

WATER QUALITY EVALUATION OF CHOOSAN SPRING IN NARI BASIN OF ULLEUNG ISLAND, KOREA

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I. Introduction

Springs are concentrated discharge of groundwater appearing at the ground surface as a current of flowing water as compared to seepage areas which are slower movement of groundwater to the surface. Choosan spring water that are currently being developed for natural mineral water were hydrochemically evaluated and investigated in order to maintain their quality to satisfy strict health standards. Water quality of the Choosan spring and surface waters in the valley of the study area is dominated by porous pyroclastic rocks with a large surface area in Nari basin.



Fig. 1 Location map of Study area.

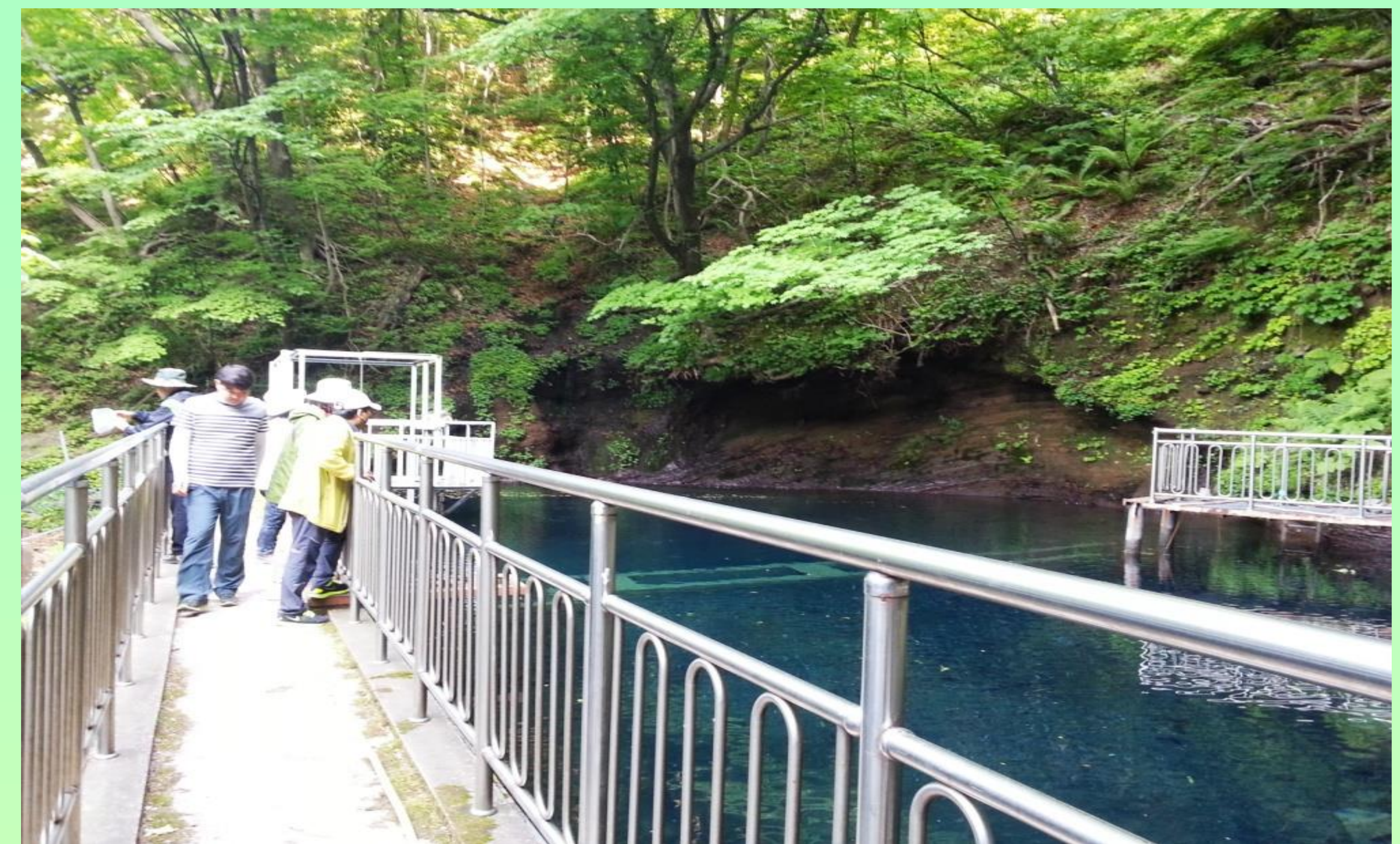


Fig. 2 Choosan Spring water in Nari basin of Ulleung island.

II. Methods and Results

Water type of the Choosan spring is characterized by Na-HCO₃ and surface waters in the valley is placed at the boundary from Na-HCO₃ to Na-Cl. Components with high determinative coefficients with respect to EC are HCO₃, Na, F, Ca, Mg, Cl, SiO₂, and SO₄. There is a possibility that high concentrations in Na and Cl are attributed to a lithological properties of alkaline series volcanic rocks which are predominantly distributed throughout Ulleung Island and an age-old volcanic activity. Eh and pH, assumed as important indicators in water-rock interaction, have nothing to do with any other components. According to the results obtained from factor analysis, cumulative percent of variance of factor 1 is 54 % while it is 25.8 %, respectively. Components with high loading to factor 1 are F, Na, EC, Cl, HCO₃, SO₄, SiO₂, Ca, NO₃, and Mg. Components with high loading to factor 2 are Mg, Ca, along with K, NO₃, DO as negative loading.

