The influence of uncertainty of upstream discharge on downstream in Tokachi river basin

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The river discharge is predicted including various uncertainty. Prediction or observation of rainfall, observation of water level and discharge, run-off model and river model have uncertainty respectively. It is considered to be important for prediction of flood or flood control plan to understand how the uncertainty of discharge affect the grasp or prediction of down stream water level or discharge.

On 2016, three typhoons sequentially landed on Hokkaido in a week and caused heavy rainfall and severe floods over many river basins. Followed by three typhoons, another typhoon approached Hokkaido and caused exceptional heavy rainfall and many damages along the central mountains. If the spatio-temporal distribution of rainfall was different, more serious damage might be occurred. Also, it is predicted that the rainfall amount will be increase and the spatio-temporal distribution of rainfall will change in the future in Hokkaido because of the climate change. This change of spatio-temporal distribution of rainfall may increase the risk of flood. Discussions taking into account the range of discharge uncertainty may also be useful for prediction of flood in the future climate.

So in this research, regarding the two uncertainties which are uncertainty of peak discharge time and discharge amount, we investigated the influence of each uncertainty of discharge on the downstream with numerical calculation.

In the Tokachi river basin where eight tributaries join, we did numerical calculation with the Quasi-two dimensional unsteady flow model which we made. We investigated the influence of the uncertainty of discharge by making the multiple patterns of discharge hydrographs at the upstream end of three tributaries which are the boundary conditions and a large amount of calculations with combining them.

It became possible to evaluate where and how much the discharge uncertainty affects the river basin by a large amount of calculations with different boundary conditions.