SUPPLEMENT FOR THE RESPONSE TO REVIEWER #1

Number of tables:4 Number of figures: 3

Table list

Table R1 in the Main revisions and response: Comparisons of total N deposition fluxes between our study and Vet et al (2014) (kg N/S ha^{-1} yr⁻¹).

Table S3 in the revised supplement: The modeled V_d for different land use categories (cm s⁻¹).

Table S5 in the revised supplement: The Mann-Kendall test for the trend of $R_{dry/wet}$ of N and S in 2005-2020. The z-value represents the standard normal statistic, and the p-value represents the generalization. The former indicates the trend, while the latter indicates statistical significance. P1 and P2 indicate 2005–2015 and 2015–2020, respectively.

Table S6 in the revised supplement (Table S4 in the original submission): Comparisons of total deposition fluxes of different species between our study in China and two networks in other countries (kg N/S ha⁻¹ yr⁻¹).

Figure list

Figure 2 in the revised manuscript: Methodology framework to estimate dry and wet deposition of this study. The blue process shows the four steps to establish the RF model. The orange process shows the three steps in establishing a GAM model. See Sections 2.2 to 2.3 of the method section in the text for the acquisition of the preliminary data set.

Figure S4 in the revised supplement (Figure S3 in the original submission): China average total precipitation from ECMWF: https://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/.

Figure S5 in the revised supplement: in the revised supplement: The monthly means of the modeled dry deposition velocity of N and S during 2013-2020.

 Table R1 in the Main revisions and response: Comparisons of total N deposition fluxes between our study and Vet et al (2014) (kg N/S ha⁻¹ yr⁻¹).

Reference	Ν	S
This study	16.0	16.1
Vet et al (2014)	0.4-20.0	4.0-23.4
This study	6.1	4.1
Vet et al (2014)	2.0-28.1	4.0-32.0
	Reference This study Vet et al (2014) This study Vet et al (2014)	ReferenceNThis study16.0Vet et al (2014)0.4-20.0This study6.1Vet et al (2014)2.0-28.1

Land use categories	HNO ₃	NH3	NH ₄	NO ₂	NO ₃	SO ₂	SO ₄
Paddy fields	1.63	0.47	0.14	0.20	0.14	0.45	0.14
Dry land	1.42	0.42	0.16	0.17	0.16	0.41	0.16
Forestland	2.55	0.49	0.14	0.24	0.14	0.46	0.14
Shrub forest	1.83	0.45	0.16	0.21	0.16	0.43	0.16
Sparse forestland	1.96	0.47	0.15	0.22	0.15	0.44	0.15
Other forestland	2.17	0.53	0.14	0.22	0.14	0.52	0.14
High coverage grassland	1.29	0.36	0.18	0.12	0.18	0.36	0.18
Medium coverage grassland	1.05	0.34	0.18	0.09	0.18	0.34	0.18
Low coverage grassland	0.88	0.31	0.17	0.04	0.17	0.31	0.17
River channel	1.17	0.38	0.15	0.13	0.15	0.37	0.15
Lakes	0.93	0.32	0.19	0.07	0.19	0.32	0.19
Reservoir pond	1.37	0.43	0.14	0.14	0.14	0.43	0.14
Permanent glacial snow	0.59	0.27	0.16	0.03	0.16	0.28	0.16
Tidal-flat	1.06	1.01	0.07	0.02	0.07	1.02	0.07
Beach land	1.30	0.37	0.16	0.12	0.16	0.36	0.16
Urban land use	1.37	0.44	0.15	0.14	0.15	0.44	0.15
Rural settlements	1.27	0.40	0.15	0.14	0.15	0.40	0.15
Other construction land	1.40	0.47	0.14	0.16	0.14	0.47	0.14
Sand	0.87	0.30	0.10	0.02	0.10	0.30	0.10
Gobi	0.98	0.30	0.10	0.02	0.10	0.30	0.10
Saline alkali soil	0.87	0.31	0.15	0.04	0.15	0.31	0.15
Swamp land	1.61	0.38	0.15	0.14	0.15	0.37	0.15
Bare land	1.10	0.30	0.10	0.03	0.10	0.30	0.10
Bare rock	0.88	0.30	0.14	0.03	0.14	0.30	0.14
Other unused land	0.72	0.29	0.18	0.04	0.18	0.30	0.18

Table S3 in the revised supplement: The modeled V_d for different land use categories (cm s⁻¹).

Note: Land-Use and Land-Cover Change (LUCC) data were obtained from Resource and Environment Data Cloud Platform (http://www.resdc.cn/), generated by manual visual interpretation of Landsat TM/ETM remote sensing images.

Table S5 in the revised supplement: The Mann-Kendall test for the trend of $R_{dry/wet}$ of N and S in 2005-2020. The z-value represents the standard normal statistic, and the p-value represents the generalization. The former indicates the trend, while the latter indicates statistical significance. P1 and P2 indicate 2005–2015 and 2015–2020, respectively.

Species	٥X	KN	RI	DN	Ν	1	S	5
Period	P1	P2	P1	P2	P1	P2	P1	P2
Z	-2.024	2.254	-2.024	1.879	-2.336	1.879	-3.270	1.127
р	0.043	0.024	0.043	0.060	0.020	0.060	0.001	0.260

Note: Negative and positive z-value indicate a downward and upward trend in the time series, respectively;

p<0.01 indicates a significance level of 99%.

Table S6 in the revised supplement (Table S4 in the original submission): Comparisons of total deposition fluxes of different species between our study in China and two networks in other countries (kg N/S ha⁻¹ yr⁻¹).

	Period	RDN	OXN	Ν	S
USA	1990-2020	2.7	13.3	16.0	16.1
Europe	2000-2019	1.4	4.7	6.1	4.1
China	2005-2020	20.2	15.2	35.4	25.9

Figure 2 in the revised manuscript: Methodology framework to estimate dry and wet deposition of this study. The blue process shows the four steps to establish the RF model. The orange process shows the three steps in establishing a GAM model. See Sections 2.2 to 2.3 of the method section in the text for the acquisition of the preliminary data set.



Figure S4 in the revised supplement (Figure S3 in the original submission): China average total

ECMWF:

precipitation from



https://apps.ecmwf.int/datasets/data/interim-full-daily/levtype=sfc/.

Figure S5 in the revised supplement: in the revised supplement: The monthly means of the modeled dry deposition velocity of N and S during 2013-2020.



References

Vet, R., Artz, R. S., Carou, S., Shaw, M., Ro, C.-U., Aas, W., Baker, A., Bowersox, V. C., Dentener, F., Galy-Lacaux, C., Hou, A., Pienaar, J. J., Gillett, R., Forti, M. C., Gromov, S., Hara, H., Khodzher, T., Mahowald, N. M., Nickovic, S., Rao, P. S. P., and Reid, N. W.: A global assessment of precipitation chemistry and deposition of sulfur, nitrogen, sea salt, base cations, organic acids, acidity and pH, and phosphorus, Atmos. Environ., 93, 3-100, https://doi.org/10.1016/j.atmosenv.2013.10.060, 2014.