

## Supplementary Materials

### Pollution status, distribution, source analysis, and risk assessment of OCPs in soil from the Hexi Corridor in Northwest China

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Supplemental Materials Caption:

**Supplementary Figure 1.** Concentration of individual OCPs in soils of five cities from the Hexi Corridor in Northwest China.

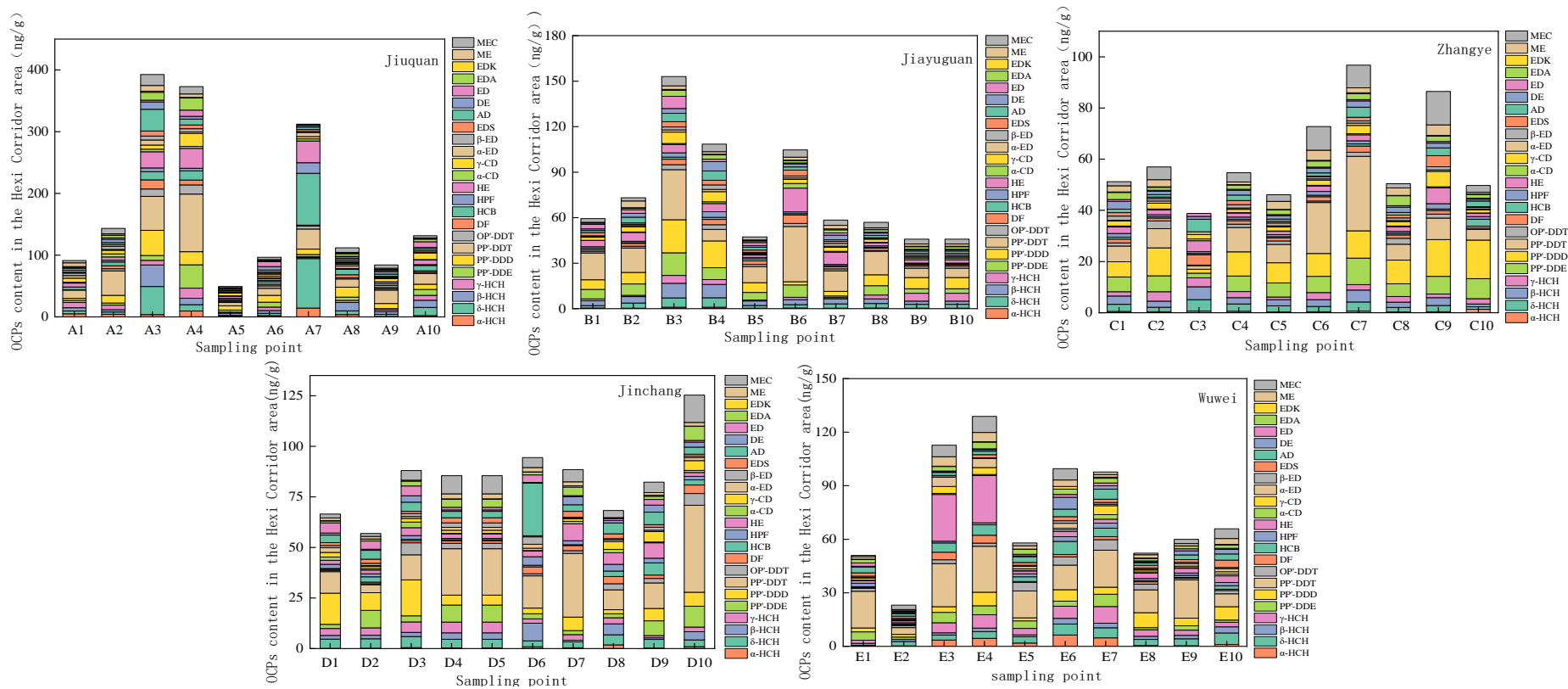
**Supplementary Figure 2.** Relationships of (a) between TOC and  $\sum_{24}$ OCPs, (b) TOC and  $\sum$ HCHs, and TOC and  $\sum$ DDTs in soils from the Hexi Corridor in Northwest China.

