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Measurement report: Secondary organic aerosols at a forested mountain site in southeastern China

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Abstract. Aerosol particles play crucial roles in both climate dynamics and human health. However, there remains a significant gap in our understanding of aerosol composition and evolution, particularly regarding secondary organic aerosols (SOA), and their interaction with clouds in high-altitude background areas in China. Here we conducted real-time measurements of submicron aerosols (PM_1) using aerosol mass spectrometers at a forested mountain site (1128 m a.s.l.) in southeastern China in November 2022. Our results revealed that organic aerosol (OA) constituted a substantial portion of PM_1 (41.1 %), with the OA being primarily of secondary origin, as evidenced by a high oxygen-to-carbon (O/C) ratio (0.85–0.96). Positive matrix factorization resolved two distinct SOA factors: less oxidized oxygenated OA (LO-OOA) and more oxidized OOA (MO-OOA). Interestingly, MO-OOA was scavenged efficiently during cloud events, while cloud evaporation contributed significantly to LO-OOA. The ratio of OA/ΔCO increased with a decrease in the O/C ratio, suggesting that OA remaining in cloud droplets generally maintained a moderate oxidation state. Furthermore, our results indicated a higher contribution of organic nitrates to total nitrate during cloudy periods (27 %) compared to evaporative periods (3 %). Notably, a substantial contribution of nitrate in PM_1 (20.9 %) was observed, particularly during high PM periods, implying that nitrate formed in polluted areas interacted with clouds and significantly impacted the regional background site. Overall, our study underscores the importance of understanding the dynamics of secondary organic aerosols and the impacts of cloud processing in regional mountainous areas in southeastern China.

1 Introduction

Aerosol particles play essential roles in regional and global climate (Ramanathan et al., 2001; Kanakidou et al., 2005), as well as air pollution (Huang et al., 2014) and public health (Kampa and Castanas, 2008). Submicron aerosol (PM_1) from both

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This is contrary to many other studies that reported higher O/C ratios for OA in cloud/fog droplets than ambient OA, what could be the reasons?

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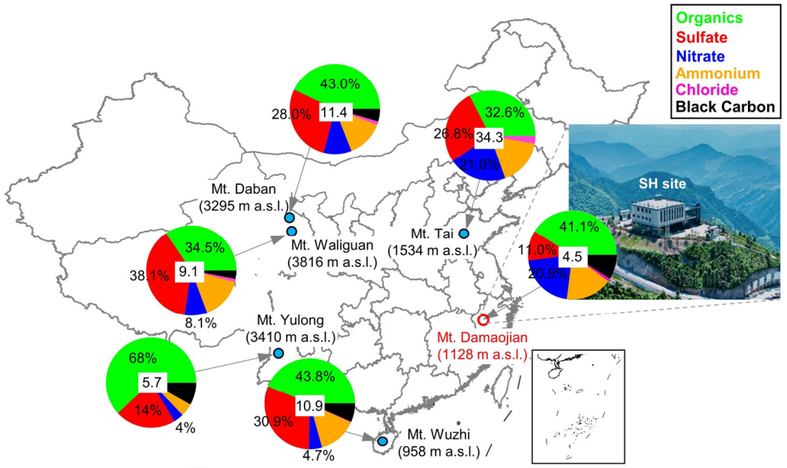

Figure 1. Location of the sampling site. The mean concentration (in μg m-3) and chemical composition of submicron aerosols (NR-PM1+ BC if it was available) measured at selected mountain sites in China are also shown. Detailed information of these sampling sites is presented in Table S1 in the Supplement.

2 Methods

2.1 Site and instrumentation

The campaign was carried out from 1 November to 30 November 2022 at Shanghuang Atmospheric Boundary Layer and Eco-Environment Observatory (SH site) on the top of Mt. Damaojian (119.51°E, 28.58°N, 1128 m a.s.l.) in Wuyi County, Zhejiang Province (Fig. 1). This site is a typical background site in southeastern China that is surrounded by mountains and forests, and there are no strong local anthropogenic sources nearby.

