

## Global Track Analysis of d4PDF Tropical Cyclones

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Tropical cyclones (TCs) play an important role in the climate system and are a major source of coastal-related hazards worldwide, such as those due to storm surges, flooding, and extreme waves. Assessment and future projection of many of these water-related hazards are sensitive to properties of a TC track. While global climate models (GCMs) can provide data to accurately model these events, samples are inadequate for proper analysis (on climatological time scales) of extreme events.

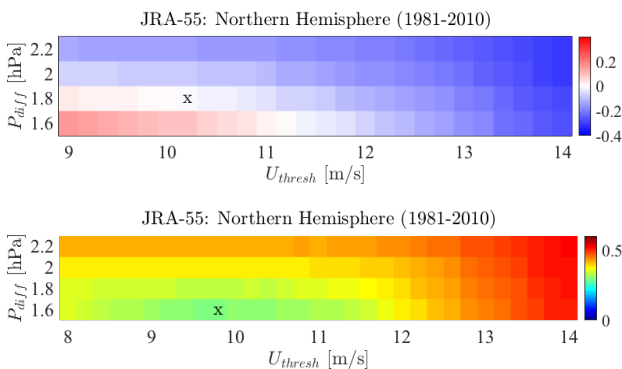


Fig. 1: Algorithm parameters (MSL pressure difference, wind speed threshold) are tuned using JRA-55 analysis and IBtrACS storm track data: (a) relative annual storm count difference, and (b) relative  $\ell^\infty$  norm of total latitudinal storm count

D4PDF, the Database for Policy Decision Making for Future Climate Change, was created to overcome this challenge and contains hundreds of thousands of simulated TCs under a +4K warming condition (5400

years), making it possible to estimate 100 year or longer return values. Many "landmark" studies have already been conducted using regional (20 km) TC track data for East Asia and interest has grown recently in using similar data from the global d4pdf dataset (60 km). As such, a previous regional TC extraction method has been modified to encompass hemisphere and global scale, using JRA-55 analysis data to tune and validate the method.

The TC extraction method uses environment and storm MSL pressure differences and wind speed thresholds (see Fig. 1) to identify storm candidates and extract TC tracks (see Fig. 2). Here, we will present details of the method and analyze some of the properties of the TC tracks, such as projected changes in occurrence frequency, cyclogenesis location, duration, central pressure, etc.

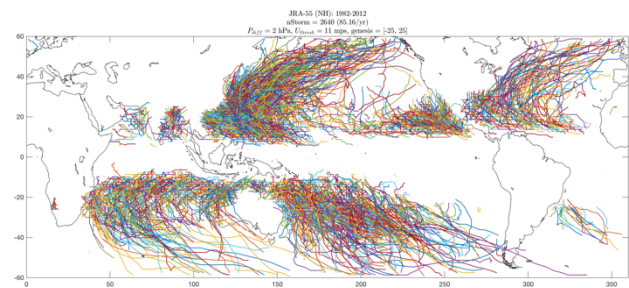


Fig. 2: Sample TC track extraction using tuned algorithm with JRA-55 analysis data