**Supplementary Table 1.** Individual OCP and  $\sum_{24}$ OCPs contents (ng/g) in soils of the five cities from the Hexi Corridor in Northwest China

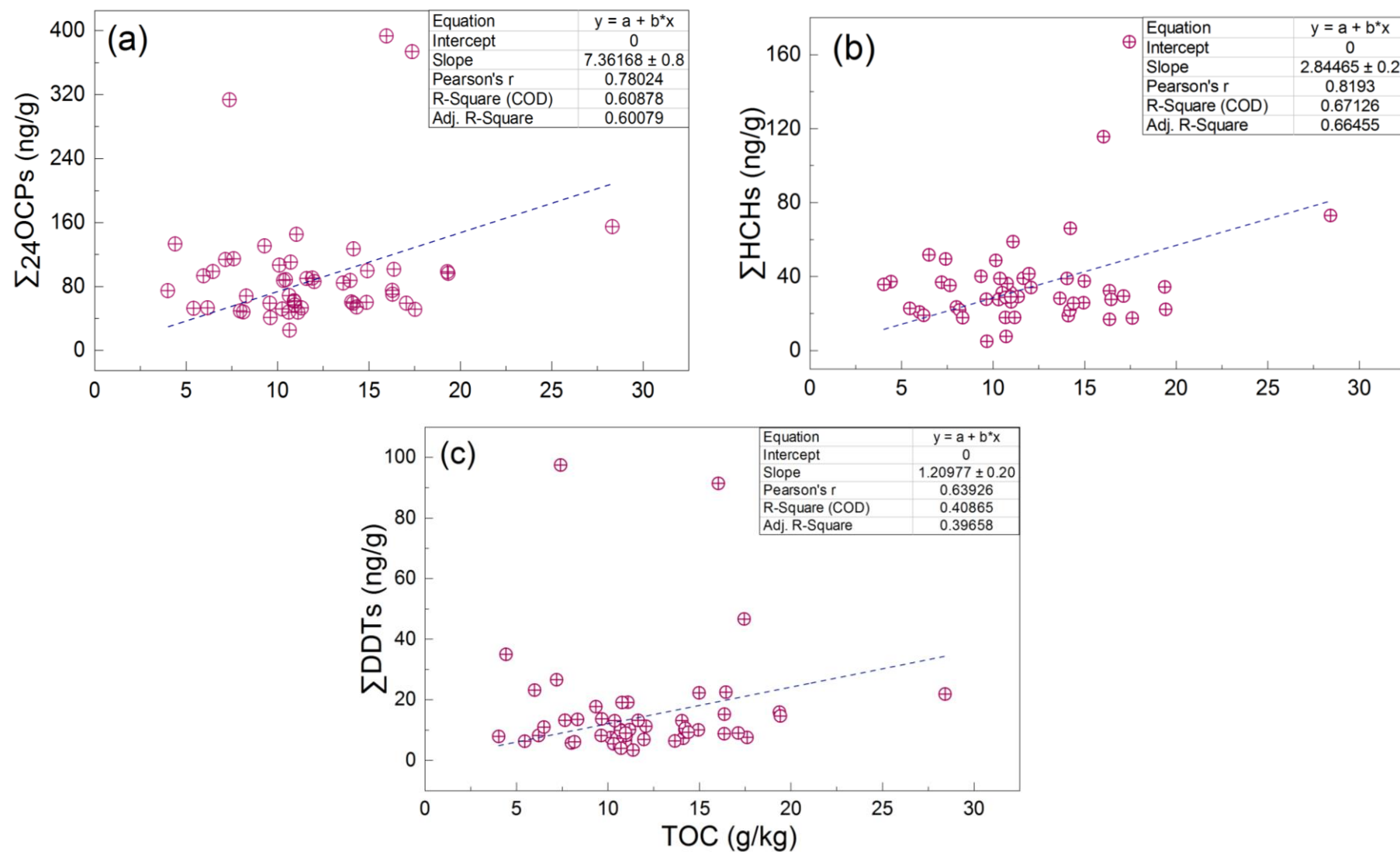
**Supplementary Table 2.** Parameters in Health Risk Model

