Modeling of Extreme Freshwater Outflow from the North-Eastern Japanese River Basins to Western Pacific Ocean

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We investigated the effects of extreme fluvial outflow events on river mouths to salinity distribution in the coastal zone of the north-eastern Japanese coast. We created a set of hourly simulated river outflow data from 9 first-class Japanese river basins flowing to the western Pacific Ocean for targeted two events of typhoons (Chataan and Roke) and used it with a coupled hydrological-oceanographic model for estimation of the circulation and salinity distribution in coastal zones. The coastal ocean circulation was simulated by using a coupled hydrological oceanographic model JCOPE-T, comparing the case with using climatological mean monthly discharges as freshwater input from rivers with the case using our hydrological model CDRMV3.1.1 simulated discharges for the case of typhoon Roke passage as freshwater input from the 9 rivers. By using SCE-UA method we successfully reproduced peak discharge prediction of extreme typhoon events on river mouths. The results show an importance of detailed information on extreme river outflows for developing accurate nowcasting coupled river-ocean models for real time prediction of extreme flood events. The results suggest that our models that were calibrated on typhoon Roke and Chataan can be successfully used to predict runoffs from other extreme precipitation events. The salinity reproduction prediction in the coastal zone became more realistic than without including total river outflow. The proper simulation of extreme discharge events can be used to improve coastal and ocean modeling, especially modeling which is sensitive to reproducibility of the salinity distribution in coastal areas.

Keywords: salinity distribution, extreme discharge, coastal zone, SCE-UA method, river-ocean coupled model, nowcasting