Refining Convective Classification Thresholds

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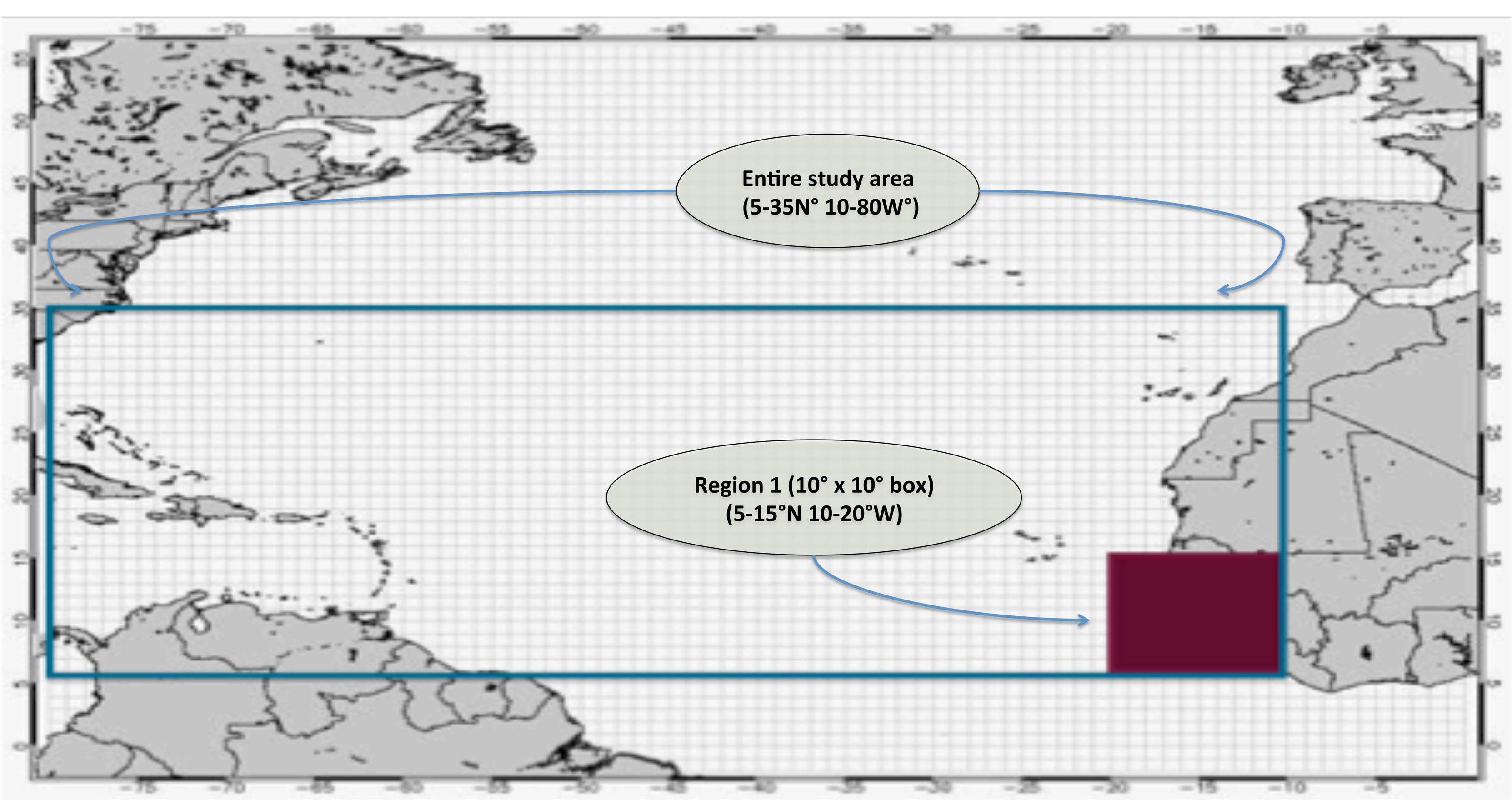
1. Introduction

Parameterizing deep moist convection by cloud top temperature (CTT) has been done in previous literature: 215K *Fu et al.* [1990], 219K *Maddox* [1980], and 235K *Arkin and Meisner* [1987]; *Arkin* [1979]. To provide a better threshold using CTT, a ring interpolation method suggested by Sauter et al. [2018] will be used. With a robust CTT algorithm information on convective events will be available at shorter time increments and larger spatial scales. This will have profound effects on the study of convective systems: their development, strength, spatial extent, decay and any climatic shift in properties. This algorithm could also be applied to real time observations of severe weather for aviation, shipping and other industries deprived of adequate radar observations.

