Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-452-RC2, 2020

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mixing states of Amazon-basin aerosol particles transported over long distances using transmission electron microscopy" *by* Kouji Adachi et al.

Anonymous Referee #2

Received and published: 4 July 2020

The study works on individual aerosol particles collected in Amazon basin where is important for carbon cycle as the green ocean in the world. The authors collected the aerosol particles during the Green Ocean Amazon compaign at T3 site. They used TEM to analyzed different kinds of particles during the LRT particles. They carefully divided particle types based on their compositions and mixing states. Also, they accounted for their number fractions and compared them during LRT and non-LRT periods in the Amazons. Certainly, the study is critical important to understand properties of background aerosols and LRT particles in the Amazons. Finally, they found these particles are internally mixed particles, in particular, sulfate and sea salts as important coatings. Therefore, I think that the knowledge is filled into the gaps in the Amazon.

Before the paper accepted, I would like have some minor comments here.

(1) I might suggest that the authors need to add clear TEM images as the Figure 1 including different types of particles, such as K-bearing, Sulfate, soot, and mineral particles..Then you can give the Figure showing their number fractions. The potential readers might be know better clear the particle types.

(2) It is better to add more discussion. I noticed that they didn't deploy more discussion in discussion part. I might suggest that you need to consider the result from LRT and non-LRT. What are they different? And how could they have large impacts on ecology or climate? Also, the authors can add discussions on mixing structure of different aerosol components. These could be have more literature and scientific discussion should be enhanced.

Some minor comments:

L58: coated by acidic gas condensation

L165 during the IOP1 (Figure 2)

L200, Did you observe the NaNO3? NaCl can easly react with HNO3 and H2SO4 forming NaNO3 and Na2SO4.

L223, you observed the 600 nm and >2 um. Recently, Li et al., (2020) found two modes, suggesting different types of biological particles. I am wondering whether the authors observe observed more types with different morphologies. Here the PBA name can be changed to PBAP. PBAP can be more acceptable in many studies such(Després et al., 2012); (Pöhlker et al., 2012); (Li et al., 2020).

L227-229,The diurnal variations can commonly occur in the forests in the worlds. The emission mechanisms could be very complicated depending on winds, RH, and Temperature on plants and soil (Li et al., 2020)(Elbert et al., 2007).

L251, Again, what about nitrate.

L270, Here the authors found 10% sulfate. Maybe need to add one TEM image to show their morphology in Figure 1?

L289, Maybe add one TEM image showing the SOA and POA? As the authors found many sulfate particles. The SOA is internally mixed with sulfate as its coating? For example, Li et al. (2016) shows most of SOA coat on secondary inorganic particles in the forest and remote air.

L294, why did the authors used biofuel not biomass here?

L308 other aerosol components

L309 form various internal mixtures. As Li et al., raise the concept models of mixing structure. The sulfate can be core with SOA coating. They also can be coating on mineral, POA or others.

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