



Development and Application of an Objective Tracking Algorithm for Tropical Cyclones over the North-West Pacific purely based on Wind Speeds

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Tropical Cyclones over East Asia have huge socio-economic impacts due to their strong wind fields and large rainfall amounts. Especially, the most severe events are associated with huge economic losses, e.g. Typhoon Herb in 1996 is related to overall losses exceeding 5 billion US\$ (Munich Re, 2016).

In this study, an objective tracking algorithm is applied to JRA55 reanalysis data from 1979 to 2014 over the Western North Pacific. For this purpose, a purely wind based algorithm, formerly used to identify extra-tropical wind storms, has been further developed. The algorithm is based on the exceedance of the local 98th percentile to define strong wind fields in gridded climate data. To be detected as a tropical cyclone candidate, the following criteria must be fulfilled: 1) the wind storm must exist for at least eight 6-hourly time steps and 2) the wind field must exceed a minimum size of $130.000km^2$ for each time step. The usage of wind information is motivated to focus on damage related events, however, a pre-selection based on the affected region is necessary to remove events of extra-tropical nature.

Using IBTrACS Best Tracks for validation, it is found that about 62% of all detected tropical cyclone events in JRA55 reanalysis can be matched to an observed best track. As expected the relative amount of matched tracks increases with the wind intensity of the event, with a hit rate of about 98% for Violent Typhoons, above 90% for Very Strong Typhoons and about 75% for Typhoons. Overall these results are encouraging as the parameters used to detect tropical cyclones in JRA55, e.g. minimum area, are also suitable to detect TCs in most CMIP5 simulations and will thus allow estimates of potential future changes.