Supplements to: "Persistent high PM pollution in the Eastern Mediterranean and Middle East: Insights from long-term observations and source apportionment in Cyprus."

Elie Bimenyimana[1], Jean Sciare[1], Michael Pikridas[1], Konstantina Oikonomou[1], Minas Iakovides[1], Emily Vasiliadou[3], Chrysanthos Savvides[3], and Nikos Mihalopoulos[1,2].

[1]*Climate and Atmosphere Research Centre (CARE-C), The Cyprus Institute, Nicosia, Cyprus.*

[2]*National Observatory of Athens, Athens, Greece.*

[3]*Department of Labour Inspection, Ministry of Labour and Social Insurance, Nicosia, Cyprus.*

Table S1. Information on PM chemical speciation data availability from 2005 to 2023 at AMX and NICTRA.

Site and size		05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
AMX-PM$_{2.5}$	Mass	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Ions							■	■	■	■	■	■	■	■	■	■	■	■	■
	OC/EC											■	■	■	■	■	■	■	■	■
	Metals											■	■	■	■	■	■	■	■	■
AMX-PM$_{10}$	Mass	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Ions											■	■	■	■	■	■	■	■	■
	OC/EC											■	■	■	■	■	■	■	■	■
	Metals											■	■	■	■	■	■	■	■	■
NICTRA-PM$_{10}$	Mass	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Ions											■	■	■	■	■	■	■	■	■
	OC/EC											■	■	■	■	■	■	■	■	■
	Metals											■	■	■	■	■	■	■	■	■

Chemical mass closure
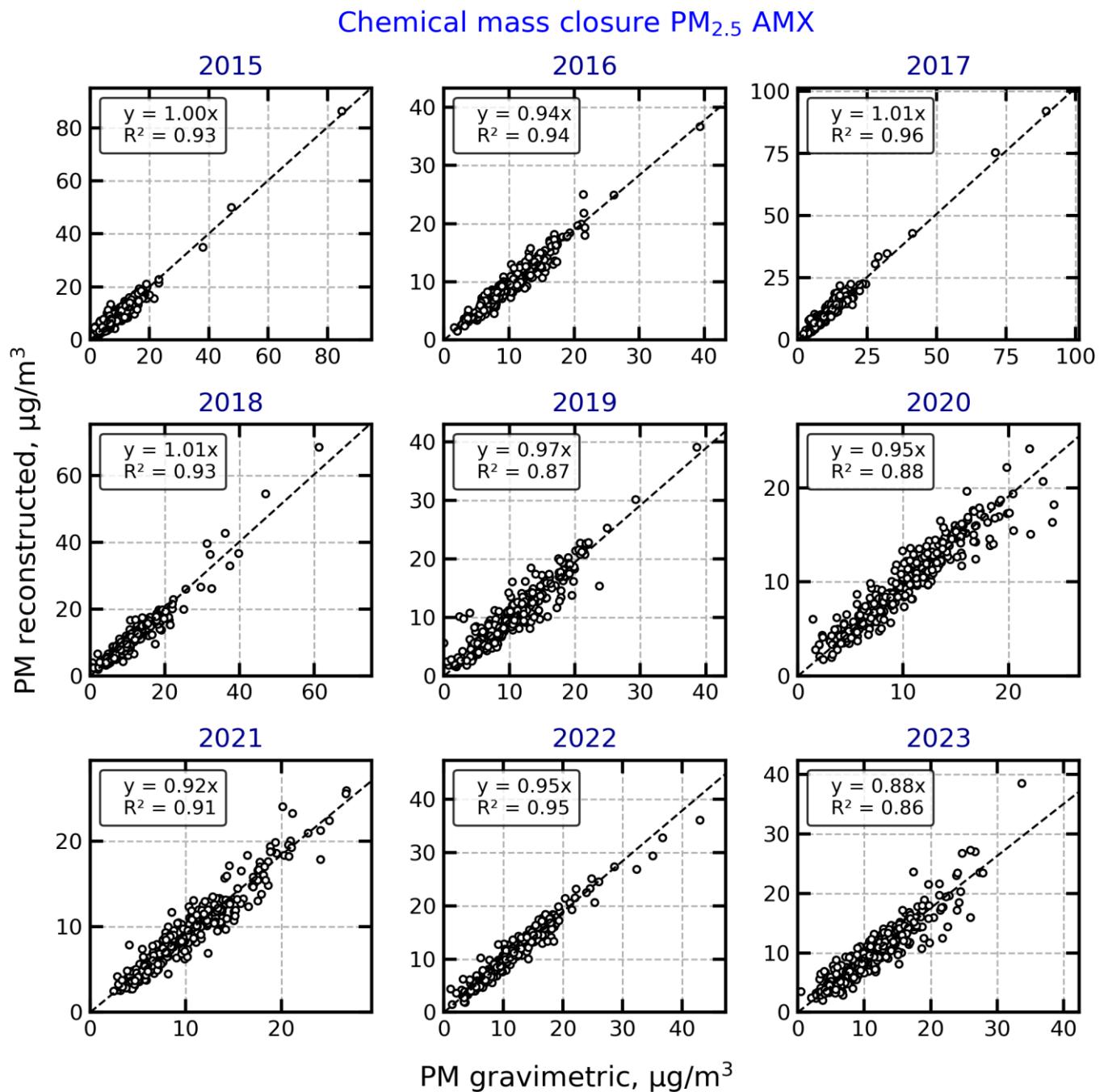
Fig. S1-A. PM$_{2.5}$ chemical mass closure at AMX for the period 2015-2023
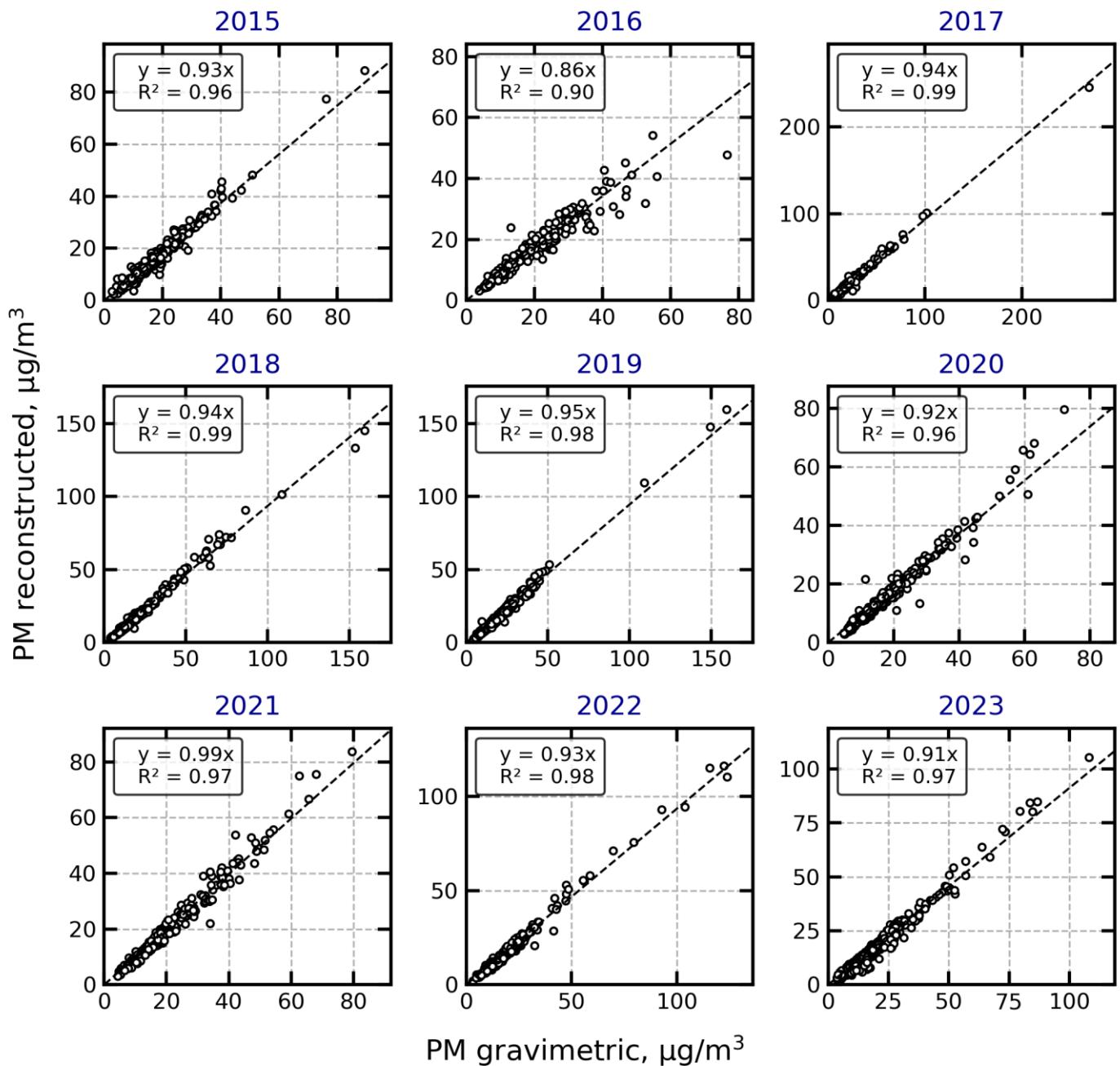
Fig. S1-B. PM$_{10}$ chemical mass closure at AMX for the period 2015-2023.

