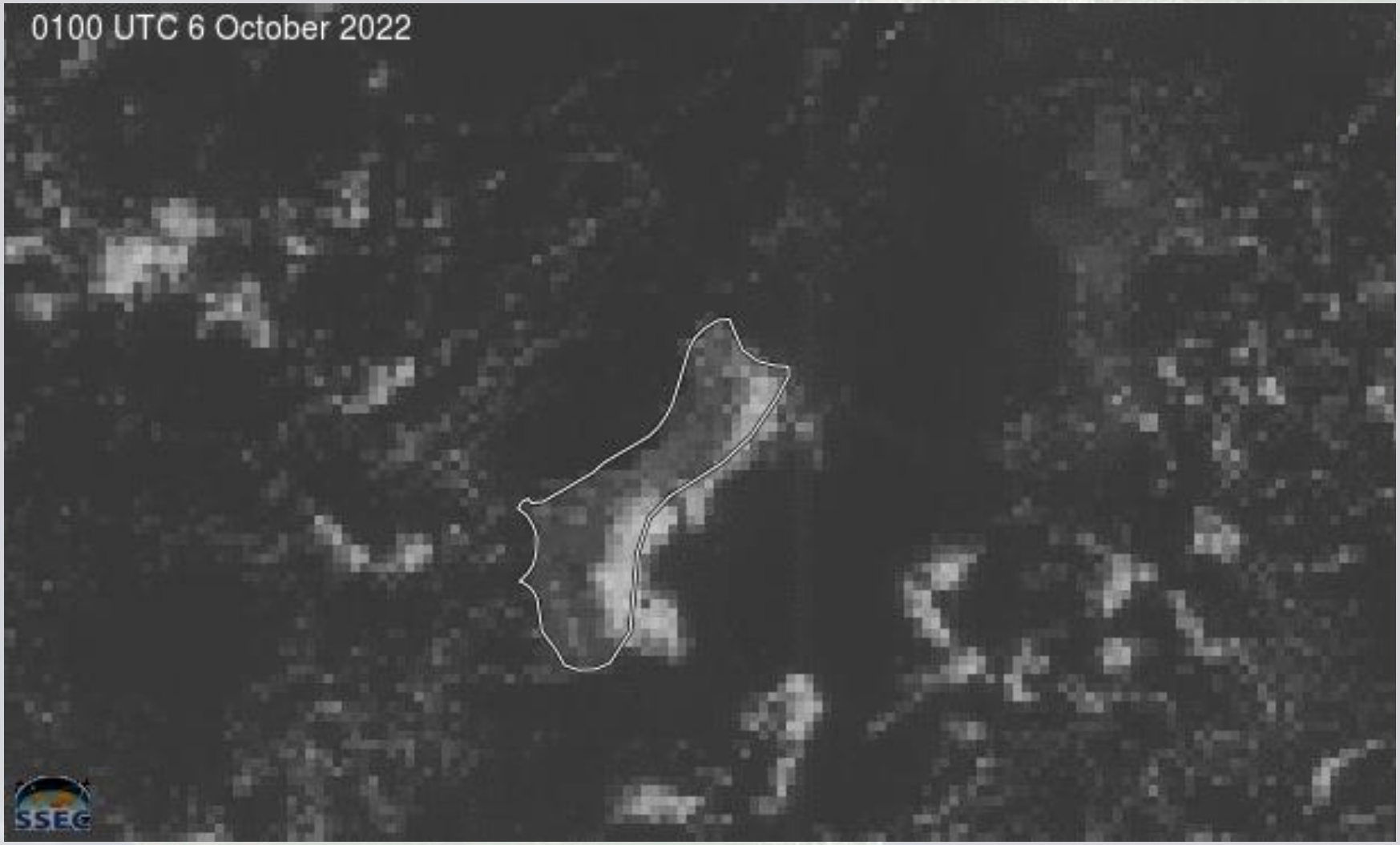


Note: USA NWS offices can get this information directly into AWIPS displays in the forecast office;

CIMSS is working on implementing this into the AWIPS at NWS GUM.

(Guam is circled in magenta)