PM_1 species were measured using a suite of real-time instruments with 1−5 min time resolution, including an AMS operated under the "V-mode" and a quadrupole ACSM for non-refractory (NR)-PM_1 composition, together with a seven-wavelength Aethalometer (AE33, Magee Scientific Corp.) for equivalent black carbon (BC) mass concentration. The AMS measurements were only conducted during two periods (15−20 November and 24−28 November, respectively) in this study due to the malfunction of the instrument. Briefly, aerosol particles were sampled into an air-conditioned room through stainless steel tube (O.D.: 1/4 inch), and the residence time was estimated as 5 s. A nafion dryer was placed upstream of the ACSM and AMS to remove the moisture, after that, aerosol particles were sampled into AMS, ACSM, and AE33, respectively. Simultaneously, air pollutants including NO_x, O_3, $PM_{2.5}$, and PM_{10} were measured by gas analyzers (Thermo Scientific Inc., USA), and CO was measured by a Picarro greenhouse gas analyzer (G2401, Picarro Inc., USA). In addition, meteorological parameters containing temperature (*T*), RH, wind speed (WS), wind direction (WD), and pressure (*P*) were measured at the same site.

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make it a superscript, check and rectify such discrepancies throughout the manuscript

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by what?

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2.2 Data analysis

2.2.1 ACSM and AMS

ACSM data were analyzed using ACSM standard data analysis software (v2.5.13) and AMS data were analyzed using SQUIRREL v1.65F and PIKA v1.25F. A composition-dependent collection efficiency (CDCE) was applied to the ACSM/AMS data according to Middlebrook et al. (2012). Elemental analysis of high-resolution mass spectra (HRMS) was performed using the "Improved-Ambient" (I-A) method (Canagaratna et al., 2015). The default relative ionization efficiency (RIE) values of 1.1, 1.4, and 1.3 were applied for nitrate, organics, and chloride. According to the ion efficiency (IE) calibration results, the RIE values of ammonium and sulfate were 5.05 and 0.73 for ACSM, and 5.26 and 1.28 for AMS, respectively. As shown in Fig. S1, the concentrations of NR-PM_1 tracked well with $PM_{2.5}$ and PM_{10} measured by gas analyzers (r^2 = 0.70 and 0.66, respectively), suggesting that the AMS/ACSM quantification was reasonable.

PMF Evaluation Tool (PET v3.04) was employed to further deconvolve the HRMS into different source factors following the procedures reported by Ulbrich et al. (2009) and Zhang et al. (2011). In addition to organic fragment ions, the major fragment ions of inorganic species, i.e., SO^+ (*m/z* 48), SO_2^+ (*m/z* 64), SO_3^+ (*m/z* 80), HSO_3^+ (*m/z* 81), $H_2SO_4^+$ (*m/z* 98) for sulfate, NO^+ (*m/z* 30), NO_2^+ (*m/z* 46) for nitrate, NH^+ (*m/z* 15), NH_2^+ (*m/z* 16), NH_3^+ (*m/z* 17) for ammonium, and Cl^+ (*m/z* 35), HCl^+ (*m/z* 36) for chloride were also included into the HR data and error matrices for PMF. A more detailed description of the procedures was given in Sun et al. (2012). After checking the key diagnostic plots (Fig. S2), mass spectra, and the correlations with related tracers, a four-factor solution was considered as the optimal solution in this study.

2.2.2 Estimation of organic nitrates

ONs were estimated from the PMF results (Zhang et al., 2011; Xu et al., 2015). Briefly, NO_x^+ (i.e., NO^+ and NO_2^+) are major fragments of nitrate functionality (-ONO_2), which can be referred to as the total nitrate measured by AMS. Combining inorganic with organic mass spectra in PMF, NO^+ and NO_2^+ can be separated into different organic aerosol (OA) factors and an inorganic nitrate aerosol factor (NIA). Therefore, the mass concentration of ONs ($NO_{3,org}$) was calculated by summing these two ion signals distributed in all OA factors as follows:

$$NO_{3,org} = NO^+_{org} + NO^+_{2,org} \quad (1)$$

$$NO^+_{org} = \sum([\text{OA factor}]_i \times f_{NO^+,i}) \quad (2)$$

$$NO^+_{2,org} = \sum([\text{OA factor}]_i \times f_{NO_2^+,i}) \quad (3)$$

where $[\text{OA factor}]_i$ represents the mass concentration of OA factor *i* resolved by PMF, $f_{NO^+,i}$ and $f_{NO_2^+,i}$ are the mass fractions of NO^+ and NO_2^+ in OA factor *i*, respectively.

