UJNR Panel on Wind and Seismic Effects

Panel Update

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PARI CONDUCTING REAL-TIME TYPHOON-CAUSED STORM SURGE PREDICTION FOR JAPANESE MAJOR PORTS

After the storm surge that resulted in the loss of 5,000 lives in 1959, the Japanese Government constructed coastal defenses such as dikes and seawalls on the major bay coasts. These facilities significantly reduced loss of lives and properties, however tidal level may exceed the design level. Hence, the reason why real-time prediction of the storm surge at each port and coast is essential to mitigate coastal disasters.

Following the above-mentioned situation, since 2001 the Port and Airport Research Institute (PARI) has been improving their storm surge model based on long wave approximation with an empirical typhoon pressure and wind field model and also forecasting the storm surges at the major ports. For effective forecasting the spatial grid interval of computation domains has been optimized between 0.6 km and 1.8 km around the target ports, because fine grid mesh gives the accurate result but requires longer computation time. The figure below shows a part of the result for Typhoon 0418 (SONGDA).

In 2004, the storm surges from five typhoons were forecasted and three typhoons triggered severe coastal disasters in west Japan. Just after these disasters, PARI began to model the storm surges for the actual typhoon tracks with finer spatial resolution and also investigated the damages of coastal defenses and the inundation heights at more than 20 ports in Japan. These results will make the storm surge forecasting more accurate.

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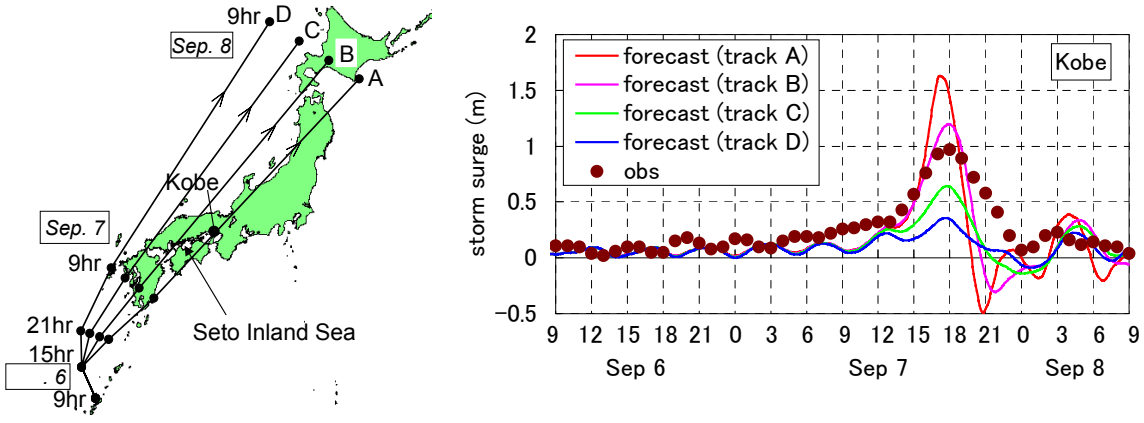

COASTAL INUNDATION CAUSED BY STORM SURGE

The Port and Airport Research Institute (PARI) in cooperation with Ministry of Land, Infrastructure and Transportation conducted field investigations on damage due to storm surge and high waves caused by Typhoon CHABA in some coastal cities and towns. The typhoon struck the south part of Kyushu island around 0900 on 30 August 2004 and traveled through the west part of Honshu island (Figure 1). The storm surge caused serious inundation to Takamatsu City. The peak of the storm surge was 1.3 m and occurred at the same time of high spring tide near 2400 on 30 August. The resultant sea level reached T.P.+2.46 m, which exceeded the previous highest record by 0.54 m. Seawater overflowed some low-lying areas as shown in Picture 1. Water flooded a downtown section of the city. Inundation depth was over 1 m (Picture 2). Two persons died from the flooding and more than 15 000 houses were damaged.

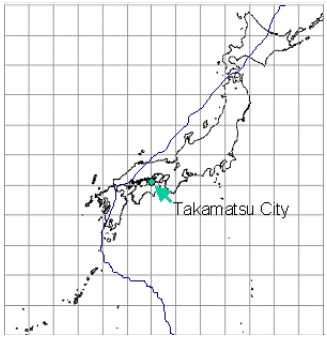

Figure 1. Route of Typhoon CHABA

Picture 1. Maximum seawater level due to storm surge by Typhoon CHABA

Picture 2. Inundation in the city

In addition to Takamatsu City, the storm surge and high waves caused by Typhoon CHABA resulted in damage to many coastal cities and towns. Another typhoon, SONGDA, in early September 2004 produced damage to many Japan cities and towns. PARI has conducted field surveys and numerical simulations on their storm surge and high waves, and plan to report detailed investigation results as soon as possible.

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