

INVESTIGATION OF HISTORICAL CHANGES IN AIR TEMPERATURE AND RAINFALL EVENTS IN FLORIDA

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Changes in weather patterns have significant implications for agriculture and infrastructure. However, it is often not straightforward to understand how quickly the weather patterns have changed and what the changes look like, especially at local and regional scales. This study investigated historical weather records made in Florida to understand the progress of climate change in the subtropical and tropical regions and help develop an information-driven decision-making process for the mitigation of potential climate change impacts. We compiled historical daily weather observations made at 950 stations across the state of Florida between 1892 and 2022. Then, we quantified the characteristics of air temperature, such as the numbers and frequencies of hot and cold days and rainfall events, including depths, intensities, durations, and pause periods. Results showed the daily average temperature, PET, and rainfall have increased by 3.6% (0.8°C), 5.4% (59 mm), and 6.7% (61 mm) on average in the past 30 years, respectively. The daily minimum air temperature increased more rapidly than the daily maximum air temperature. The number of hot days and tropical nights increased by 0.6 and 12.6 days, respectively, and the number of cold days decreased by 2.4 days on average. Southern Florida experienced relatively higher increases in the air temperature and PET, compared to other Florida areas. These findings indicate the hardiness zone expansion might move toward the north, and drought frequency and severity might increase in South Florida, suggesting increases in water demand for agriculture. Overall, the depths of daily rainfall events with varying return periods (or design daily storms) relatively more increased in North Florida. In addition, rainfall events tended to happen more frequently in the recent ten years. The findings suggest an increased frequency of extreme events and the resulting need to review agricultural management practices and technical criteria for infrastructure design.

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