

Changes in water characteristics during precipitation in the mid-stream of the Itachi river, Toyama

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During precipitation, material circulation and evaluation of water quality in populated cities is important because the amount of nutrients and chemicals runoff and quantity of load is usually large. This study evaluates the character and changes of runoff in a river during precipitation. The 15 km long Itachi River flows through Toyama city and drains from the Joganji River to the Jinzoo River. 4 September 2009 and 8 October (During Typhoon-18), water samples were collected from three selected sites on the Itachi River after on-site measurements of water level, water temperature, electric conductivity and pH. The sampling was done at an interval of 30 minutes to 1 hour during precipitation. In addition, rainwater was collected from the roof of University of Toyama with a rain collector that consisted of a 10 L capacity container and a 21 cm diameter funnel. All samples were analyzed shortly after collection in the laboratory for Na^+ , K^+ , Ca^{2+} , Mg^{2+} , NH_4^+ , HCO_3^- , Cl^- , SO_4^{2-} , NO_3^- , NO_2^- , PO_4^{3-} , SiO_2 , Delta D and Delta 18O. The results showed a progressive reduction in the concentration of SiO_2 , Na^+ , Ca^{2+} , Mg^{2+} , Cl^- and SO_4^{2-} , with a corresponding increase in flow quantity in the river. The observed rainwater also showed a low concentration in Na^+ and Cl^- , indicating that it may be causing the low concentrations observed in the river water through dilution. However, rainfall during this typhoon showed a high concentration in Na^+ and Cl^- . In addition, the concentration of silica and major cations and anions reduces with increase in runoff. The loading of silica, and major ions as a function of time increased 2-fold. On the other hand K^+ and PO_4^{3-} do not show any remarkable variation with increase in runoff, where as NO_3^- showed a slight increase with increasing runoff. The load of K^+ , PO_4^{3-} and NO_3^- , as a function of time indicates a 3~5 fold increase during the peak period, which occurred on 4 September 2009. The observed loading of K^+ and nutrients (PO_4^{3-} , NO_3^-) suggests their continuous accumulation, and are subsequently drained by the river. The next steps in this study are to trace the source of K^+ and nutrients, and examine their outflow process in the river.

Keywords: Changes in water characteristics during precipitation, The middle scale city river, Rainfall-runoff processes, Event water component