[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-HW Hydrology & Water Environment

[A-HW24]Hydrological change after the 2016 Kumamoto earthquake

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More than two years have been passed after the occurrence of 2016 Kumamoto earthquake. Many investigators have been investigated the cause of observed coseismic hydrological changes such as spring lake dry up, groundwater level drop and rise. We also found groundwater quality changes before and after the quake and this information has been becoming accumulated. In fact, highly densed groundwater monitoring network installed in Kumamoto enables us to grasp comprehensive view of coseismic hydrological responses in very high resolution, so that, the results of these studies have high potential impact to this academic area globally. In this sense, we are welcome for all topics regarding coseismic hydrological changes after or even before the 2016 Kumamoto earthquake from broad point of view including hydrological cycle, deep water and hydrothermal water contribution, subsurface temperature, water quality, isotopes and microbiology. Topics of earthquake prediction and crustal defamation mechanism, surface morphological change in relation to hydrological changes are also welcomed.

[AHW24-P03]Change of groundwater radon concentration caused by 2016 Kumamoto earthquake

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The 2016 Kumamoto earthquake struck central Kumamoto prefecture on April 14 (Mw 6.2 foreshock) and 16 (Mw 7.0 main shock) and caused huge damage around the area. The area of a series of the events and the aftershocks, Beppu, Aso and Central Kumamoto prefecture, is situated along the active Beppu-Shimabara rift. It is explained that the main shock and foreshock ruptured Futagawa fault and Hinagu fault, respectively, in the Beppu-Shimabara rift. Across the Futagawa fault the northern wall sank by one meter while the southern wall rose by 30 cm, and surface fractures and cracks along the fault zone are recognized (Fujiwara et al., 2016). After the quake, the field investigation of ground waters and hot springs around the faults have been carried out to detect a change in ground water by the earthquakes (e.g. Sato et al., 2017; Koizumi et al., 2017). They reported increased flow rate at several springs and newly occurred spring after the earthquakes, suggesting that the earthquake strongly affected the ground water system. Here we measured radon concentration in groundwater covering the sampling points of Sato et al. (2017).

Groundwater radon concentration changes have been reported as precursory indicators of earthquakes (e.g. Noguchi and Wakita, 1977; Kuo et al., 2006, 2011). Radium in rocks decays to produce radon and the radon is released from rock surface to pore. The rate of the radon release increase with the surface area, therefore the radon release can be indicative of the crustal deformation such as earthquake.

We report the results of groundwater radon concentration at 7, 11, 13, 18 and 19 months after the 2016 Kumomato earthquake. In Kumamoto area, fortunately groundwater radon had been measured in 2009, seven years before the Kumamoto earthquake (Tokunaga, 2010). We then discuss the change of groundwater radon concentration in relation to the fault rupture by comparing our data to Tokunaga (2010), i.e., before and after the quake.

The results of our measurement show that the groundwater radon indicate high concentration in the step and jog region of Futagawa and Hinagu faults both before and after the earthquake. The concentration around newly recognized surface fracture is significantly high. Although there is a difficulty in comparing the radon data directly with those from the previous work gained by different measurement device, the values of radon concentration in northern region from Futagawa and Hinagu fault are decreased after earthquake wheareas the values are increased in the southern region. In addition to appearing newly formed cracks in the northern region, our result suggests that the ground after the earthquakes is more permeable than before, causing decrease of ^{222}Rn concentration in northern region, accordingly.