Impact of extreme river discharges on coastal ocean environment on example of the North-Eastern Pacific coast of Japan in JCOPE-T ocean model

*Sergey Varlamov[1], Yasumasa Miyazawa[1], Josko Troselj[2], Yosuke Yamashiki[1,3]

1. Application Laboratory, Japan Agency for Marine-Earth Science and Technology, 2. Graduate School of Engineering, Kyoto University, 3. Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University

As show simple estimations (Troselj et al., submitted), extreme outflow of Japanese rivers caused by passing typhoons and related precipitations can bring monthly climatological amount of fresh water to the oceans just in 2-3 days. Impact of discharged fresh water masses on the coastal ocean environment was analyzed by us using the regional JCOPE-T ocean circulation model nested to the basin scale JCOPE2 model and forced by tides, realistic meteorological fluxes and different presentations of freshwater discharges. In the "base" case the monthly mean climatological river discharges were used. It was compared with the “extreme" case when real-time hourly fresh water discharges from rivers flowing to the north-eastern Pacific coast of Japan for the period of typhoon Roke passage over this part of Japan in September 2011 were applied. Comparison showed significant differences in simulation results for the “extreme" case. Differences could be considered as local and remote. For example, the salinity in proximity of river mouths dropped quickly (in couple of hours) on up to 10-12 PSU and then slowly restored to mean climatology (base case) during more then 15-20 days of model integration. It generated peculiarities in local ocean circulation. Further, lowered salinity waters spread all along the north-eastern coast of Japan, were transported southward and traced along the Kuroshio extension current. Considering an importance of information on detailed realistic river discharges, the Kyoto University group developed hydrological model for selected rivers which would be coupled with the JCOPE real-time ocean prediction systems for improvement of ocean forecasting.

Keywords: Extreme river discharges, Ocean modeling, Coastal ocean environment

