



Measurements of volcanic gas emissions during the first phase of eruptive activity of Eyjafallajokull, April 2010

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The March-April 2010 alkali-basalt eruption of Eyjafallajokull immediately preceded the vigorous, ash-rich April-May 2010 trachyandesitic eruption. We performed open-path FTIR, mini-DOAS and UV camera measurements on the erupted gases emitted from the first phase of the eruption at Fimmvörduháls on 1st and 2nd April, followed by downwind SO₂ flux measurements on the following days.

The SO₂ gas flux produced by the eruption was ~3000 tonnes per day. Approximately 70% of the SO₂ flux was produced by the fissure which opened on 31st March, with ~30% emitted from the 21st March fissure. The flux of HF from the eruption was ~30 tonnes per day. Gas compositions emitted from the two eruption fissures were broadly similar, being very rich in H₂O (>80% by mole), <15 % CO₂ and <3% SO₂. Strong variations between 5 and 25 in the SO₂/HCl ratio were observed at the 31st March fissure on the two measurement days, with higher values observed on 1st April when the activity was apparently more intense than 2nd April.

In this work we interpret the gas emission data in terms of the eruption dynamics and CO₂ contribution to the atmosphere. We also examine the implications of the observed gas fluxes for the erupted magma volume.