Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-437-RC1, 2020

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Distinct chemical and mineralogical composition of Icelandic dust compared to North African and Asian dust" *by* Clarissa Baldo et al.

Anonymous Referee #1

Received and published: 21 June 2020

General comments:

Iceland is among the most active dust source areas in the world. Glacial flood plains contain fine glacial volcanic sediments that supply the Icelandic dust hotspots. Chemical and mineralogical composition, especially for those of iron, were determined for Icelandic dust. Icelandic dust was shown significantly different from low latitude dusts (African and Asian dust) in the chemical and mineralogical composition of iron. Estimation showed the soluble Fe deposition from Icelandic dust could contribute to the atmospheric deposition of soluble Fe and can impact primary productivity in the North Atlantic Ocean. The distinct chemical and mineralogical composition, particularly the

high magnetite content (1-2 wt%), indicates a potentially significant impact of Icelandic dust on the radiation balance in the sub-polar and polar regions. This results and conclusion would contribute our understanding in the role of dust on regional and global scales. Therefore, I recommend this manuscript is accepted and published in the journal of ACP

Specific comments:

Materials and methodology. Page 4, lines 115–116: "The method in Di Biagio et al. (2017), allowing for the realistic generation of dust aerosols from parent soils, was adopted for the dust particles generation." Page 4, lines 123–125: "CESAM (French acronym for Experimental Multiphasic Atmospheric Simulation Chamber), a 4.2 m3 stainless steel atmospheric simulation chamber (Wang et al., 2011), was used to generate the PM20 samples while acquiring information on the size distribution and the optical properties of the generated dust aerosols." Two different chambers were used to resuspend soils. Comment: The method in Di Biagio et al. (2017) allows for the realistic generation of dust aerosols from parent soils, how about CESAM? Are the physical and chemical characteristics of the sand and dust generated by these two chambers the same? Comparison of Icelandic dust with North African and Asian dust. Page 12, lines 357-359: "TiO2 catalyses heterogeneous photochemical reactions of atmospheric trace gases including SO2, NO2, VOC and O3, and contributes to the chemical balance of the atmosphere (Chen et al., 2012). In North African and Asian dust, TiO2 is around 1% (e.g., Formenti et al., 2014b; Jeong, 2008; Shi et al., 2011b), which is significantly lower than that in Icelandic dust (2-5.5%)." Comment: Titanium dioxide (anatase and rutile) can serve as photocatalyst in oxidation and reduction reactions. However, TiO2 given by XRF is not the mineral of TiO2, but element Ti. The high content of element Ti in dust does not mean that it contains higher TiO2 minerals.

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