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PM measured by gas analyzers? provide clear description in the methodology part.

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and slopes?

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ON could also be estimated using NO+/NO2+ ratios as reported in some studies, so why PMF?

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2.2.3. Backward trajectory analysis

The Hybrid Single-Particle Lagrangian Integrated Trajectories (HYSPLIT) model and meteorological data from the NOAA Global Data Assimilation System (GDAS) were used to calculate 72 h backward trajectories at the SH site. The trajectory time was set from 0:00 to 23:00 at 1 h intervals, and the height was set as 1100 m.1 To further show the particle concentration levels in different regions, the map was colored by the time-averaged organic carbon surface mass concentration (ENSEMBLE) from the MERRA-2 model, which was obtained from the NASA Giovanni website (http://giovanni.sci.gsfc.nasa.gov/giovanni).

3. Results and discussion

3.1. General descriptions

Figure 2 shows the time series of meteorological parameters (*T*, RH, WD, and WS), air pollutants ($PM_{2.5}$ and CO) along with PM_1 species during the campaign. The total PM_1 concentration varied dynamically from 0.3 μg m^{-3} to 57.95 μg m^{-3},2 with an average (± 1σ) of 4.45 ± 6.51 μg m^{-3}. As shown in Fig. 1, organics held the largest contribution to total PM_1 during the sampling period (41.1 %), followed by nitrate (20.9 %), ammonium (17.0 %), sulfate (11.0 %), BC (9.0 %), and chloride (1.0 %). The concentration and composition of PM_1 are quite different from those observed at other mountain sites with similar altitudes (Fig. 1), such as Mt. Wuzhi, where PM_1 has a mean mass concentration of 10.9 μg m^{-3}, and sulfate makes up a significant part (30.9 %) of total PM_1 (Zhu et al., 2016). Note that the PM_1 concentration at SH site is even lower than those at mountain sites with higher attitude (Fig. 1), such as Mt. Tai (34.3 μg m^{-3}) in NCP (Zhang et al., 2014), Mt. Yulong (5.4 μg m^{-3}) (Zheng et al., 2017), and Mt. Waliguan (9.1 μg m^{-3}) (Zhang et al., 2019). Considering the occurrence of frequent cloud events during the sampling period, the low PM_1 concentration might be mainly associated with cloud scavenging (Kim et al., 2019). Indeed, the unexpectedly high fraction of nitrate at the regional background site might indicate that nitrate formed from anthropogenic-emitted NO_x can have a significant impact on regional scale in the southeastern China. One explanation was that nitrate formed in polluted regions interacted with clouds and affected the regional nitrate level as cloud evaporates (Tao et al., 2018).

Figure 3 shows the relative contribution of each PM_1 component as a function of PM_1 concentration together with the probability density of PM_1 mass loading. The highest two probabilities were distributed within 0–6 μg m^{-3} and 12–18 μg m^{-3} (48.5 % and 30.1 %, respectively). The fraction of nitrate increased significantly with PM_1 concentration, and meanwhile, the fraction of organics and BC exhibited a decreasing trend. This result suggested that high levels of PM_1 at the SH site might be mainly attributed to the nitrate formation and transport. It is also noted that a nitrate-dominant peak of PM_1 mass loading was observed at the nighttime of 4 November (Fig. 2d), which was associated with the corresponding increase in CO, further emphasizing the contribution of transport to nitrate.

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why this height?

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In fig. 2, it doesn't seem that PM2.5 ever crossed 50 ug/m3, so max PM1 levels of 57.95 ug/m3 seems off, please explain.

