

NOTE AND CORRESPONDENCE

Dynamics of currents in a Small-scale Coastal Lagoon, Southwestern Taiwan

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ABSTRACT

A portable electromagnetic current meter was used to measure currents in a coastal lagoon southwest of Taiwan. Shipboard measurements were made at ebb and flood stages during neap and spring tides. To retain as much synopticity as possible, each round of measurement covering most of the lagoon was minimized to less than two hours. Observations revealed a stagnation area for tidal currents inside the lagoon. Tidal streams entering and leaving the two inlets converge and diverge at this location. Current speeds in the two inlets range from 30 to 50 cm/s during neap tide and up to 60 cm/s during spring tide. A vertically averaged two-dimensional numerical model was used to simulate tidal currents and possible modulations by winds and river runoff. Model results indicate tidal dominance over other forcing. The width difference between northern and southern entrances determines the strength difference between two tidal streams entering and leaving the lagoon. The strength difference then determines the location of the flow stagnation area. The effect of northerly wind stress pushes the flow stagnant area southward during flood but northward during ebb. The effect of large river runoff (200 m³/s) also modulates the stagnation location, which is moved northward during flooding but is hardly displaced during ebbs. The observational and numerical results also suggest that the flow stagnation may hinder transport of waterborne materials between northern and southern reaches.

(Key words: Coastal lagoon, Current, Convergence, Divergence)

1. INTRODUCTION

Coastal lagoons are shallow bodies of coastal water shielded from the sea by barriers,

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