**Supplementary Table 3.** R<sub>f</sub>D and SF of the HCHs and DDTs

**Supplementary Table 4.** Summary of hazard index of HCHs and DDTs in different cities in the Hexi Corridor in Northwest China



Supplementary Figure 1. Concentration of individual OCPs in soils of five cities from Hexi Corridor in Northwest China



**Supplementary Figure 2.** Relationships of (a) between TOC and  $\Sigma_{24}$ OCPs, (b) TOC and  $\Sigma$ HCHs, and TOC and  $\Sigma$ DDTs in soils from the Hexi Corridor in Northwest China

**Supplementary Table 1. Individual OCP and  $\Sigma_{24}$ OCPs contents (ng/g) in soil five cities from Hexi Corridor in Northwest China**

OCPs	Jiuquan			Jiayuguan			Zhangye			Jinchang			Wuwei		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
$\alpha$ -HCH	0.45	14.4	4.60	0.28	0.97	0.48	0.32	1.35	0.56	0.12	1.83	0.57	0.22	6.39	2.34
$\delta$ -HCH	1.25	80.1	17.3	1.55	6.22	3.22	1.00	4.46	2.50	2.92	5.47	4.19	0.30	6.44	3.84
$\beta$ -HCH	1.81	35.0	9.37	2.12	9.62	4.29	1.07	5.08	2.90	0.79	8.72	3.17	1.00	3.37	1.93
$\gamma$ -HCH	1.22	16.5	6.21	0.62	5.17	2.63	1.02	3.66	2.28	1.08	5.35	3.42	0.16	9.32	4.40
<i>p,p'</i> -DDE	2.23	37.6	8.43	1.09	14.97	6.25	1.79	10.4	6.19	1.95	10.37	5.47	1.17	6.86	3.55
<i>p,p'</i> -DDD	3.62	40.7	13.8	2.10	21.77	8.72	1.56	15.1	9.39	2.00	17.82	7.61	1.54	8.35	4.68
<i>p,p'</i> -DDT	5.14	93.6	30.3	6.14	36.45	16.3	1.35	29.1	9.95	3.98	43.05	18.6	3.77	25.7	16.5
<i>o,p'</i> -DDT	0.76	14.6	4.70	0.61	3.22	1.66	0.26	3.02	1.37	0.45	5.95	2.58	0.85	5.95	2.81
DF	0.29	14.9	4.24	0.97	5.52	2.28	0.76	4.05	1.67	0.53	4.23	2.02	0.36	4.42	1.54
HCB	2.08	83.9	14.9	0.47	1.41	0.87	0.47	2.68	0.82	0.39	6.10	1.73	0.40	7.38	3.05
HPF	0.22	17.2	4.02	0.51	3.76	1.33	0.73	2.04	1.11	0.69	4.22	2.03	0.71	2.85	1.63
HE	2.67	35.0	12.64	1.64	15.74	5.26	1.22	6.15	2.51	1.84	8.44	3.85	1.03	26.4	7.11
$\alpha$ -CD	0.50	4.92	2.23	0.11	3.00	0.86	0.15	0.76	0.35	0.28	2.80	1.04	0.16	2.54	0.74
$\gamma$ -CD	1.98	21.3	6.87	0.51	7.53	2.91	1.28	5.99	2.31	1.01	5.11	2.43	0.29	5.08	1.96
$\alpha$ -ED	0.36	8.19	2.89	0.35	1.56	0.75	0.27	1.03	0.59	0.33	2.27	1.18	0.18	5.13	1.91
$\beta$ -ED	0.64	6.41	2.81	0.36	2.91	1.20	nd	1.57	0.93	0.51	3.65	1.51	0.15	1.47	0.71
EDS	0.90	8.35	3.17	0.16	3.86	1.87	nd	4.37	1.18	0.57	2.91	1.77	0.94	4.18	1.86
AD	1.88	35.2	6.91	1.10	6.12	2.63	0.92	4.92	2.17	3.22	25.90	6.32	1.32	5.63	2.88
DE	0.72	11.7	4.27	0.73	6.18	2.21	0.74	3.07	1.77	0.37	3.99	1.76	0.35	6.66	1.64
ED	0.83	9.83	3.94	0.47	8.06	2.06	0.36	1.15	0.54	0.53	4.96	2.54	0.43	1.88	0.98
EDA	nd	19.6	5.02	0.86	3.91	1.85	nd	3.86	1.98	0.39	6.90	2.67	0.51	3.80	2.19
EDK	0.20	1.60	0.58	0.16	0.57	0.32	nd	0.37	0.16	0.05	0.60	0.28	0.11	1.44	0.37
ME	nd	9.48	3.10	0.36	4.48	1.77	nd	4.14	2.31	nd	2.44	1.47	0.70	5.28	2.59
MEC	nd	17.6	6.32	1.96	6.14	3.57	nd	13.1	4.83	1.38	13.43	5.90	0.75	8.98	3.67
$\Sigma$ HCH	7.58	97.5	37.4	5.73	21.9	10.6	5.47	13.7	8.25	6.42	15.2	11.3	3.40	22.5	12.5
$\Sigma$ DDT	17.8	167	57.3	17.9	73.0	32.9	4.96	51.8	26.9	16.8	66.1	34.3	7.61	40.1	27.5
$\Sigma_{24}$ OCPs	49.2	393	179	45.8	153	75.3	38.8	96.7	60.4	56.9	125	84.1	23.1	129	74.9

