



Early prediction of eruption site using lightning location data: An operational real-time system in Iceland

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Eruption of subglacial volcanoes may lead to catastrophic floods and thus early determination of the exact eruption site may be critical to civil protection evacuation plans. A system is being developed that automatically monitors and analyses volcanic lightning in Iceland. The system predicts the eruption site location from mean lightning locations, taking into account upper level wind.

In estimating mean lightning locations, outliers are automatically omitted. A simple wind correction is performed based on the vector wind at the 500 hPa pressure level in the latest radiosonde from Keflavík airport. The system automatically creates a web page with maps and tables showing individual lightning locations and mean locations with and without wind corrections along with estimates of uncertainty.

A dormant automatic monitoring system, waiting for a rare event, potentially for several years, is quite susceptible to degeneration during the waiting period, e.g. due to computer or other IT-system upgrades. However, ordinary weather thunderstorms in Iceland should initiate special monitoring and automatic analysis of this system in the same fashion as during a volcanic eruption. Such ordinary weather thunderstorm events will be used to observe anomalies and malfunctions in the system.

The essential elements of this system will be described. An example is presented of how the system would have worked during the first hours of the Grímsvötn 2011 eruption. In that case the exact eruption site, within the Grímsvötn caldera, was first known about 15 hours into the eruption.