

# Lightning Prediction in the Atlantic offshore region

John Cintineo (UW-CIMSS), Mike Pavolonis (NOAA/NESDIS/STAR), Justin Sieglaff (UW-CIMSS)



**Goal:** support NOAA's Ocean Prediction Center with accurate and timely lightning forecasts, especially for lightning initiation (LI), leveraging radiances from GOES-16 ABI.

### Predictors:

- ABI 0.64- $\mu\text{m}$  reflectance (CH02)
- ABI 1.6- $\mu\text{m}$  reflectance (CH05)
- ABI 10.3- $\mu\text{m}$  brightness temperature (CH13)
- ABI 12.3- $\mu\text{m}$  brightness temperature (CH15)

### Target / truth:

- Sum of GLM flash-extent density from  $t_0 + 5$  min to  $t_0 + 60$  min

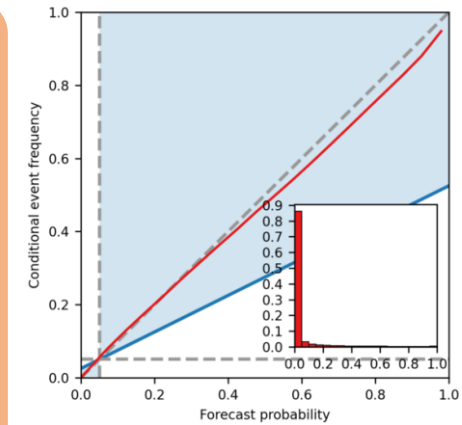
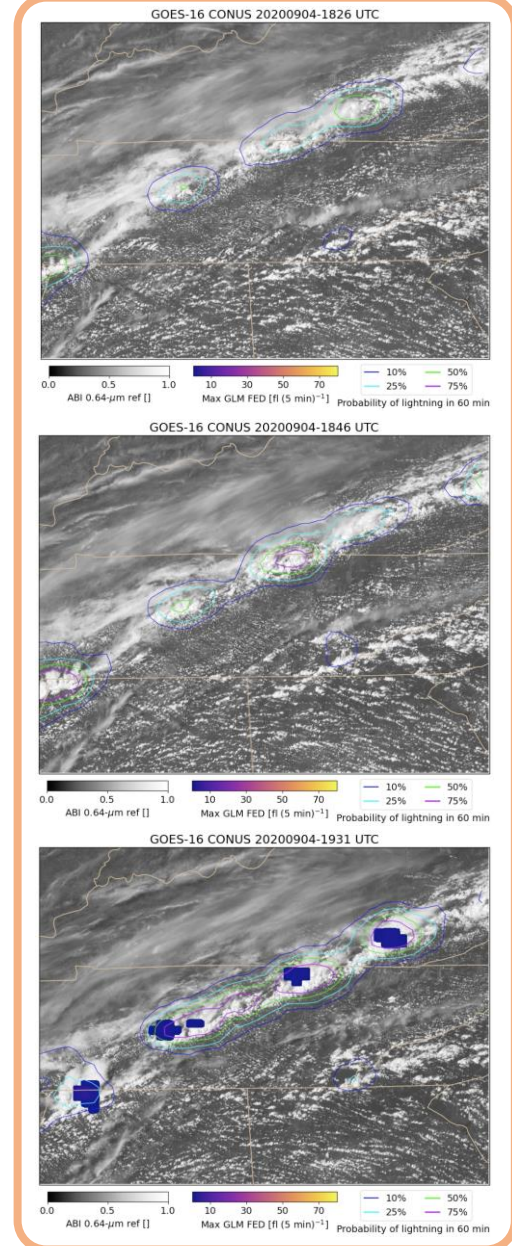
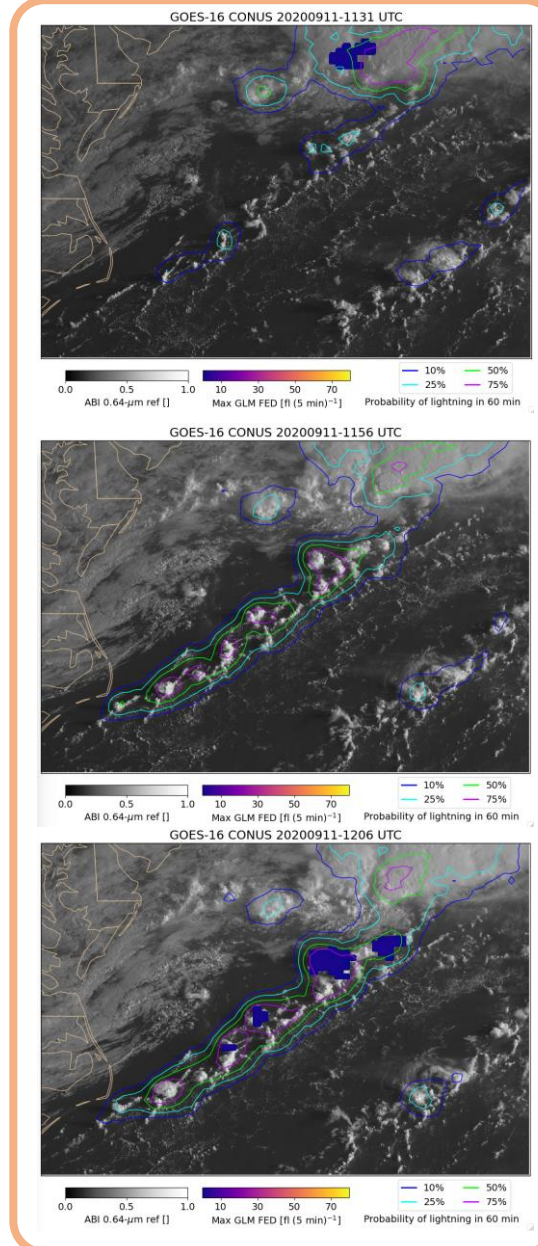
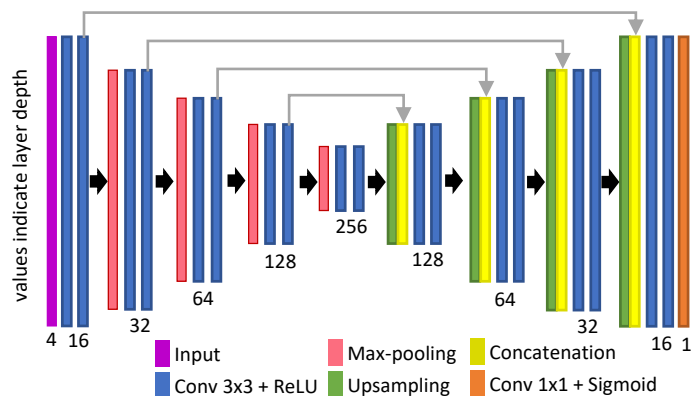
### Output:

