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Supplement of

Dynamic model evaluation for secondary inorganic aerosol and its precursors over Europe between 1990 and 2009

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Supplementary material to 'Dynamic model evaluation for secondary inorganic aerosol and its precursors over Europe between 1990 and 2009'

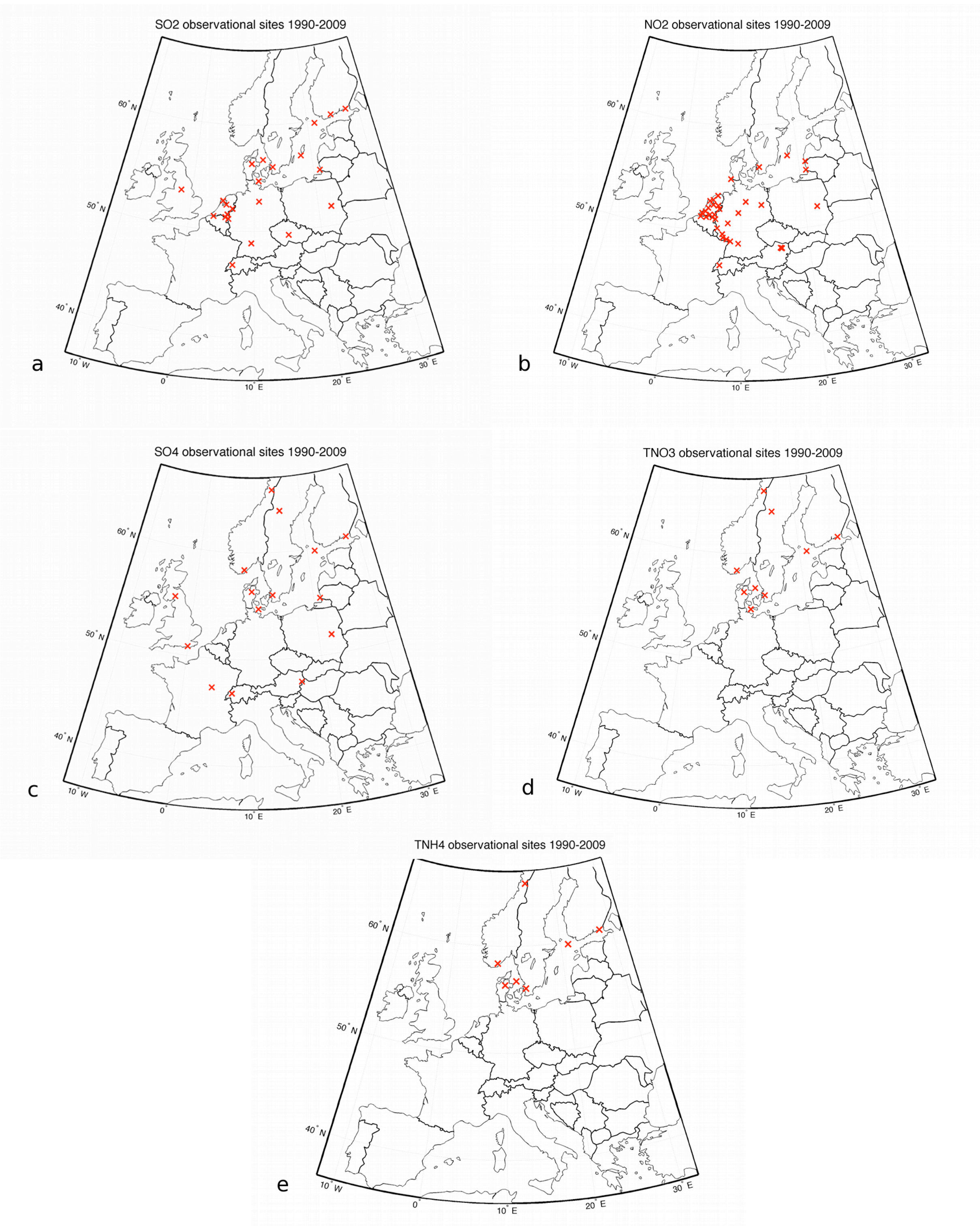

Figure S1. Locations of the observational sites used for the analysis of the different components for the 1990 to 2009 time period.

