

Interactive comment on “Observations of the altitude of the volcanic plume during the eruption of Eyjafjallajökull, April–May 2010” by P. Arason et al.

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General comments:

The paper is well written with the data cautiously processed, interpreted and presented. The inter comparison between the weather radar and webcam images confirms the need of these tools for real-time observation of volcanic plumes in Iceland. The plume-top altitude is a key parameter for modelling the atmospheric dispersal of volcanic ash over the North Atlantic region and for the London VAAC to issue ash forecasts for the civil aviation. The combined assessment of the plume-top altitude and its variation during the course of the eruption by these tools is therefore crucial.

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Specific comments:

The authors must indicate how the two UTC time scales of the weather radar and webcam were calibrated and matched for the cross-validation of the two observation tools.

As indicated in the paper each of these tools has its own limitation for observing in real-time and continuously the altitude variation of the plume top during the course of the eruption. Figures 4 and 6 reflect these limitations.

Precipitating clouds and poor visibility will always obscure respectively the weather radar and webcam data. However other aspects can be considered for improving the spatial and time coverage of these observation tools.

Improvements must be made for enlarging the altitude range to be covered by the weather radar above the volcano, by both lowering and increasing respectively the minimum and maximum detection heights.

During 27% of the time the altitude of the volcanic plume was too low to be detected by the Keflavík weather radar. Can the radar be moved to a more appropriate location in order to minimize the blocking effect of Brennisteinsfjöll mountain ridge and to lower the minimum detection height?

7% of the non-availability for the weather radar data was simply due to missing scan. Can this figure be lowered to a minimum? What maintenance work will this require?

The volcanic plume of the recent Grímsvötn eruption (21-28 May) reached an altitude of 17-20 km in the very first hours of the eruption. What are the modifications that can be brought to the Keflavik weather radar for increasing its maximum detection height to at least 20 km?

5% of the webcam images show the plume penetrating above the frame of the images while 4% of the images are missing. These webcams are relatively inexpensive to install and to maintain. Can a network of webcams be installed in the proximity of the

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most active volcanoes in Iceland?

Each set of webcams can be installed at appropriate distances to a volcano and inclinations from the horizontal. Figure 5 shows that the altitude above Eyjafjallajökull, covered by the fixed webcam in Hvolsvöllur, can be increased by several km by increasing its inclination from the horizontal.

Can the screens of these webcams be incremented (1, 2, 3, ... km) for estimating the plume-top altitude? This estimate is to be corrected by taking into account the wind speed and direction?

Technical corrections:

First author: Thórdur Arason = Th. Arason

Figures 4 and 6 must be in colour with their legend properly labelled: (a) observed, (b) below/above, (c) obscured, (d) missing.

Figure 9 must be enlarged.

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