Example with very light winds

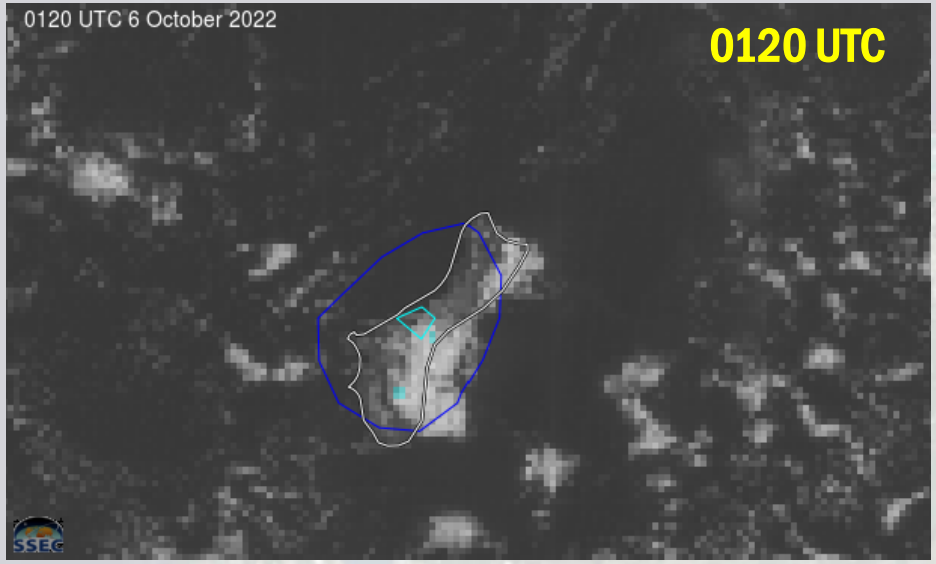


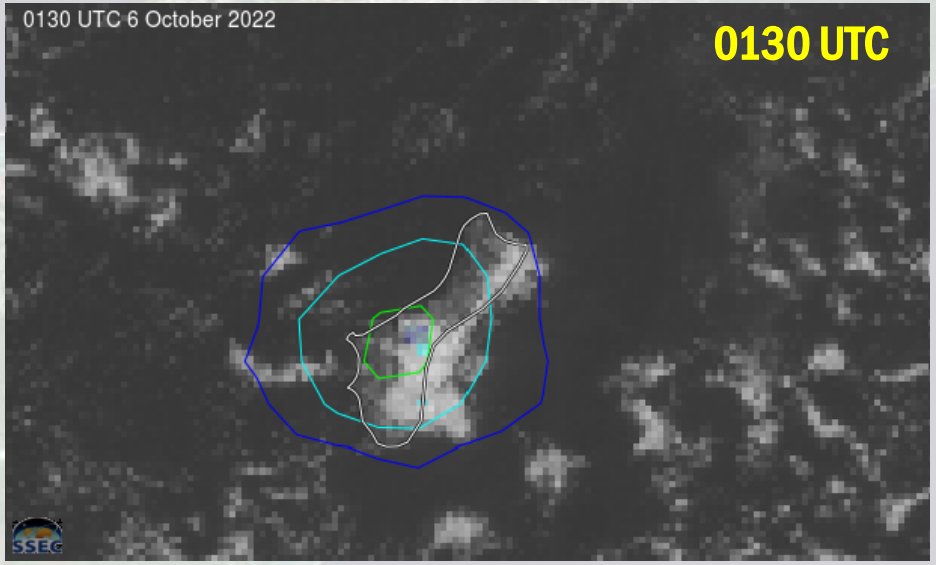
Watched this in real time

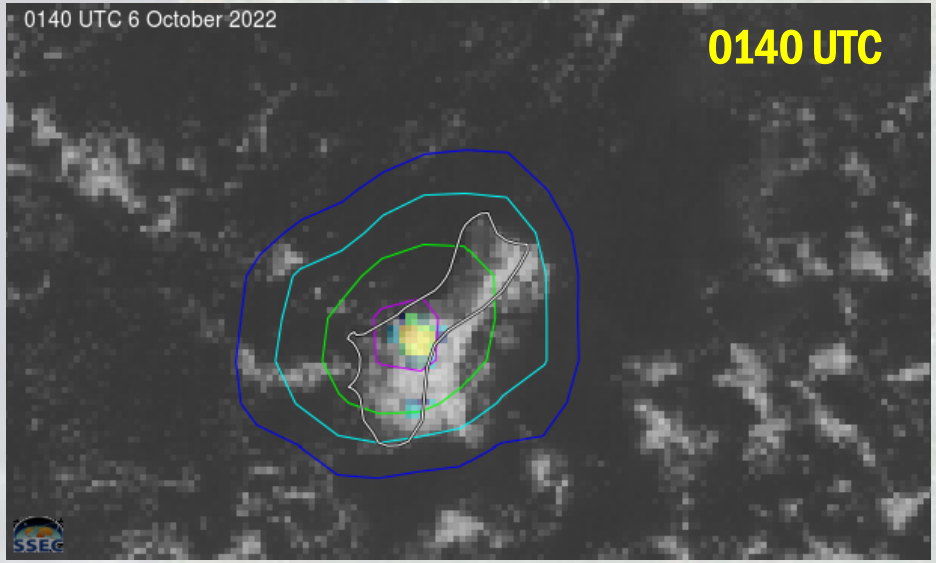
Surprised to see that contour show up at 0110 UTC – especially given that very little else seemed to change!

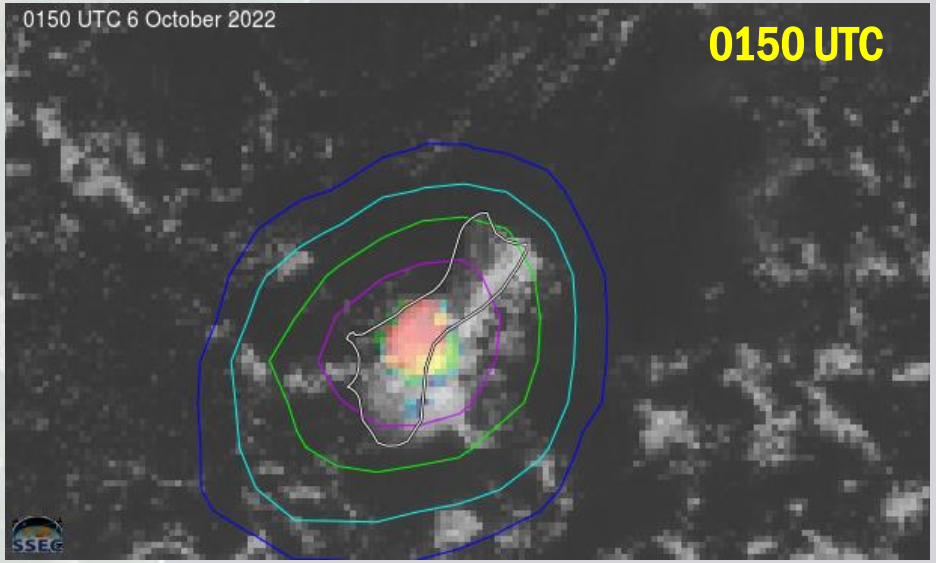
Light showers were occurring along the eastern shore of Guam under those clouds

Given how things were changing…lightning?