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The diurnal cycles of PM_1 species, air pollutants, and meteorological parameters during the entire campaign are illustrated in Fig. S3. The mean and median values of organics and nitrate both showed distinct noon peaks at around 14:00, which could be attributed to the daytime photochemical production and the low wind speed (Tang et al., 2022; Xu et al., 2018b). The high nighttime peak of nitrate was mainly due to the influences of the nitrate event on 4 November. Comparatively, sulfate, chloride, and BC showed relatively flat diurnal variations, suggesting the regional characteristics of these species (Zhang et al., 2015).

3.2 Comparisons of two different periods

RH plays a crucial role in determining the composition, formation, and evolution of PM_1 (Sun et al., 2013; Xu et al., 2019). Figure S4 shows the variation of organics, nitrate, and sulfate mass concentrations as a function of RH during the entire campaign. Overall, the mass concentrations of organics decreased significantly with increasing RH, while nitrate and sulfate only showed slight decreases. Previous studies have shown that aerosol mass generally increases on foggy days (Chen et al., 2021). This phenomenon could be due to the cloud scavenging effect under high RH at this site. Another explanation is that submicron aerosols grow to larger sizes under high RH that AMS aerodynamic lens cannot transmit (Chakraborty et al., 2016). To further investigate aerosol characteristics under different meteorological conditions, we selected two periods (Fig. 2, denoted as P1 and P2 hereafter) with largely different humidity and PM_1 concentrations. P1 was a typical cloud scavenging period with relative humidity remaining to be saturated (RH = 100 %), and meanwhile, PM_1 stayed at a very low level, with an average value of 1.34 μg m^{-3}. Whereas in P2, the mean RH decreased to 93.9 % with almost no cloud event, and a high PM_1 event happened with a maximum mass concentration of 20.65 μg m^{-3} (on average 9.39 μg m^{-3}). Then, the PM_1 concentration decreased rapidly due to the enhanced mountain-valley wind (WS > 4 m s^{-1}) and increasing RH (71 % to 100 %) during the nighttime. Therefore, P2 was more likely to be a cloud evaporation period, where aerosol particles were released from the cloud droplets after water evaporation (Fanourgakis et al., 2019).

3.2.1 Size distributions and composition

The average chemically resolved size distributions of NR-PM_1 during P1 and P2 are shown in Fig. 4. Generally, all species were distributed in accumulation mode in both periods. However, a smaller peak size (300–500 nm) and broader size distribution were observed during P1 when compared to those of P2 (~700 nm), probably owing to the wet removal of larger and hygroscopic particles in P1 (Ge et al., 2012). Ammonium showed similar size distribution with sulfate and nitrate during P2, while in P1, it was mixed mainly with sulfate and exhibited a quite different size distribution with nitrate, indicating the potential contribution of organic nitrate.

Clear differences were also found in aerosol composition during P1 and P2. Organics were the dominant contributor to total NR-PM_1 mass during P1 (68 %), followed by nitrate (12 %), ammonium (11 %), and sulfate (8 %). In contrast, despite the decreased contribution of organics (51 %), the mass fractions of sulfate and nitrate increased considerably during P2 (17 % and 19 %, respectively). These changes in the mass fraction of species were attributed to the lower mass scavenging

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High PM1 even had 20.65 ug/m3 max conc. then when that 57.95 ug/m3 lPM1 level event happened?

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I am not convinced with the identification/naming of P1 and P2 events, evidences are not clear to term them as cloud and evaporating cloud episodes. Rh 100% or 90% doesn't necessarily indicating cloud or its evaporation.

