

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

P. Arason et al.

arason@vedur.is

Received and published: 3 June 2011

[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.]

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



We are grateful to dr. Lacasse for these very positive general remarks.

[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.]

This is a valid concern and will be addressed in the revised paper.

[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.]

This is not really a maximum detection height, but a configuration that can be changed anytime if needed. We apologize for this being unclear and will amend this in the paper.

[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?]

As the main purpose of the weather radar is to monitor precipitation the location of the radar at the international airport is fixed. However, there are now plans to install a radar in NE-Iceland for a better coverage of the country, both in terms of weather and volcanic plume monitoring, and also to use a mobile radar for monitoring eruptions. In fact, a mobile radar was located 80 km from Grímsvötn during the May 2011 eruption was used for monitoring the eruption.

[7% of the non-availability for the weather radar data was simply due to missing scan.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Can this figure be lowered to a minimum? What maintenance work will this require?]

For routine observations this figure is much lower. When the setup is changed because of extraordinary circumstances, there is an increased risk of something going wrong. That is the main reason for these 7%.

[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?]

The Keflavík radar observed the May 2011 Grímsvötn plume up to 25 km at a distance of 260 km. There is practically no maximum detection height, see reply above. However, there were about 5 km increments between higher radar elevation angles during the Grímsvötn eruption.

[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 most active volcanoes in Iceland?]

Yes, and this has been discussed within the Icelandic Meteorological Office. The volcanoes Katla and Hekla are actually monitored by web cameras, a cooperation between the National Commissioner of the Icelandic Police and others. However, a lesson learned from the Eyjafjallajökull eruption is that those dealing with plume monitoring may have different needs from others, e.g. geophysicists and the media, and monitoring location may vary from eruption to eruption. Also, someone has to finance its installation and keep these instruments operational.

[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 in-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



creasing its inclination from the horizontal.]

Yes, but keep in mind that the Hvolsvöllur webcam was not installed to monitor plume-top altitudes. It was installed by a commercial telecommunications company, probably as a general service to the public, perhaps to monitor if the eruption was ongoing, or if something unexpected would happen.

[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?]

Probably, but the webcams were not installed to monitor plume-top altitudes.

[Technical corrections: First author: Thórdur Arason = Th. Arason]

The first author's first name initial is the old-English character "thorn". When forced to use the modern-English character set he prefers to use P. Arason

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

We disagree and think that figures 4 and 6 are very clear as they are. The a-b-c-d in the figure caption is perhaps not necessary, as the figure is self explanatory as required by ESSD.

[Figure 9 must be enlarged.]

We agree and would like to see figure 9 on a whole-page in a landscape format. However, this is up to the editor.

Interactive comment on Earth Syst. Sci. Data Discuss., 4, 1, 2011.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