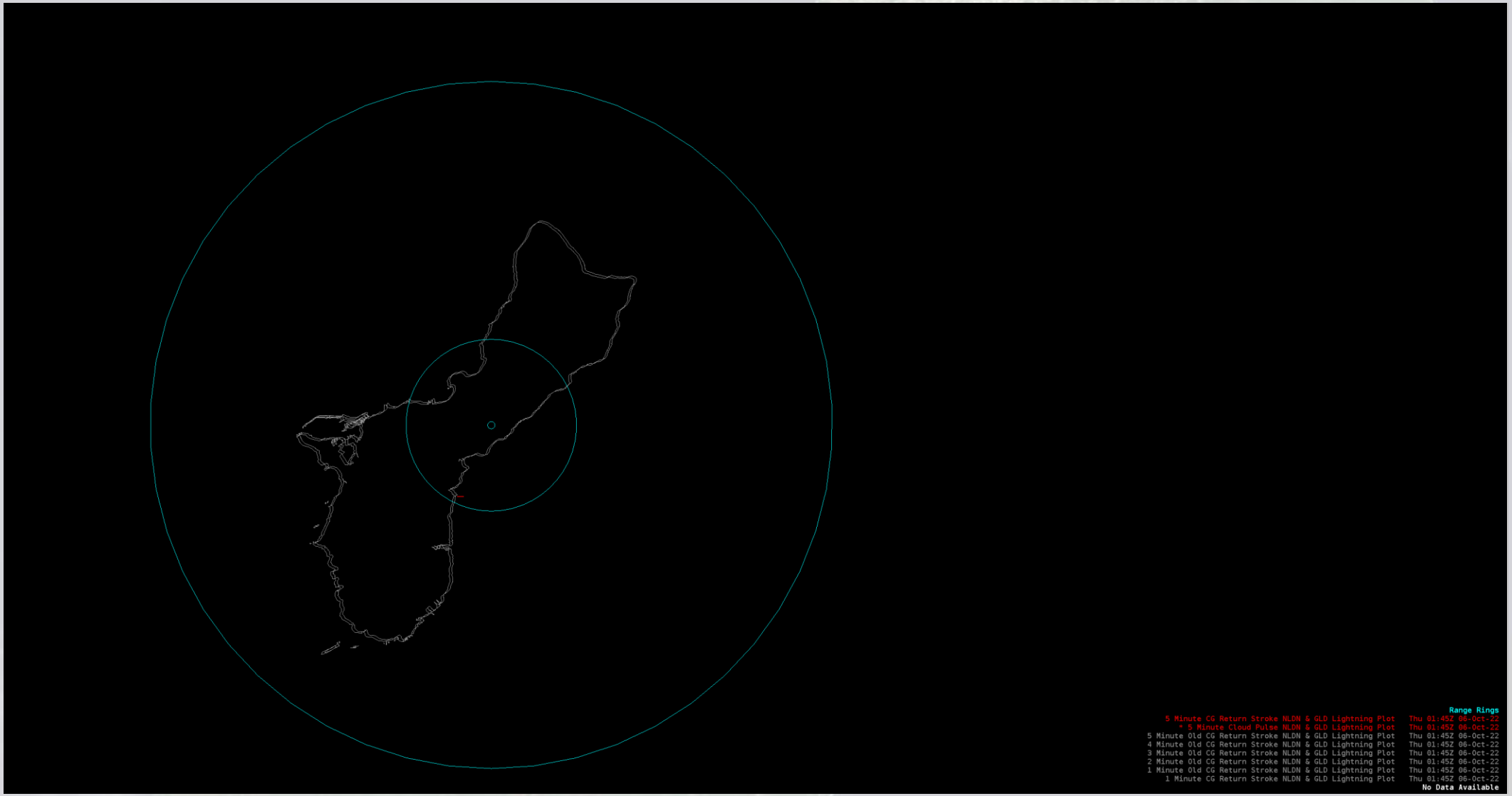






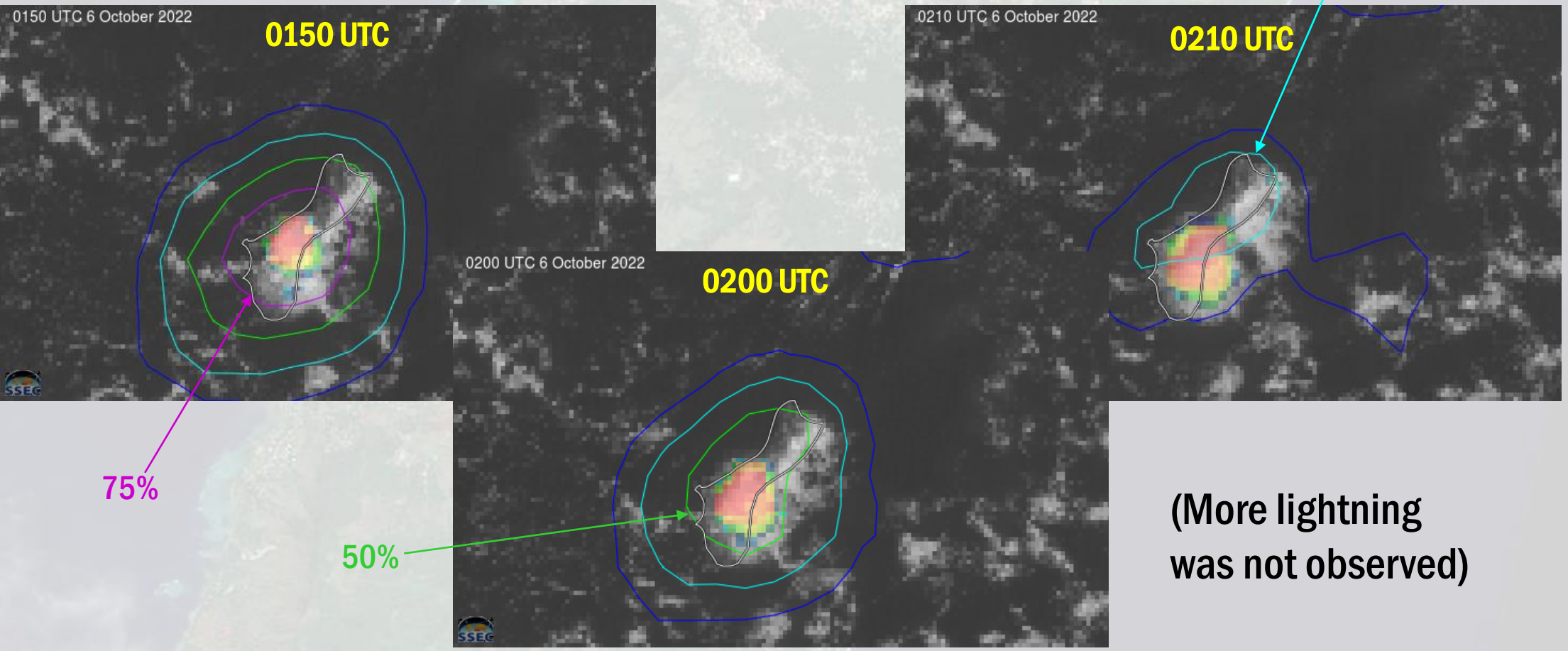
There is also a time delay in the imagery coming in – about 12-15 minutes, not because it takes a long time for LightningCast to be computed – that's really very fast – but because the Himawari-8 data has to move from JMA to NOAA

First lightning: Off the east coast of Guam at 0141 UTC



Given how things were changing…..

- Would you expect lightning to continue?



(More lightning was not observed)

