Temporal chemical variation of the deep groundwater compositions in Miyagi,Japan and the significance of the earthquake prediction

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Aspects of groundwater, such temperature, water level, flux, and, chemical compositions exhibit anomalies as precursors or as aftermaths of earthquakes. For example, chemical components, such as Cl- increased by 10% before the Hyogo-Ken Nanbu earthquake (Tsunogai and Wakita., 1995). In this study, I carried out investigation of analysis of chemical components (Cl-,SO42-,Br-) in waters from deep wells at three localities ,Atago,Naruse,and Nishikigaoka, in Miyagi Prefecture.

At Atago, Sendai, the linear correlation between Cl- and SO42- implies mixing of waters which are usually separated each other . Concentrations of Cl- gradually fluctuated within 40% range. In the locality, the wide band fluctuation impedes from comparing water compositions and earthquakes.

At Nobiru, Naruse town, Cl- concentrations are linearly correlated with SO42-, similarly to Atago, but the fluctuation range is comparatively narrow. Concentration of Cl- remarkably changed around the occurrence of the Nigata Chuetu earthquake, whereas any notable chemical manifestation was not detected around the Miyagi Oki earthquake. Similarly, Cl- concentrations from Nishikigaoka, Sendai, are linearly correlated with SO42-, and the fluctuation range is relatively small. As in the case of Naruse, abrupt change in concentration, which is 2% depletion, was detected right before the Nigata Chuetsu earthquake.

Fault-activity-relating mechanical properties, including delta CFS and volume strains induced by fault activities of Nigata Chuetu and Miyagi Oki earthquakes were calculated by using MICAP-G. The calculation can not account for the reason or abrupt change in concentration around the Nigata Chuetu earthquake and or the absence of any chemical sign around the Miyagi Oki earthquake.