Reviewed research article

The 1783–1785 A.D. Laki-Grímsvötn eruptions II: Appraisal based on contemporary accounts

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Abstract – *The 1783–1784 Laki eruption along with intermittent explosive eruptions at the subglacial Grímsvötn central volcano, represents a two-year-long volcano-tectonic episode within the Grímsvötn volcanic system, from June 1783 to May 1785. The Laki eruption is the second largest basaltic flood lava eruption in historical times (after the 934–940 A.D. Eldgjá event) and its consequences were disastrous for Iceland. Detailed eyewitness accounts of the Laki-Grímsvötn eruptions exist and are here analysed in order to reconstruct the sequence of events as accurately as possible. This information is catalogued and critical eruption phenomena, such as the timing and nature of seismicity, explosive activity and mechanics of lava flow emplacement is evaluated. The results show that the 1783–1785 activity on the Grímsvötn volcanic system included at least 14 eruption episodes. Ten of these episodes were associated with the eight-month-long Laki eruption and linked to rifting and gradual lengthening of the erupting fissure. Each eruption episode began with an earthquake swarm, leading into a vigorous explosive eruption on a new fissure segment that was followed by sudden increases in outflow of lava. Concurrent explosive eruptions were reported at the Grímsvötn volcano during four of these episodes. The remaining four eruption episodes were confined to the Grímsvötn volcano, which remained active until May 1785. Evaluation of descriptions of flow phenomena in conjunction with new field observations of flow structures indicates that endogenous growth (i.e., insulated transport and inflation) was the characteristic mode of flow emplacement.*