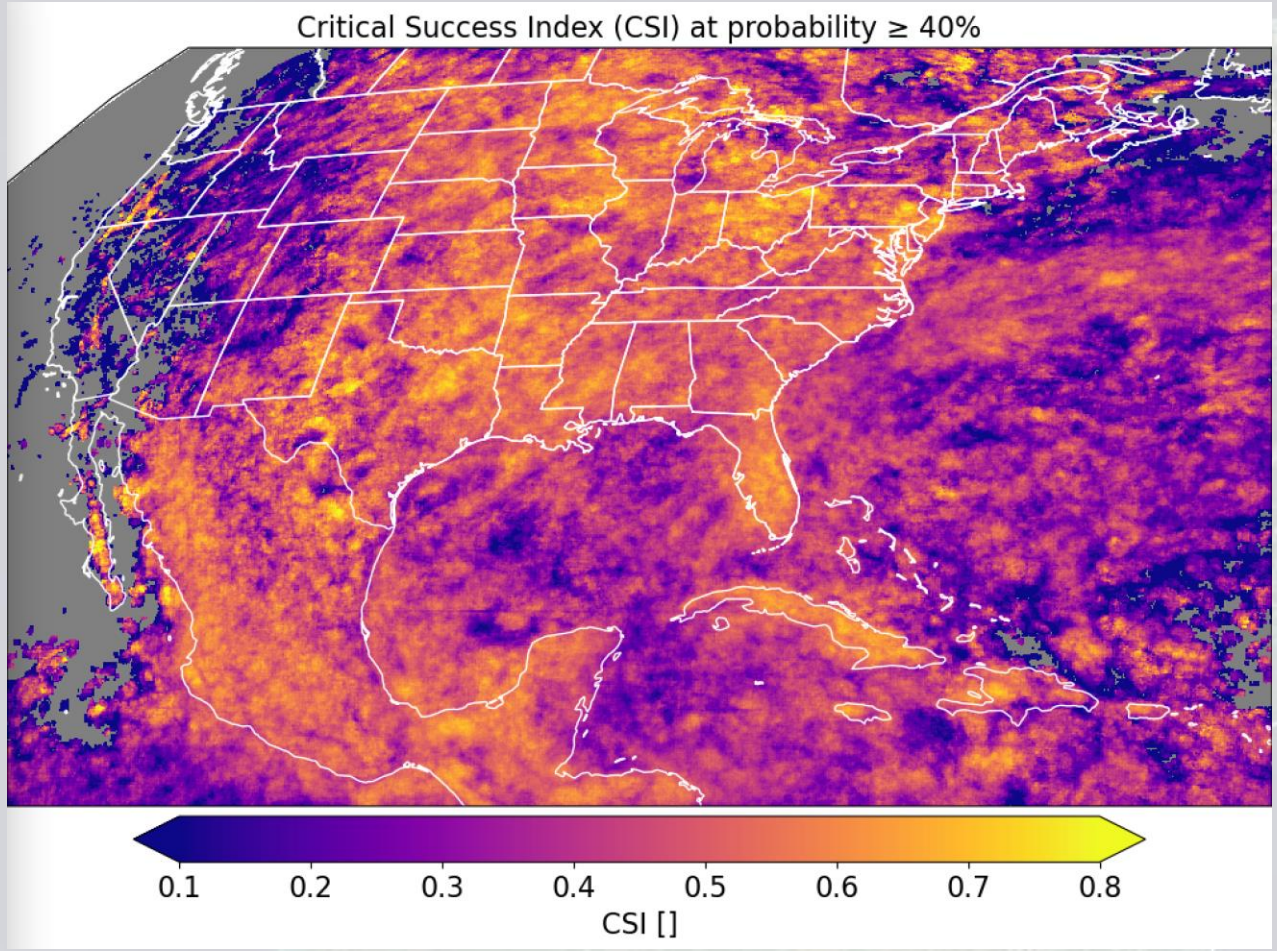
Commentary from Guam

- Just last night, we had several booms close to the airport, but unfortunately the airport TS warning was issued after the booms. The next morning, looking at radar and LC, I noted the cells developed fairly quickly east of the island and matured to ltg production over the island. Without LC, I'd agree such cases would be difficult to predict by Sat/Rad alone, but the LC did show 50% and even 75% just before ltg occurred. Convection was generally short-lived across the region with cells tending to produce a quick burst of ltg then dissipating. LC probs were expectedly noisy with all the convection around, but did seem to latch on to the active convective elements with some slight off-centeredness (perhaps bridging multiple areas?). I'd asked the forecaster today if he was looking at LC online, but he wasn't

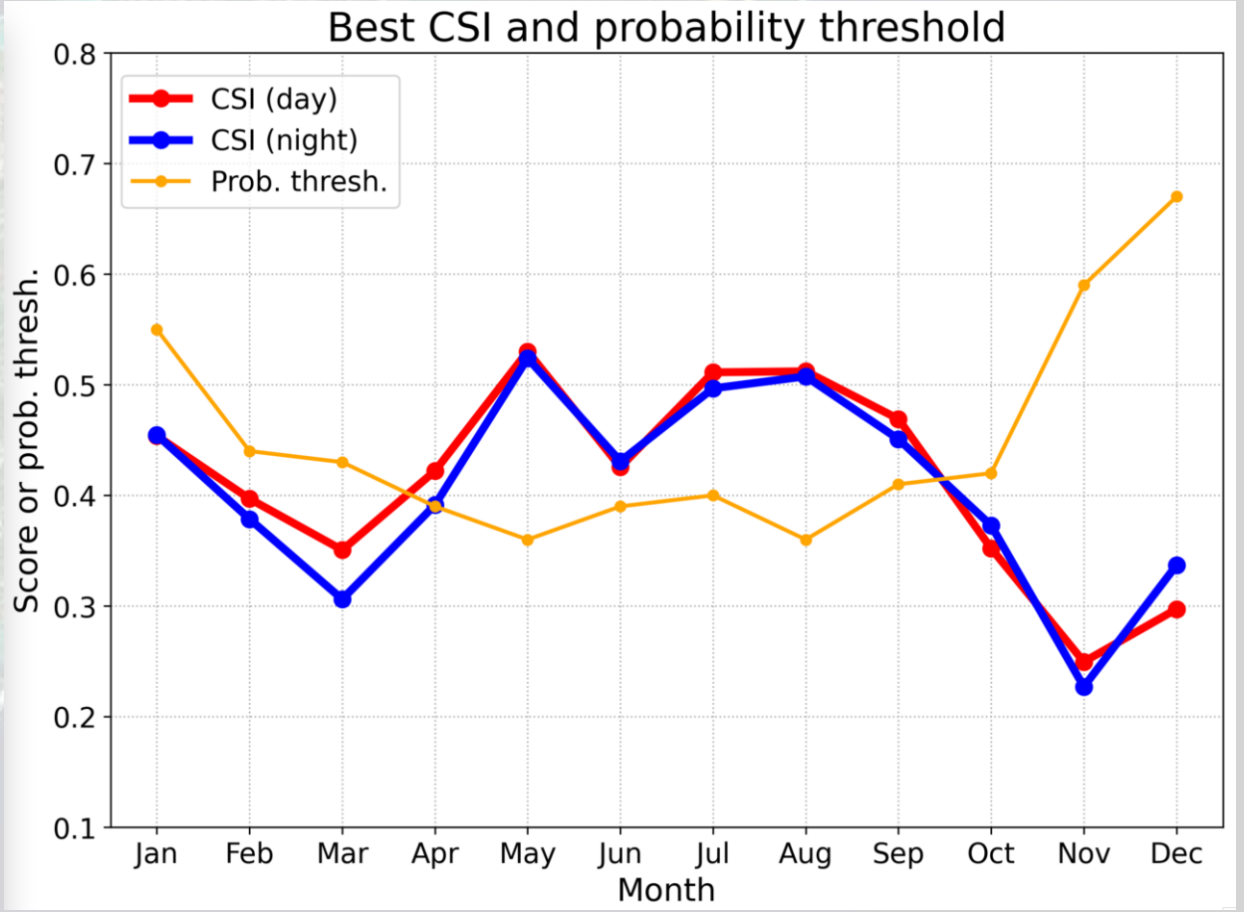
- One of the lead forecasters had recently cited a 75% poly that ultimately had no ltg. I believe I loaded the loop or an image on it. I'll admit, tropical convection can be confounding with occasions of widespread convection and -70C to -80C cloud tops and no ltg, and other times, warmer cloud tops and much ltg.

- A number of forecasters have been using it and seem to be fond of it. Like anything new, though, longer-term forecasters will be more gradual in adopting new datasets into ops, but I believe LC would provide tangible benefits to our situational awareness. I'm thumbs up for considering getting this into our AWIPS.

