Abstract for Dragon 2018, Xi'an, PRC

南海潮汐演变新见解 "New insights of tidal evolution in the South China Sea"

摘要 ABSTRACT

通过对香港区域和南海（SCS）多个站点潮汐演变的分析，我们发现某些特定潮站的潮汐相关性会引发极端水位。这种潮汐演变具有多空间尺度的特性。在南海区域潮汐演变是由平均海平面（MSL）上升、上层海洋暖化（因而层化有变化）或者南海入口处（吕宋海峡）的斜压潮转换改变造成的。斜压潮可以在南海北部陆架区得到增强，产生多种 PSI 型的相互作用，这些相互作用可以加强香港附近所观测到的弱潮信号（如 M3）。此外，香港地区大规模的填海工程可能改变了区域动力学中的港口共振和/或摩擦因素。我们先前的工作报道了潮汐异常与平均海平面变化的相关性，这种相关性在港口地区尤为显著（如香港维多利亚港）。在此项研究中我们着重分析全日潮（D1）与半日潮（D2）的相关性及倍潮（overtide）与 D1 和 D2 潮的相关性。前者相关性在南海北部得到了正增强，在同样区域后者相关性得到了负增强（反相关）。对各种水位变化分析有助于解释一些站点增大的潮汐变化相关性（tidal anomaly correlations）和更好地了解潮汐演变对香港区域未来水位造成的严重影响。

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ABSTRACT

Continuing investigations of tidal variability at multiple tide gauges in Hong Kong and the South China Sea (SCS) have identified correlations that have the potential to yield amplified extreme water levels at certain locations. Observed changes are hypothesized to be due to mechanisms active on multiple spatial scales. The regional behaviour of the SCS may have changed tidal evolution via MSL rise, upper-ocean warming (and hence, stratification), or modulations in the baroclinic conversion at the entrance of the SCS (the Luzon Strait). The baroclinic tidal signal can be enhanced at the northern shelf of the SCS and can generate multiple PSI-type interactions that yield amplifications in minor tides such as M_3 that can be observed in Hong Kong. Additionally, the enclosed regions of Hong Kong have undergone massive land reclamation projects that may have changed the resonant and/or frictional response of the harbors to the regional dynamics. Previous works reported on the tidal anomaly correlations (TACs) to detrended MSL fluctuations, shown to be most important in harbour regions such as Victoria Harbor in Hong Kong. In this work, we highlight the intertidal correlations of diurnal (D_1) tides to semidiurnal (D_2) tides, which are positively reinforced through the northern SCS, and the correlations of overtide (OT) fluctuations to D_1 and D_2, shown to be negatively reinforced (i.e., anti-correlated) across the same region. The consideration of all water level variabilities may help explain the large TACs previously reported and may have serious implications for future water levels in Hong Kong.