35

36

37

38

39

40

41

42

Chemical mass closure PM$_{10}$ NICTRA
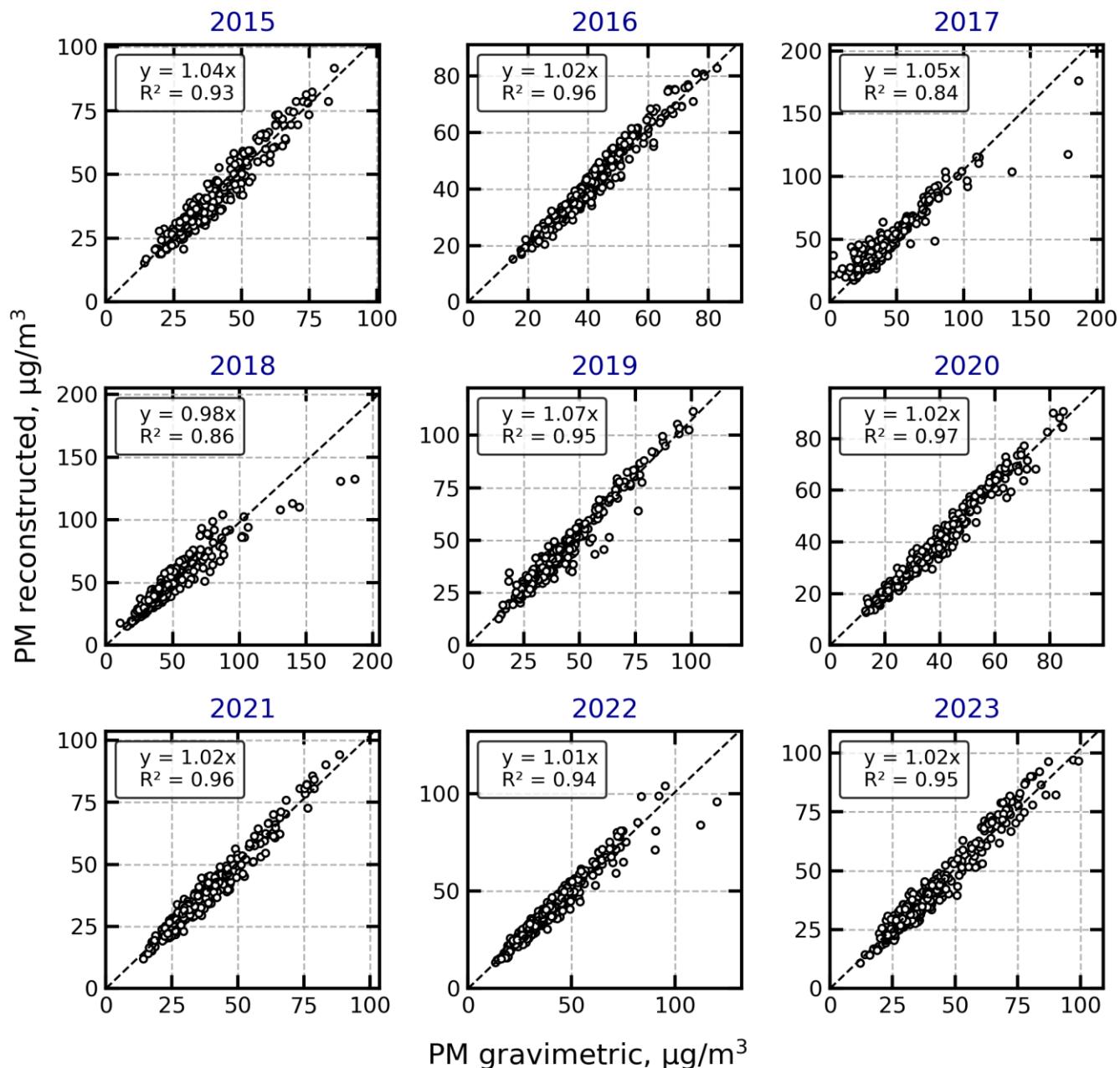
Fig. S1-C. PM$_{10}$ chemical mass closure at NICTRA for the period 2015-2023.

43
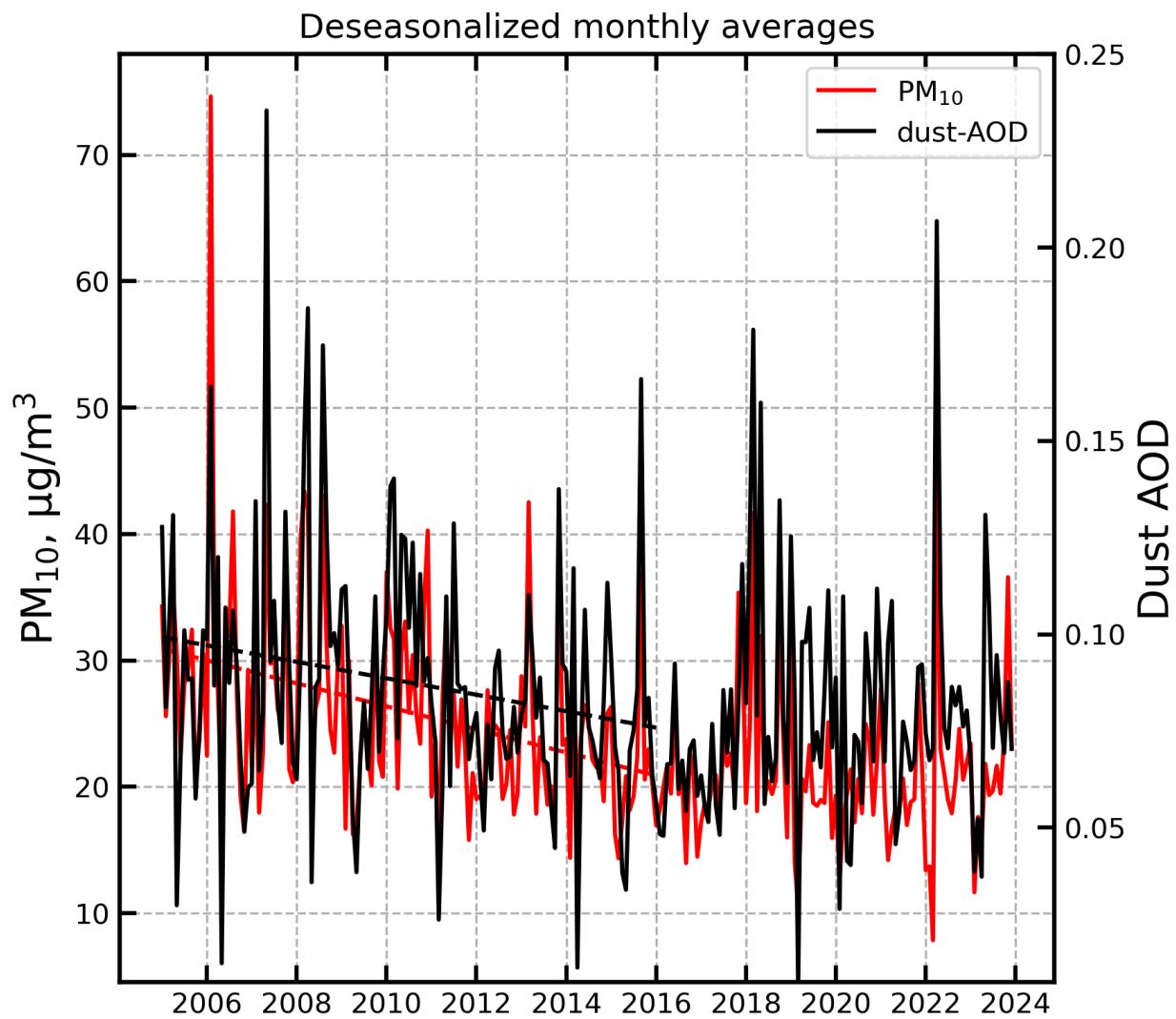
Fig. S2. Deseasonalized monthly averages of PM$_{10}$ concentrations measured at AMX and dust aerosol optical depth (AOD) over Cyprus from 2005 to 2023. Dust AOD values were retrieved from the MERRA-2 (Modern-Era Retrospective analysis for Research and Applications, Version 2) global atmospheric reanalysis dataset provided by NASA (https://goldsmr4.gesdisc.eosdis.nasa.gov/data/MERRA2_MONTHLY/M2TMNXAER.5.12.4/).

