Characteristics of dissolved N_2O concentrations and flux in the agricultural watershed of Jurong Reservoir

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Outline

- 1 Introduction
- 2 Experimental method
- 3 Results and Discussion
- 4 Conclusions

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1 Introduction

- Nitrous oxide (N_2O) is the third most important greenhouse gas and grows annually by 0.2 percent as a result of anthropogenic perturbation in antural nitrogen (N) cycle (Khalil et al., 2002).

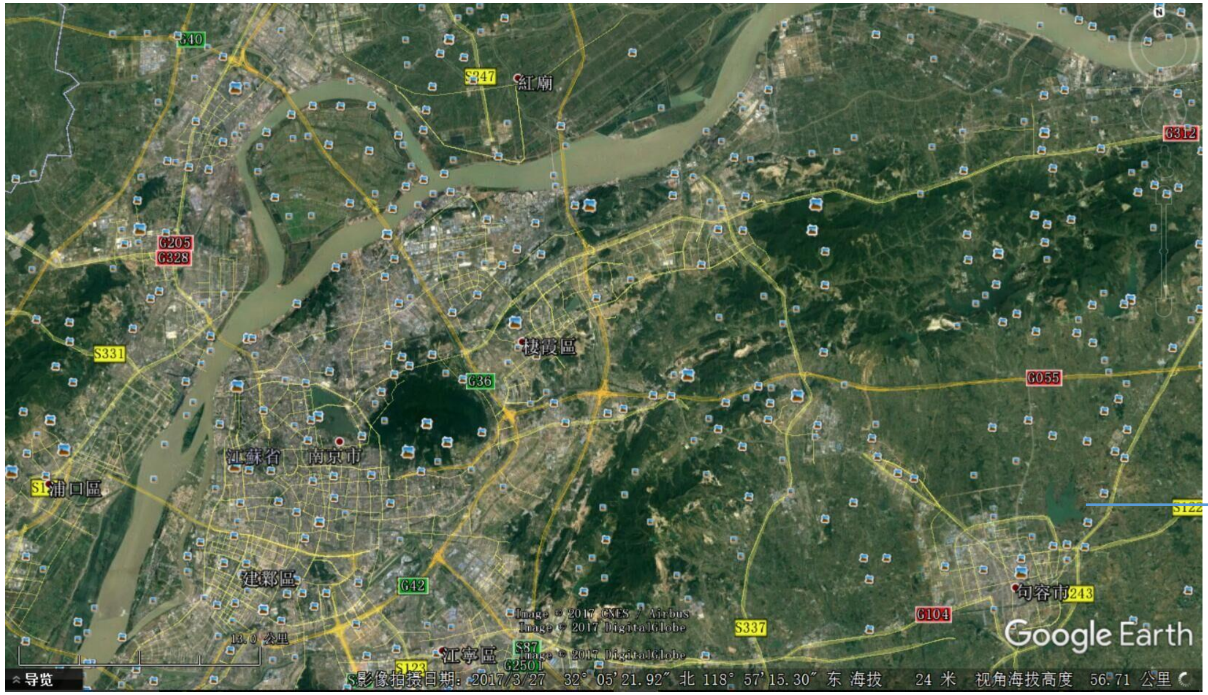
- Agriculture is the major source of N_2O (Kroeze et al.,1999), while little attention is given to agriculture watershed. (Beaulieu et al., 2008).

- This report studies N_2O concentration and flux in the Jurong Reservoir watershed, which has obviously spatial and temporal changes.

Outline

2 Experimental method

2.1 Site description and sample collection



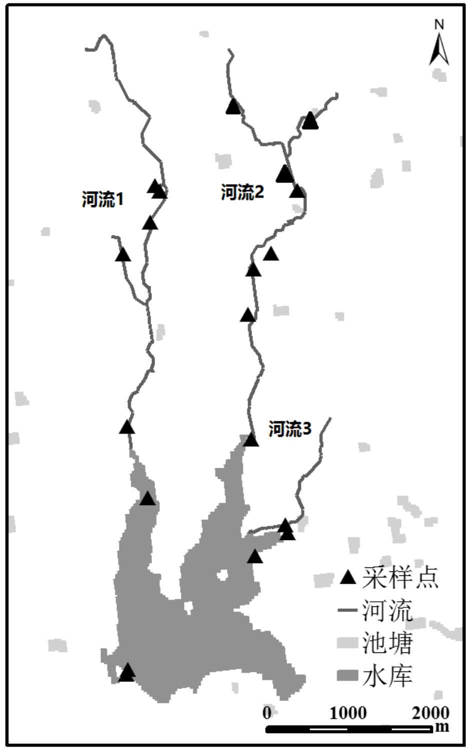


Fig.1 Location and sampling map of the Jurong Reservoir watershed.