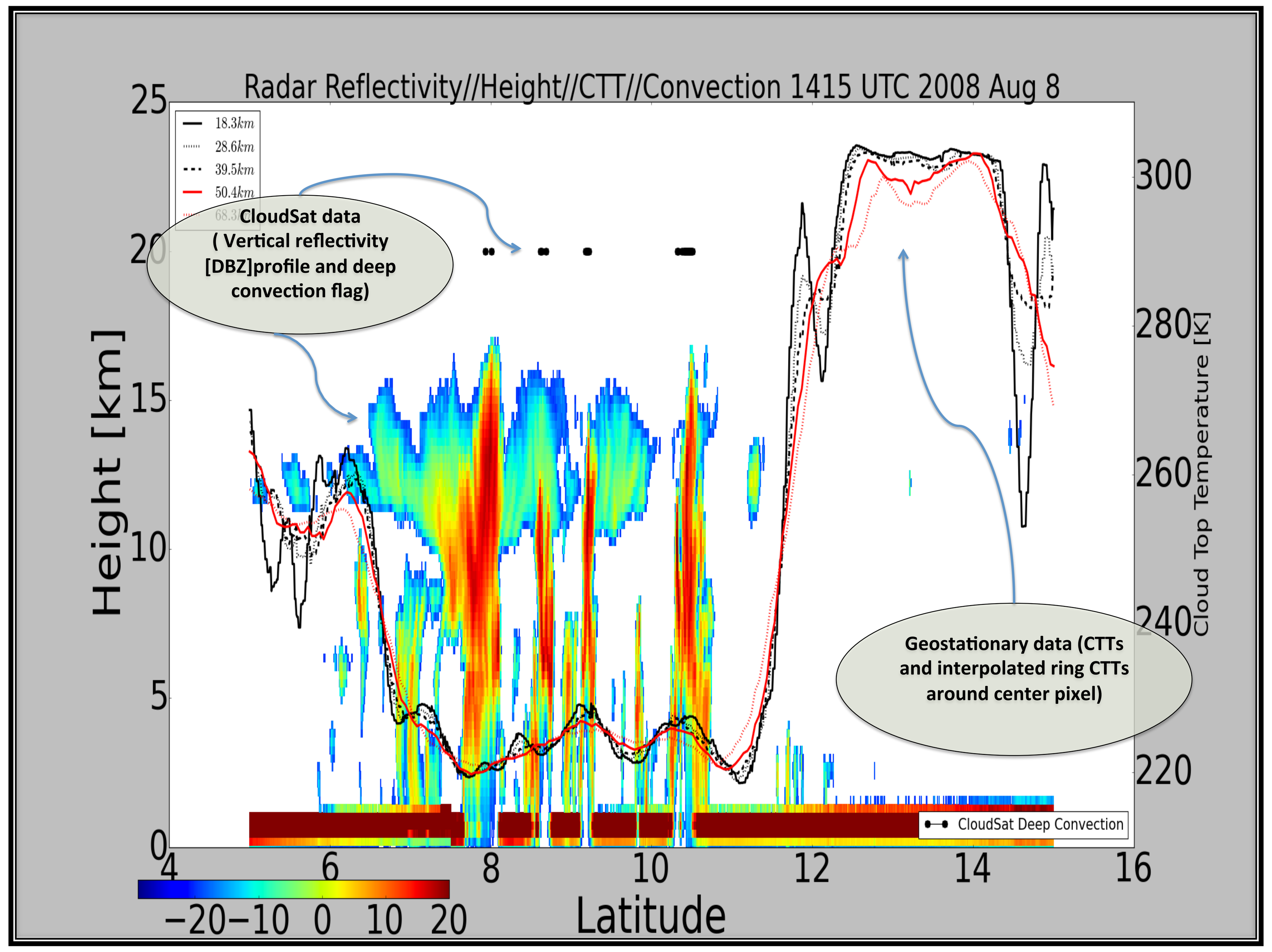
2. Methods

- Split Atlantic Ocean into 10° x 10° regions (Fig. 1). Line up places where CloudSat and Geostationary (Meteosat and GOES) satellites intersect – and "train" readily available Geostationary data * (From 2007 -2010)
- (For every different region) For every geostationary pixel that lines up with a CloudSat pixel that reports deep convection, record the pixel's CTT (Fig. 2)
- Every pixel that corresponds to deep convection will then include average CTT for a certain area centered around the center pixel. i.e. ring one (smallest) to ring five(biggest) (Fig. 3).
- (For every different region) Create a vector that contains center pixel CTT, and the corresponding ring CTT. i.e. a vector with 6 values representative of the specific region
- Once this vector is created use geostationary CTT data to compare with regional vectors by Quadratic Discriminant Analysis (QDA)
- Create a 2D map of Atlantic Region and plot center pixel CTT (Fig. 4) and where algorithm says convection is occurring (Fig. 5)

