

## **The effect of volcanic eruptions on the chemistry of surface waters**

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The overall objective of this study is to measure the effect of volcanic eruptions on the chemistry of surface waters in the vicinity of the Hekla volcano (Iceland), during and after the 1991 and 2000 eruptions. The volume of the tephra was 0.02 km<sup>3</sup> for the 1991 eruption (Gudmundsson et al., 1991) and 0.01 km<sup>3</sup> for the 2000 eruption (Haraldsson et al., 2002). Experiments have shown that metal salts were adsorbed on the surface of the tephra and that they dissolved rapidly when exposed to de-ionized water and seawater (Frogner et al., 2001).

Ash embeded in snow was collected during the initial sub-plinian phase of the 2000 eruption and in the later stage of the 1991 eruption. River Ytri-Rangá, in the vicinity of Hekla, was monitored during and after both eruptions to detect changes in chemistry due to weathering of ash and metal salts.

The pristine volcanic ash and metal salts weathered rapidly when exposed to rain which resulted in high concentrations in the melted snow samples (F: 66.2, Fe: 4.2, Al: 6.0 mmol/kg, Pb: 0.28 and Cd: 0.95 µmol/kg) and low pH (2.6). River Ytri-Rangá became more polluted during the 2000 eruption than during the 1991 eruption due to a thicker load of ash in the river catchments. The concentration of F rose from 0.035 mmol/kg to 0.7 mmol/kg in the first period with rain after the 2000 eruption. Similar concentration increase was found for several other dissolved constituents in the river. The increase in concentration of F, Al and Pb were higher than the European Communities guidelines for water intended for human consumption (Council directive 98/83/EC).

### References:

Gudmundsson et al. (1991). Bull. Volcanol., 54, 238-246.

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Frogner et al. (2001). Geology, 29-6, 487-490.

Council directive 98/83/EC, Official Journal of the European Communities