2 Experimental method

2.2 Sample analyses

$$K = [N_2O]_g / [N_2O]_L \rightarrow [N_2O]_L = \frac{[(X \times V_L / 18) \times 10^9]}{(1 - X) \times V_L} \rightarrow P = EX$$

$$[N_2O]_W = [N_2O]_g \times (\frac{1}{k} + \beta) \rightarrow \beta = V_g / V_L$$

$$F = k(C_W - C_{eq})$$

$$k / k_{600} = (S_C / 600)^{-n} \rightarrow$$

n=2/3 :for $U_{10} < 3.7$m/s
n=0.5 :for $U_{10} \geq 3.7$m/s
$k_{600} = 2.07 + 0.215 U_{10}^{1.7}$

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3 Results and Discussion

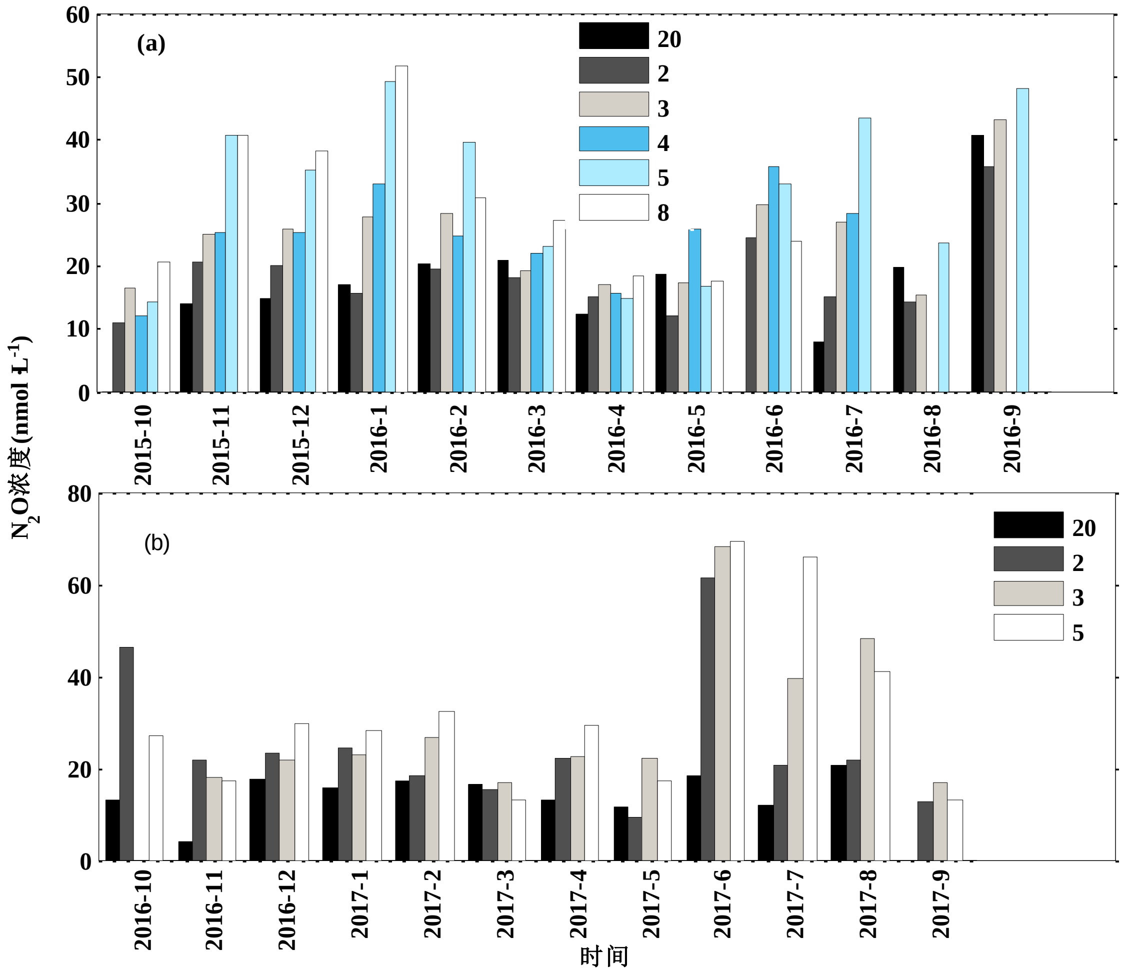

Fig.2 The N_2O concentration in River 1 for two years .

