

## **The 1783-1784 Laki Eruption: Modelling the Impact on Climate**

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A range of climatic phenomena including a warm summer in Europe and cold winters in subsequent years have been attributed in previous studies to the Laki eruption of 1783-84. Sulphate aerosol fields resulting from chemical transport model simulations of the effect of emissions from this eruption (see paper by Stevenson) are used here together with the Reading Intermediate General Circulation Model (IGCM) in an attempt to model the impact of this eruption on the radiation budget and climate. An ensemble of runs over the few years following the eruption is examined, particularly in terms of effect on surface temperature and atmospheric circulation. Large negative radiative forcing is found due to the direct effect of the sulphate aerosol from the eruption. A complex spatial pattern of surface temperature changes is found over the seasons following the eruption, some of which appear consistent with contemporary accounts. Depending on the emission scenario and resulting chemistry and transport, good agreement can be found between the modelled Northern Hemisphere mean temperature anomaly and observations. Other possible influences on climate, such as the effect of the emission of other gases and particles, and the indirect effect of aerosol on clouds are also discussed.