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# Change of the stream discharge process affected by the rainstorm magnitude in the small headwater catchment

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Recently, because rainstorm characteristics such as total and peak rainfall is increasing along with global warming, a lot of disaster as flood and landslide has been occurring in many areas worldwide. This change might engender changes in the water resource of a particular area. Therefore, this study was conducted for the two component hydrograph separation using EC value during rainstorm event between July 2012 and November 2013 in two small adjacent forest and grassland catchments at the headwaters of the western foot of Mt. Aso, Kumamoto prefecture, southwestern Japan, aims to understand the relationship between the groundwater discharge ratio and rainstorm magnitude. EC values of the stream water were recorded at 10-min interval at each Parshall flume using EC logger. We compared our results and data which we summarized, with published literature (Onda et al.,2006; Ichiyanagi and Kato, 1998; Ichiyanagi et al.,1994; Iwagami et al.,2010; Ohrui et al.,1992; Katsuyama et al.,2000; Katsuyama et al.,2001).

We observed 18 rainstorm events of varied magnitude in which total rainfall range from 9 mm to 727 mm and peak rainfall range from 5 mm/h to 94 mm/h. As a result, we reaffirmed that the groundwater discharge ratio decreased due to increase total rainfall and peak rainfall for small rainstorm event where total and peak rainfall were less than 200 mm and 20 mm/h respectively, and agreed with previous studies. The total discharge also increased in conjunction with an increase of ”new water” component. However; increasing of groundwater discharge ratio was observed for large rainstorm event where total and peak rainfall were larger than 200 mm and 20 mm/h, respectively. In this case, the total discharge increased in conjunction with an increase of ”old water” component. Therefore, we found that the rainstorm magnitude has an impact on the formation of the peak stream discharge during rainstorm. The peak stream discharge phenomena from catchment can be classified into two stages based on previous literature and our present studies. In the first stage, stream discharge is dominated by the old water before rainstorm, but the old water component of stream discharge decrease gradually with an increase of rainstorm magnitude. As the total rainfall reach 200 mm, most of stream discharge is dominated by the new water. Under larger rainstorm events, additional stream discharge increased in conjunction with an increase of ”old water” component (the second stage).

Keywords: Two component hydrograph separation, Stream discharge process, Rainstorm magnitude, Groundwater discharge