3 Results and Discussion

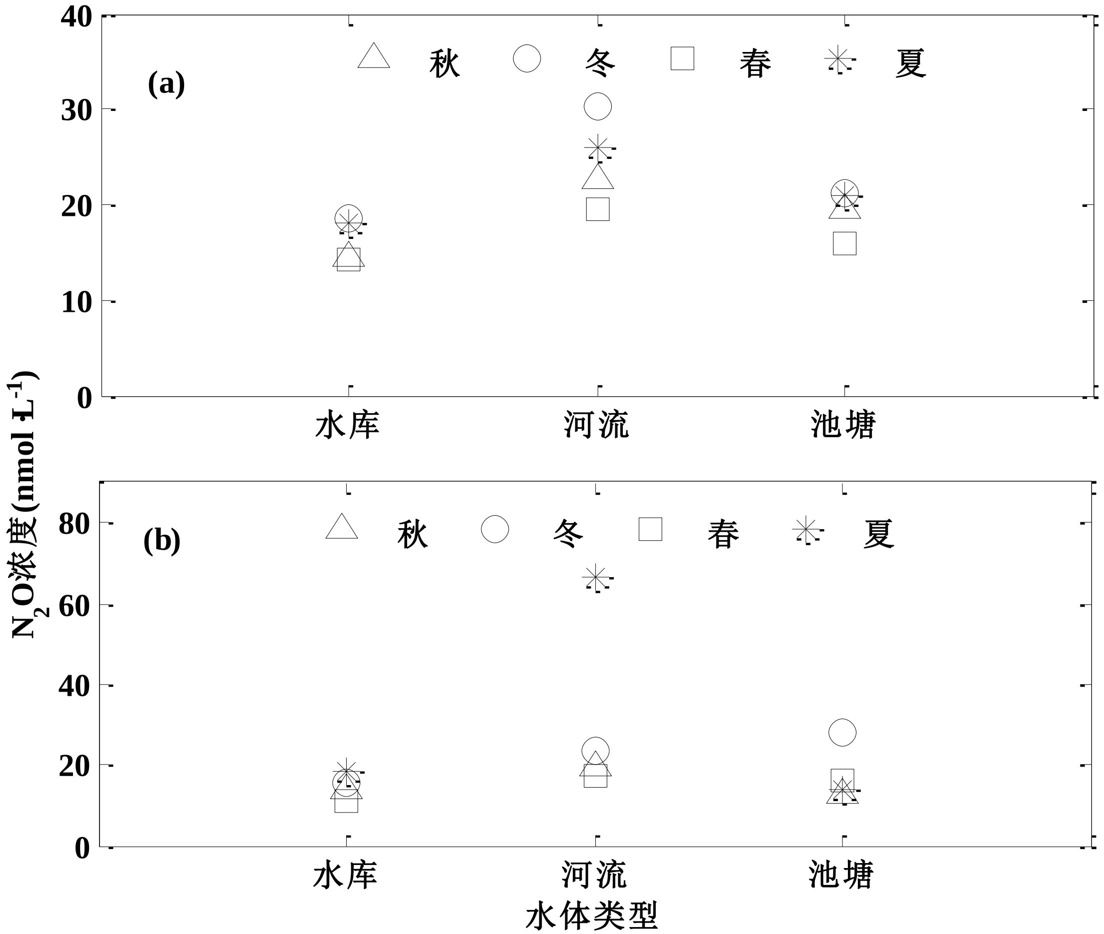

Fig.3Temporal variation of dissolved N_2O concentration in different water spaces.

3 Results and Discussion

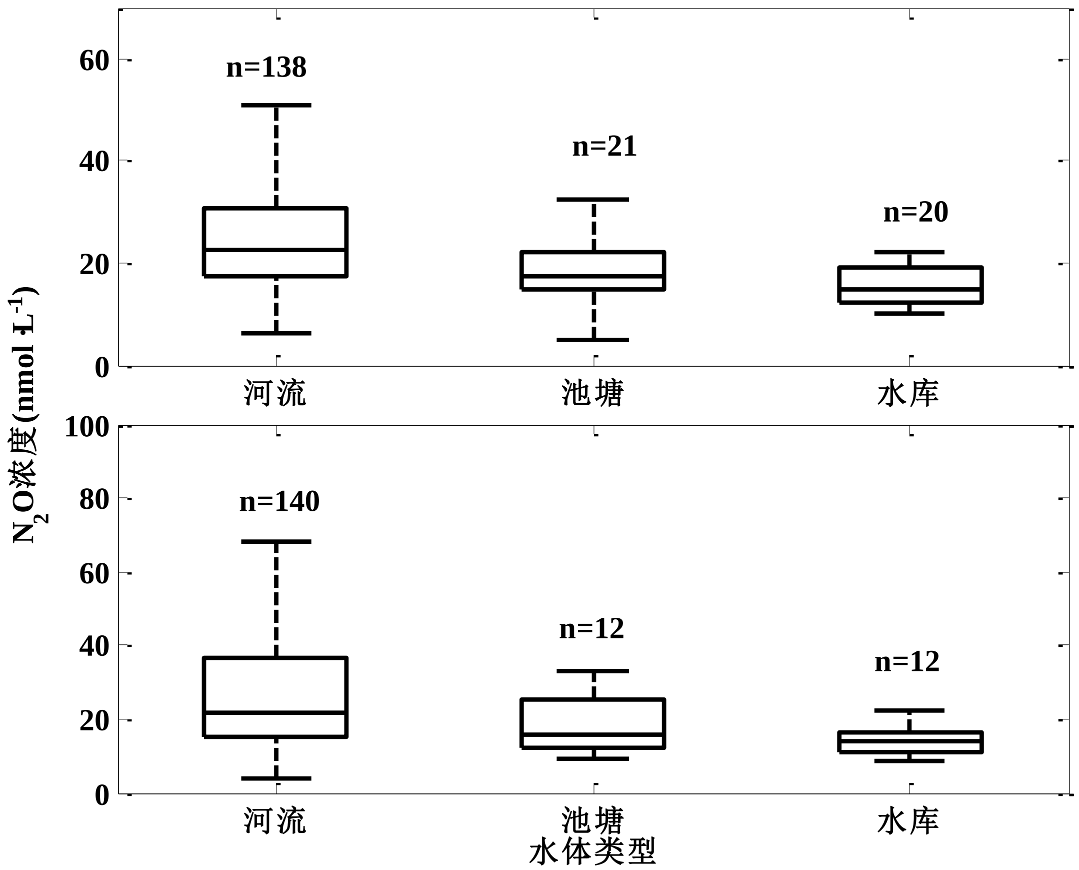

Fig.4 The dissolved N_2O concentration in different water space.

