Marine Environmental Survey of Coral Reef Habitats in Northeastern Taiwan

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This study conducts a comprehensive marine environmental survey of coral reef habitats in the northeastern region of Taiwan. It employs integrated multi-satellite and reanalysis data to investigate the profound influences of climate change and interactions with ocean currents from 1985 to 2022. This investigation delves into both ocean physical and biogeochemical perspectives. The study area is significantly affected by coastal ocean currents, particularly influenced by Kuroshio intrusion, tidal flows, and the seasonal interactions of the Taiwan Strait coastal current. As a first step, the research meticulously analyzes marine heatwave (MHW) events in the region, encompassing assessments of their frequency, duration, and total annual occurrence days. Subsequently, the variation of the coral bleaching indicator, Degree Heating Weeks (DHW), is closely examined to discern the months and years predominantly impacted by exceedingly high temperatures. Additionally, this research explores the crucial role of water quality characteristics and marine biogeochemical cycling in shaping the conditions of coral reefs. Therefore, pivotal factors such as carbon dioxide, particulate organic carbon (POC), particulate inorganic carbon (PIC), chlorophyll-a (Chla), and the diffuse attenuation coefficient at 490 nm (KD490) are meticulously analyzed. Also, the study culminates with a comprehensive investigation of the trends of ocean acidification and its relationship with total alkalinity (TA) within the region. These intricate variations in seawater parameters directly influence the health, growth, and ecological stability of the coral reefs, highlighting their sensitivity to environmental changes and underlining the significance of preserving and managing these fragile ecosystems.

Keywords: Coral Reefs; Marine heatwave; Degree Heating Weeks; Kuroshio;