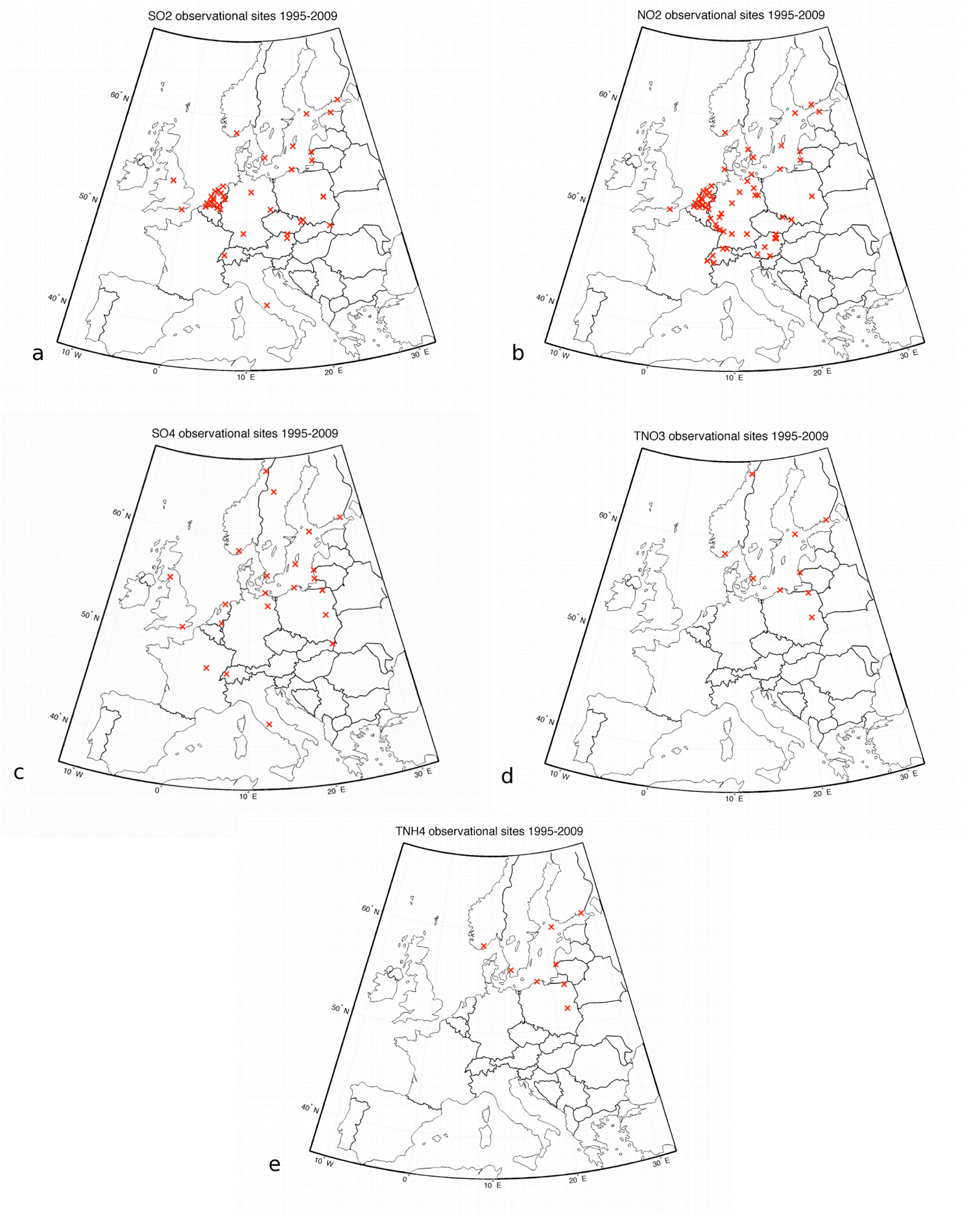

Figure S2. As Figure S1 for the 1995 to 2009 time period

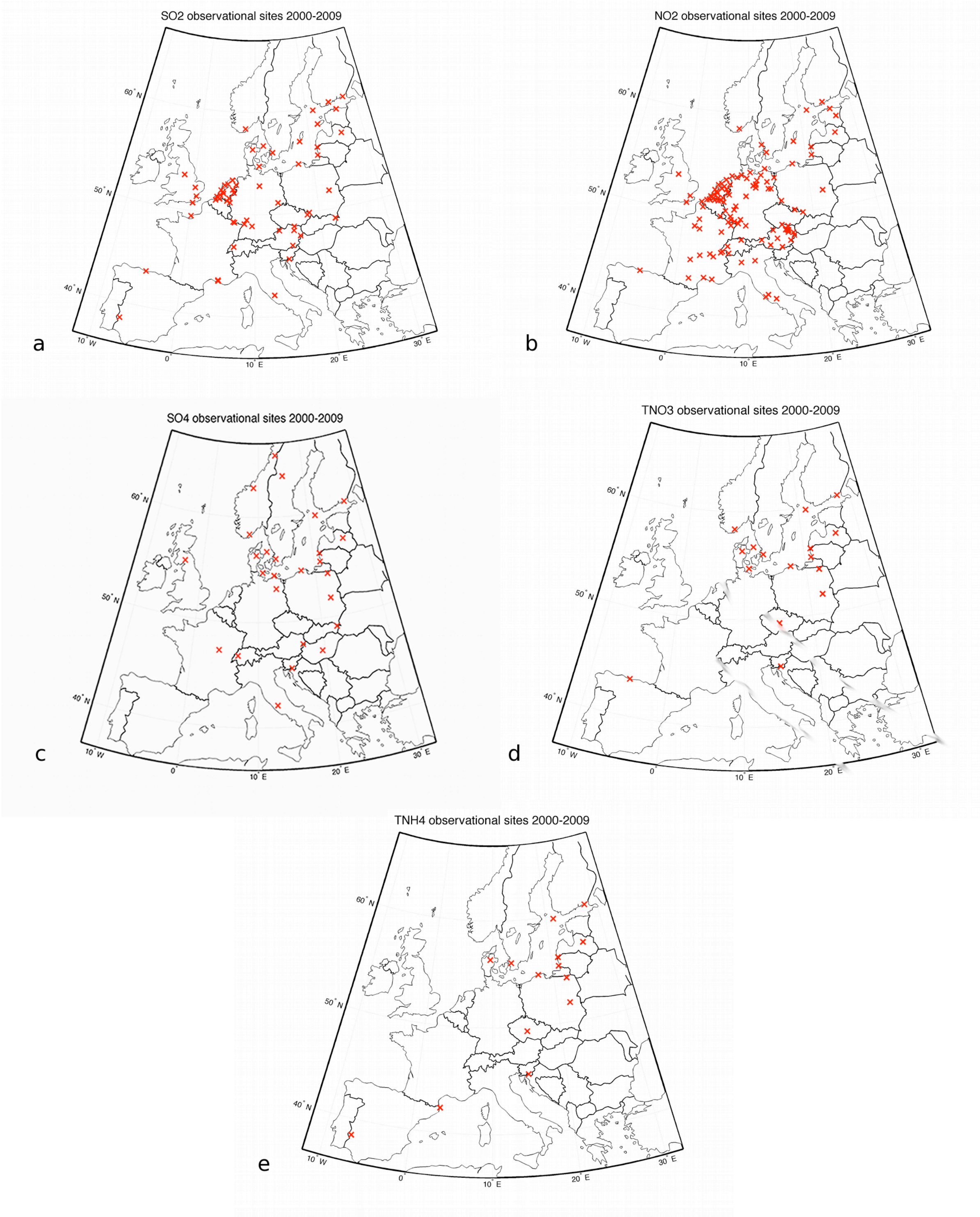

