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Time-series variations of the short-lived Ra in coastal waters: implying input of SGD to the coastal zone of Da-Chia River, Taichung, Taiwan

Feng-Hsin Hsu (1), Chih-Chieh Su (1), In-Tain Lin (2), and Chih-An Huh (3)

(1) National Taiwan University, Institute of Oceanography, Taipei, Taiwan (fenghsinhsu@gmail.com; donccsu@ntu.edu.tw), (2) Exploration and Development Research Institute, CPC Corporation, Miaoli, Taiwan (itlin@cpc.com.tw), (3) Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan (huh@earth.sinica.edu.tw)

Submarine groundwater discharge (SGD) has been recognized as an important pathway for materials exchanging between land and sea. Input of SGD carries the associated nutrients, trace metals, and inorganic carbon that may makes great impacts on ecosystem in the coastal zone. Due to the variability of SGD magnitude, it is difficult to estimate the flux of those associated materials around the world. Even in the same area, SGD magnitude also varies in response to tide fluctuation and seasonal change on hydraulic gradient. Thus, long-term investigation is in need.

In Taiwan, the SGD study is rare and the intrusion of seawater in the coastal aquifer is emphasized in previous studies. According to the information from Hydrogeological Data Bank (Central Geological Survey, MOEA), some areas still show potentiality of SGD. Here, we report the preliminary investigation result of SGD at Gaomei Wildlife Conservation Area which located at the south of the Da-Chia River mouth. This study area is characterized by a great tidal rang and a shallow aquifer with high groundwater recharge rate. Time-series measurement of the short-lived Ra in surface water was done in both dry and wet seasons at a tidal flat site and shows different trends of excess Ra-224 between dry and wet seasons. High excess Ra-224 activities (>20 dpm/100L) occurred at high tide in dry season but at low tide in wet season. The plot of salinity versus excess Ra-224, showing non-conservative curve, suggests that high excess Ra-224 activities derive from desorption in dry season but from SGD input in wet season.