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efficiency of organics than inorganic species (Gilardoni et al., 2014). The average HRMS of OA during P1 and P2 are presented in Fig. S5. The HRMS of OA were quite similar for the two periods, with a significant peak *m/z* 44 (mainly CO_2^+). The OA was highly oxidized, with $C_xH_yO_1^+$ dominating the total OA in P1 and P2 by 41 % and 40 %, followed by $C_xH_y^+$ (31 % and 32 %), and $C_xH_yO_2^+$ (20 % and 19 %). The contributions of the two major oxygen-containing ion fragments ($C_xH_yO_1^+$ and $C_xH_yO_2^+$) at the SH site were much higher than those at various urban or suburban sites in China, such as 37.4 % in urban Nanjing (Wang et al., 2016), and 52.9 % in suburban Lanzhou (Tang et al., 2022). Note that higher fraction of CO_2^+ (3 % higher) was found in P1 than P2 (Fig. S5c), indicating a higher oxidation degree of OA in P1 (Xu et al., 2014). This is consistent with the higher O/C and OSc (0.96 and 0.49) in P1 than P2 (0.85 and 0.21).1

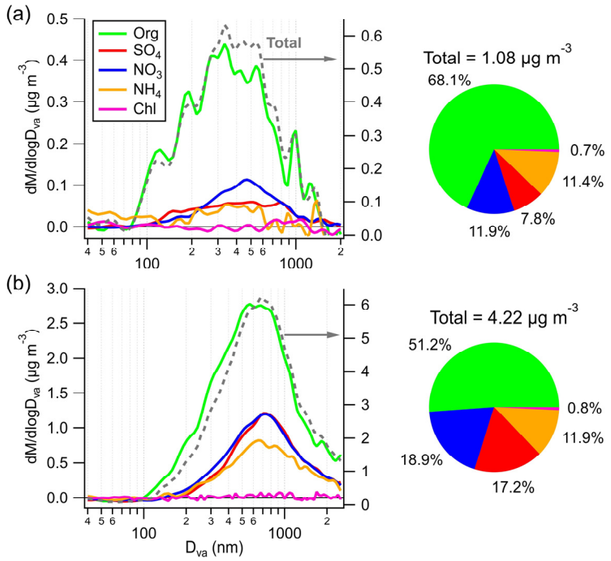

Figure 4. Averaged size distributions and chemical composition of NR-PM_1 during (a) P1 and (b) P2.

3.2.2 Elemental ratios

Figure 5 shows the time series and box plots of N/C, H/C, OM/OC, O/C, and carbon oxidation state (OSc) of OA, as well as two ion ratios at the SH site. The hourly averaged ratios were only reported for periods with OA concentrations above 0.7 μg m^{-3}. The average N/C ratios were 0.018 for P1 and 0.027 for P2, consistent with the higher fraction of $C_xH_yN_p^+$ in OA during P2. OA had a slightly lower H/C ratio (1.44 vs. 1.48) and higher average ratios of O/C (0.96 vs. 0.85), OM/OC (2.42 vs. 2.29), and OSc (0.49 vs. 0.21) during P1 than those during P2, indicating more oxidized OA during P1. The O/C ratios were

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please move the values in parenthesis after P1 and P2, respectively. Evaporating cloud residue organics in P2 was less oxidized than P1, why so?

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overall within the range of 0.94 ± 0.18 at regional background sites (Zhou et al., 2020), yet much higher than those observed at urban and suburban sites. These results suggest that OA at the SH site was relatively ~~well~~ aged.

The ratio of fragment ions NO^+ (*m/z* 30) to NO_2^+ (*m/z* 46) is a good indicator for identifying the presence of ONs (Farmer et al., 2010; Lin et al., 2021). The mean ratio of NO^+/NO_2^+ in P1 was 4.9, which exceeds the value of 3.88 for pure NH_4NO_3 (AN) obtained from the AMS IE calibration, indicating a potential contribution of ONs. Conversely, the mean NO^+/NO_2^+ in P2 (3.9) was almost identical to that of AN, implying the dominance of inorganic nitrates (INs). Additionally, the $CH_2SO_2^+$ (*m/z* 79) and $CH_3SO_2^+$(*m/z* 80) ions were used as signature fragments of methanesulfonate, a typical organic sulfur species (Chen et al., 2019). However, the mean ratios of $CH_3SO_2^+$ and $CH_2SO_2^+$ during P1 and P2 (0.98 and 1.99, respectively) were lower than the value of 2.9 reported in previous studies for MSA, indicating the negligible contribution of MSA (Song et al., 2019).