44
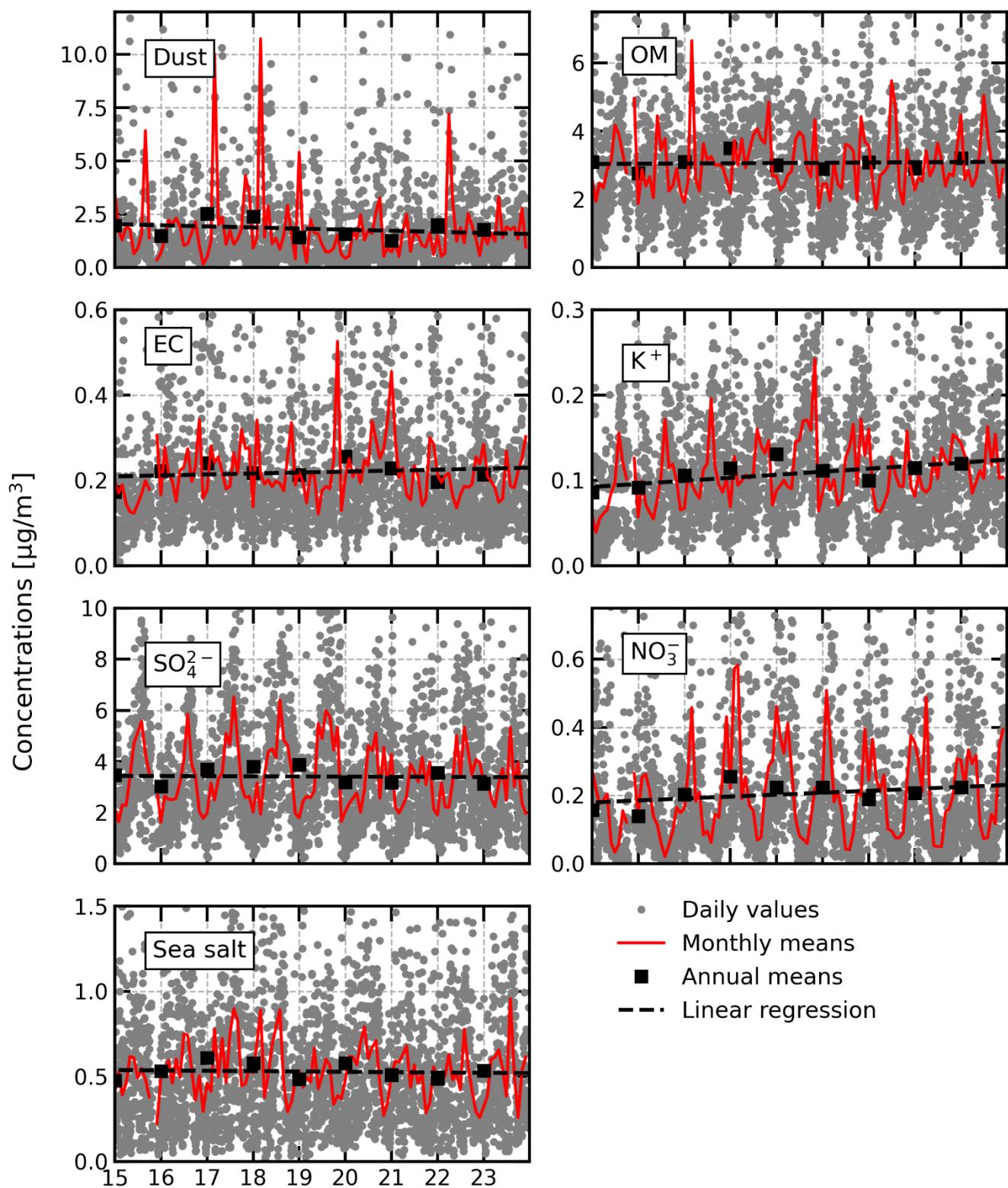
Fig. S3. Long-term variability of PM$_{2.5}$ chemical constituents at the regional background (AMX) for 2015-2023.

