

Analysis of marine heatwaves in the northern Philippines

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Significant ocean warming has been observed globally as a consequence of anthropogenic climate change. Extreme thermal stress in the ocean waters poses detrimental effects on marine ecosystems with significant socioeconomic ramifications. Discrete and prolonged extreme ocean warming events are known as marine heatwaves (MHWs). This study used the NOAA Coral Reef Watch (CRW) daily global 5km sea surface temperature product, called CoralTemp, from 1985 to 2022 to analyze the MHWs in the northern Philippines (13-24°N, 114-130°E). Different ocean currents dominate the western and eastern coast of the northern Philippines resulting in the variation in the spatial patterns of the MHW indices. Six MHW indices in the study area were determined and analyzed. Maximum values of the multiyear average for the frequency, duration, total MHW days, mean intensity, maximum intensity, and cumulative intensity are 4.66 times/year, 15.62 days, 64.26 days, 1.47 °C, 1.92 °C, and 24.75 °C-day, respectively. The corresponding MHW category for each MHW day was also determined. A total of 7 coral reef points were identified to further examine the MHWs and their potential effect on coral reefs through degree heating weeks (DHW). In general, summer and autumn (June-November) are periods in which the coral reef points experience extreme temperature anomalies that exceed the bleaching threshold.

Keywords: Marine heatwaves, Kuroshio, Sea surface temperature, Philippines, Degree heating weeks