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Long-term groundwater temperature change at a hot spring preceding the 2014 Nagano-ken Hokubu earthquake of M6.7

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[1]None

On November 22, 2014, an large earthquake of M6.7 took place at the Kamishiro fault in Hakuba Village in the northern Fossa Magna region, central Japan. The Hakuba earthquake was predicted in a long-term basis: a historical earthquake, the Kamishiro active fault, accumulation of crustal strains, etc(Association for the Development of Earthquake Prediction, 1990). To clarify how large earthquakes are generated, we should closely observe changing signals associated with their preparatory process underground. For the purpose of monitoring the preparation process of large earthquakes, various kinds of surveys and nearby observations have been being conducted in the Hakuba Village region around the northern Fossa Magna. Affiliated organizations are Shinshu University, Toyama University, Tokyo Metropolitan University, Tokai University, Nagasaki University, and others. Among them, the observation of water temperature has been conducted at a hot located just west of the Kamishiro fault, since October 1998. The temperature has been slightly decreasing with a rate -0.17 degree/year before around 2009, whereas the rate grew more than before during recent five years as -1.5 degree/year, indicating that dilatation processes in the subsiding region on the footwall side of the fault had been going on before the earthquake.

Keywords: the 2014 Nagano-ken Hokubu earthquake of M6.7, earthquake prediction, precursor, water temperature, dilatation, contraction