45

46

47

48

49

Long-term trends in PM$_{10}$ composition at AMX
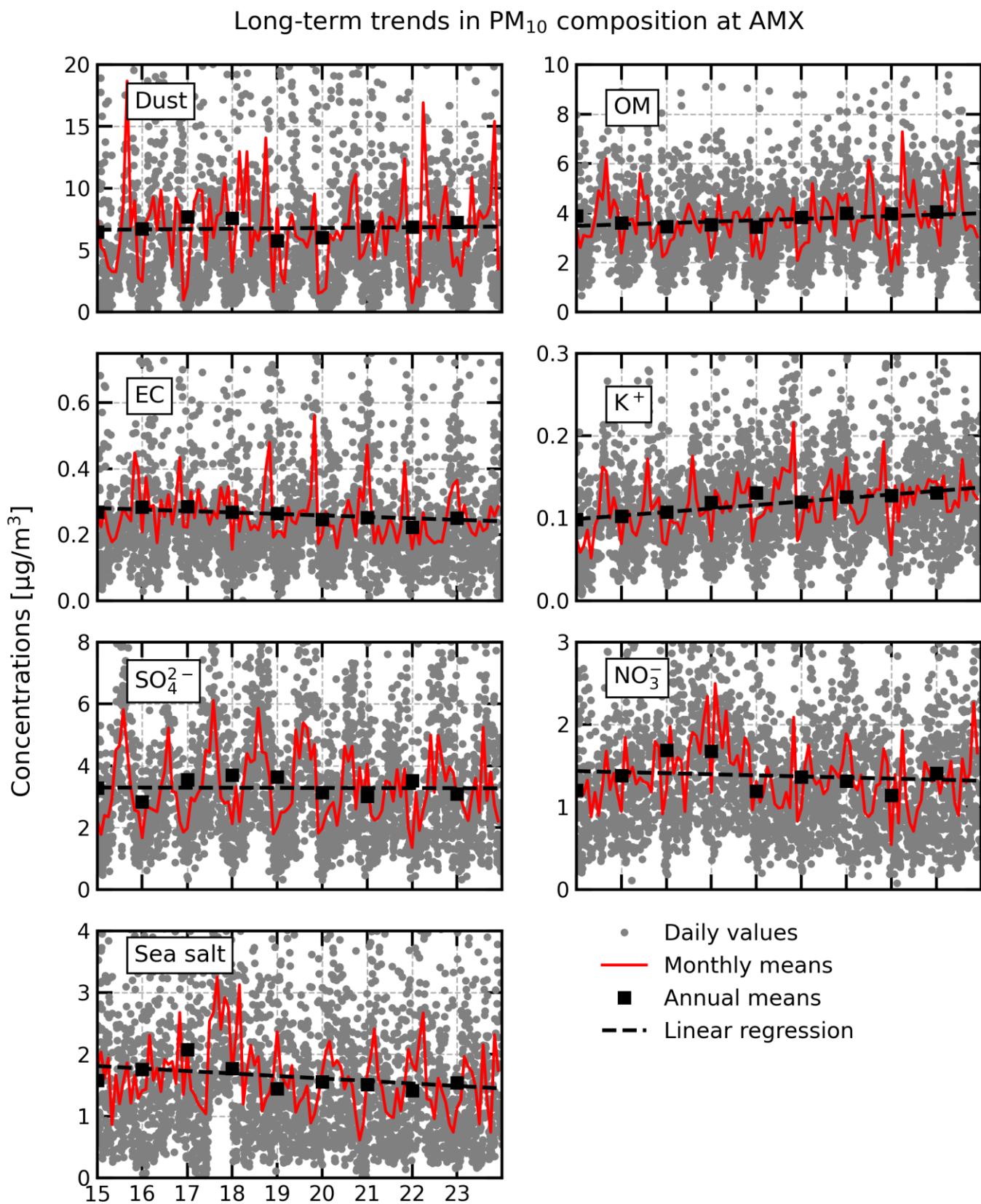
Fig. S4. Long-term variability of PM$_{10}$ chemical constituents at the regional background (AMX) for 2015-2023.
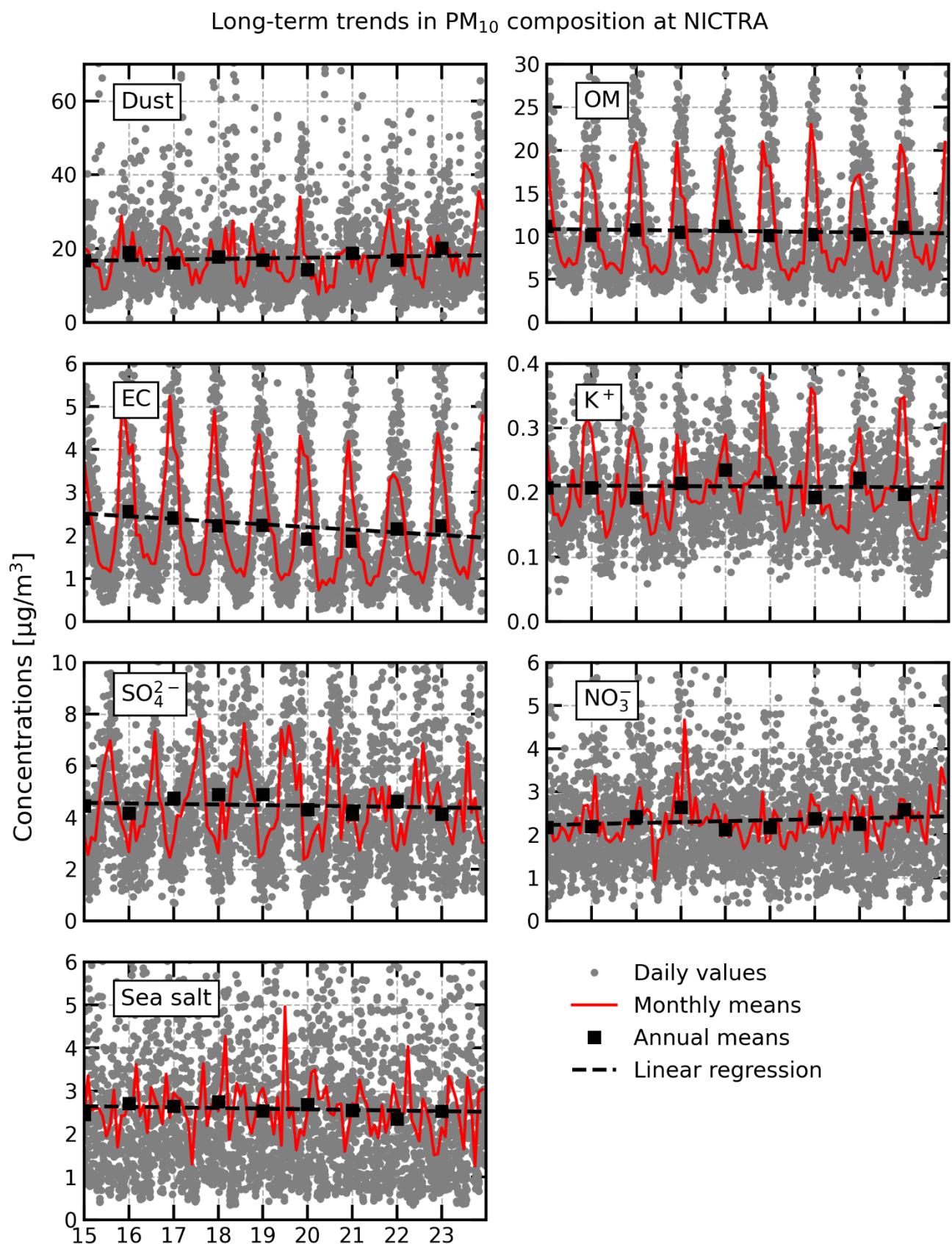
Fig. S5. Long-term variability of PM$_{10}$ constituents at the urban traffic site (NICTRA) for 2015-2023.