**Supplementary Table 2. Parameters in Health Risk Model**

<b>Exposure parameters</b>	<b>Meanings</b>	<b>Unit</b>	<b>Adult</b>	<b>Child</b>
SSAR <sup>[1]</sup>	Soil-skin adhesion coefficient	mg/cm <sup>2</sup>	0.07	0.07
BW <sup>[2]</sup>	Average weight	kg	70	15
EFI <sup>[3]</sup>	Indoor exposure frequency	d/a	187.5	187.5
EFO <sup>[3]</sup>	Outdoor exposure frequency	d/a	62.5	62.5
ED <sup>[3]</sup>	Exposure years	a	24	6
EF <sup>[3]</sup>	Rate of exposure	d/a	350	350
DAIR <sup>[3]</sup>	Daily air volume	m <sup>3</sup> /d	15	7.5
OSIR <sup>[3]</sup>	Daily soil intake	mg/d	100	200
PEF <sup>[3]</sup>	Formation coefficient of soil dust	m <sup>3</sup> /kg	1.36×10 <sup>9</sup>	1.36×10 <sup>9</sup>
SAE <sup>[3]</sup>	Skin area touching the soil	cm <sup>2</sup>	2415	1295
AT <sup>[3]</sup>	Average contact time, non-carcinogenic/carcinogenic	d	9125/26280	2190/26280
PM <sub>10</sub> <sup>[3]</sup>	Air inhalable particulate matter content	mg/cm <sup>3</sup>	0.15	0.15
E <sub>v</sub> <sup>[3]</sup>	Daily frequency of skin contact events	time/d	1	1
PLAF <sup>[3]</sup>	Proportion of inhaled soil particulate matter trapped in the body	-	0.75	0.75
SAF <sup>[3]</sup>	Scale of reference dose allocation for exposure to soil	-	0.2	0.2
fspi <sup>[3]</sup>	Proportion of particulate matter from the soil in the indoor air	-	0.8	0.8
fspo <sup>[3]</sup>	Proportion of particulate matter from the soil in the outdoor air	-	0.5	0.5