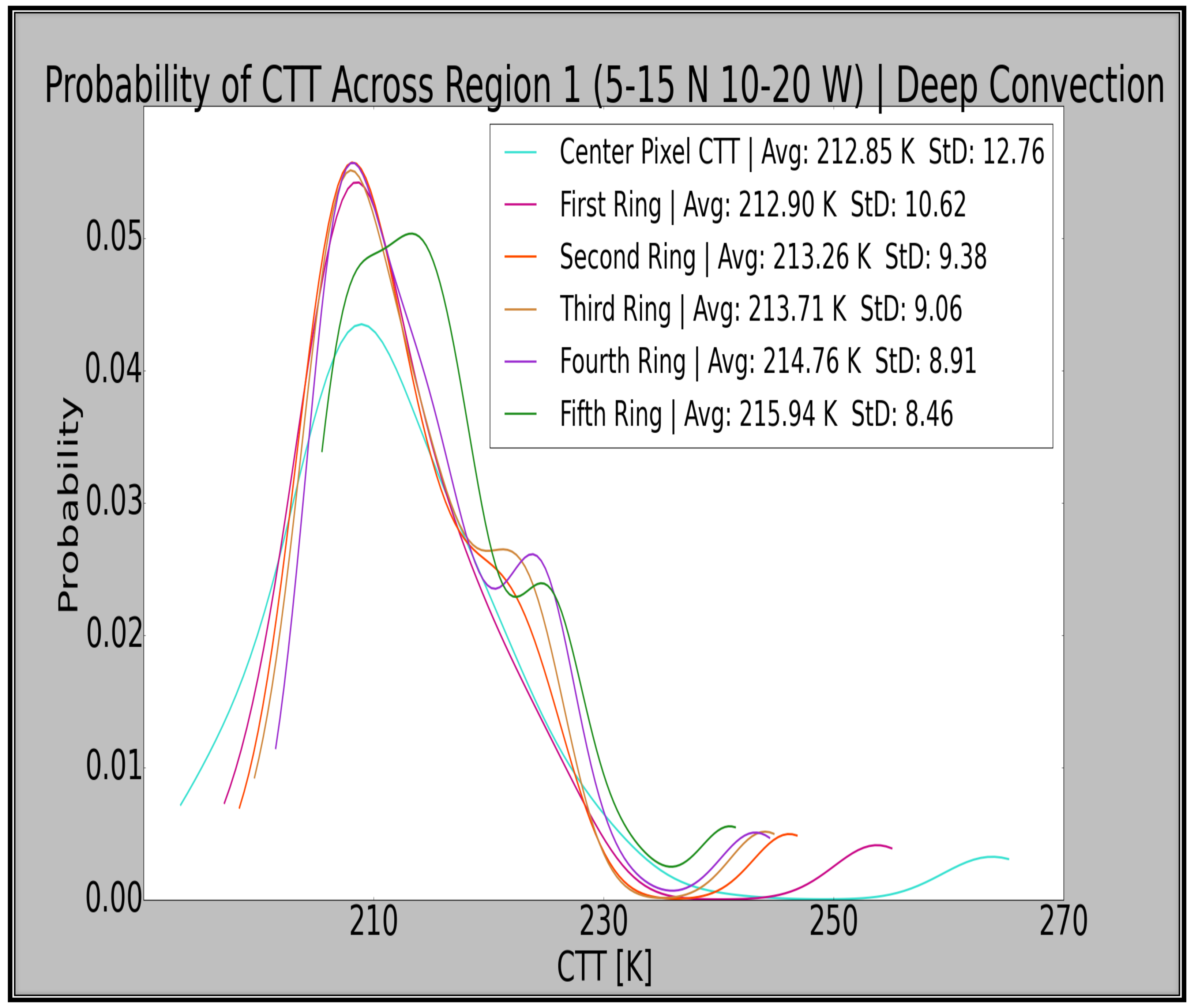


Online map containing all regions information: http://u.osmfr.org/m/161180/

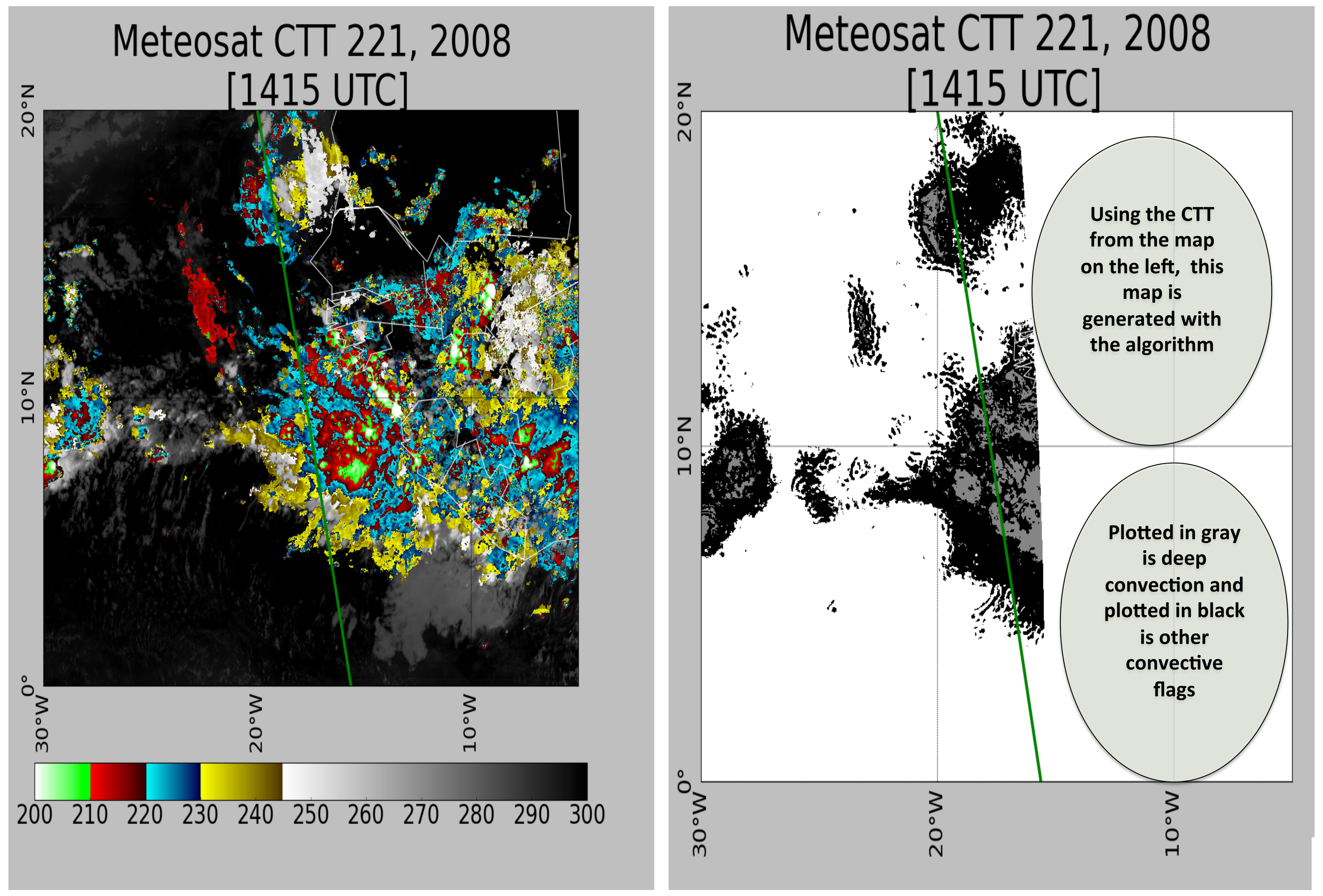
3. Training GOES-11 Data w. CloudSat



4. Regional CTT Probability



5. Satellite Map w/ Convective Algorithm



6. Future Work

1. Run skill scores comparing algorithm to previous thresholds in literature
2. Tamper with algorithm to maximize skill , in accordance with future findings
3. Repeat entirety of experiment with GOES 16 data for increased accuracy (less time lag between CloudSat and geostationary data)
4. Use this method to study the effect of climate change on storm properties

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