3 Results and Discussion

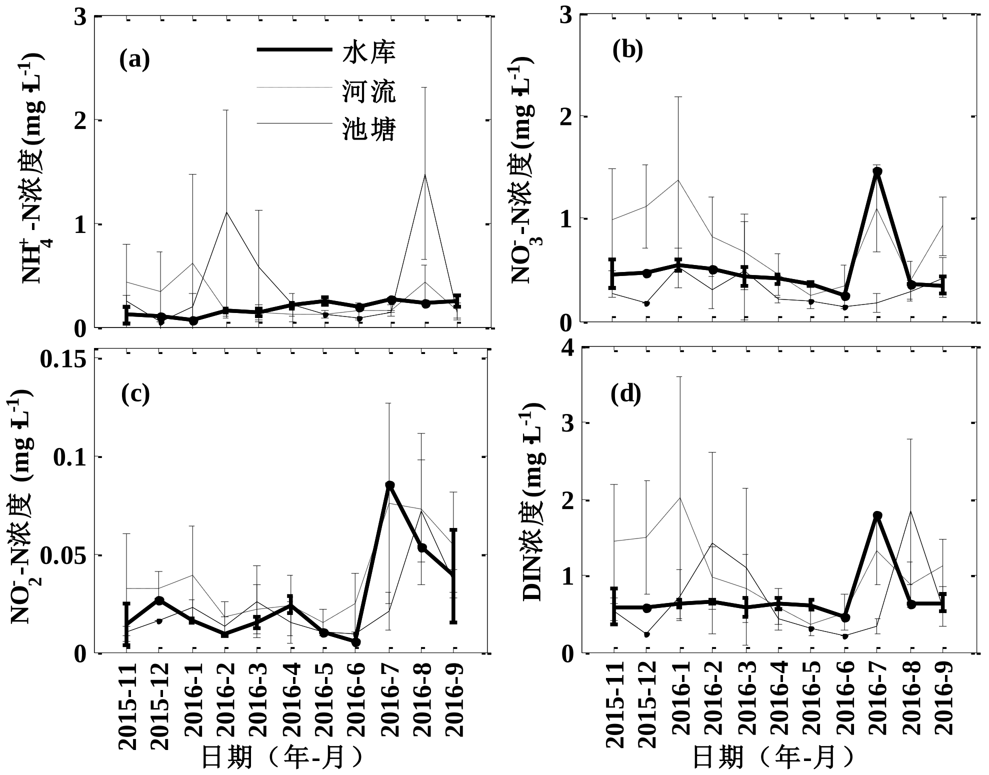

Fig.5NH_4^+-N, NO_3^--N, NO_2^--N, and DIN concentrations in different water space in 2016

Table 1 Correlation analysis between N_2O concentration and Inorganic salt in 2016

	NH_4^+-N	NO_3^--N	NO_2^--N	DIN
河流	0.46* *	0.61* *	0.42* *	0.63* *
水库	-0.15	-0.06	-0.28	-0.10
池塘	0.78* *	0.32	0.74* *	0.76* *
总水体	0.45* *	0.60* *	0.45* *	0.64* *

