

Detection and Analysis of Tropical Cyclones in the d4pdf Mega-ensemble Projection

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Tropical cyclones (TCs) play an important role in the climate system and are a major source of natural hazards worldwide, such as those due to heavy precipitation, river flooding, and storm surges. TC-related hazards are sensitive to properties of the storm path and while climate models can provide data to accurately model these events, samples are inadequate for analysis of extreme events on climatological time scales. The climate dataset d4PDF, Database for Policy Decision Making for Future Climate Change, was created to overcome this low-occurrence frequency limitation and contains hundreds of thousands of simulated TCs under present and future +4 K warming conditions (11,400 years), making it possible to estimate 100 year or longer return values.

Here, a tropical cyclone track dataset has been created for the d4PDF dataset. The detection method uses pressure difference, wind speed, and SST threshold parameters and is tuned to optimize annual TC count and cyclogenesis locations. Tuning and validation of the method is conducted using 30-year IBTrACS observation and JRA-55 reanalysis data. We will present an overview of the detection method, validation, and performance, and analyze properties of the TC tracks, such as projected changes in occurrence frequency, and cyclogenesis and dissipation locations.

Keywords: tropical cyclone tracks, d4PDF, climate ensemble, IBTrACS, JRA-55