Verification - GOES-16



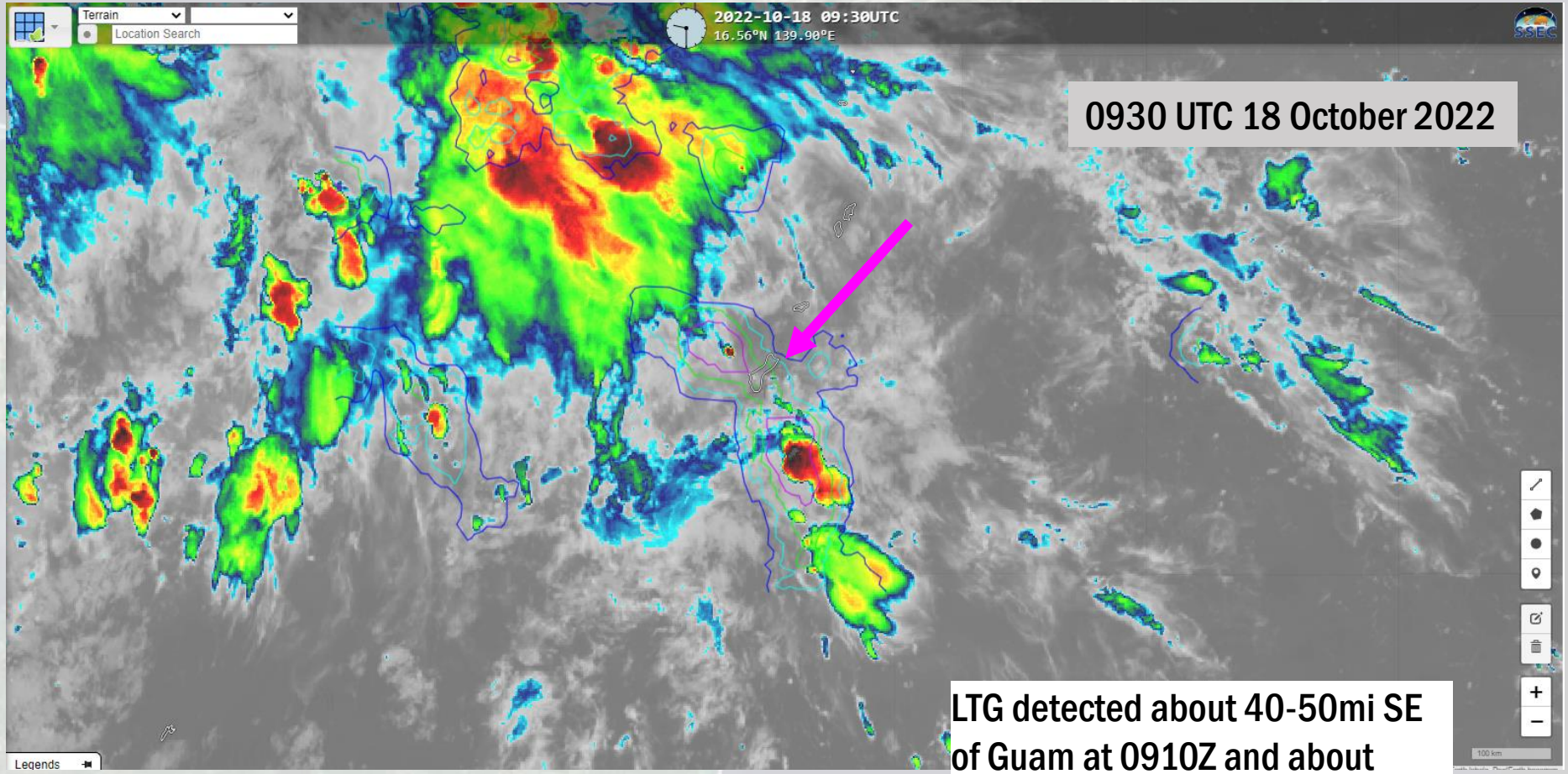
Critical success index for probability > 40%



