

## Numerical modeling study on reproducing groundwater level change caused by the 2016 Kumamoto Earthquake

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The monitoring network of about 100 groundwater level showed that the tendency of groundwater level fluctuation was changed clearly by the 2016 Kumamoto Earthquake. Groundwater level was dropped immediately after the earthquake and then increased gradually around Kumamoto plain area. Numerical modeling studies on groundwater level drawdown derived from massive earthquakes are scarce. This phenomenon of groundwater drawdown is supposed that many ruptures which reach deep underground generated by the earthquakes and surrounding groundwater filled these open areas for vacuum pressure. Numerical modeling study incorporating the open ruptures identified on land surface was conducted to reproduce the observed groundwater level evolutions after the earthquakes. The three dimensional watershed model in Kumamoto area was used in this modeling study which was validated through comparing between simulated data and several time transient observed data such as river flow rate, groundwater level and water quality data of  $^3\text{H}$ ,  $\delta^{18}\text{O}$ ,  $^{85}\text{Kr}$ , nitrate nitrogen and temperature. The watershed modeling tool GETFLOWS was applied in this study. The model incorporating this mechanism could reproduce the tendency of groundwater level change after the 2016 Kumamoto Earthquake. Additionally, the distribution of rupture depth was estimated based on this modeling study. This study was financially supported by SUNTORY Kumamoto groundwater research project.

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