

Supporting information

New estimates of direct N₂O emissions from Chinese croplands from 1980 to 2007 using localized emission factors

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We calculated statistically the maximum and minimum emission factors of paddy fields according to the original data, log-transformed data and cube root-transformed data, and defined the class interval according to the difference between the maximum and minimum and the number of classifications, here calculated in accordance with 10 groups. Linear interpolation was applied to calculate the value that could not be found directly in the table of normal area according to cumulative frequency, and the last obtained t values ($\bar{t} \pm \delta t$) were also used to deduce the original value by linear interpolation (Table S1). The average group value \pm standard error ($t = \bar{t} \pm \delta t$) from the method of direct calculation with original data using equations (1) and (2) using the values in Table S1 are 1.0977 and 0.682, respectively, and their corresponding original values were calculated by linear interpolation as 2.44% and 1.93%, respectively, giving a mean of 2.18% with a standard error of 0.25%. The values of $\bar{t} \pm \delta t$ from the log-transformed data are 0.3745 and -1.1608, and their corresponding values were calculated by linear interpolation to be -0.602 and -0.660, respectively, giving a mean of -0.631 with standard error of 0.029, and then converted into original

values to obtain a mean of 0.23% with a standard error of 1.07%. The values of $\bar{t} \pm \delta t$ from the method of cube root conversion were 0.7364 and -0.6966, and their corresponding values were calculated by linear interpolation at 0.953 and 0.533, respectively, thus the mean is 0.743 with a standard error of 0.350, and then converted into original values to obtain a mean of 0.41% with a standard error of 0.04%.

We used the same method to calculate the emission factor of uplands (Table S2). The values of $\bar{t} \pm \delta t$ from the method of direct calculation with original data are 1.1009 and -0.0893, respectively, and their corresponding origin values are calculated by linear interpolation to be 2.88% and 0.92%, respectively, giving a mean of 1.90% with a standard error of 0.98%. The values of $\bar{t} \pm \delta t$ from the log transformation are 0.3681 and -1.1235, and their corresponding values are calculated by linear interpolation to be 0.334 and -0.543, respectively, giving a mean of -0.105 with a standard error of 0.439, and then converted into original values to obtain a mean of 0.79% with a standard error of 0.36%. The values of $\bar{t} \pm \delta t$ from the cube root transformation are 0.7146 and -0.7706, and their corresponding values are calculated by linear interpolation to be 1.215 and 0.817, respectively, giving a mean of 1.106 with a standard error of 0.279, and then converted into original values to obtain a mean of 1.05% with a standard error of 0.02%.

Table S1 Normalization of N₂O emission factors from Chinese paddy fields

Method	Classification	Frequency	Accumulated frequency	Probability scale	Class interval	f-Frequency/ Class interval	t-Group value
Original data	0.0036~	87	0.4462	-∞~	∞	0	/
	0.2163~	21	0.5538	-0.1354~	0.2708	77.5537	0
	0.4291~	15	0.6308	0.1354~	0.1985	75.5629	0.2346
	0.6418~	18	0.7231	0.3339~	0.2581	69.7377	0.4630
	0.8545~	24	0.8462	0.5920~	0.4280	56.0656	0.8060
	1.0672~	12	0.9077	1.0200~	0.3066	39.1377	1.1734
	1.2780~	6	0.9385	1.3267~	0.2153	27.8671	1.4343
	1.4927~	0	0.9385	1.5420~	0	0	1.5420
	1.7054~	6	0.9692	1.5420~	0.3276	18.3145	1.7058
	1.9181~	8	1	1.8696~	∞	0	/
	Total	195	/	/	/	364.2392	/
Log- transformed	-2.4413~	3	0.0154	-∞~	∞	0	/
	-2.1643~	3	0.0308	-2.1600~	0.2904	10.3306	-2.0148
	-1.8873~	9	0.0769	-1.8696~	0.4435	20.2931	-1.6479