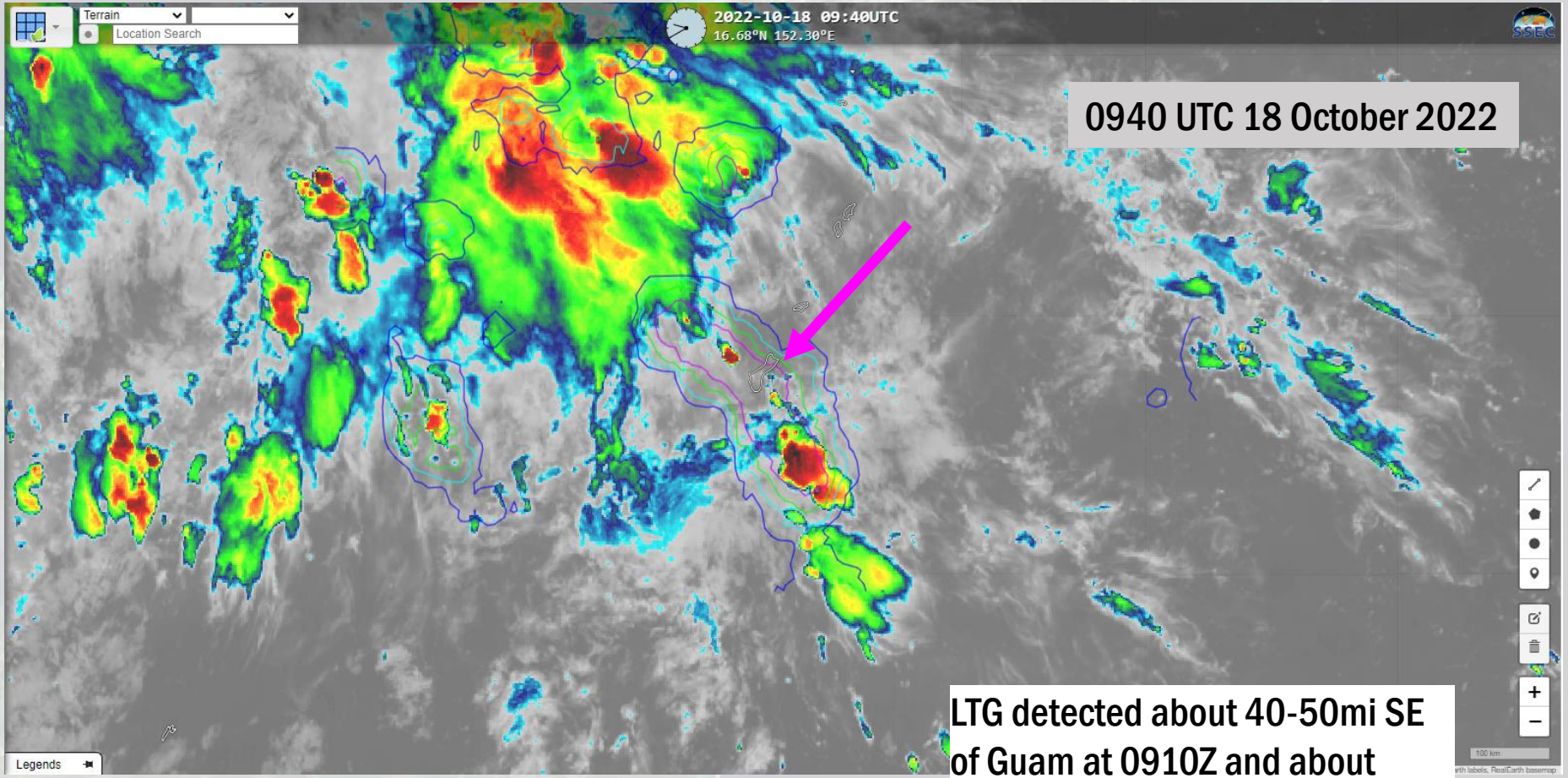
Seasonal performance

CIMSS

The previous example was straightforward



In this example, Lightning occurred nearby but not within the LightningCast contours over the island



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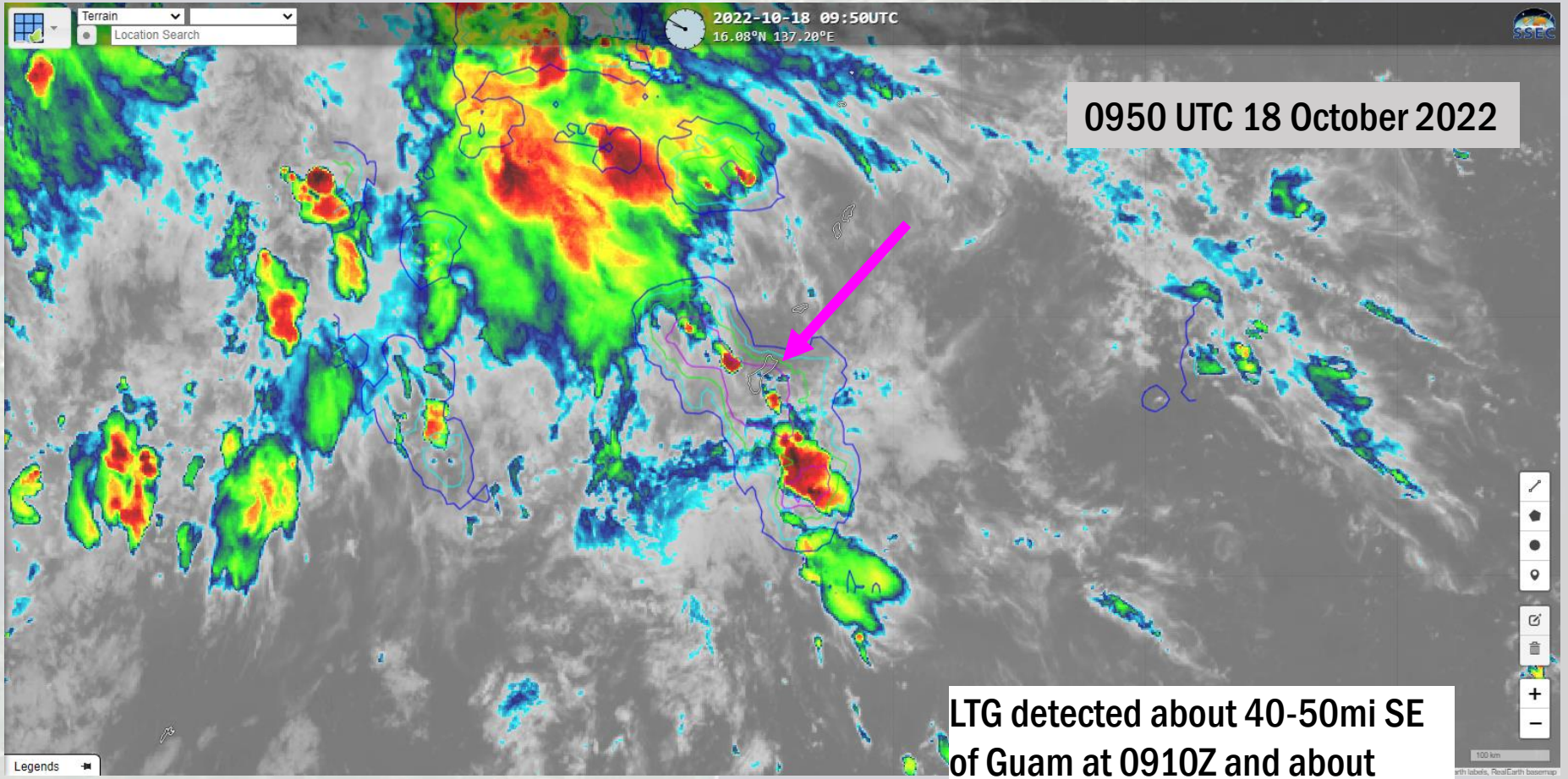

