Atmospheric Chemistry and Physics Discussions

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Comment on acp-2022-336

Anonymous Referee #2

Referee comment on "Fluorescence characteristics, absorption properties, and radiative effects of water-soluble organic carbon in seasonal snow across northeastern China" by Xiaoying Niu et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-336-RC2, 2022

The manuscript discussed the fluorescence characteristics, absorption properties, and radiative effects of WSOC based on 34 snow samples collected from sites in northeastern China. Given that the fluorescence characteristics, absorption properties, and radiative effects of WSOC in snow samples in northeastern China are not addressed in the literature, the work therefore is novel and would add useful information to the climate effect of WSOC. There are some issues and comments that need to be considered before publication:

Specific comments:

- Page 3, Line 2: “the majority of which is water soluble organic carbon (WSOC).”, Please provide references.
- Page 3, Line 2-6, Some more important information on WSOC should be involved in the Introduction.
- Page 3, Line 19: Please provide the corresponding references.
- Page 4, Line 10-11: “34 samples of seasonal snow collected in December 2020 and January 2021”, repeated information which has been mentioned in Line 20.
- Page 5, Line 11: “sample sites” or “sampling sites”?
- In Section 2.2, how did the authors quantify the concentration of WSOC in the snow samples? Did they randomly select different masses of snow samples for dissolution? Or snow need to be weighed? More information about experiment should be supplemented in the Experiment section
- Page 6, Line 27ï¼☐It is recommended to provide how inner filtration effect, Raman scattering and Rayleigh scattering are removed in EEM.
- Page 6, Line 29: “As fluorescence spectra with wavelengths greater than 600 nm are

primarily noise", I would like to know why the authors measured excitation and emission wavelengths greater than 600 nm.

- Page 7, Line 28: Please check Eq. 3.
- Please provide the absorption measurement of WSOC in the method section.
- Please provide the blank concentration of WSOC in the method section.
- Page 10, Line 1-6: Suggest put it in the above paragraph.
- Page 10, Line 23: The author should give the full name of "HULIS".
- Page 10, Line 25: "Wen et al. 2021", format error.
- Page 12, Line 15: Indeed, I don't know how the author obtained this conclusion, because the author only mentions SEIN and SNC here.
- Page 14, Line 8: Can you really claim "monotonously"?
- Page 14, Line 14-16: "FI values of ≤1.4 correspond to terrestrial sources and values of ≥1.9 denote a primarily microbial origin, values of 1.4–1.9 suggest a mixed origin.". Suggest put it in Section 2. In addition, please provide references.
- Page 15, Line 2: The result of TFV could not be seen in Figure 5a. Is it Figure 5b? as well as $_{WSOC}$ (280).
- Missing space in front of the unit in Figure 5 and elsewhere.
- Page 16, Line 19: "P" should be "*P*".
- Page 17, Line 1-11: Suggest putting it in Section 1 (Introduction) and revising it appropriately.
- Figure 7 should include the legend. In addition, in Line 11, Figure 7a refers to the absorption at wavelengths at 280-400 nm?
- Page 23, Line 5, this sentence belongs to Section 2.
- References: Please check the references and unified format. For example, "Characterization of Chromophoric Water-Soluble Organic Matter in Urban, Forest, and Marine Aerosols by HR-ToF AMS Analysis and Excitation–Emission Matrix Spectroscopy," in Line 8.