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"Eastern United States, West to East Transect Temporal Trends in Dew Point Temperature (1973-2024)"

BACKGROUND: Dew point temperature (Td) are a key indicator of atmospheric moisture. Td is an extremely important component in climate change and is related to air temperatures, sea surface temperatures, and evaporation. It is also one of the best determinants of how much moisture is actually in the air. Td influences weather patterns, heat stress, and hydrological processes and it plays an important role in human health. Since climates have been warming over the past century and longer, it is not unreasonable to think that long-term trends in Td might exist. A finding like this can offer insight into changes in regional climate, water vapor transport, and land-atmosphere interactions. The Eastern United States offers a variety of climates giving us insight into the temporal and spatial trends on from the Rocky Mountains to the Atlantic Coast in a west to east transect.

OBJECTIVES: This project seeks to address the following: 1) Are Td temperatures increasing over time as the climate warms. 2) Are Td's increasing in specific seasons? 3) How do Td's change during a course of a day (the diurnal cycle), and 4) what is the spread in dew point temperature by month. This research will address these questions for 5 stations in a west-to-east transect.

METHODS: Hourly Td records were extracted from the National Oceanic and Atmospheric Administration (NOAA) website from the National Centers for Environmental Information (NCEI). The data were quality assured, and quality controlled using statistical and visual techniques. The time period from 1973-2024 was selected because it provides the largest and most accurate data. The west to east transect was determined to provide a longitude range and acquire variables from the grassland to the east of the Rocky Mountains to the Atlantic Coast. The stations selected include; Richmond Virgina, Charleston West Verginia, Louisville Kentucky, Kansas city Missouri, and Wichita Kansa. Statistical tests include tests for trends (Mann-Kendell) and t-tests. Spatial variability will also be discussed.

RESULTS: Central US/ western stations such as Kansas and Missouri remained relatively stable, while easternmost sites like Virginia and West Virginia showed more drastic Td changes. There also seems to be long term annul upward trends in Wichita, Charlston, and Kansas City.

CONCLUSIONS: Td increases were most pronounced at eastern stations, indicating possible climate-driven shifts in atmospheric moisture due to the costal surface and water temperature increasing leading to more moisture in the air.