Revisiting the Connection between African Easterly Waves and Atlantic Tropical Cyclogenesis James Russell¹, Anantha Aiyyer¹, Dylan White¹, and Walter Hannah¹ **NC STATE UNIVERSITY** MEAS, North Carolina State University

I. Motivation & Background

Genesis Number (GN) and Fraction (GF)

How many Tropical Cyclones (TCs) form from African Easterly Waves (AEWs) (GN)? What fraction of TCs form from AEWs (GF)?

These statistics govern the AEW-TC relationship and have not been updated since Avila and Pasch (2000).



Figure 1: Map of TCs that formed from AEWs during 1996 from Avila and Pasch (2000)

Genesis Efficiency (GE)

How does TC genesis vary with AEW activity (GE)? This is a critical question for seasonal TC prediction and has typically been addressed by correlating counts of AEWs with counts of TCs.

Figure 2: Correlation between 1963-1996 tropical storm number and ERA-40 850hPa 2-6 day filtered meridional wind variance from Hopsch et al. (2007)



Aims & Goals

- . Extend and examine the statistics associated with GN and GF.
- 2. Investigate GE using seasonal average EKE associated with AEWs.

2. Methods For GN and GF NHCTC Reports⁴



For **GE**

ERA-Interim Reanalysis²

3. Genesis Number and Fraction









4. Genesis Efficiency

Correlations

- No correlation in association with midlevel peak EKE.
- Strong correlation below southern track in low-levels (area 1).

EKE vs Correlation

- Negative relationship between EKE and correlation.
- There is predictability at low EKE but not high EKE.

GE Metric

A new non-



Figure 4: Correlation between GN and EKE for a) an average between 30W and 30E and for b,c,d,e, and f) specified longitudes. Statistical significance indicated by stippling. EKE shown as contours.

0.3 0.4 0.5 0.6 0.7 0.8

0.2



Figure 6: As in Figure 3 but for GE (red) and Contribution Efficiency (CE) (blue).





Future Work



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References 128(10), 3695-3706. Roy. Met. Soc., 137, 553–597.

0.6 Figure : Relationship between AEW EKE and a) low-level AEW strength, and b) number of AEWs.

6. Summary and Conclusions

With the addition of 21 years of data, the average GN remains similar to past studies such as Avila and Pasch (2000). However, by combining GF and CF, we show that 72% of all Atlantic TCs are influenced by AEWs during their formation.

There is a minimum in correlation between TC genesis and EKE at the canonical AEW storm tracks. Meanwhile there is stronger correlation in the low-levels below the southern track of AEWs. This low-level correlation is likely associated with convectively generated circulation in the low-levels, as can be understood through PV dynamics.

EKE may be used as a predictor for TC activity on seasons when it is expected to be low. This has potential implications for seasonal prediction of TC genesis.

Examine the connection between convective activity and AEWs through PV dynamics, and the role of convection in the transition between AEWs and TCs.

Incorporate AEW activity in seasonal TC forecasting using long-range forecasts of low-level EKE.

7. Acknowledgements & References

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