

1. Specify whether the instrument used a PM1 or PM2.5 lens

Reply: The ToF-ACSM in this study was equipped with a PM<sub>2.5</sub> aerodynamic lens.

2. Specify whether the instrument used a 'standard' or 'capture' vaporiser (there is some confusing language here)

Reply: The instrument used a standard vaporizer.

3. Give the model of the Nafion drier, in particular whether this was a single or multi-bore drier, the method used to dry the outer and how the instrument subsampled the major 3lpm flow. If the unit used is the system offered by Aerodyne, this should be stated because this would give confidence in the set-up.

Reply: Thanks for the valuable suggestion. Our ToF-ACSM system was equipped with a multi-bore Nafion dryer (Perma Pure, Model MD-700-24F-3). The sample aerosol passes through the inner tubes, while a dry purge gas flows counter-currently on the shell side. The resulting concentration gradient drives water vapor across the Nafion membrane, effectively reducing the sample's relative humidity to below 40%. This drying principle is well-established for Perma Pure MD-700 series dryers in previous studies. Downstream of the PM<sub>2.5</sub> cyclone and the Nafion dryer, the main sample flow ( $\sim 3 \text{ L min}^{-1}$ ) is subsampled into the ToF-ACSM through a 100  $\mu\text{m}$  critical orifice at a flow rate of  $1.4 \text{ cm}^3 \text{ s}^{-1}$ .

4. Was the humidity after the drier measured? If so, please state the typical humidity

Reply: No dedicated RH sensor was installed downstream of the Nafion dryer in this study. Previous studies using similar ToF-ACSM configurations have consistently reported that this dryer effectively reduces the sample's RH to below 40% (Lin et al., 2021, <https://doi.org/10.5194/acp-21-12173-2021>).

Based on the above revision, we supplied the following statement to the Methods section: The ToF-ACSM system used in this study was a standard integrated unit from Aerodyne Research Inc., equipped with a PM<sub>2.5</sub> aerodynamic lens, and a standard vaporizer. The sample flow ( $\sim 3 \text{ L min}^{-1}$ ) was dried using a multi-bore Nafion dryer (Perma Pure, Model MD-700-24F-3). The sample

aerosol passes through the inner tubes, while a dry purge gas flows counter-currently on the shell side. The concentration gradient drives water vapor across the Nafion membrane, effectively reducing the sample's RH to below 40% (Lin et al., 2021). The aerosol was then subsampled into the ToF-ACSM through a 100  $\mu\text{m}$  critical orifice at a flow rate of  $1.4 \text{ cm}^3 \text{ s}^{-1}$ .