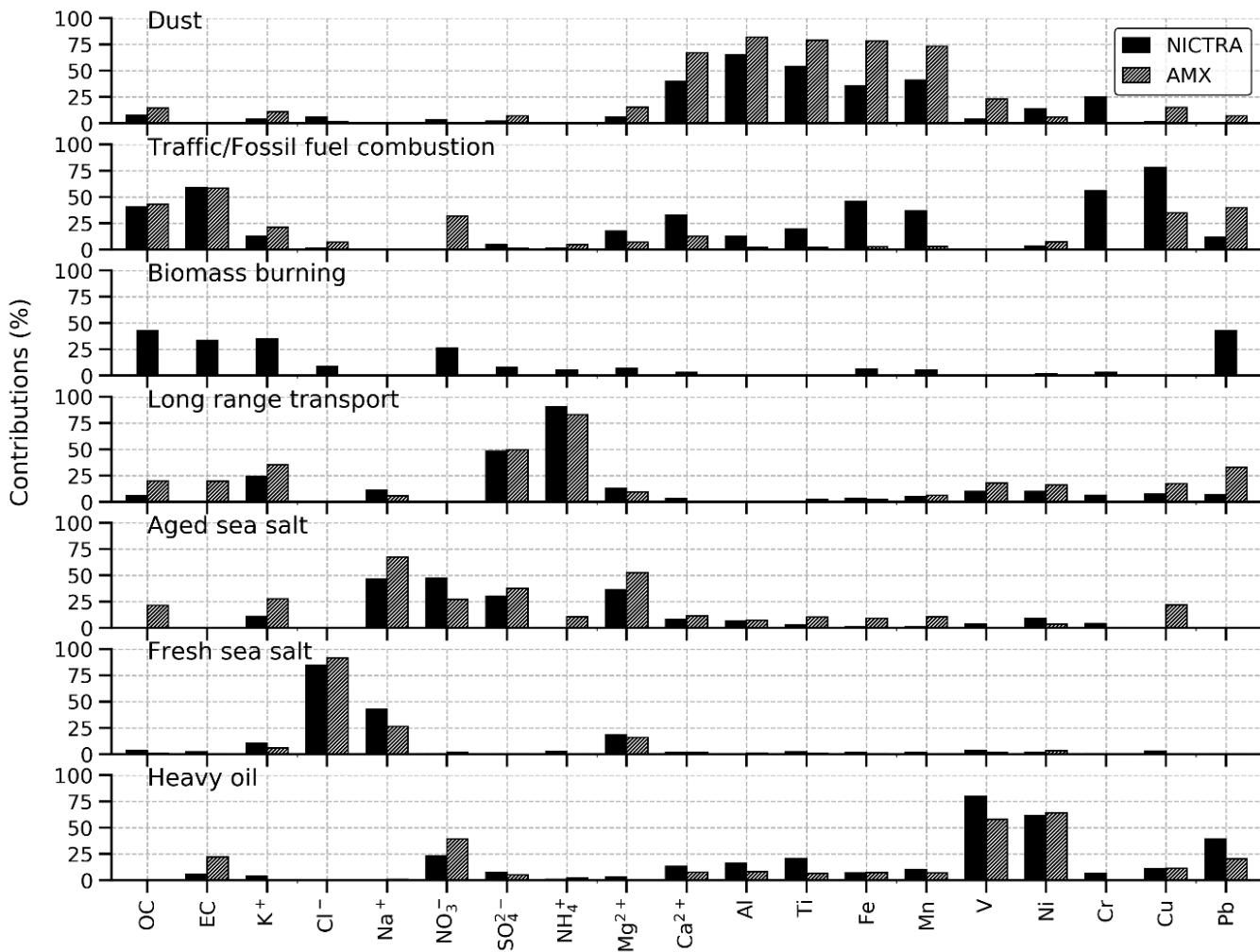
Fig. S6. PM₁₀ source profiles resolved by Positive matrix factorization (PMF) from PM chemical composition data collected at two sampling sites (NICTRA and AMX) during the period 2015-2023. The traffic factor is resolved only for the traffic site (NICTRA), while Fossil fuel combustion is for the regional background (AMX).