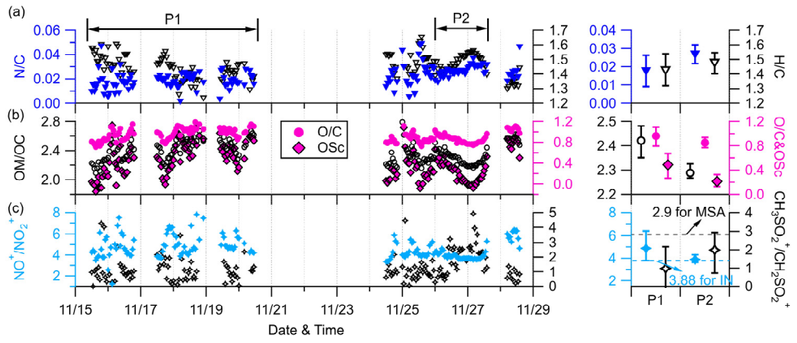

Figure 5. Time series and box plots of 1-hour averaged (a) N/C and H/C, (b) OM/OC, OSc, and O/C, and (c) NO^+/NO_2^+ and $CH_3SO_2^+/CH_2SO_2^+$. Only ratios determined with good S/N (i.e., organics > 0.7 μg m^{-3}) are shown.

3.3 Source apportionment of OA and contribution of organic nitrates

Four factors were resolved by PMF, including three types of SOA and one inorganic factor: less oxidized oxygenated OA (LO-OOA), more oxidized oxygenated OA (MO-OOA), OA associated with sulfate ions (SO_4-OA), and inorganic nitrate aerosol (NIA). These four factors together on average accounted for 87.5 % of the total NR-PM_1 mass. The mass spectra profiles and OA ion family composition of the four factors are shown in Figs. 6 and 7.

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MSA is established as a good indicator for cloud/fog processing, why MSA was lower? an explanation is needed.

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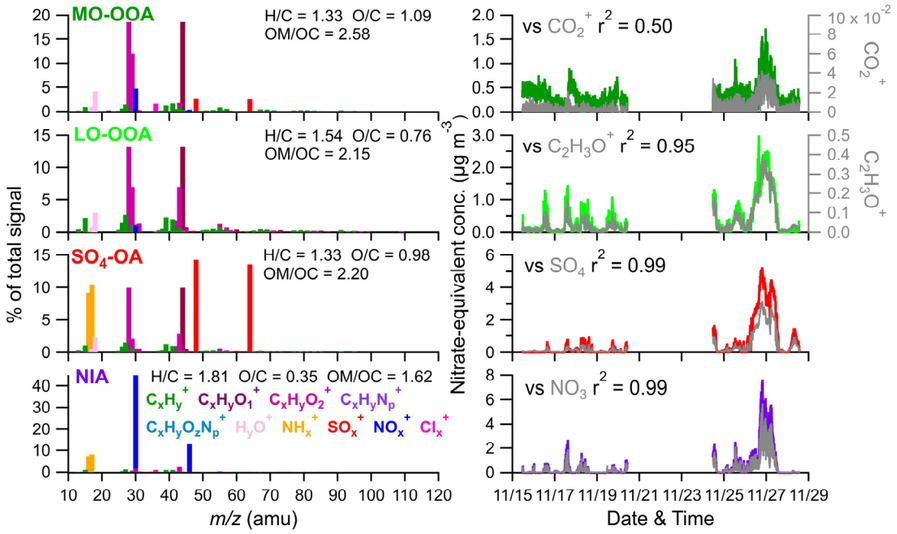

225 **Figure 6.** High-resolution mass spectral profiles (left) and time series (right) of four factors. The correlations of four factors with corresponding tracers are also shown.

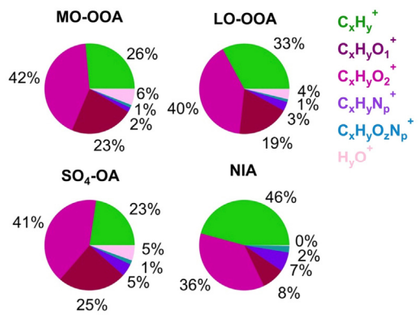

Figure 7. Mass fractional composition of OA ion families for the resolved four PMF factors.