ABS <sub>o</sub> ,ABS <sub>d</sub> <sup>[3]</sup>	Absorption factor, mouth / skin	-	0.001	0.001
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1. Wang Z, Liu SQ, Chen XM, et al. Estimates of the exposed dermal surface area of Chinese in view of human health risk assessment [J]. *J. Saf. Environ.* 2008; 8: 152-156 (in Chinese) Available from: <https://kns.cnki.net/kcms2/article/abstract?v=3uoqIhG8C44YLTIOAiTRKgchrJ08w1e7VSL-HJEdEx0I2Pzo3kUv1S0xSLf-9gxpO1cSnDBvqBkMAbLom1oaSPZ0eA1A1oB9&uniplatform=NZKPT> [Last accessed on 28 Aug 2023]
2. Wang BB, Duan XL, Jiang QJ, et al. Inhalation exposure factors of residents in a typical region in Northern China [J]. *Res. Environ. Sci.* 2010, 23: 1421-1427. (in Chinese) [DOI: 10.13198/j.res.2010.11.92.wangbb.011].
3. Ministry of Environmental Protection of the People's Republic of China. HJ25. 3-2019 Technical Guidelines for Risk Assessment of Soil Contaminated of land for Construction [S]. Beijing: China Environment Science Press, 2019. Available from: <https://www.mee.gov.cn/ywgz/fgbz/bz/bzwb/trhj/201912/W020191224560850148092.pdf> [Last accessed on 28 Aug 2023]

**Supplementary Table 3. R<sub>f</sub>D and SF of the HCHs and DDTs**

Pollutant	SF <sub>inhalation</sub> (mg·kg <sup>-1</sup> ·d <sup>-1</sup> ) <sup>-1</sup>	R <sub>f</sub> D <sub>i</sub> (mg·kg <sup>-1</sup> ·d <sup>-1</sup> )	SF <sub>dermal</sub> (mg·kg <sup>-1</sup> ·d <sup>-1</sup> ) <sup>-1</sup>	R <sub>f</sub> D <sub>d</sub> (mg·kg <sup>-1</sup> ·d <sup>-1</sup> )	SF <sub>ingestion</sub> (mg·kg <sup>-1</sup> ·d <sup>-1</sup> ) <sup>-1</sup>	R <sub>f</sub> D <sub>o</sub> (mg·kg <sup>-1</sup> ·d <sup>-1</sup> )
<i>p,p'</i> -DDE	0.0001	0.0005	0.3400	0.0005	0.3400	0.0005
<i>p,p'</i> -DDD	0.0001	0.0005	0.2400	0.0005	0.2400	0.0005
<i>p,p'</i> -DDT	0.0001	0.0005	0.3400	0.0005	0.3400	0.0005
$\alpha$ -HCH	0.0018	0.0080	6.3000	0.0080	6.3000	0.0080
$\beta$ -HCH	0.0005	0.0300	1.8000	0.0003	1.8000	0.0300
$\gamma$ -HCH	0.0005	0.0003	1.1000	0.0003	1.1000	0.0003
$\delta$ -HCH	0.0005	0.0003	1.8000	0.0003	1.8000	0.0003

SF<sub>inhalation</sub>: inhalation carcinogenic slope factor; R<sub>f</sub>D<sub>i</sub>: inhalation reference dose; SF<sub>dermal</sub>: dermal carcinogenic slope factor; R<sub>f</sub>D<sub>d</sub>: dermal reference dose; SF<sub>ingestion</sub>: ingestion

carcinogenic slope factor;  $RfD_o$ : Oral intake reference dose.