Long-term trends in PM$_{10}$ sources at NICTRA
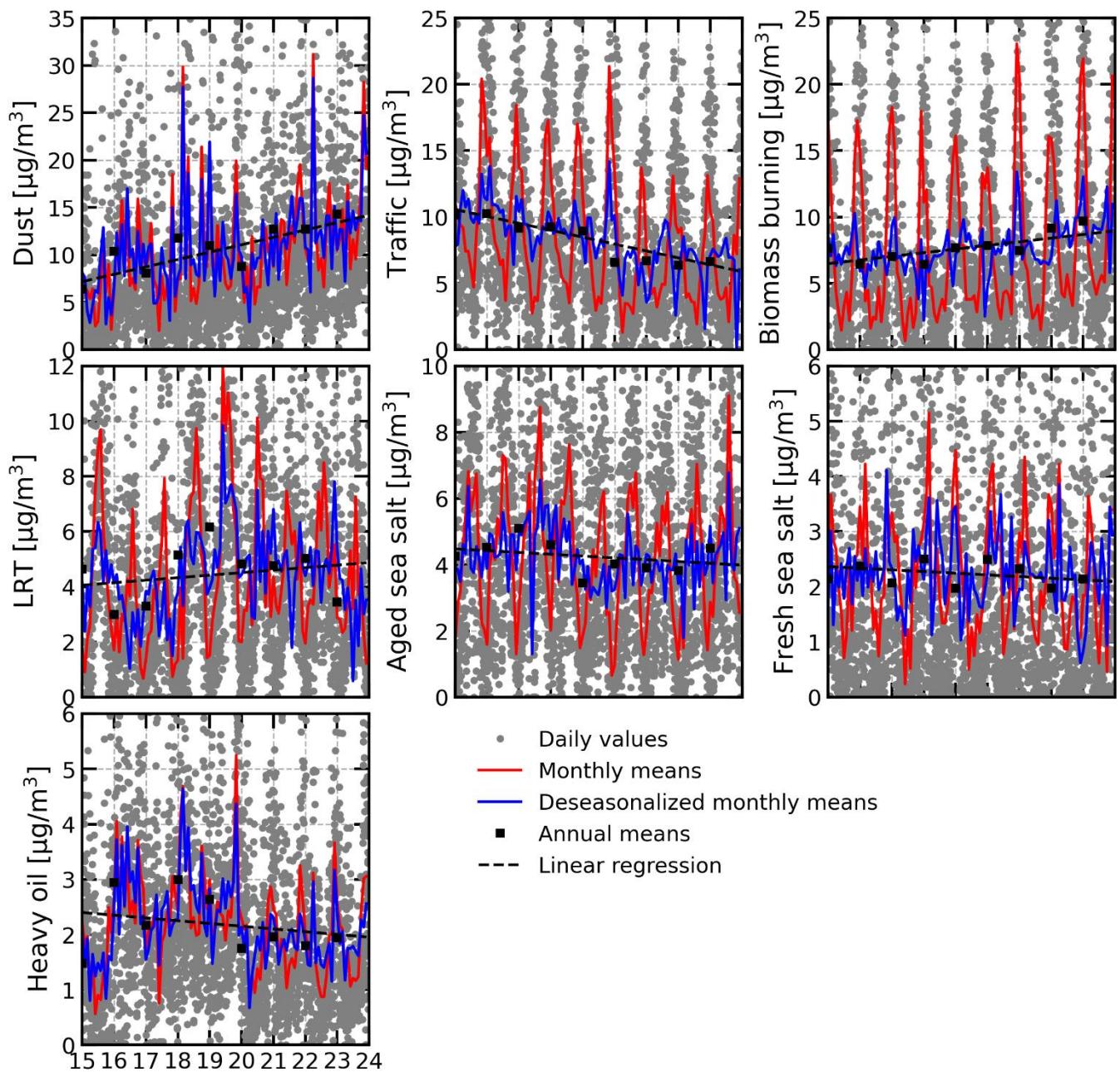
Fig. S7. Long-term trends in PM$_{10}$ sources resolved at NICTRA (Dust, Traffic, Biomass burning, Long range transport (LRT), Aged sea salt, Fresh sea salt and Heavy oil combustion).