3 Results and Discussion

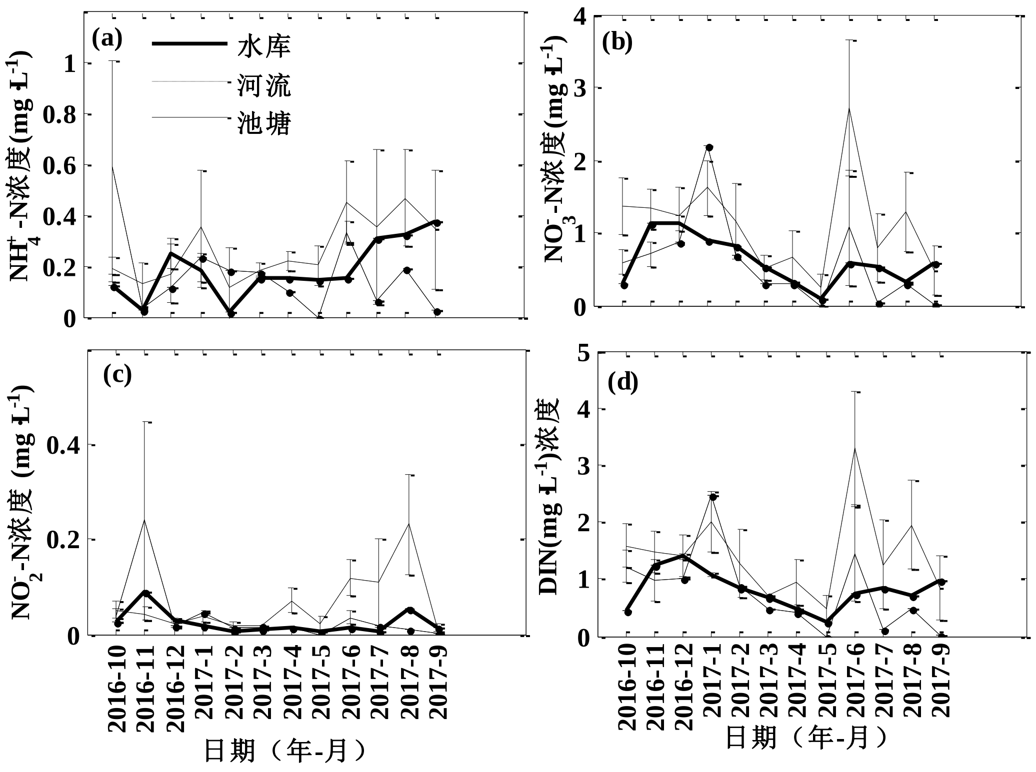

Fig.6NH_4^+-N, NO_3^--N, NO_2^--N, and DIN concentrations in different water space in 2017

Table 2 Correlation analysis between N_2O concentration and Inorganic salt in 2017

	NH_4^+-N	NO_3^--N	NO_2^--N	DIN
River	0.53* *	0.68* *	0.66* *	0.74* *
Reservoir	0.11	0.31	0.36	0.36
Pond	0.25	0.60	-0.02	0.61*
Total	0.46* *	0.62* *	0.51* *	0.68* *

3 Results and Discussion

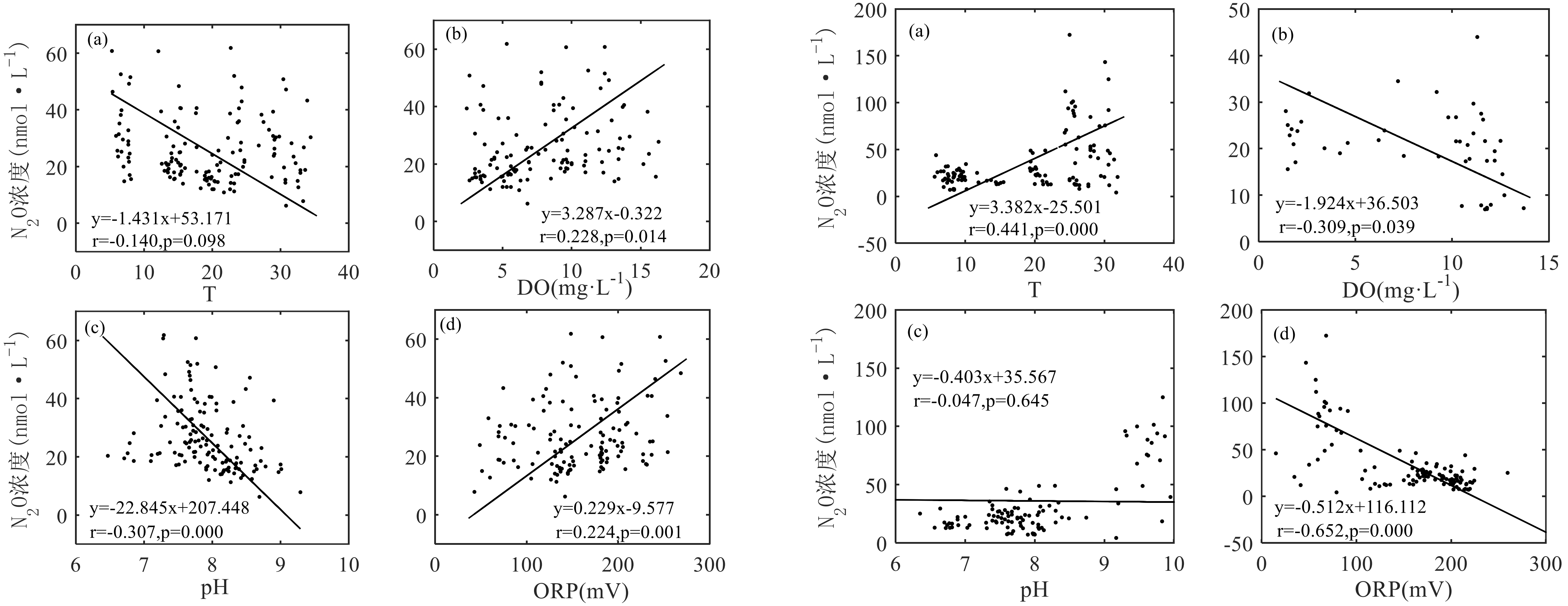

Fig.7 The relationship between N_2O concentration and (a)T (b)DO (c)pH(d)ORP.