	-1.6103~	6	0.1077	-1.4261~	0.1916	31.3152	-1.3303
	-1.3334~	9	0.1538	-1.2345~	0.2144	41.9776	-1.1273
	-1.0564~	33	0.3231	-1.0201~	0.5610	58.8235	-0.7396
	-0.7794~	36	0.5077	-0.4591~	0.4784	75.2508	-0.2199
	-0.5024~	24	0.6308	0.0193~	0.3146	76.2873	0.1766
	-0.2254~	48	0.8769	0.3339~	0.8258	58.1255	0.7468
	0.0516~	24	1	1.1597~	∞	0	/
	Total	195	/	/	/	372.4037	/
Cube root-	0.1535~	15	0.0769	$-\infty$~	∞	0	/
transformed	0.2669~	9	0.1231	-1.4261~	0.2664	33.7838	-1.2929
	0.3802~	15	0.2000	-1.1597~	0.3181	47.1550	-1.0007
	0.4935~	48	0.4462	-0.8416~	0.7062	67.9694	-0.4885
	0.6068~	18	0.5385	-0.1354~	0.2320	77.5996	-0.0194
	0.7202~	15	0.6154	0.0966~	0.1968	76.2040	0.1950
	0.8335~	21	0.7231	0.2934~	0.2986	70.3282	0.4427
	0.9468~	30	0.8769	0.5920~	0.5677	52.8448	0.8759
	1.0602~	12	0.9385	1.1597~	0.3823	31.3890	1.3509

	1.1735~	12	1	1.5420~	∞	0	/
	Total	195	/	/	/	457.2738	/

Table S2 Normalization of N₂O emission factor from Chinese upland

Method	Classification	Frequency	Accumulated frequency	Probability scale	Class interval	f-Frequency/Class interval	t-Group value
	0.0350~	57	0.2184	-∞~	∞	0	/
	0.5115~	66	0.4713	-0.7776~	0.7055	93.5507	-0.4249
	0.9880~	33	0.5977	-0.0721~	0.3195	103.2864	0.0877
	1.4645~	27	0.7011	0.2474~	0.2803	96.3254	0.3876
	1.9410~	24	0.7931	0.5277~	0.2895	82.9016	0.6725
Original data	2.4175~	12	0.8391	0.8172~	0.1735	69.1643	0.9040
	2.8940~	15	0.8966	0.9907~	0.2715	55.2486	1.1265
	3.3705~	9	0.9310	1.2622~	0.2214	40.6504	1.3729
	3.8470~	9	0.9655	1.4836~	0.3351	26.8577	1.6512
	4.3235~	9	1	1.8187~	∞	0	/
	Total	261	/	/	/	567.9849	/

	-1.4559~	6	0.0230	-∞~	∞	0	/
	-1.2422~	1	0.0268	-1.9956~	0.0659	15.1745	-1.9627
	-1.0285~	17	0.0920	-1.9297~	0.6009	28.2909	-1.6293
	-0.8148~	6	0.1149	-1.3288~	0.1281	46.8384	-1.2648
	-0.6011~	21	0.1954	-1.2007~	0.3425	61.3139	-1.0295
Log-	-0.3873~	30	0.3103	-0.8582~	0.3633	82.5764	-0.6766
transformed	-0.1736~	57	0.5287	-0.4949~	0.5670	100.5291	-0.2114
	0.0401~	33	0.6552	0.0721~	0.3272	100.8557	0.2357
	0.2538~	48	0.8391	0.3993~	0.5914	81.1633	0.6950
	0.4675~	42	1	0.9907~	∞	0	/
	Total	261	/	/	/	516.7422	/
Cube root-	0.3271~	6	0.0230	-∞~	∞	0	/
transformed	0.4631~	21	0.1034	-1.9956~	0.7334	28.6338	-1.6289
	0.5991~	24	0.1954	-1.2622~	0.4040	59.4059	-1.0602
	0.7350~	30	0.3103	-0.8582~	0.3633	82.5764	-0.6766
	0.8710~	51	0.5057	-0.4949~	0.5093	100.1374	-0.2403
	1.007~	24	0.5977	0.0144~	0.2103	114.1010	0.1196

1.1430~	39	0.7471	0.2247~	0.4408	88.4835	0.4451
1.2789~	24	0.8391	0.6655~	0.3252	73.8007	0.8281
1.4149~	24	0.9310	0.9907~	0.4929	48.6914	1.2372
1.5509~	18	1	1.4836~	∞	0	/
Total	261	/	/	/	595.8302	/
