

# An overall investigation of changing nature of tropical storms in the North West Pacific basin

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An increasing strength of tropical storms (TS) in the North West Pacific (NWP) basin in recent years is a crucial matter of concern for the meteorological scientists as the basin already possesses the highest number of storms in the world. This study is broadly divided into two portions. First, the observational analysis on the nature of tracks of all (959) TS originated over four decades in the NWP basin is conducted by adopting a track sinuosity-based approach. The spatiotemporal variations in the nature of TS tracks in the four decades are investigated. The relationship of track sinuosity with TS parameters and with warm/cold phases of El Niño/Southern Oscillation (ENSO) is also examined. Strong enhancement of storm track sinuosity is observed from early to late typhoon season months (July to October). Significant longitudinal shift (from 110<sup>o</sup>-140<sup>o</sup> E to 130<sup>o</sup>- 160<sup>o</sup> E) in the positions of genesis points of majority of TS is observed with increasing track sinuosity. Mostly intense TS are originated during warm phase of El-Nino in the eastern part of NWP basin with their high track sinuosity values. Second, the favorable seasonal meteorological factors for the recent (2013-2017) all (30) most intense storms, generally called Super-Typhoons (STY), are also studied. It is found that a dominant and crucial role of southwest air flow and northwest cold air mass intensify STYs in summer and winter seasons, respectively. The majority of winter STYs are also partially assisted by southwest air flows and, thus, exhibit higher intensities than summer STYs in general. The findings of the study are crucial for mitigating the risk related to TS in the NWP region by improving understanding of their changing nature in recent years.

Keywords: North West Pacific, Track Sinuosity, Super-Typhoon, Southwest Air Flow, Cold Air Mass, El Niño/Southern Oscillation