Geophysical Research Abstracts, Vol. 9, 05842, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05842

Numerical model of typhoon surge for flooding assessment on coast of Taiwan

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There are some areas along coast of Taiwan with land elevation below or equal to mean sea level. The estimated area of these lowlands is about 1200 km^2. These lowlands are prevented from flooding by sea wall. These areas are inclined to flooding due to typhoon surge, especially when typhoon passes Taiwan in the period of spring tide. In this study we developed a hydrodynamic- numerical model to calculate typhoon surge around Taiwan. The finite difference method is used to solve the control equations. The model area is 620 $km\times$ 580 km, and Taiwan lies in the central part of model. The grid size of this model is 500 $m\times$ 500m. Air pressure gradient and wind stress are considered as the driving forces for typhoon surge in this model. A circular storm model of Jelesnianski (1965) is taken here as the typhoon model. The computed results are compared to the observed ones at some tidal stations around Taiwan. For stations near typhoon center the computed results agree well with the observed data. For some stations far away from typhoon center the computed results are poorly comparable to the observed ones. This may be due to the discrepancy between circular typhoon model and real typhoon. The coastline of Taiwan is quite smooth. The volume of seawater transport induced by typhoon is hardly accumulated along the coast of Taiwan. Thus the flooding due to typhoon surge occurred mostly in the vicinity of typhoon center at its arrival time. The storm surges in the coastal region far away from typhoon center were quite small and nearly did no harm. Although Jelesnianski's model is not suitable to calculation of storm surge distant from the typhoon center, we can still use it for a prediction model of typhoon surge along the coast of Taiwan. We will estimate the flooding area by means of digital elevation model for hazard assessment on coast of Taiwan during typhoon period..