Geophysical Research Abstracts
Vol. 21, EGU2019-7138-1, 2019
EGU General Assembly 2019

The scenario analysis of the extreme storm surge events and the effect of the sea level rise to the inundation area

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Due to global warming and sea level rise, the numbers and intensity of typhoon are expected to increase in the future. This paper introduces the models and equations used in Storm Surge Forecasting System developed for Central Weather Bureau (CWB) in Taiwan. This storm surge model is featured by combining several models and functions, such as COMCOT Storm Surge Model, TPXO global tidal system, parametric wind field model, WRF wind field model, nested grid algorithm, and inundation model. The characteristics of the nested grid method are that it merges the mesoscale meteorological field in ocean scale with the near-shore small scale. Benefited from the nested grid method, the entire lifespan of a storm surge can be fully covered.

In order to understand the effect of the sea level rise to the storm surge inundation area, several scenario simulations are conducted to include the impacts of uniformly raised sea level and typhoon track variation. The results show that the southwestern and northeastern Taiwan coast is more likely to have flooding events due to the low-lying topography. Besides, the typhoon track is one of the main factors that determine the severity of the flooding. As a further matter, take typhoon tracks as a controlled variable, it is found that the increase of sea level rise is not linearly related to the increase of the inundation area. The detailed comparison of the scenarios will be discussed in this study.