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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Physical and optical properties of 2010 Eyjafjallajökull volcanic eruption aerosol: ground-based, LIDAR and airborne measurements in France" *by* M. Hervo et al.

Anonymous Referee #2

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Review of: Physical and optical properties of 2010 Eyjafjallaj ÂÍ okull volcanic eruption aerosol: ground-based, LIDAR and airborne measurements in France M. Hervo1, B. Quennehen1, N. I. Kristiansen3, J. Boulon1, A. Stohl3, P. Fr′ eville1, J. M. Pichon1, D. Picard1, P. Labazuy2, M. Gouhier2, A. Colomb1, A. Schwarzenboeck1, and K. Sellegri

Decision: Publish with minor revisions.

Some points to consider:

You derive mass extinction coefficient using 550 nm scattering properties an 637 nm

absorption properties and apply to a 355 nm LIDAR. How is the mass extinction going to differ between 355 nm and 550 nm and how does this uncertainty propagate to LIDAR retrieved mass concentrations?

Some reasons for differences between measurements and model are suggested. One is in-cloud sulphate production. O'Dowd et al., 2011, measured of the order of 10 micrograms/mˆ3 sulphate in the plume.

You can retrieve ash layer thickness in the Free Troposphere. Is the dilution factor of the plume after mixing into boundary layer or in-situ measurement layer consistent with the ratio of in-situ mass to LIDAR derived concentrations in the FT ash layer aloft?

"it suggests that the volume size distribution is not dominated by the ashes but by the accumulation mode centred on 350 nm." This implies you do not consider ash particles occurring in the accumulation mode! I believe that this is an unfounded assumption, can you substantiate it?

What can you say about water uptake or CCN properties?

There is a special issue in Atmospheric Environment which contains related papers. One relevant paper is the Mace Head characterization of the ash plume (O'Dowd et al., 2011) which warrants a mention in the introduction as well as in the discussion section.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 24631, 2011.