Figure S3. As Figure S1 for the 2000 to 2009 time period

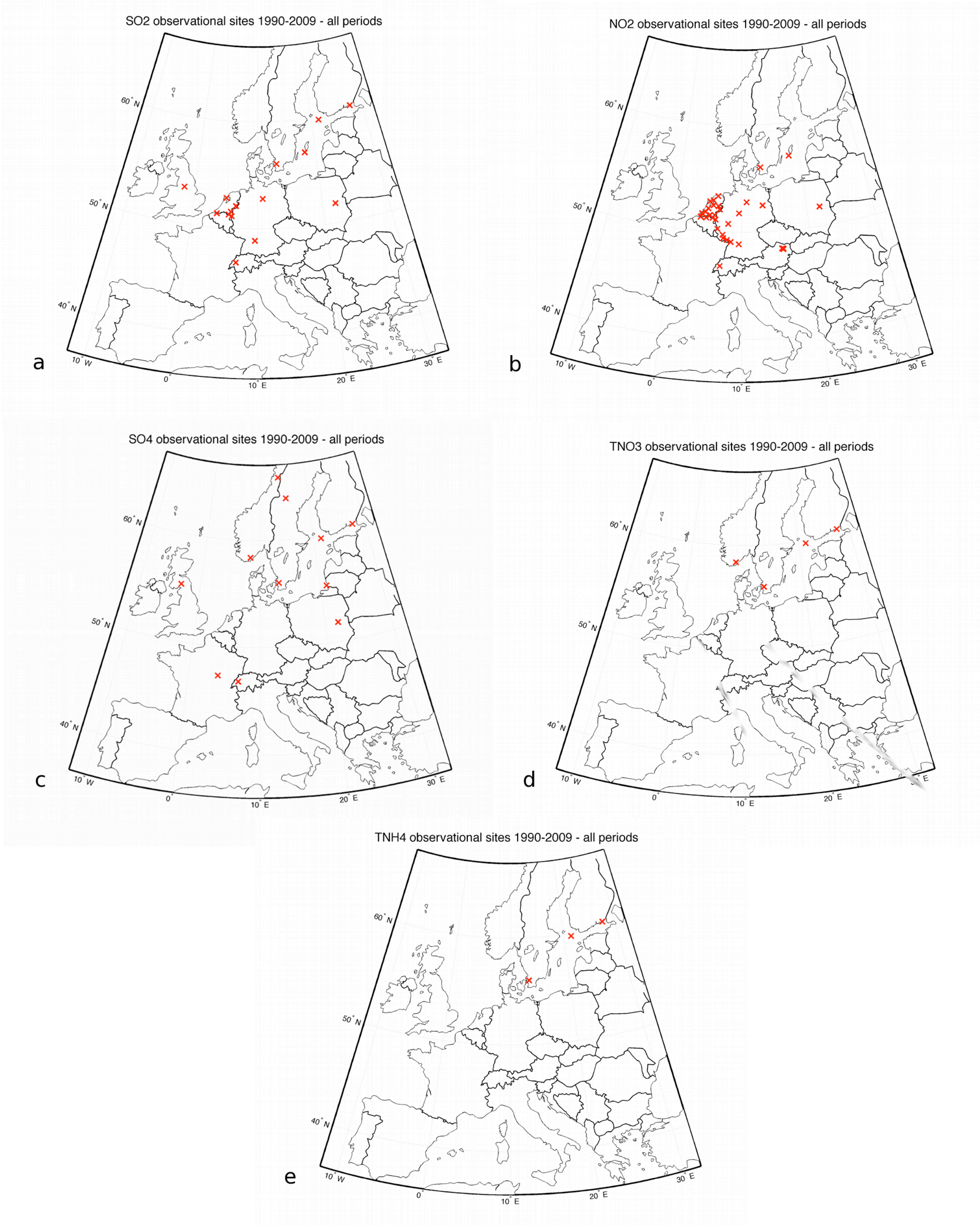

Figure S4. Locations of the observational sites used for the analysis of the different components when considering only those stations that pass the data selection criteria for all three periods.

