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Modeling the global emission, transport and deposition of trace elements associated with mineral dust

Y. Zhang et al.

Correspondence to: Y. Zhang (yan_zhang@fudan.edu.cn)

Supplementary material includes Tables S1, S2, and S3, and Figures S1, S2 and S3

Fig.S1. Percentages of elements in deposited dust（%）:a. Mg, b. P, c. Ca, d. Mn, e. Fe, f. K, g. Al, h. Si

Fig.S2. Monthly dust emission (Tg/mon) over 15 dust-producing regions(WAsia: West Asia; NC-As:North Central Asia; CAsia:Central Asia; SC-As: South Central Asia; EAsia:East Asia; WN-Af:North West Africa; EN-Af: North East Africa; S-NAf: Southern North Africa; SAf: South Africa; MWNAm: Middle North West America; SWNAm: Southern North West America; SAm1: Northern South America; SAm2: Southern South America; WAus: West Austrilia; EAus: East Australia)

Fig.S3. Seasonal cycle of global mean elemental percentages (%) in atmospheric dust from 2001 to 2010

Table S1. Averaged macronutrient contents (‰) of soils classified by FAO/UNESCO soil units *

Soil types	Mg	P	Ca	Mn	Fe	K
Acrisols	0.092	0.006	0.465	0.029	0.058	0.060
Cambisols	0.104	0.011	0.980	0.012	0.144	0.069
Chernozems	0.111	0.012	2.058	0.009	0.046	0.067
Rendzinas	0.220	0.005	4.127	0.007	0.035	0.102
Ferralsols	0.052	0.005	0.313	0.031	0.054	0.043
Gleysols	0.103	0.018	0.615	0.026	0.123	0.079
Phaeozems	0.137	0.010	1.262	0.016	0.073	0.223
Lithosols	0.117	0.003	2.225	0.004	0.026	0.137
Fluvisols	0.348	0.007	2.253	0.005	0.069	0.183
Kastanozems	0.259	0.005	2.713	0.006	0.023	0.204
Luvisols	0.155	0.009	1.587	0.011	0.092	0.094
Nitosols	0.072	0.006	0.388	0.032	0.032	0.058
Histosols	0.123	0.017	0.800	0.007	0.423	0.058
Podzols	0.033	0.031	0.562	0.015	0.144	0.070
Arenosols	0.032	0.032	0.305	0.025	0.096	0.063
Regosols	0.139	0.013	1.553	0.010	0.062	0.134
Andosols	0.043	0.006	0.608	0.032	0.042	0.149
Vertisols	0.262	0.005	2.791	0.007	0.054	0.135
Planosols	0.240	0.009	1.623	0.014	0.087	0.210
Xerosols	0.253	0.005	2.387	0.003	0.027	0.231
Yermosols	0.185	0.003	2.026	0.003	0.036	0.168
Halosols	0.300	0.004	2.314	0.003	0.062	0.102

*these values calculated based on extractable contents (mg/L) of micronutrients of soil from Sillanpaa (1982, Apendix 6-7), here we assume soil density as 2.6 g/cm^3（Hillel 1980）.

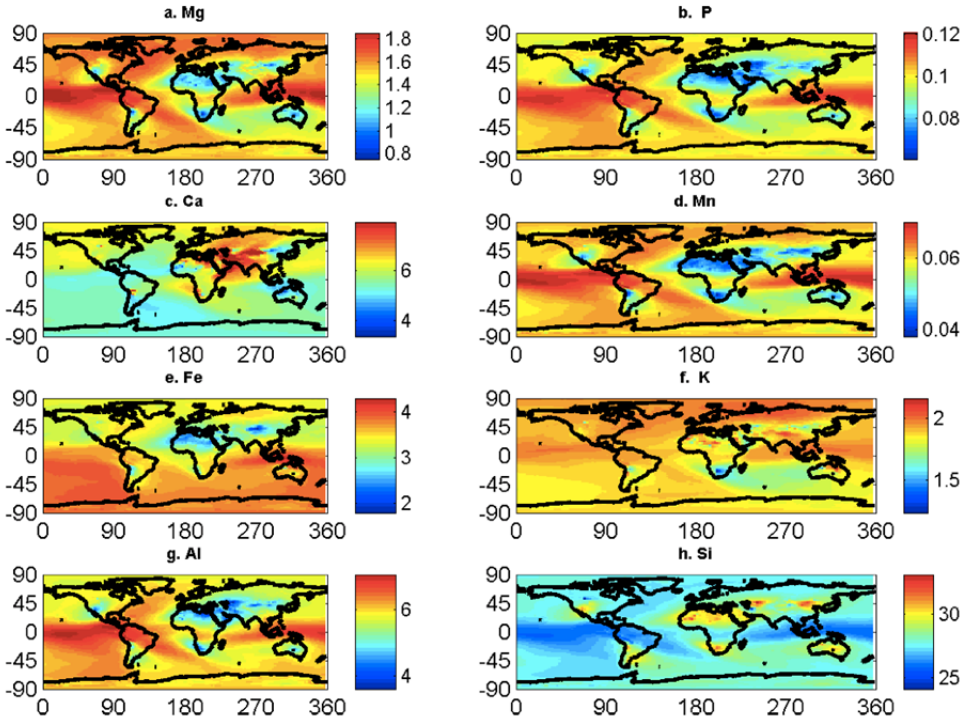
Table S2. The fraction of dust aerosol mass contributed by the soil clay and silt fractions for each of the 4 particle size bins for the bulk scheme in CAM

