



Eyjafjallajökull April-June 2010: An explosive-mixed eruption of unusually long duration

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The summit eruption of Eyjafjallajökull on April 14 to June 8 was of moderate size (0.17 km³ DRE) but in many ways unusual. Continuous but quite varied explosive eruption persisted for 39 days, it produced an abundance of fine grained ash, and ash transport was persistent towards south and southeast. The eruption was preceded by an 18 year long period of unrest and precursor activity. An intense seismic swarm accompanied with uplift occurred in January-March 2010, leading to the small basaltic flank eruption in March-April. The summit eruption of trachyandesite that began on April 14 was subglacial for some hours before penetrating the 200 m thick ice cap in the summit caldera. The first of three main phases (April 14-17) had a strong phreatomagmatic component, magma discharges reaching 1×10^6 kg/s when the eruption plume rose to 5-10 km height. A substantial fraction of the tephra erupted during this phase was fine ash and the eruption cloud was transported by northwesterly jet stream towards Europe. During April 14 and 15, ice melting lead to flooding, as jokulhlaups rushed down the slopes of the volcano. During this initial four day period the plume colour alternated between white and dark gray, reflecting alternations between periods of steam-rich plume and ash-loaded plumes generating dilute pyroclastic density currents. The second main phase of the eruption was the declining, mixed phase: On April 18, the vigour of the eruption subsided and by April 21 lava began to emerge from the vent, advancing north down Gígjökull outlet glacier. During most of this period the magma discharge ranged from $0.1-1.0 \times 10^5$ kg/s, with about 90% of the magma flowing as lava. The lava flow advanced down the outlet glacier to the north of the summit caldera, reaching a distance of 3 km from the vent in early May. On its way it melted the ice, forming a canyon in the glacier. The third main phase, the Vulcanian phase took place between May 5 and May 18. Deep earthquakes during the first days of May signalled renewed injection of magma into the volcano plumbing system. At the same time effusion of lava came to halt. On 5 to 6 May the eruption plume reached 8-10 km and the corresponding discharge is estimated at $0.3-1.0 \times 10^5$ kg/s. During the last days of continuous eruption the declining vulcanian phase was observed, with lower plume and less tephra dispersal. The end to continuous activity occurred late on May 22. However, minor explosions involving small amounts of magma took place on 4 to 8 June. The explosive eruption was therefore continuously active for 39 days with minor occasional activity persisting for further 17 days, not including a single, small explosion occurring on June 17.