- Probability of lightning in next 60 minutes

### Training and validation data:

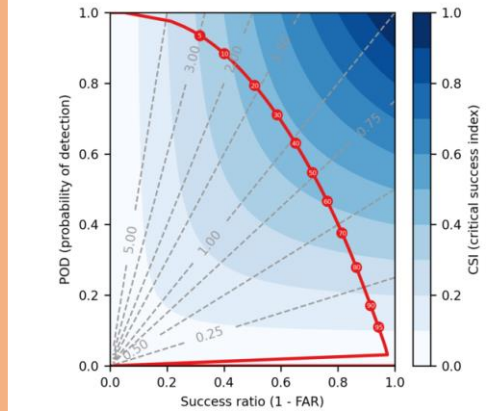
- 118 days in May – August 2018
- Domain: Southeast U.S. offshore region
- 23,074 training patches
- 5,152 validation patches

### Model: U-Net (Ronneberger et al. 2015)



### Test data:

- 20 days in May – August 2020 (5,536 patches)
- Max CSI: 0.475 at  $p = 33\%$
- AUC = 0.9697
- BSS = 0.4782



Near-real-time [data](#).



More examples [here](#).

### Findings:

- ABI alone can provide skillful short-term prediction for lightning (including LI), day and night, over land and sea.
- Lead-time for LI events often ranges between 10 and 30 minutes.
- Future work will quantify performance of LI events, and measure relevance of features in predictor images.

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