Geophysical Research Abstracts
Vol. 19, EGU2017-5687, 2017
EGU General Assembly 2017

Flooding Mitigation of seawalls and river embankments to storm surges in the coastal areas of Guangdong Province, China

Xianwei Wang and Xina Wang
Sun Yat-sen University, School of Geography and Planning, Guangzhou, China (xianweiw@vip.qq.com)

The coastal areas of Guangdong Province, China are susceptible to the destructions of tropical cyclones and storm surges. The projected global warming, coastal subsidence and sea level rise together will bring about greater flooding risk to these areas. The seawall and river embankment have played a significant role in mitigating and preventing the coastal low-land areas from the impairment of storm surges flooding and wave runup. However, few risk assessment studies in this region consider the existence of seawall and river embankment and often overestimate the risk and potential economic loss and population affected due to storm surge flooding. This study utilizes a hydraulic model to simulate the overtop flooding and compare those without seawall and river embankment using several specific tropic storm events and extreme events of tropic storm surges in different return periods of 2, 10, 20, 50, 100, 200 and 500 years. Most seawalls are 4 or 5 meters plus another meter of wave levee above the local mean sea level. The river embankments are usually 4 or 5 meter higher than the local mean sea level as well and decrease from the outer estuary to the inner riverine. The modeling results considering seawall and river embankments and from real storm surges are in agreement with on-site survey and observations, while those without infusing seawall and river embankments overestimate the inundation condition and economic loss. Modeling results demonstrate that seawall and river embankment greatly reduce the flooding risk and prevent the low-land area from inundation for most tropic storm events, e.g., for extreme events less than 20 to 50 years, in the coastal areas of Guangdong Province, China. However, the seawall and river embankment may also cause catastrophic disasters once there is an engineering failure of seawalls and river embankment, especially once encountering with an extreme typhoon event, e.g., the 1969 super typhoon Viola in Shantou China and the 2005 hurricane Katrina in New Orleans, USA.