

## **Modeling Variable-density Groundwater Flow in Coastal Aquifer: Groundwater Discharge, Tides Influence and Nearshore Circulation**

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Numerical simulation study is conducted to study submarine groundwater discharge (SGD) in a coastal area of the northeastern Gulf of Mexico by applying a finite difference model SEAWAT2000. The simulation results are calibrated through various data of head, salinity and seepage rate collected from piezometers installed in a line perpendicular to the coastline and seepage meters at the ocean bottom. The data are collected every 10 minutes. The influence of oscillations of dispersive mixing freshwater-saltwater interface is discussed to the estimation of SGD in the aquifer and through the sea floor. Due to insufficient information of coastal aquifer, several trial models were set first to investigate the influence of heterogeneity. Modeling investigations are also made to research the suggested mechanisms of SGD, such as tidal pumping, nearshore circulation or seasonal exchange and the phenomena related to them. Meanwhile, under three periods: stable sealevel, regular tides and storm, uncertainties of the transient models are analyzed.