3 Results and Discussion

Table.3The level of dissolved N_2O concentration in other rivers ponds ,and reservoirs

水体类型	研究区域	时间	N_2O 浓度 ($nmol \cdot L^{-1}$)	参考文献
河流	Upper Thurne(英国)	2007.3	62	Outram et al., 2012
	句容水库流域(中国)	2010.9~2012.9	11.82	Xia et al., 2013
	脱甲河小流域(中国)	2014.4~2015.4	6~1380	张羽等, 2016
	句容水库流域	2015.10~2017.9	3.90~70.83	本研究
池塘	句容水库流域	2010.9~2012.9	9.09	Xia et al.2013
	句容水库流域	2015.10~2017.9	5.04~32.36	本研究
水库	句容水库流域	2010.9~2012.9	9.77	Xia et al.2013
	句容水库流域	2015.10~2017.9	9.05~51.52	本研究

3 Results and Discussion

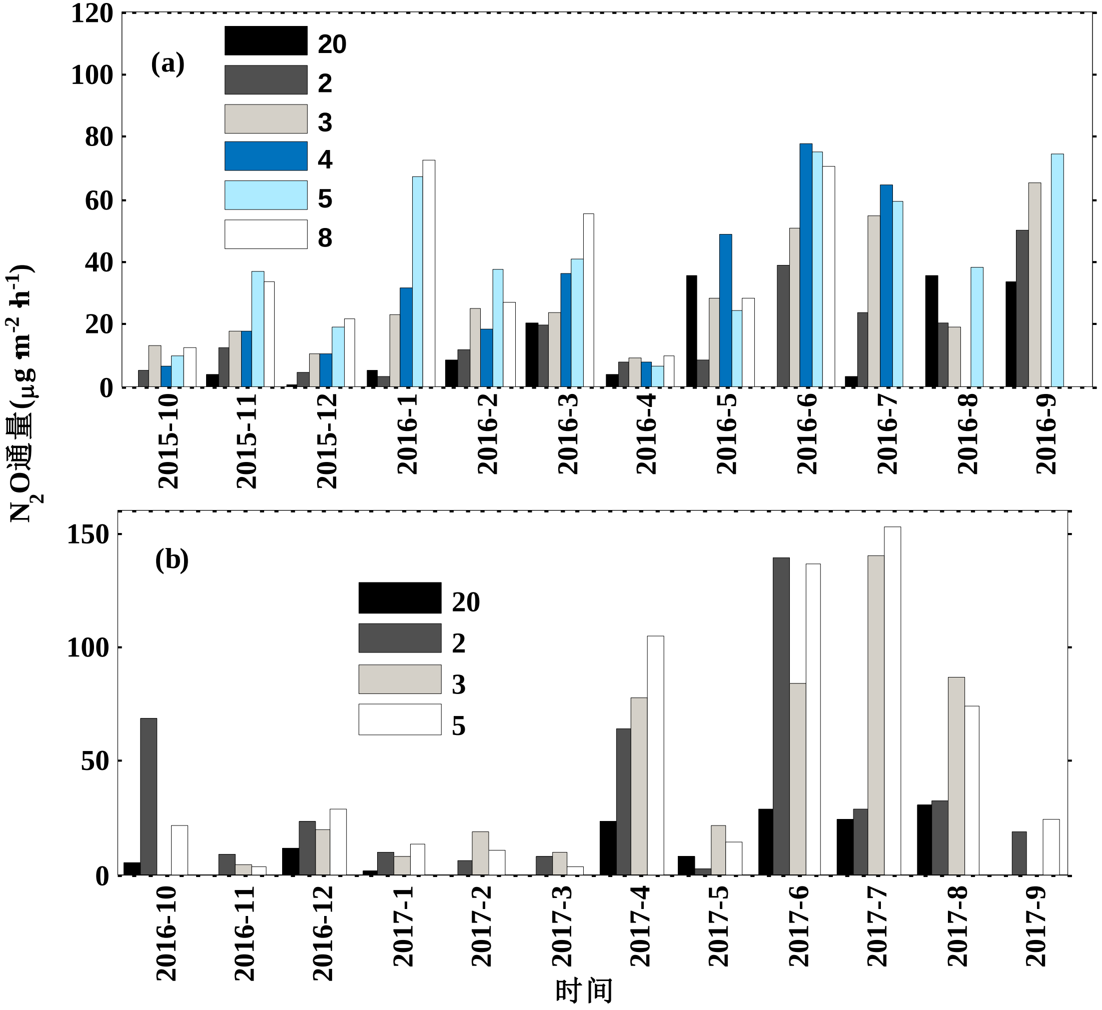

Fig.8 The N_2O flux in River 1 for two years

3 Results and Discussion

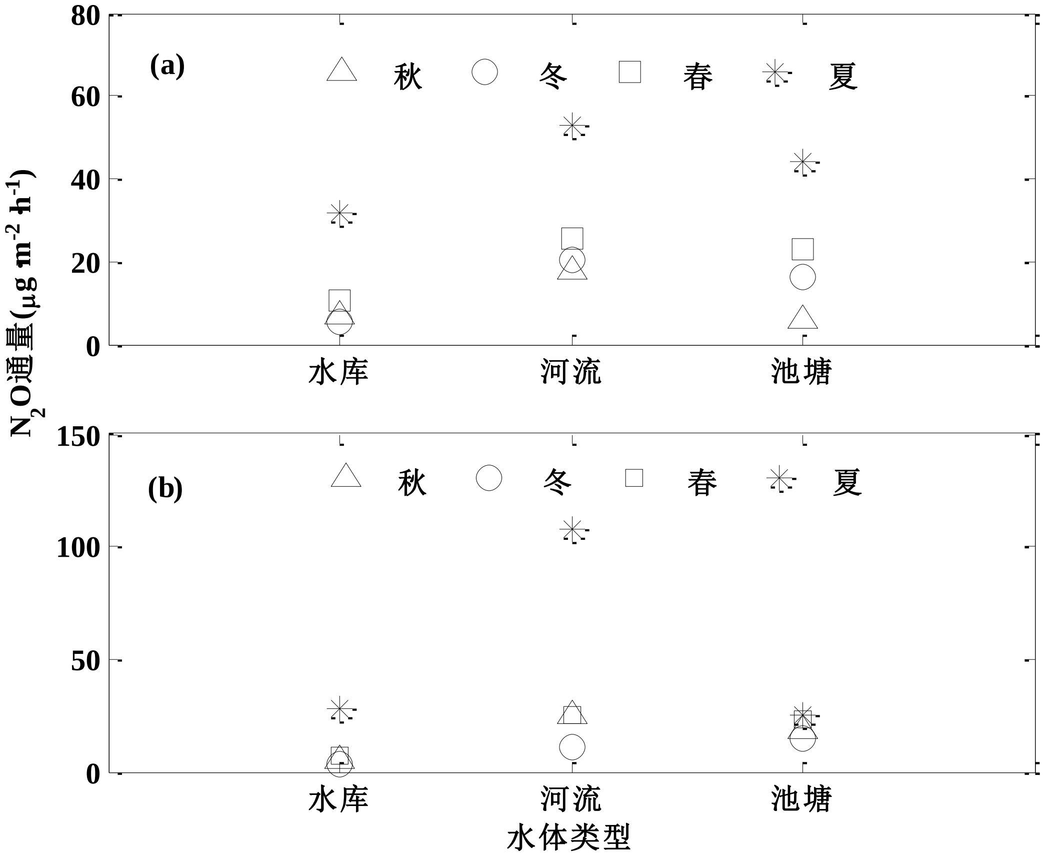

Fig.9Temporal variation of dissolved N_2O flux in different water spaces.

3 Results and Discussion

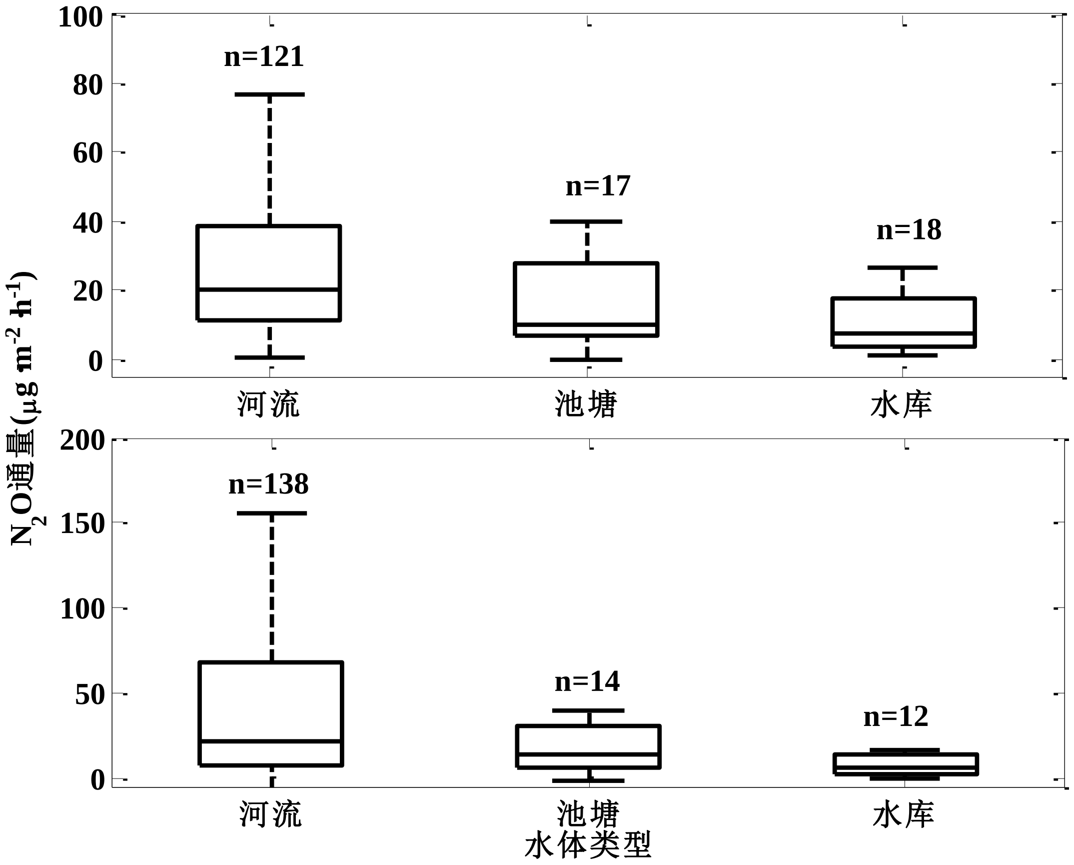

Fig.10 The dissolved N_2O flux in different water space.

