

Interactive comment on “CARIBIC aircraft measurements of Eyjafjallajökull volcanic plumes in April/May 2010” by A. Rauthe-Schöch et al.

Anonymous Referee #1

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The paper is a useful addition to the Eyjafjalla literature and thus worthwhile to be published in the framework of the ACP Eyjafjalla Special Issue. However, I believe the basic reason for the CARIBIC activity was not just a scientific one, but public-relation-driven. The opportunity was taken to show up with some observations to demonstrate that Lufthansa is active.

Some revisions are necessary.

Page 16696, line 1: More lidar papers are available Gross et al., 2011, Atmos. Env. (Special Issue, in press), Wiegner et al., 2011 (Chem Phys Earth), Mona et al., ACPD, 2011. JGR Special Issue, Ansmann et al., 2011. Pietruczuk et al (2010) assume that they observed ash (with optical depth of 0.01...).

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Page 16702: The basic method (how to get the number concentrations at diameters from 1 to 10 microns and thus a realistic estimate of the mass concentration) should be illustrated in a figure. This is an easy task. In this figure the largest slope and smallest slope (later used to estimate the upper and lower limit of the estimated mass concentrations) should be indicated too. This is the fundamental approach of the paper and should not just be explained within one paragraph.

Page 16709: 240 micrograms per m³ over northeastern Germany on 20 April 2010 seems to be much too high (about a factor of 5-10). Is that observation supported by model results (FLEXPART)? How do you know that this was ash and not just sulphate accumulation particles or other particles?

Page 16718: CARIBIC data significantly add to the modest amount of Eyja measurements... is stated. Hm!? There are so many question marks concerning the measured (and extrapolated) size distribution that the aerosol observations are very uncertain. The only conclusion that can be drawn is: The observations are qualitatively consistent with FLEXPART results and thus reasonable. Is that a significant contribution? The aerosol measurements were by far not optimized for coarse mode particle counting. So please provide a more realistic statement.

Page 16719: Non volcanic air? Please specify more clearly what you mean! Note that ash and sulphate (formed from volcanic SO₂) was found in volcanic layers after 19 April 2010 (Ansmann 2011, JGR). How is non volcanic air defined?

Page 16719: Who knows the exact injection height? Therefore, there is always a large uncertainty in all the particle size estimates for given flight levels.

Figure 4: The CARIBIC potential to detect and document new particle formation is a unique point. That should be emphasized. And this point (together with gas observations, CO, O₃, ...) may justify statements such as ... significant contribution to the Eyjafjalla observations. ...

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Figure 7: The dotted bars are hard to detect.

Conclusion: The paper is well written, the CARIBIC observations are carefully evaluated. But some revisions are required.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 16693, 2011.