Ensemble forecast of typhoon-induced storm surge along China coasts

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The uncertainty in typhoon wind field forecast may introduce a large error in storm surge forecast. The common method to tackle this problem is based on the ensemble forecasting of typhoon wind field by using different initial and/or boundary conditions in the weather forecast model. However, this method demands very high computational costs and it might not be practical for operational use. This talk will introduce a new method which is based on the bias-modified control forecast operated from 4 weather forecast centres, and the ensemble forecast perturbed by 5 different typhoon tracks and 3 different wind speeds around the control forecast. The ensemble storm surge forecast is conducted by running an operational storm surge model driven by the wind fields obtained from the above ensemble typhoon forecast. In comparison with the traditional forecast, the control forecast exhibits a higher accuracy, and the ensemble forecast provides further insights into the occurrence probability of storm surge over a certain water level, which is useful for the probabilistic decision of protection measures against the storm surge. This talk will also include the applications of this new method to the operational storm surge forecasts along China coasts.

Bio:
Prof. Yongping Chen received his BSc degree in Harbor and Waterway Engineering at Hangzhou University (now named as Zhejiang University) in 1996, his MSc degree in Coastal Engineering at Nanjing Hydraulic Research Institute in 1999, and his PhD degree in Coastal Environmental Fluids at The Hong Kong Polytechnic University in 2006. Following 3.5 years' postdoctoral research experience at the University of Plymouth in the UK, he joined the COastalResource and Environmental (CORE) research group at Hohai University as a full professor. His research interests lie in modelling and forecasting of tides, waves and storm surge in nearshore areas, as well as environmental assessment of submarine wastewater outfalls. He played a key role in the development of real-time storm surge forecast system along China coasts, which is now used to support the disaster prevention and mitigation decision making for the central and provincial government during typhoon events.

Prof. Yongping Chen has led a number of research projects, e.g. the National Key Research and Development Program “Response of main estuarine elements to the changing input conditions in Yangtze estuary”, the NSFC project “Dynamic behaviors and dilution processes of buoyant jets under the co-existing wave and current environment” and the Special Programs for Scientific Research on Public Welfares of the Ministry of Water Resources of China “Ensemble prediction of typhoon waves and storm surge nearshore” and secured more than 12 million RMB research funds in the past 6 years. He has published 130+ journal & conference papers and 3 books, and holds 5 national patterns. He was awarded the second prize for National Science & Technology Development in 2011, the first prize for Science & technology Development of the Ministry of Education in 2010, and the second prize for Science & technology Development of the Ministry of Education in 2014.

Currently he serves as a deputy director at the International Office of Hohai University. He is also the member ofStanding Committee on Natural Disaster and Preparedness of The Federation of Engineering Institutions of Asia and the Pacific (FEIAP) on behalf of China Association for Science and Technology (CAST).