230 LO-OOA and MO-OOA were identified by prominent peaks of CO^+ and CO_2^+ in the mass spectra. LO-OOA had a high fraction of $C_2H_3O^+$ (*m/z* 43, 6.8 % of the total signal), while MO-OOA, corresponding to more oxidized and aged components, had a higher abundance of CO_2^+ (17.6 % vs. 12.8 %), $C_xH_yO_2^+$ (23 % vs. 19 %), and O/C ratio (1.09 vs. 0.76) than LO-OOA. The average O/C ratios of these two OOA factors are similar to those at Mt. Bachelor, where the O/C ratios of SV-OOA and LV-OOA were 0.67 and 1.17, respectively (Zhou et al., 2019). LO-OOA correlated tightly with $C_2H_3O^+$ (r^2 235 = 0.95), and MO-OOA showed a moderate correlation with sulfate (r^2 = 0.56). Overall, the LO-OOA and MO-OOA

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Use tracers not used as inputs in PMF, else these comparison doesn't properly justify the factors selection.

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components account for 39.1 % and 29.4 % of the total measured OA mass, respectively (Fig. S6). The mass spectra of the SO_4-OA factor had a large amount of NH_x^+ and SO_x^+, together accounting for 48.5 % of the total mass of this factor. Meanwhile, organic components also made up a considerable fraction, yet on average contributing 51 %. It is also noticed that the O/C ratio of the organic fraction of this factor is 0.98, which is even higher than LO-OOA and comparable to MO-OOA, suggesting that this factor has experienced aging processes during the regional transport. Not surprise, no primary OA factor (e.g., hydrocarbon-like OA, biomass burning OA, etc.) was resolved during this study due to the negligible influences of local emissions, which was consistent with the PMF results at other background sites (Zhou et al., 2019; Zhu et al., 2016). A nitrate aerosol factor was also separated from these OA factors, with nitrates in this factor accounting for 92.6 % of the total NO_x^+ ions. Despite NIA, NO_x^+ ions were more assigned in MO-OOA (6.0 % of the total NO_x^+) than LO-OOA (1.4 % of the total NO_x^+), suggesting that ONs were more associated with MO-OOA. According to previous studies, the ratios of NO^+/NO_2^+ for ONs are approximately 2.25–3.7 times higher than pure NH_4NO_3 (Fry et al., 2013; Fry et al., 2009). Consistently, the average NO^+/NO_2^+ ratios of LO-OOA and MO-OOA were 13.19 and 11.2, falling within the range of ONs. In contrast, a NO^+/NO_2^+ ratio of 3.56 was observed for NIA, reflecting its characteristics of inorganic nitrates. Based on the PMF results above, the mass concentrations of ONs during the AMS sampling period were estimated (Fig. 10). Considering ONs as part of organics, we chose a RIE value of 1.4 for the estimated ONs, while a nitrate RIE value (1.1) was correspondingly applied for INs. The results showed that ONs made a greater contribution to total nitrate in P1 than in P2 (27 % vs. 3 %). This was further supported by the result of Huang et al. (2021), which found that organic nitrate can increase rapidly when RH > 70 %. The average mass concentration of ONs in P1 was 30 ng m^{-3}, which was comparable to that in P2 (40 ng m^{-3}), likely owing to the cloud scavenging. Also, the ONs at this site was close to the value (40 ng m^{-3}) obtained at a forest-urban mixed site in Finland (Hao et al., 2014). However, significant discrepancies were observed between the INs mass concentrations during P1 and P2 (0.08 μg m^{-3} vs.1.47 μg m^{-3}), revealing that INs dominated the elevation of total nitrate during cloud evaporation in P2.

