

Interactive comment on “Chemical characterization and sources of submicron aerosols in the northeastern Qinghai-Tibet Plateau: insights from high-resolution mass spectrometry” by Xinghua Zhang et al.

Anonymous Referee #2

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This paper reports on the chemical characterization and sources of submicron aerosols observed at Waliguan Baseline Observatory, a high-altitude background station in the northeastern Qinghai-Tibet Plateau (QTP), during summer season using a high-resolution time-of-flight aerosol mass spectrometer (HR-ToF-AMS) along with other online instruments. Mass concentrations and fractions of PM₁ chemical species, bulk aerosol acidity and size distribution are characterized, respectively. The PM₁ mass in the northeastern QTP is obviously higher than those at other high-elevation sites in the southern or central QTP and sulfate dominates the total PM₁, which relates tightly with

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the regional transport of intense industrial emissions from areas in the northwestern China. Four distinct OA components, including two biomass burning related OAs with different oxidation degree as well as one oxygenated OA and one traffic related OA, are identified by the PMF analysis. Source analysis finally show that the prevailing air masses from northeast with lower transport height and distance can bring surface anthropogenic and industrial pollutants to Mt. Waliguan. Overall, this paper adds new and valuable measurements of aerosol compositions and concentrations in the northeastern QTP, one of the less studied key regions. The paper is within the scope of ACP and generally well written. I recommend publication of this paper in ACP after revisions. I only have some minor points for the author to consider in the revision. Specific Comments: (1) The full expression need to be added when the abbreviations are used first time in the manuscript, such as NO_x, PM₁₀, and PBL, etc.. (2) Line 171, does the OM/OC here refer to organic mass or organic matter? (3) Although the AMS mass spectrometer in this study was toggled between V-mode and W-mode every 5 min and the W-mode was used to obtain the high resolution mass spectral data for PMF analysis (in Line 160-165), the author also state in Line 188-190 that the data and error matrices input into the PMF analysis were finally generated from V-mode data rather than W-mode due to the low aerosol mass loading at WLG, hence the entire data used in this study for mass concentration, size distribution and PMF analysis are all from V-mode with 10-min time resolution rather than 5-min, please checked and revised totally. (4) Line 216, when the unique burning event occurred and why was it removed ? (5) Line 239, the author explained the high mass concentration at WLG was due to the relatively shorter distance from the polluted city center and strongly mountain-valley breeze during summer, are there any other evidences to support this conjecture? Such as references, WD variations or air mass trajectories. (6) Line 290, are there any other ion fragments at m/z 44? Please checked carefully for those similar expressions in the whole manuscript. (7) Line 293, "at Lanzhou, an urban city located at the northeastern edge of QTP". The description of Lanzhou that located at the northeast edge of QTP seemed inappropriate. (8) Line 308-313, these sentences for diurnal variations of el-

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emental ratios need to be rewritten clearly. Technical Comments: (1) Line 39-41, "Its huge surface area...and therefore called as the third pole". These are two sentences with different subject, please rewritten. (2) The tense in one sentence should consistent, please check the entire manuscript carefully, e.g., Line 48-49, "climb" and "move" need to be changed to "climbed" and "moved", respectively. (3) Line 55, change "that in the southern QTP" to "those in the southern QTP". (4) Line 57, change "however" to "nevertheless". (5) Line 59, change "distinct" to "distinctly". (6) Line 62, change "sulfate was a..." to "sulfate was the". (7) Line 83, change "high attention to" to "great concern of". (8) Line 87, add "the" before "deployment". (9) Line 90-91, change "a HR-ToF-AMS at QOMS (Zhang et al., 2018) and Mt. Yulong (Zheng et al., 2017) in the southern QTP" to "a HR-ToF-AMS at QOMS in the southern QTP (Zhang et al., 2018) and a HR-ToF-AMS at Mt. Yulong in the southeastern QTP (Zheng et al., 2017)". (10) Line 224, "daily mean values" change to "daily mean precipitation" and the unit must be mm d-1 rather than mm d-3. (11) Line 230, add "the" before "average". (12) Line 238, the sentence of "The high mass concentration at WLG..." need to be rewritten, because the mass concentration is just relatively higher when comparing with other sites in the QTP yet much lower than those at other urban or rural sites in China. (13) Line 278, change "contributed" to "contribute". (14) Line 307, change "suggesting an overall regional transport organic aerosol source at WLG" to "suggesting an overall OA source from regional transport at WLG". (15) Line 320, change "HRMS of OA" to "OA HRMS". (16) Line 355, change "high" to "higher" (17) Line 367, "spectrums" change to "spectra".

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