

Comment on acp-2021-193

Anonymous Referee #2

Referee comment on "Polycyclic aromatic hydrocarbons (PAHs) and their nitrated and oxygenated derivatives in the Arctic boundary layer: seasonal trends and local anthropogenic influence" by Tatiana Drotikova et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-193-RC2>, 2021

This manuscript investigated the seasonal variations and long-range transportation of polycyclic aromatic hydrocarbons (PAHs) and their nitrated and oxygenated derivatives on a remote island in the European Arctic. Considering the importance of the topic, it is a significant contribution to fully understand the current contamination status with both local emissions and those from midlatitudes via different transport processes. The article is generally well-written and derives reasonable conclusions. Hence, I recommend it for publication in the journal after some revision.

Specific comments

L105-140, an high-volume sampler was deployed on the roof of UNIS for air sampling. In such case, the local emissions might be highly controlled by the cars or snowmobiles parked in front of UNIS. The contributions from the plumes of the harbor and the power station of Longyearbyen might be only remarkable in a few samples. Apart from winter, it can be very hard to identify the proportion of PAHs originated from midlatitudes owing to many removal processes on the way to Longyearben.

L197-200, For instrumental analysis, GC-NICI-MS was used to quantify 35 nitro-PAHs and 29 oxy-200 PAHs. If a GC-MS is available, what is the advantage to analyze PAHs by UHPLC-Fluorescence. It can add additional uncertainty for comparison with PAH data from Zeppelin station.

L215-208, The high field blank contamination of biphenyl-2,2'-dicarboxaldehyde, 2,3-naphthalenedicarboxylic anhydride, and 1,8-naphthalic anhydride present in PUF samples. Actually, these chemicals are not only occurring in nature, but also synthesized for industrial application. Thus, the blanks might be from the PUF matrices.

L210-212, the LOQ is useful to control the data quality for the compounds which are not detectable in field blanks. While for the compounds present in field blanks, it might be good to calculate the method detection limit with field blanks.

L235, Fig.1 shows the concentrations of Oxy-PAHs are 2-10 times higher than their parent PAHs. Are the Oxy-PAHs determined in this work mainly from LRAT or resulted from degradation of local PAHs?

L425, Fig.5b shows five oxy-PAHs accounted ca. 90% of the total oxy-PAHs in all seasons, how is about their parent PAHs?