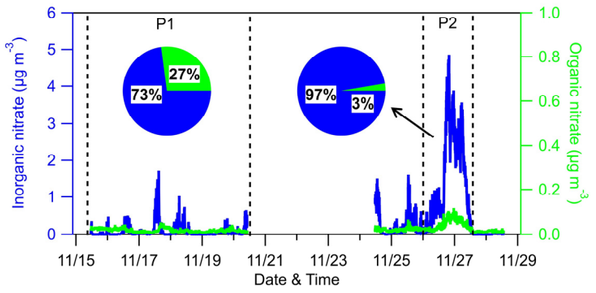

Figure 8. Time series and relative contributions of inorganic nitrate and organic nitrate during the AMS sampling period.

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Could such low values be detected by AMS/ACSM? please show some uncertainty estimates for ON.

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3.4 Evolution of OA

The formation and evolution of OA can be investigated using the ratio of OA to ΔCO (CO minus background CO) to remove the atmospheric dilution effects (Sun et al., 2011). In this study, 0.12 ppmv (average of the lowest 5 % concentration) was used as the background mixing ratio of CO (Fig. S7), which is close to the 0.1 ppm used in Hu et al. (2013) and Yuan et al. (2013). OA/ΔCO was 28.3 ± 26.3 μg m^{-3} $ppmv^{-1}$ during the studing period, which is comparable to (41.7 ± 23.0 μg m^{-3} $ppmv^{-1}$) in suburban Sichuan Basin (Hu et al., 2016) but much lower than the mean value (70 ± 20 μg m^{-3} $ppmv^{-1}$) in worldwide urban air (De Gouw and Jimenez, 2009). The scatter plot of OA/ΔCO as a function of O/C ratios during P1 and P2 is shown in Fig. 9a. Interestingly, different OA/ΔCO variations were found with the increasing O/C during P1 and P2. During P1, OA/ΔCO trended to increase with the increase of the O/C ratio, indicating aging process produced SOA (Hu et al., 2017). In contrast, a remarkable decrease trend of OA/ΔCO was observed with the increasing O/C during P2, suggesting that less oxidized OA may contribute more significantly to the high OA concentration during this period. Moreover, the negative correlation between OA/ΔCO and O/C in P2 also implies that more oxidized OA had almost been scavenged by clouds, while less oxidized OA previously formed or scavenged into cloud droplets was released during cloud evaporation. Similarly, significant increases in the LO-OOA concentration (0.27 to 1.70 μg m^{-3}) and fraction (40 % to 70 %) were observed from P1 to P2, while the MO-OOA concentration (0.40 vs. 0.74 μg m^{-3}) did not show large variation (Fig. 9b), further supporting our conclusion. In addition, these released LO-OOA is likely composed of humic-like substances (HULIS), which can account for 49 % of the water-soluble organic matter at a nearby mountain site in southeastern China (Tao et al., 2023; Chen et al., 2016).

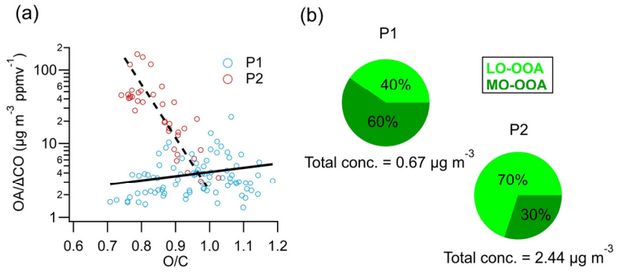

Figure 9. (a) Scatter plot of OA/ΔCO as a function of O/C ratios and (b) mass concentrations and proportions of MO-OOA and LO-OOA during P1 and P2.

Figure 10a shows the Van Krevelen diagrams of OA in this study together with other mountain sites. The slope of H/C to O/C in the present study was -0.66 (r^2 = 0.64), suggesting the addition of carboxyl functional groups during OA evolution (Heald et al., 2010). It is interesting to mention that the two OOA factors exhibited a strong alignment with the fitting line, which suggested that the evolution of OA in this site likely follows a transformation pathway from LO-OOA to MO-OOA.

Number: 1 Author: ADMIN Subject: Highlight Date: 2024-02-04 20:51:51
What happened to the OA formed inside the cloud droplets? or no such formation happened?