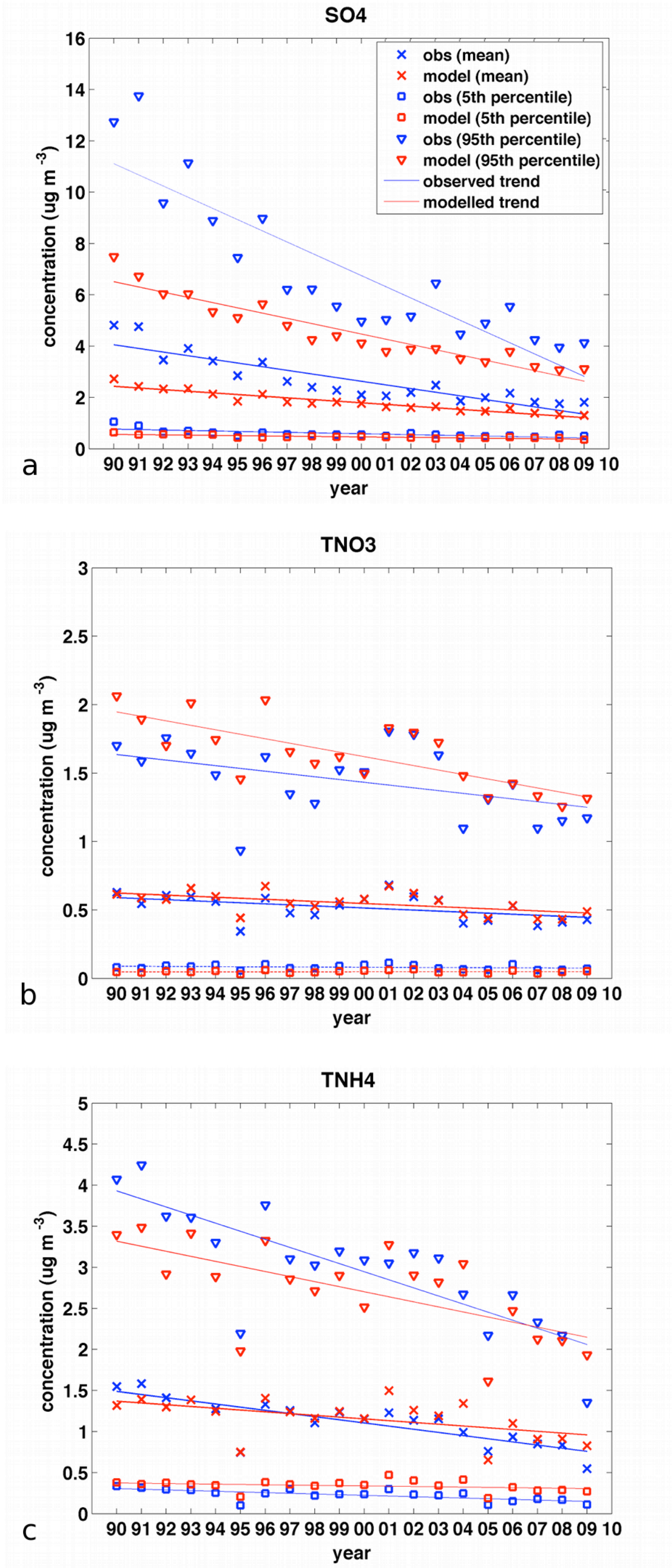

Figure S5. Observed (blue) and modelled (red) annual mean (crosses), 5th percentile (squares) and 95th percentile (triangles) and corresponding trend line of (a) SO_4, (b) TNO_3 and (c) TNH_4. Solid lines indicate a significant and dashed lines a non-significant trend.

Sensitivity of resultant observed trends to data selection

Following the guidance of the European Environment Agency one of the data selection criteria listed in section 2.2.1 was that at least 80% of the annual time series of observations must be available at each site. In this section we would like to test the sensitivity of the resultant observed median trends to that selection criterion. Table S1 shows the number of stations and the observed median trends for all considered species for the selection criteria that at least 16 (=80%), 17, 18, 19 or 20 years of the annual time series of observations must be available for the 1990-2009 time period. As already for the least stringent criterion we start with a small amount of stations for TNO_3 and TNH_4 concentrations and all stations are located in northern Europe, there is hardly any or no change in median trends when using a different number of available years for these components. For SO_2, NO_2 and SO_4 concentrations Table S1 shows that even though the sign is robust the selection criterion does impact the observed median trends as a result of a changing number of considered stations. The differences are smallest between choosing 16 or 17 years as selection criterion. The most stringent criterion of 20 years (=100%) significantly reduces the number of considered stations. Although the completeness of the time series increases the robustness of the trend assessment at the single stations, the overall assessment gets less representative for Europe as the number of stations is considerably lower.

Table S1. Number of stations and the corresponding observed median trend for different selection criteria varying the amount of required years of the annual time series

1990-2009	SO_2		NO_2		SO_4		TNO_3		TNH_4	
#years	#stations	Median trend ($\mu g\ m^{-3}\ a^{-1}$)	#stations	Median trend ($\mu g\ m^{-3}\ a^{-1}$)	#stations	Median trend ($\mu g\ m^{-3}\ a^{-1}$)	#stations	Median trend ($\mu g\ m^{-3}\ a^{-1}$)	#stations	Median trend ($\mu g\ m^{-3}\ a^{-1}$)
16	23	-0.343	37	-0.363	15	-0.156	9	$-6x10^{-3}$	7	$-2.7x10^{-2}$
17	21	-0.345	37	-0.363	14	-0.147	7	$-6x10^{-3}$	5	$-2.7x10^{-2}$
18	20	-0.302	36	-0.368	11	-0.110	6	$-9x10^{-3}$	3	$-2.7x10^{-2}$
19	14	-0.247	28	-0.368	9	-0.110	5	$-6x10^{-3}$	3	$-2.7x10^{-2}$
20	7	-0.234	12	-0.381	7	-0.101	3	$-6x10^{-3}$	3	$-2.7x10^{-2}$