64
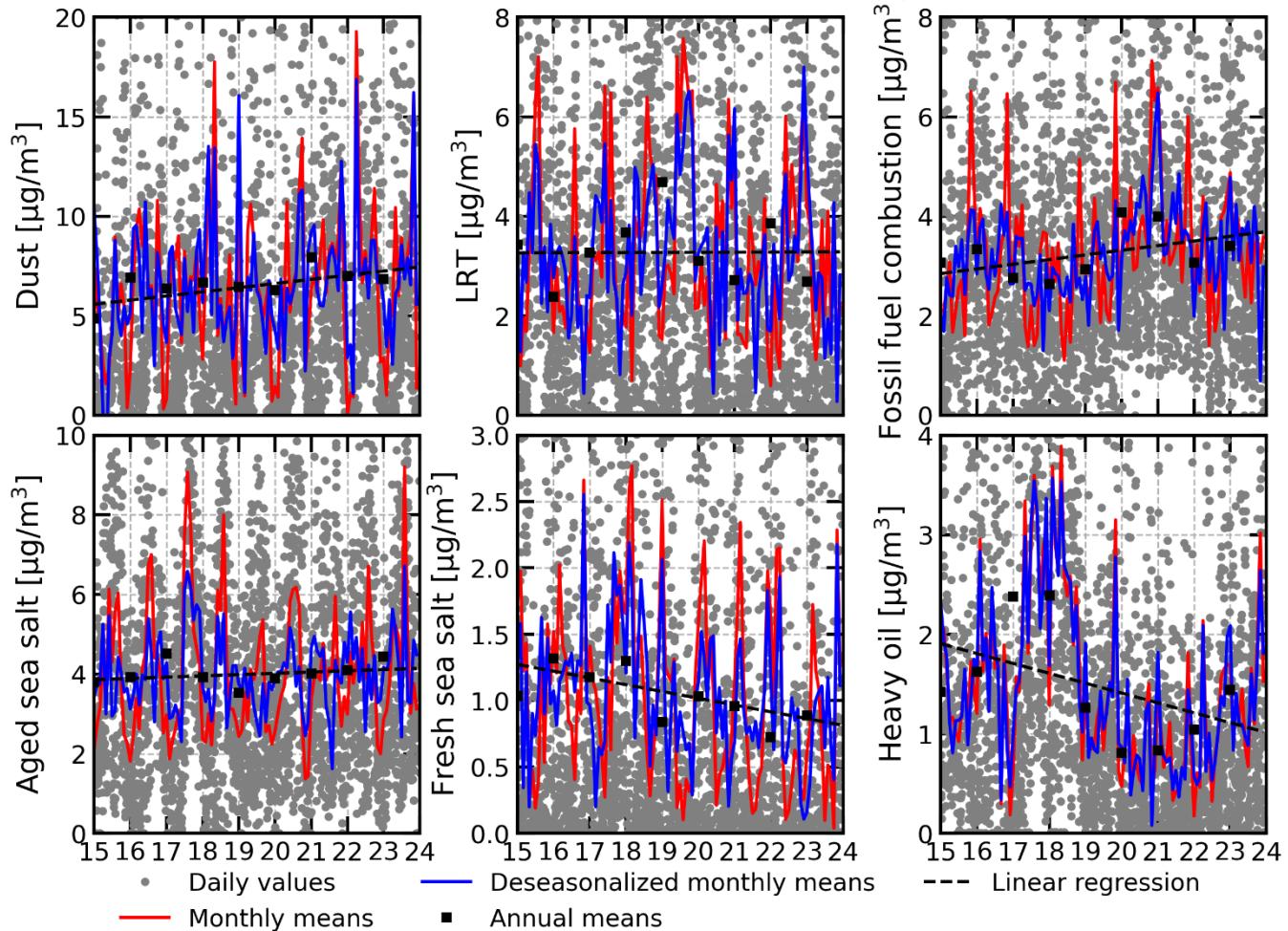
Fig. S8. Long-term trends in PM$_{10}$ sources resolved at AMX (Dust, Long range transport (LRT), Fossil fuel combustion, Aged sea salt, Fresh sea salt and Heavy oil combustion).

