Group I

October 17 2024

EEB313 Proposal - Arctic Tern Migration

In our research project, we will examine migration timing in Arctic Terns with a hypothesis that timing has been altered by changing temperatures. We predict that Arctic Tern migrations away from the Arctic will occur later in the year as Arctic temperatures have increased annually. This prediction is based on the Terns migration from the Arctic to Antarctica being onset by the northern hemisphere fall, suggesting that the timing of migration is temperature dependent with a correlation between the two variables, providing evidence for active bird evolution in the Anthropocene. The decrease in Arctic temperature (which our data shows is gradually occurring later in the year) alters the Arctic Terns migration patterns, as their signal to migrate comes later due to the delayed cold temperatures. Furthermore, global average temperatures are expected to rise from the beginning of our data to the near-present, which we believe will correlate with later Arctic Tern migrations through the same time frame.

Data on the Arctic Tern was collected from NatureCounts with data sourced from the citizen science project eBird. The columns for the analysis will include the genus, common name, observation date, and observation count. Coordinates for each observation are also available in the dataset, which might be useful for specifically pinpointing and mapping to show the occurrences of the arctic tern (NatureCounts). Secondly, for our weather and climate data, we will use Climate Reanalyzer. This website supplies daily temperatures, averaged across the Arctic, from 1940 to the present day (Climate Reanalyzer). Climate Reanalyzer itself uses data from ERA5

reanalysis to calculate these statistics. ERA5 reanalysis uses historical observations and modeling to infer weather conditions, such as temperature, across the globe at an hourly scale as far back as 1940 (Hersbach et al. 2018).

References

Climate Reanalyzer (n.d.). *Daily surface air temperature*. Climate Change Institute, University of Maine. https://climatereanalyzer.org/

Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., Thépaut, J-N. (2018): ERA5 hourly data on single levels from 1940 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). 10.24381/cds.adbb2d47

NatureCounts. EBird Canada (Atlantic). https://naturecounts.ca//nc//default/datasets.jsp?code=EBIRD-CA-AT&sec=bmdr