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A study on the development of the rain-based urban flood forecasting method with X-MP radar in Toga river basin

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Urban flood is occurred by hydrologic phenomenon of urban watershed characteristic and localized heavy rainfall. One of the characteristics in urban flood is to occur the flood rapidly after rainfall occurred. To consider this characteristic, we developed the flow nomograph such as the look-up table, which can be used immediately when it rains. The flow nomograph is based on rainfall information (rainfall intensity and duration time) and it is assembled and comprised by the relationship between water level and the various rainfall scenarios. The flow nomograph of each reference flood water levels (the walk lane, waist, flood alert, special flood alert and flood risk level) is made using the regression analysis. We can forecast the flood by the location, which is determined by rainfall intensity and duration time, on the flow nomograph. If the location is exceeding the isoflow line of monograph, there is some possibility of flood occurrence (Fig. 1). Fig. 1(a) and (b) are cross section of Toga River, Fig. (c) is to determine of the flood using flood nomograph.

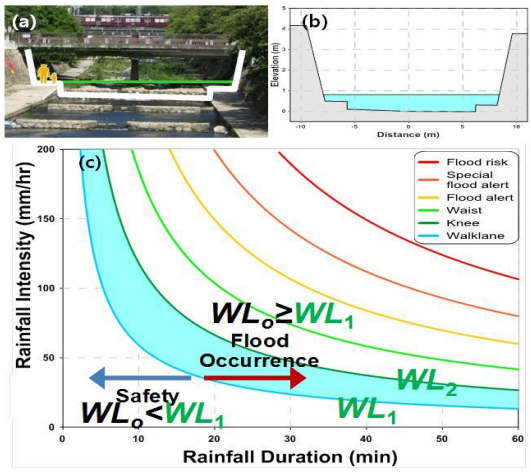

Fig. 1 Concept of flood nomograph

This study developed the flow nomograph and evaluated its applicability in Toga river basin of Japan. In the results of the applicability evaluation, the flow nomograph forecasted the flood level for all 9 events, and missed the flood occurrence timing for 1 event. Furthermore, we forecasted the flood occurrence using the flow nomograph with X-MP radar rainfall to secure the lead time of rainfall for real rainfall events. Fig. 2 shows the application results of flow nomograph with forecasted radar rainfall at 14:00 21 July 2012. Three circles of Fig. 2(b) are located over the walklane level line; therefore we guess the possibility of flood occurrence. The flood occurred at 15:00 in real situation. Through the evaluation results of real situations, we confirmed the developed flow nomogrpah is useful for urban flood forecasting.

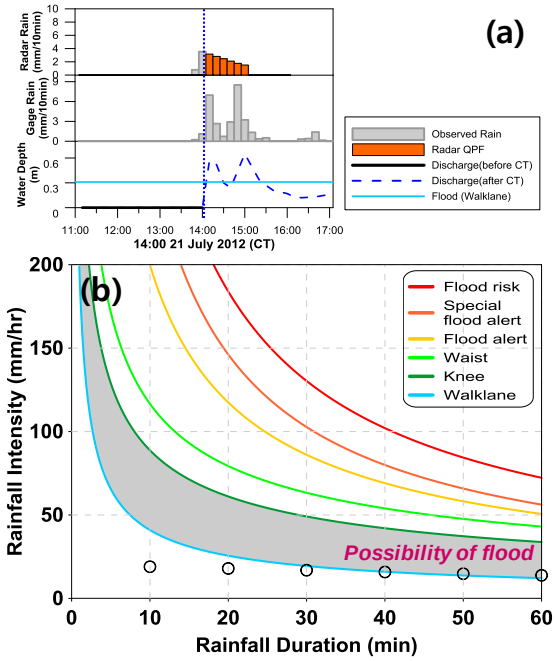

Fig. 2 Flood forecasting using flow nomograph and forecasted radar rainfall at 14:00 21 July 2012