

Variabilities in soil moisture and temperature by natural and artificial snow in Mt. Balwang area, Gangwon-do, South Korea

YALALT NYAMGEREL¹, HYEJUNG JUNG¹, DONG-CHAN KOH², KYUNG-SEOK KO² AND JEONGHOON LEE¹

¹Ewha Womans University

²Korea Institute of Geoscience and Mineral Resources

Presenting Author: yalaltn@gmail.com

Soil moisture and temperature are important variables for understanding hydrological processes, and the year-round monitoring of soil moisture and temperature reflect the variations induced by snow cover and its melt. Herein, we monitored the soil moisture and temperature in high (two sites) and low (two sites) elevation regions with groundwater sampling near the Mt. Balwang area in Gangwon-do, South Korea from Sep 2020 to May 2021. This study aims to examine the temporal and spatial variations in soil moisture and temperature due to snow (natural and artificial snow) and its melt. A ski resort has been operating in this area and has been producing artificial snow during winter periods; thus, the spring snowmelt comprises both natural and artificial snow. The effect of soil freezing and thawing, wind conditions and vegetation covers, and the timing and intensity of snow cover and snowmelt differed in the monitoring sites. The high elevation sites 1 and 2 exhibit the relatively longer and consistent snow cover than the low elevation sites. Particularly, site 2 show late (May 8) snow melting even this site is in south slope of the Mt. Balwang. The relatively steady and moist soil layers at sites 1, 2, and 3 during the warm period can be considered as influential points to groundwater recharge. Moreover, the differences between the mean $\delta^{18}\text{O}$ (-9.89 ‰) of the artificial snow layers and other samples were low: in the order of surface water (0.04 ‰) >groundwater (-0.66 and -1.01 ‰) >natural snow (1.34 and -3.80 ‰). This indicates that the imprint of artificial snow derived from surface and with decreasing amount of natural snow around the Mt. Balwang region, the results support the assumption that the potential influence of artificial snowmelt on groundwater quality. This study helps to understand the snow dynamic and its influence on the hydrological processes in this region by combining the hydro-chemical and isotopic analysis.