

Effect of the Hanaore fault and Biwako-seigan fault on the water quality of the Ado river in Shiga Prefecture

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1. Introduction

Along a fault plain, there is a fractured damage zone, which has high permeability. This zone is often become groundwater path from deep to shallow (Faulkner et al., 2010). As a result, the fault-related groundwater stably supplies heat and chemical materials including water itself, which make some effect on the environment in and around the fault zone. For example, hot and mineral springs tends to distribute in and around fault zones. This fault-related groundwater should also have some effect on the river in the case that the river runs along or across the fault.

The Ado river, which is located in the western part of Shiga Prefecture, is the second longest in the rivers which flow into Lake Biwa, which is the largest lake in Japan. The catchment area of the Ado river is also the largest in the rivers which flow into Lake Biwa. In the part of the upstream and most of the midstream, the Ado river runs along the Hanaore fault. In the downstream the Ado river cross the Biwako-seigan fault (Fig.1). Both of the faults are the main active faults in the western part of the Shiga Prefecture. Therefore the Ado river is suitable for investigating the effect of active faults on the river water quality.

2. Observation

We surveyed the Ado river during the period from August 12 to August 14 in 2018 (Fig.1), which is named the spatial survey. Before this period there had been no precipitation for thirteen days at IMZ and MNM. Therefore it is considered that the river water was mainly composed of the base flow, which supplies from groundwater to river. We also surveyed the Ado river at RYD, HRS, ADG and KTG about once a month from April, 2018, which is named the temporal survey.

3. Result

In the spatial survey the water quality type was Ca-HCO₃ at all the sampling points. The ion concentrations were gradually increased from AD7 to TKI although there were no systematic change in the ion concentrations at the other sampling points. Between HRS and ADG, where the Ado river crosses the Biwako-seigan fault, there was no change in the ion concentrations. In the temporal survey, there was also no change in the ion concentrations between HRS and ADG. This shows that the Hanaore fault has some effect on the water quality of the Ado river although the Biwako-seigan fault has little effect on it.

Fig.1 The solid circles show the sampling points of the Ado river during the period from August 12 to August 14 in 2018. The solid triangles denote meteorological observation points of Japan Meteorological Agency. This is modified from the figure of the active fault database of Japan (Geological Survey of Japan, AIST, 2019). The background map is from Geographical Information Authority of Japan (2019).

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