Particle size bin	Lower bin limit (μm)	Upper bin limit (μm)	Fraction of aerosol mass from soil clay fraction	Fraction of aerosol mass from soil silt fraction
1	0.1	1	1	0
2	1	2.5	0.970	0.030
3	2.5	5	0.625	0.375
4	5	10	0.429	0.571

Table S3. Locations of 17sampling sites

No.	Sites	Longitude	Latitude	Citation
1	Hetian,China	79.92	37.12	
2	Tazhong,China	83.67	39.0	Sun et al., 2004a,b;
3	Yulin,China	109.13	38.33	Wang et al., 2010;
4	Duolun,China	116.83	42.5	Guo et al., 2014
5	Shengsi,China	122.69	30.85	
6	Hanoi,Vietnam	105.80	21.05	Personal communication with David Cohen, 2012
7	Manila,Philippines	121.07	14.65	
8	Balad, Iraq	44.15	34.02	
9	Baghdad, Iraq	44.43	33.33	Engelbrecht et al., 2009;
10	Taji, Iraq	43.68	34.6	

11	Gulf of Aqaba,Eilat	34.91	29.51	Chen et al., 2008
12	Cape Verde, Atlantic	335.08	16.85	Carpenter et al., 2010;
13	Muswellbrook, Australia	150.88	-32.23	Cohen et al., 2011
14	Richmond,Australia	150.75	-33.62	
15	Tamanrasset, Algeria	5.53	22.97	Formenti et al., 2008;
16	Banizoumbou, Niger	2.6	13.5	Desboeufs et al., 2010;
17	Douz, Tunisia	9.4	33.46	Personal communication with Karine Desboeufs, 2013



