Makoto Tani

Assigning Higher Priority to Catchment Classification in the Runoff Prediction.

Spatial and temporal extrapolations are needed to predict runoff responses for an ungauged catchment based on information for an observed catchment. For this purpose, it is the most important to specify the sensitivity of runoff responses to each of catchment properties. Observations of hillslope hydrology particularly conducted in active tectonic activities like the Pacific rim, however, have demonstrated that this is too difficult for runoff models to evidently incorporate each property as a model parameter because of heterogeneities involved in the runoff processes. Masami Sugawara, famous as a Tank Model developer, once mentioned a miserable man searching his missing key only within the circle illuminated by a streetlight although he might have dropped it in the dark. This metaphor may be accepted for a parameterization of runoff model because heterogeneous catchment properties under the ground such as preferential pathways in the soil and cracks in the weathered bedrock give large influences besides visible properties like land-surface topography. Nevertheless, it is fortunate that catchment classification has often be successful for mountainous catchments. Statistical analyses for many catchments in Japan demonstrated that allocation of a rainfall volume to a stormflow volume had been clearly classified by surface geology (Shimizu, 1980). Though effects of another properties were relatively secondary, the delay in the storm runoff process, controlling the formation of storm runoff peak was dependent on the soil-layer properties and its changes by human disturbances (Tani et al., 2011).

A lot of long-term observations including extreme storm and drought events are already available in many countries. However, there are not enough studies on categorizing the relationship of runoff responses to each of the catchment properties from these data compared with so many studies on runoff model developments and applications. An emphasis of the geology effect may be concerned about comparisons only by statistical analyses, but more careful and strategic comparisons based on the detailed runoff mechanism on hillslope hydrology can give better contributions for the runoff prediction in ungauged basins. We should assign s higher priority on catchment classification studies. In my presentation, the catchment classification and human effects on it in mountainous regions of Japan will be summarized for this purpose.