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The category 5 typhoon activity in the Western North Pacific Ocean over the past 40 years (1979-2018)

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The western North Pacific (WNP) is the most active tropical cyclone (TC) basin in the world. In fact, tropical storms and typhoons in this basin represent 30% of global TC activity, and most of the more intense cyclones occur there. Since the beginning of the meteorological satellite era, Typhoon Haiyan (2013) is considered one of the most intense TCs. More recently, Typhoon Wutip (2019) was the first to reach Category 5 based on the Saffir-Simpson Hurricane Wind Scale for February in the WNP. In the current debate on climate warming and the worldwide changes in the number of extreme TCs, some studies indicate that the intensity of TCs has gradually increased in recent decades. However, an important issue in the discussion is the quality of existing database. Does this problem also concern the WNP basin? Is there already a trend in the number of the more intense typhoons? To answer these questions, we studied Category 5 typhoons (maximum sustained wind at least of 72 msec-1 1-minute average) since recent model projections indicate that the worldwide number of very intense TCs would increase significantly in the late 21st century. In our study, typhoon intensity is reanalysed using the manual Dvorak satellite intensity estimation technique that is still used operationally in all TC ocean basins for monitoring TCs. The technique uses Enhanced InfraRed (EIR) pictures for determining TC intensity in order to derive maximum sustained wind. We used several Japanese geostationary satellites, Himawari 1 to 8, to perform our intensity estimation. This research covers the period 1979-2018 (40 years) as the satellite pictures were available from 1979. The satellite pictures have been analysed every 3 hours since more frequent pictures were not archived in the 1980s. Despite a 4-km infrared resolution, Himawari could not restore the temperature of the warmest pixel in the eye of TCs located at the extreme west and east of the satellite disk, especially the typhoons with a small eye. The eye temperature is an important parameter for estimating the intensity of TCs from infrared images. Therefore, it was necessary to use the 4-km resolution infrared imagery of available polar orbiting satellites. The results of the reanalysis are compared to those of existing databases. The Category 5 activity is highlighted at the inter-annual and decadal scales. The goal is to detect a possible signal of global warming through indicators like the strongest typhoon by decade or the possible migration toward the North. The goal is also to determine the relationship between climate patterns such as El Niño, La Niña, and the Pacific Decadal Oscillation and the occurrence of Category 5 typhoons.