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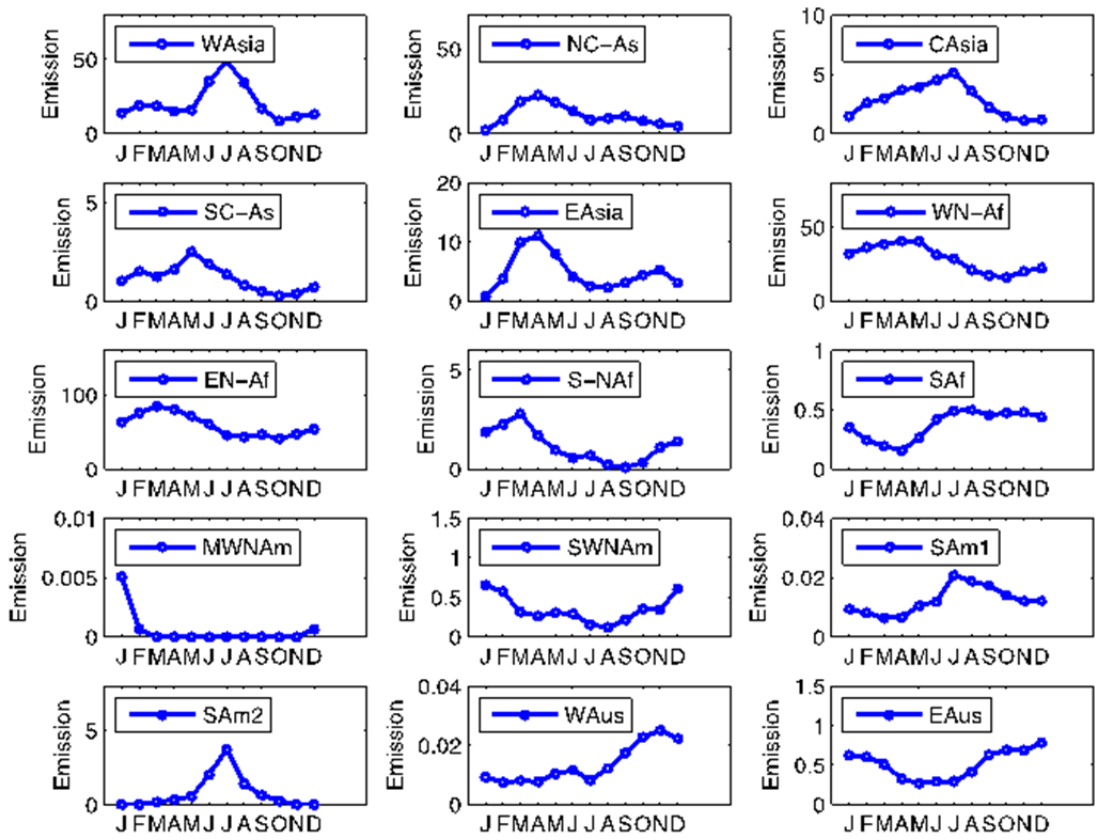

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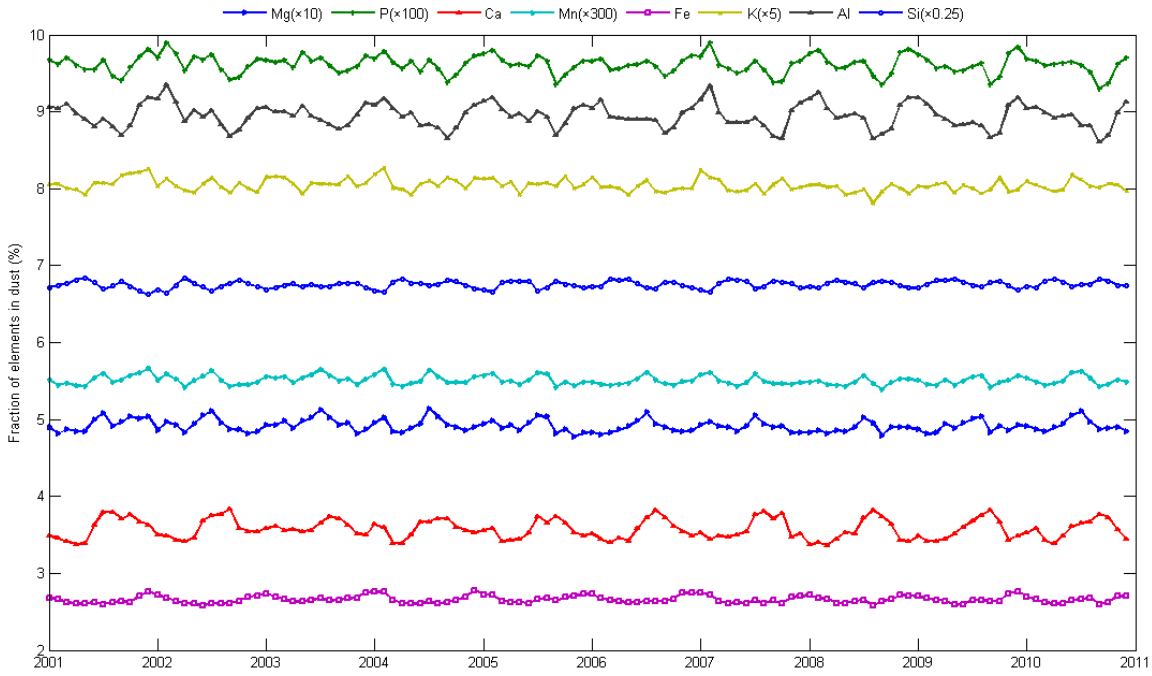

Fig.S3. Seasonal cycle of global mean elemental percentages (%) in atmospheric dust from 2001 to 2010

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