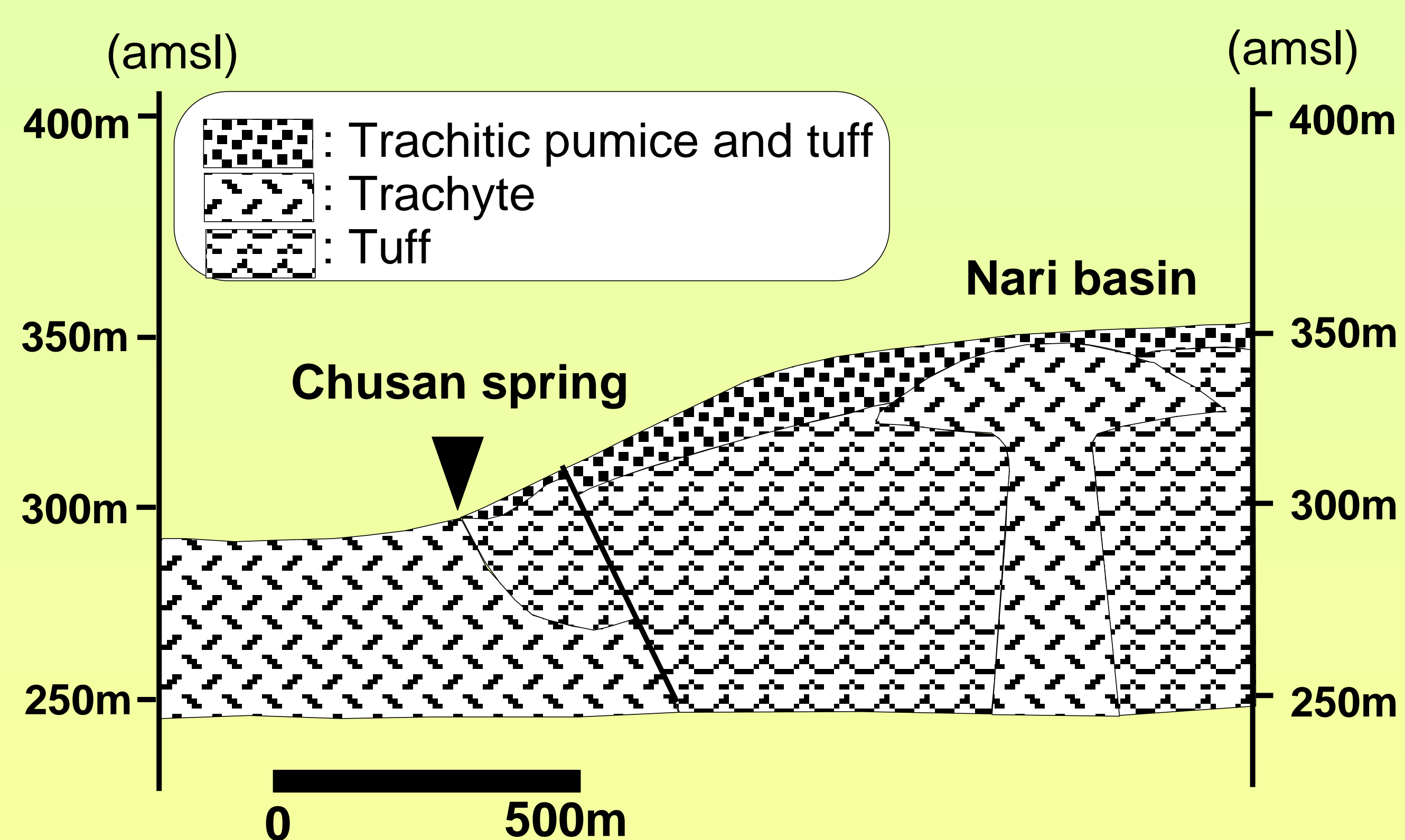


Fig. 3. Geologic section of Choosan Spring water

Sample	M/D/Y	T (°C)	pH	EC (μS/cm)	Eh (mV)	DO (mg/L)
Spring water	05/14/13	10.5	7.95	178	195	8.57
	08/28/13	10.3	8.04	178	290	8.90
	10/13/13	10.4	8.02	174	230	8.65
	11/23/13	10.4	8.13	175	235	8.90
	12/11/13	10.3	8.06	174	240	8.75
	02/21/14	10.4	8.02	176	242	8.79
	03/22/14	10.4	8.15	173	240	9.16
	05/23/14	10.6	8.20	173	228	9.67
	06/26/14	10.6	8.16	171	158	9.02
	07/21/14	10.3	8.01	167	215	8.20

III. Conclusion

Results are suggested that high concentrations in Na, Cl, F, and SO₄ might be intimately related to fine-grained, alkaline pyroclastic rocks with high permeability and porosity favorable for the water-rock interaction. However, a wide range of investigation such as geophysical prospecting and geochemical analysis including isotope, trace element, and tracer is further necessary to better understand the characteristics of groundwater chemistry, aquifer distribution, and the water cycle mechanism of Ulleung Island.