

Effects of volcanic unrest on groundwater

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Abstract

Measurements from continuous downhole data logger at the fish farm Matorka, located at Reykjanes Peninsula have been collected for several years. They show changes in heat, pressure and salinity that can be correlated to recent seismic and volcanic activity in the area.

In recent years, an unrest in volcanic activity has occurred in the Reykjanes Peninsula after almost 800 years of inactivity. In 2020, a ground uplift occurred north of mountain Þorbjörn which is located 4 km north of the Matorka main production area. This activity propagated eastwards, causing three relatively small eruptions (in 2020, 2021 and 2022) in an uninhabited area about 10 km east of Þorbjörn. In October 2023, strong earthquake swarms occurred in the Þorbjörn-Grindavík area with probable signs of magma accumulation. This activity caused dozen of M3 earthquakes and a M5.2 earthquake WNW of Grindavík on the 10th of November. Several fractures and open fissures crosscut the town which was evacuated. Since then, three small eruptions have occurred just north of the town and caused considerable damage on infrastructure.

The fish farm Matorka is in the vicinity of the town of Grindavík, Reykjanes Peninsula, Iceland and produces high quality Arctic char on land. As a part of their control system, a continuous monitoring with data logger is in a shallow groundwater well nearby, where it monitors temperature (water), pressure (water level), salinity and conductivity. The data from 2020-2023 shows changes in all parameters that can be correlated with seismic events. Temperature measurements were then obtained from other wells nearby and this data shows the effects of the volcanic and seismic activity on the groundwater in the area.

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