We show our gratitude to Anonymous Referee #1 for his constructive comments. We have revised the manuscript accordingly. Please find our point-to-point responses below.

Response to Anonymous Referee #1's comments

The aim of the study is to predict ambient particle number size distributions from 0.01 to 10 µm using meteorological data and partial size-fractionated particle data. The authors provide a good overview of the lack of particle size distribution measurements in the MENA region and application of machine learning models for atmospheric aerosol research. The authors utilized an urban aerosol dataset collected in Amman, Jordan via tandem SMPS/OPS measurements. 70% was allocated as the training set and 30% for the testing set for the feedforward neural network (FFNN) modeling analysis. Seasonal and diurnal trends in the SMPS/OPS data are concisely described. The authors provide a thorough breakdown of the performance of the three modeling approaches considered: (1) meteorological data, (2) partial particle data from remaining size bins, and (3) a combination of (1) and (2). The authors found meteorological data to be of limited value to their modeling process and noted issues with predicting particle size distributions from 0.01 to 10 µm based on partial size-fractionated particle data. The study is of value for those conducting ambient aerosol measurements with the TSI NanoScan SMPS 3910 and TSI OPS 3330, which is a common configuration with noted limitations. The authors identified size fractions where their model did not perform well, notably near the lower limit of detection for the SMPS, near the upper limit of detection for the OPS, and in the overlapping region between the two instruments. The study provides a new way for handling particle number size distribution data collected from the TSI NanoScan SMPS 3910 and TSI OPS 3330 that forgos deletion of negative values in the dataset. The proposed FFNN modeling approach can be used to predict particle number size distributions in urban environments similar to the one considered in the study.

Response: Thank you for the good summary of our manuscript.

Specific Comments

1) Pg. 5, Ln. 170: what refractive index (default or otherwise) was used for processing the data from the TSI OPS 3330?

Response: Default TSI setting was used.

2) Pg. 5, Ln. 175: please describe the configuration of the aerosol inlet assembly. Also: was a diffusion dryer used? I am curious if the authors encountered any issues with SMPS/OPS sampling at high RH (RH of 100% reported on pg. 8)?

Response: The inlet consisted of copper tubing with a diffusion drier (TSI 3062-NC). The penetration efficiency and losses in the inlet and the diffusion drier were estimated experimentally in the lab. The sentence is now inserted in Section 2.1.

3) Pg. 5, Ln. 180: it would be helpful to explain some of the limitations of the unipolar charger and radial DMA used within the TSI NanoScan SMPS 3910 as it pertains to the counting efficiency issues discussed in this section.

Response: The SMPS is designed to measure the size distribution within 0.01–0.45 µm. However, due to limitations related to the unipolar charger, the upper limit of the size distribution was 0.25 µm instead of 0.45 µm. The complete size distribution 0.01–0.1 µm was constructed by combining the distributions

measured with the SMPS (after removing the last two bins) and the OPS (after removing the first bin). The combination was based on interpolation to match the two distributions.

4) Pg. 20, Fig. 6: please specify the cold and warm months in the figure caption.

Response: Cold and warm months refer to Dec–Feb and Jun–Aug, respectively. This is now included in the figure caption.

Technical Corrections

1) General: consider writing “Dp” with “p” as a sub-script.

Response: We have now corrected all ‘Dp’ to ‘D_p’.

2) Pg. 1, Ln. 1: consider making “particle size distribution” plural in the title.

Response: Considering also the title suggestion by referee #2, we have now the title as ‘Data imputation in in situ measured particle size distributions by means of neural networks’.

3) Pg. 1, Ln. 16: please clarify if you mean size-integrated particle mass concentrations, e.g. PM2.5, PM10.

Response: Thank you for the suggestion and we specify the particle mass concentrations as size-integrated as suggested.