

Characteristics of water quality and stable isotopes in spring water, groundwater and artesian well at Minamisoma City and consideration of the water quality change after Tsunami.

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After the Great East Japan Earthquake occurred, the investigation near the coast area in northern part of Fukushima prefecture has been carried out to clarify the groundwater flow and residence time in this area. The measuring of EC, pH, water temperature, ORP and water sampling of groundwater, spring water and river water have been carried out several times. In this presentation, we will report the result of investigation which was carried out on December, 2016.

The investigation was carried out on 29-30 December, 2016 at Minamisoma City and Soma City. As a result of investigation of four spring sites and six groundwater sites (including the five artesian wells), the following were revealed.

- 1) As a result of chemical analysis for dissolved inorganic matter in spring water and groundwater, Na-(Cl+SO₄) type, Ca-HCO₃ type and Na-HCO₃ type were indicated. The spring water which shows the Na-(Cl+SO₄) type may be affected by the Tsunami. The investigation of this spring water has been performed regularly. Thus, the EC in this spring water decrease gradually (from 100 mS/m in December, 2012 to 30 mS/m in December, 2016), the influence of the Tsunami may decline. In the other sites, there is no tendency that was affected by the Tsunami.
- 2) If the water quality shows the Na-HCO₃ type, the groundwater flow might be more deeper and residence time might be relatively longer. In the investigation of December, 2016, Na-HCO₃ type was recognized at 2 sites (groundwater in Minamisoma City and artesian well in Soma City). Since the stable isotopes of oxygen and hydrogen in these water is relatively low, it is assumed that the recharge area is more higher latitude. As a result of calculation by using the altitude effect ($\delta^{18}\text{O}$: -0.29‰/100 m, δD : -2.0‰/100 m), recharge area of groundwater that water quality is Na-HCO₃ type is estimated about 300 m higher than the site where the water quality is Ca-HCO₃ type.
- 3) There is multiple groundwater flow near the coast area of northern part of Fukushima prefecture.
- 4) The concentration of trace element of manganese and iron is relatively high in the part of Minamisoma. The origin of manganese and iron might be Earth (soil or rock).
- 5) Because of the stable isotopes of strontium are different by geology, it is highly possible to grasp the difference of recharge area of groundwater. In future, we will measure the strontium isotopes and consider about the more detailed groundwater flow.

Keywords: Minamisoma City, groundwater, spring water, artesian well, water quality, Tsunami