Earth Syst. Sci. Data Discuss., 4, C17–C19, 2011
www.earth-syst-sci-data-discuss.net/4/C17/2011/

Earth System
Science Data
Discussions

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: 11 August 2011

[This paper describes data on the height of the Eyjafjallajökull volcanic plume in April and May 2010 as measured by the Icelandic C-band radar and a nearby webcam located at Hvolsvöllur, Iceland. I've heard much informal discussion and some uncertainty among volcanologists regarding how plume heights measured by nearby radar systems might compare with other measurements. This is the first systematic comparison of radar with visible plume heights that I know of, and for this reason it is worthy of publication. The paper is well organized, clearly written, not overly long, and contains figures that are clear and well described.]

We are grateful to dr. Mastin for his positive remarks.

[I have only a few minor suggestions for improvements before it is published: 1) The abstract should contain a few sentences that describe the results of the comparison.]

We agree, and in our revised manuscript we have added a description of the results of the comparison to the abstract.

[2) In Section 2.1 and perhaps in Table 1 there should be some mention of the time taken per revolution of the radar beam. There should also be a few sentences in Section 5 about the meaning of "simultaneous", when webcam images are being compared with radar plume heights. The webcam images are taken more or less instantaneously, but the radar echo-top heights are presumably constructed by combining scan angles which could be separated by minutes. If it takes the radar beam a minute or so per revolution, is it possible that the plume height changed significantly during the time of a single reflectivity scan? Over what time scale was the plume height observed to vary when directly observed? (I've heard that such observations have been noted).]

We have added information on the rotation speed of the radar antenna to Table 1 and discussions on the time lag between the web camera images and radar detection. We estimate this lag to be 10-50 s depending of the height of the plume. Furthermore, we argue that the height difference is likely insignificant due to this time lag.

[3) In section 3, the authors note that the top of the plume was sometimes 5 km downwind of the summit. Can you confirm this? I've heard other members of IMO mention that the highest point in the plume was sometimes tens of kilometers downwind.]

We realize that this may have been unclear in the text and have clarified this in the revised manuscript. Yes, in a few cases the atmospheric conditions led to continued rising of the plume downwind from the volcano, but we have constrained the data set to observations above the volcano.

[4) I've heard some volcanologists express uncertainty about whether a white, ash-

poor plume would be visible in radar images, or whether the white, vapor-rich top of an ash-rich plume would be recorded as a radar plume top. Does this dataset contain any observations that could address these questions?]

Our Fig. 10 shows that there is not a significant mean bias in the altitude estimates of the radar when the plume is 4-5 km high. Besides this evidence, we think that we do not have data to address this question.

[5) In Figure 9, the triangles and pluses are sometimes hard to distinguish from one another. Enlarging the triangles would make them easier to differentiate.]

We have revised Fig. 9 with this in mind.

[I have also checked the online dataset and found it to be well organized and well documented. Overall I think this manuscript is in good shape and will make a valuable contribution to the literature.]

[Please also note the supplement to this comment: http://www.earth-syst-sci-data-discuss.net/4/C8/2011/essdd-4-C8-2011-supplement.pdf]

We have found a few more remarks and comments in the reviewers supplement and adjusted these.

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