

Distributed Hydrologic Model for Flood Disaster Reductions in Ungauged Basins

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Severe rainfall by fronts and typhoons caused heavy flood disasters throughout Japan with 232 casualties in 2004. In 2005 and 2006, rainfall with more than 1000mm rainfall in three days brought severe damage to the west parts of Japan. These rainfall disasters mainly occurred at tributary catchments with several hundreds square km. In most situations, river improvements at these catchments do not attain a designed safety level; furthermore it is not easy to achieve river improvements in the future. Hydrologic prediction by a reliable rainfall-runoff model is only way to reduce flood disasters. However, hydrologic observation systems and accumulations of hydrologic data are quite insufficient for small scale catchments. Thus new technology and ideas are requested to achieve flood predictions in these catchments.

One of ideas to achieve flood predictions at these ungauged catchments is to apply a distributed hydrologic model with high time and space resolution for an entire river system; then extract prediction results for any small scale catchments in the entire system. As an example, a real-time hydrologic prediction system developed at the Yodo River basin (7281km²) is presented. A distributed model with 250m spatial resolution runs every one hour; and 6-hr ahead discharge prediction are conducted in a real-time basis through a web page <http://yodogawa.dpri.kyoto-u.ac.jp>. Prediction analysis at the ungauged catchments reveals that small scale catchments with less than 100km² request more efforts to improve the predictions. To understand internal model behaviors and to obtain a proper model structure and parameter set, a hydrograph separation method based on spatiotemporal record of stream flow in a distributed rainfall-runoff model is introduced.