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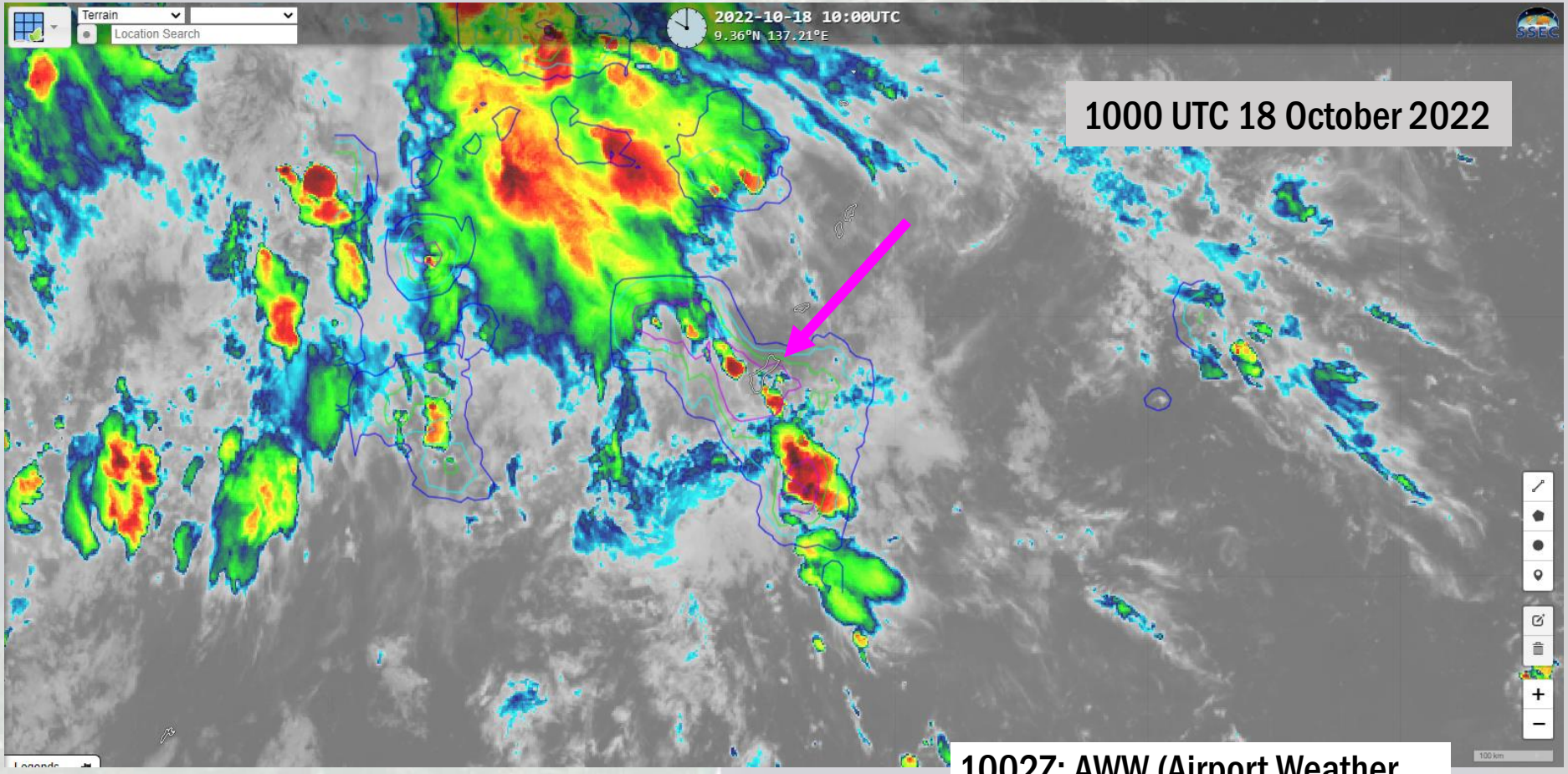

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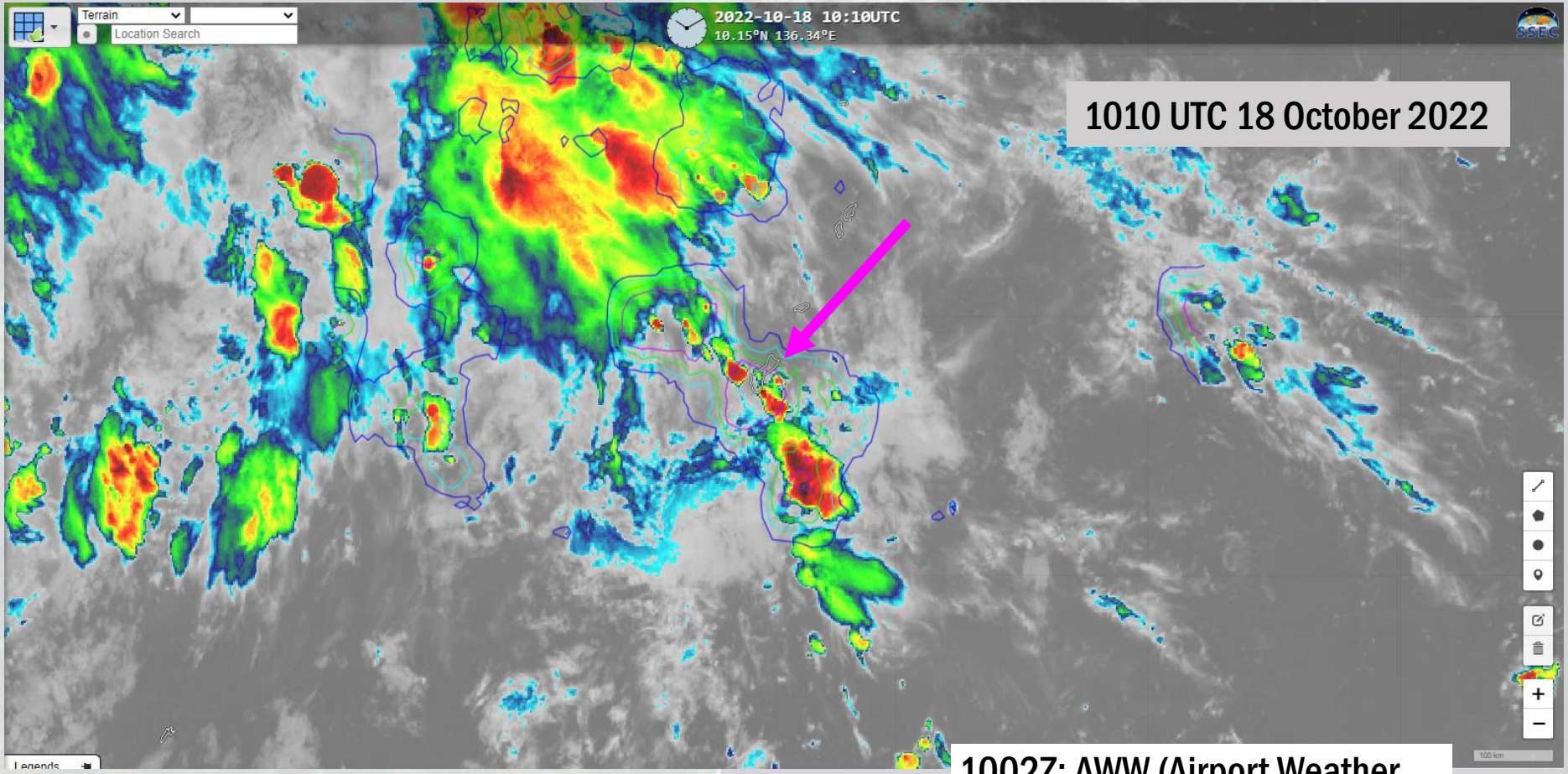

