

## **A study on the correlations among rainfall, groundwater level and mine drainage discharge**

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When there is an abandoned underground mine in an area where bedrock outcrops are distributed at relatively shallow depths, the amount of infiltration of ground water into the abandoned mine voids is predicted to have changed according to the geographical, geological characteristics and the developmental state of the mine. The study area is the Waryong-Jeongwon Mine at Donghae-si, Gangwon-do, South Korea. We conducted various surveys including hydrogeological survey, electrical resistivity survey, borehole logging, measurements of mine water discharge from the adit, and borehole water level survey. In the study area, gray sandstones are found to alternate with dark gray to black shales, and the coal deposits are distributed in a thickness of approximately 0.3–1.0m. The main discontinuities in the study area are stratified, jointed, and folded fault layers. The stratigraphy generally has a strike of N20 - 60W and a slope of 27 - 75NE, and the joint is composed of three joints. The mine drainage discharge ( $y$ ) from the adit varies according to the rainfall ( $\chi$ ) as  $y=0.0227\chi + 40.215$  ( $R^2=0.0036$ ). The results of the electrical resistivity survey showed that low resistivity anomalies tend to be distributed intensively in the fault zone and the coal bed projected area. Through drilling four sites (BH-1 - 4), it was found that the total core recovery rate (TCR) and the rock quality designation (RQD) tended to be lower in the BH-1, 2, and 3 boreholes, where the fault zone and the coal beds were dominant. The change in the water level in the boreholes over time showed different change patterns of the water level in each of the four boreholes. Among them, the borehole BH-3, which is closest to the fault, showed the closest correlation with rainfall variation. The analysis results showed that the groundwater flow around mine voids was controlled by the dome-shaped topographical distribution characteristics, geological characteristics like joints and faults in the study area.