**Supplementary Table 4. Summary of hazard index of HCHs and DDTs in different cities in the Hexi Corridor in Northwest China**

Expose	Carcinogenic risk							Non-carcinogenic risk							
	$\alpha$ -HCH	$\delta$ -HCH	$\beta$ -HCH	$\gamma$ -HCH	$p,p'$ -DDE	$p,p'$ -DDD	$p,p'$ -DDT	$\alpha$ -HCH	$\delta$ -HCH	$\beta$ -HCH	$\gamma$ -HCH	$p,p'$ -DDE	$p,p'$ -DDD	$p,p'$ -DDT	
Jiuquan	Min	7.57E-07	5.35E-07	5.37E-07	5.95E-07	1.81E-06	2.07E-06	4.17E-06	2.82E-09	2.59E-08	4.30E-10	2.91E-10	8.84E-10	1.44E-09	2.04E-09
	Max	2.44E-05	3.44E-05	1.04E-05	8.02E-06	3.05E-05	2.33E-05	7.59E-05	9.10E-08	1.66E-06	8.34E-09	3.92E-09	1.49E-08	1.61E-08	3.71E-08
	Mean	7.82E-06	7.41E-06	2.78E-06	3.02E-06	6.84E-06	7.86E-06	2.46E-05	2.92E-08	3.58E-07	2.23E-09	1.48E-09	3.34E-09	5.45E-09	1.20E-08
Jiayuguan	Min	4.80E-07	6.66E-07	6.29E-07	3.03E-07	8.83E-07	1.20E-06	4.98E-06	1.79E-09	3.22E-08	5.03E-10	1.48E-10	4.32E-10	8.31E-10	2.44E-09
	Max	1.66E-06	2.67E-06	2.86E-06	2.51E-06	1.21E-05	1.25E-05	2.96E-05	6.18E-09	1.29E-07	2.29E-09	1.23E-09	5.94E-09	8.63E-09	1.45E-08
	Mean	8.12E-07	1.38E-06	1.28E-06	1.28E-06	5.07E-06	5.00E-06	1.32E-05	3.03E-09	6.69E-08	1.02E-09	6.27E-10	2.48E-09	3.46E-09	6.46E-09
Zhangye	Min	5.45E-07	4.29E-07	3.19E-07	4.98E-07	1.45E-06	8.93E-07	1.09E-06	2.03E-09	2.08E-08	2.55E-10	2.44E-10	7.11E-10	6.19E-10	5.34E-10
	Max	2.30E-06	1.91E-06	1.51E-06	1.78E-06	8.40E-06	8.61E-06	2.36E-05	8.57E-09	9.26E-08	1.21E-09	8.71E-10	4.11E-09	5.97E-09	1.16E-08
	Mean	9.51E-07	1.07E-06	8.63E-07	1.11E-06	5.02E-06	5.37E-06	8.07E-06	3.55E-09	5.19E-08	6.91E-10	5.43E-10	2.46E-09	3.72E-09	3.95E-09
Jinchang	Min	2.02E-07	1.26E-06	2.36E-07	5.26E-07	1.58E-06	1.15E-06	3.22E-06	7.55E-10	6.08E-08	1.89E-10	2.57E-10	7.74E-10	7.93E-10	1.58E-09
	Max	3.11E-06	2.35E-06	2.59E-06	2.60E-06	8.41E-06	1.02E-05	3.49E-05	1.16E-08	1.14E-07	2.07E-09	1.27E-09	4.11E-09	7.07E-09	1.71E-08
	Mean	9.63E-07	1.80E-06	9.43E-07	1.66E-06	4.44E-06	4.36E-06	1.51E-05	3.59E-09	8.70E-08	7.54E-10	8.12E-10	2.17E-09	3.02E-09	7.38E-09
Wuwei	Min	3.77E-07	1.30E-07	2.96E-07	7.69E-08	9.48E-07	8.80E-07	3.06E-06	1.41E-09	6.29E-09	2.37E-10	3.76E-11	4.64E-10	6.10E-10	1.49E-09
	Max	1.09E-05	2.77E-06	1.00E-06	4.54E-06	5.56E-06	4.78E-06	2.08E-05	4.06E-08	1.34E-07	8.02E-10	2.22E-09	2.72E-09	3.31E-09	1.02E-08
	Mean	3.99E-06	1.65E-06	5.74E-07	2.14E-06	2.87E-06	2.68E-06	1.34E-05	1.49E-08	7.98E-08	4.59E-10	1.05E-09	1.41E-09	1.86E-09	6.55E-09