



A numerical study of circulation in reef system

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Nearshore currents are important for material dispersion and sediment transport, yet, not well understood in Taiwan Strait where complicated forcing mechanisms such as influence from topography, tide, wind, waves, and large scale current exist. This study was conducted near GuanXin algal reef using both numerical model (Delft3d) and observational data. Three Acoustic Doppler Current Profilers (ADCPs) were deployed near-coast from June-July and Nov-Dec respectively to investigate small scale inter-seasonal current variations. Model current was performed under different forcing conditions (with and without wind, tide and wave). Model was tested with various parameters to examine its sensitivity. Results suggest that the modeled current speed is highly sensitive to bottom roughness and insensitive to other parameters. The selected Manning roughness coefficient is 0.1. In summer the predicted water level is in good agreement with field observation under tidal forcing alone, with average model skill of 0.98. Tidal forcing was the dominant forcing near-coast during summer period. In winter, the dominant forcing is wind under the effect of strong Northeasterly monsoon wind. This study was important that can enhance understanding of nearshore current around algal reef which can aid in reef conservation.