

# A NEW UNDERSTANDING OF THE RELATIONSHIP BETWEEN PRECIPITATION AND TEMPERATURE VIA PRESSURE CHANGE EVENTS AND ITS TREND IN CLIMATE CHANGE

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Anthropogenic warming may change precipitation patterns, impacting infrastructure performance and reliability. Future precipitation statistics generated using General Circulation Models (GCM) are, however, often biased and not easily applied to problems such as runoff estimation. Stochastic weather generation is hence used as an alternative to GCMs in hydrology and hydraulic modelling. This paper explores the dependence of fine temporal precipitation characteristics on air pressure and air temperature using historic observations. The goal is to develop, based on the key causes of precipitation, a climatological basis for a stochastic precipitation generator for non-stationary precipitation under climate change conditions. The analysis focuses on precipitation in the urban Northeast United States and utilizes pooled observations from meteorological stations in New York City, Philadelphia, and Boston over 60 years. A negative correlation between hourly Probability of Precipitation (POP) and air pressure is observed. When the historical records are discretized using air Pressure Change Events (PCE), Decreasing Pressure Change Events (DePCEs) had a higher POP and a higher Precipitation Depth (PD) than Increasing Pressure Change Events (InPCEs). Temperature was more strongly associated with PD during DePCEs than InPCEs; this association was more pronounced during high magnitude PCEs and extreme events. The potential for simulating future hourly precipitation by associating historic hourly precipitation patterns with PCE's and monthly temperature is assessed.

**PRESENTER BIO:** Dr. Yu is an assistant professor in Agriculture Engineering at the University of Florida. He has extensive experience with hydrology, climate change and data analytics. His research focus includes, big data analytics, climate change impact assessment, automated farming system, etc.