

# ***Deep Learning-based Characterization of Tropical Cyclone using Satellite, Numerical prediction model, and Aircraft observations***

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## **ABSTRACT:**

Recent advances in machine learning approaches for atmospheric science have raised important questions about their potential to improve our understanding and prediction of phenomena. This seminar focuses on deep learning-based characterization and prediction of tropical cyclones (TCs) using satellite, numerical model, and aircraft observations. First, deep learning approaches for characterizing TC intensity from geostationary satellite observations are presented, followed by efforts to bridge the gap between observations from successive generations of geostationary satellites. Furthermore, through synergistic fusion of geostationary satellite and numerical prediction model, we proposed TC intensity predictions using multi-modal deep learning architecture. To improve the interpretability of deep learning-based TC characterization, explainable artificial intelligence (XAI) is employed to identify how satellite observations and numerical model fields characterize them. Although satellite observations and numerical prediction models play important roles in characterizing TCs, a deeper understanding of their inner-core dynamics through aircraft observations is essential for further improving TC prediction. Finally, deep learning-based framework for estimating high-resolution TC boundary layer wind profile from aircraft observations is presented, providing some insights into the inner-core structure and dynamics of TCs.

## **BIO:**

Juhyun Lee, Ph.D

I'm a postdoc in Colorado State University (Supervisor: Michael Bell), specializing machine learning-based TC research using observations.

I got the Master-Ph.D combined degree in UNIST (Ulsan National Institute of Science and Technology), South Korea, and my dissertation title was 'Explainable deep learning-based characterization and forecasting of tropical cyclones through the synergistic fusion of satellite observations and numerical model data'.