Geophysical Research Abstracts
Vol. 20, EGU2018-5983, 2018
EGU General Assembly 2018

Numerical study on the magnification mechanism of meteotsunami by Boussinesq wave model

Tien-Chi Liu (1), Yu-Lin Tsai (1), Tso-Ren Wu (1), Jun-Wei Lin (1), Mu-Qun Huang (2), and Pay-Liam Lin (2)

(1) Institute of Hydrological and Oceanic Sciences, National Central University, Taiwan (veroniqueamberliu@gmail.com), (2) Department of Atmospheric Sciences, National Central University, Taiwan (qqqaj4@pblap.atm.ncu.edu.tw)

Meteotsunamis are tsunami-like long ocean waves triggered by meteorological events. On the early morning of 13th April 2016, a squall line swept through Taiwan Strait. Radar images of composite reflectivity showed the passage of rain bands from west to northeast, propagating through the north part of Taiwan. Local water was recorded rising 0.32 m in 6 minutes and 0.28 m in 12 minutes by the tidal measurements at Waipu Fishing Port and Hsinchu Fishing Port, respectively. Data analysis found also significant secondary oscillations with periods less than 30 minutes. Relationship between the traveling pressure disturbance and the sea level variation was shown, indicating it was the latest event of meteotsunami discovered in Taiwan. In this study, numerical experiments were performed with COULWAVE, a Boussinesq-type wave model, to study the mechanism of increment of the wave height. Different combinations of long-wave speed and the speed of moving atmospheric pressure fluctuation were employed for examining the effect of Proudman resonance. Results of simulations based on fully-nonlinear, weakly-nonlinear Boussinesq equations as well as the nonlinear shallow water equations were also compared and discussed. The role of physical dispersion effect was addressed. Finally, the comparison of the numerical reconstruction and the available water elevation records of the event was presented and explained.