65

66   *Table S2. Annual occurrences of air masses from different clusters at AMX regional background site.*

	North Africa	Europe	Marine	Middle East	Turkey	West Turkey
2011	27	20	21	33	217	39
2012	45	25	24	48	187	27
2013	31	31	10	76	162	6
2014	51	43	17	48	118	70
2015	42	27	13	51	136	71
2016	43	25	21	29	144	83
2017	39	39	10	65	120	86
2018	43	53	12	79	108	65
2019	41	44	20	67	115	69
2020	54	49	7	65	95	89
2021	45	49	4	53	113	96
2022	57	26	3	56	110	105
2023	42	43	10	67	97	101

67
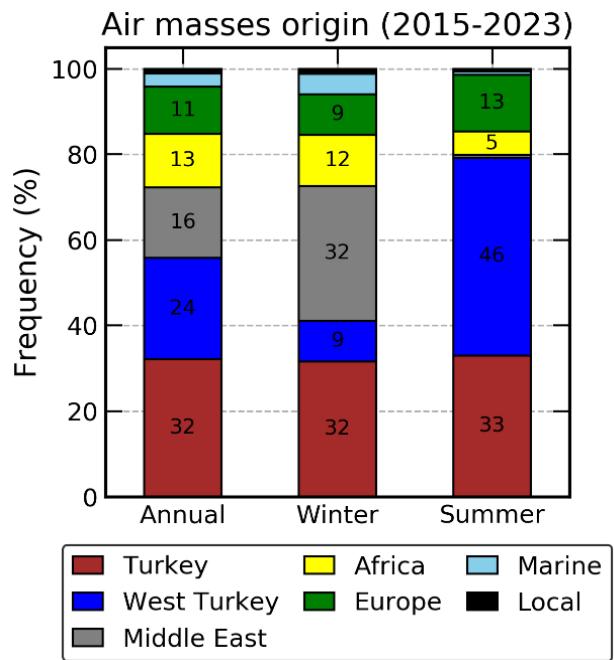
Fig. S9. Frequency of air mass occurrence at AMX regional background between 2015 and 2023.

68
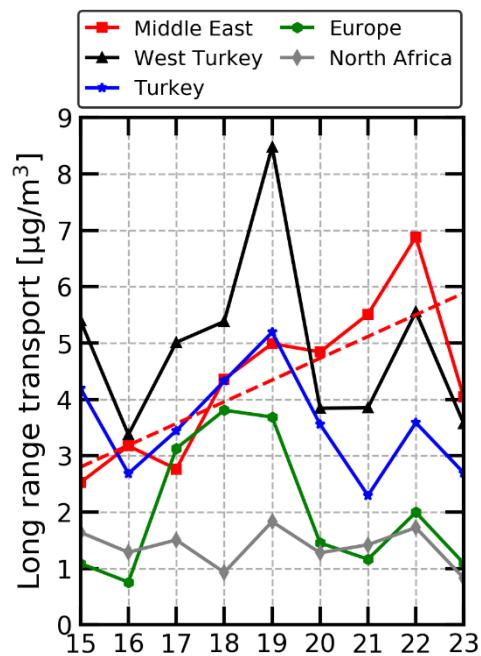
Fig. S10. Long-term evolution of long range transport (LRT) concentrations for different air mass sectors (Middle East, West Turkey, Turkey, Europe, and North Africa) at AMX from 2015 to 2023.

69

70

71

72

73