1002Z: AWW (Airport Weather Warning) TS Advy issued

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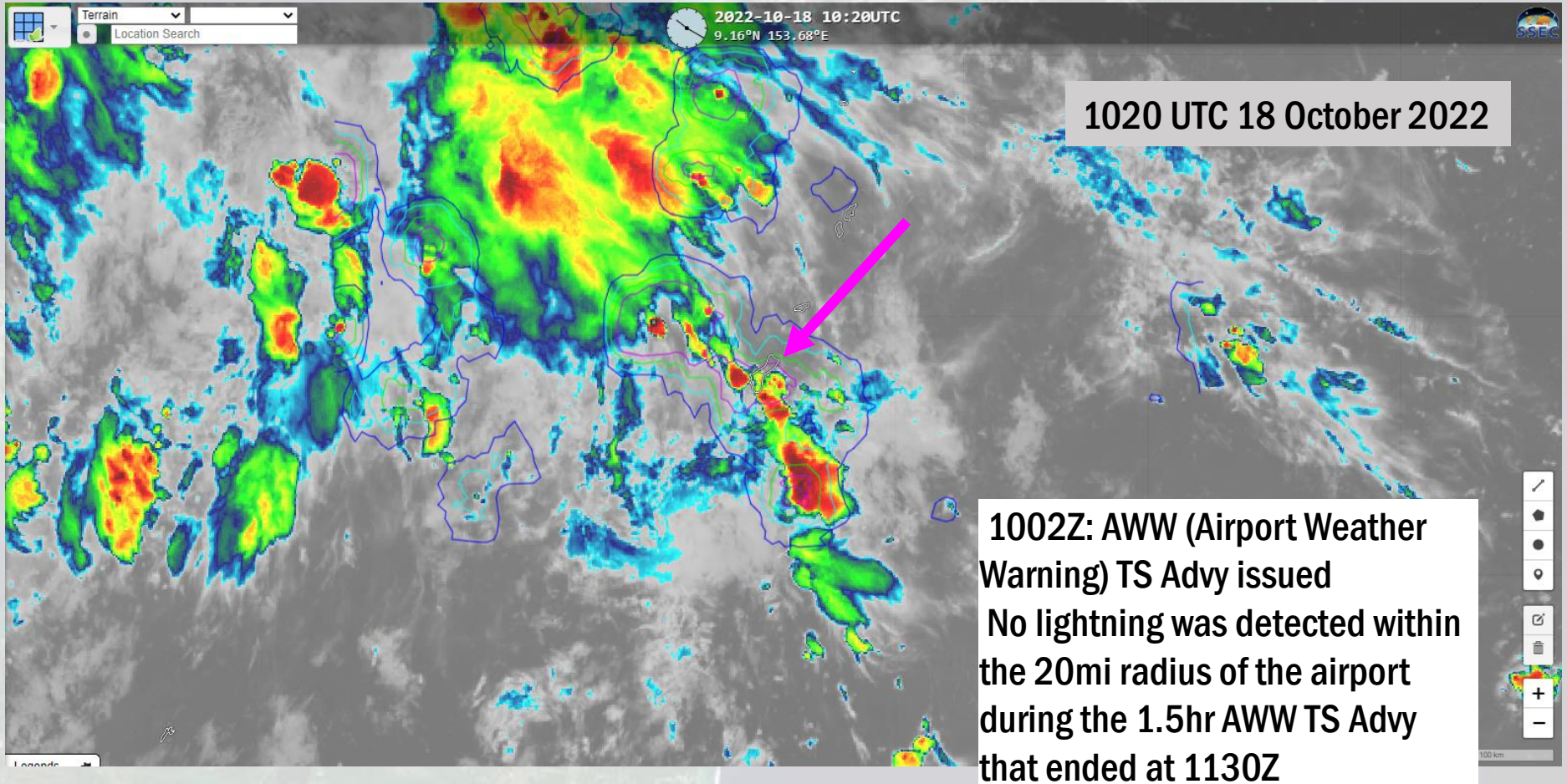
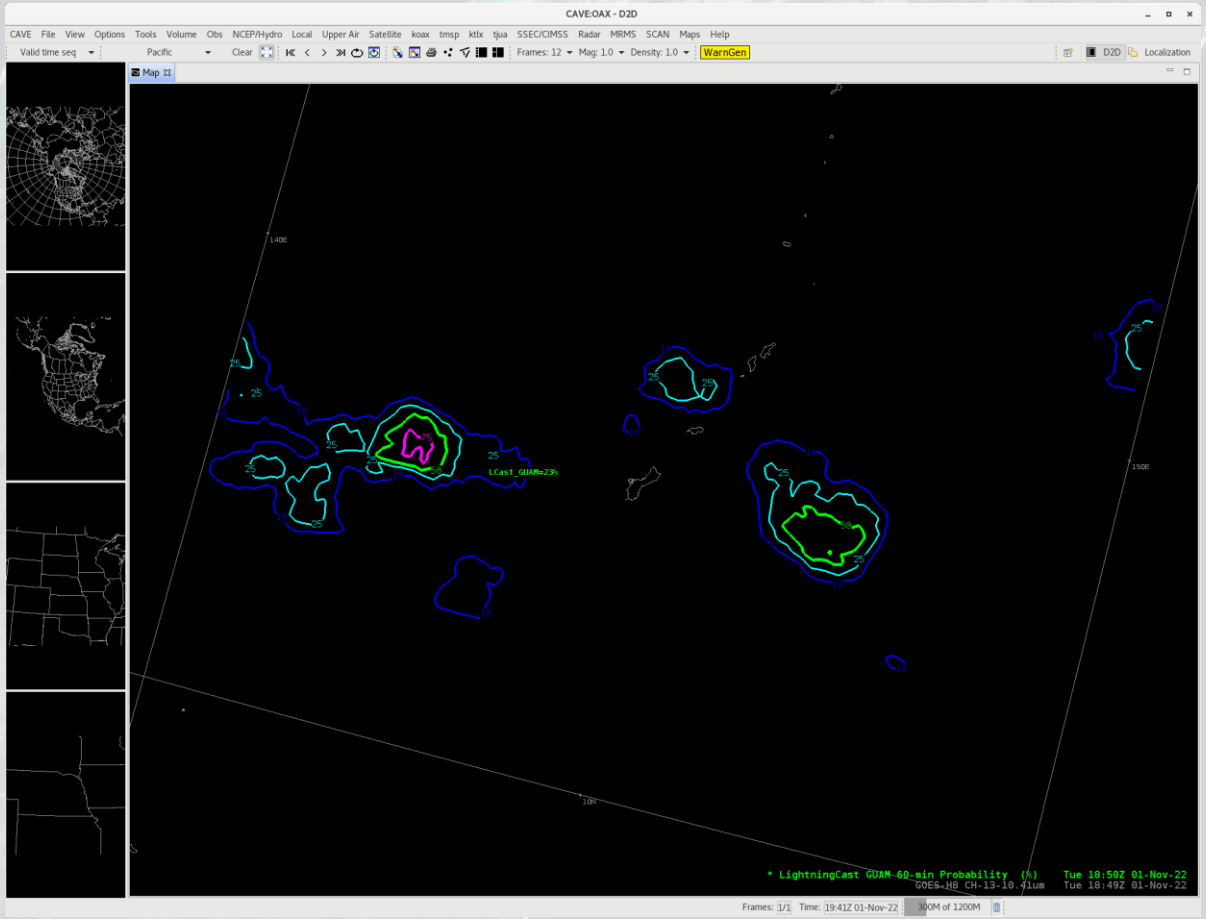


Early November: Added to AWIPS!



This is ongoing work!

- Forecasters at WFO Guam continue to evaluate the product, and get used to its performance under different weather regimes
- CIMSS is working on direct input into AWIPS so the product is more readily compared to satellite and radar

- Questions?
  - william.aydlett@noaa.gov (SOO at WFO Guam)
  - scott.lindstrom@noaa.gov (email me if you want a copy of this presentation)