3 Results and Discussion

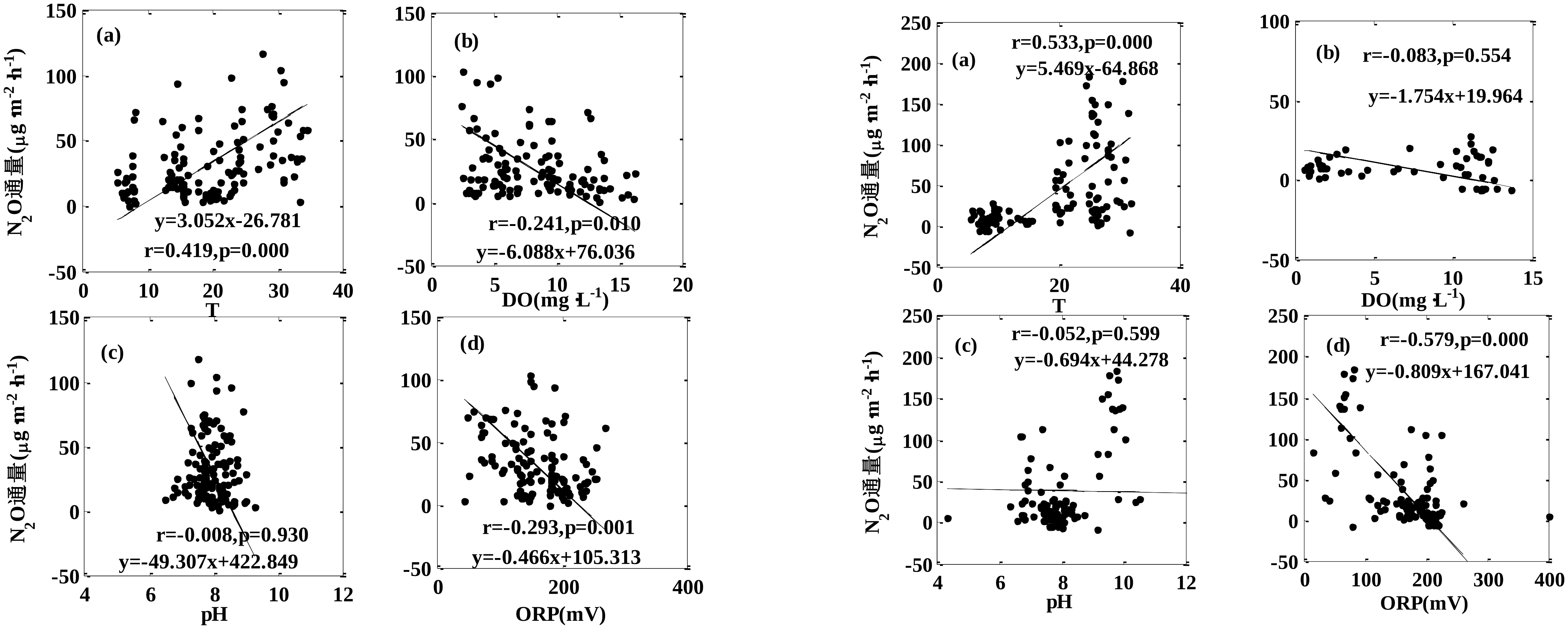

Fig.11 The relationship between N_2O flux and (a)T (b)DO (c)pH(d)ORP.

3 Results and Discussion

Table.4The level of dissolved N_2O flux in other rivers ponds ,and reservoirs

水体类型	研究区域	时间	N_2O 浓度（$\mu g\ m^{-2}\ h^{-1}$）	参考文献
河流	乌江流域	2007.7—2008.4	14.52	刘小龙等，2015
	句容水库流域(中国)	2010.9~2012.9	12.9±21.8	Xia et al., 2013
	脱甲河小流域(中国)	2014.4~2015.4	32.50±56.41	张羽等, 2016
	句容水库流域	2015.10~2017.9	33.62±38.35	本研究
池塘	句容水库流域	2010.9~2012.9	4.5±16.3	Xia et al.2013
	句容水库流域	2015.10~2017.9	18.33±20.21	本研究
水库	句容水库流域	2010.9~2012.9	7.9±10.0	Xia et al.2013
	句容水库流域	2015.10~2017.9	11.47±12.48	本研究

Outline

4 Conclusions

- In Jurong Reservior watershed, the maximum of N_2O flux appeared in the summer and the peak of N_2O concentration occurred in the summer and winter.

- For three types of water bodies, N_2O flux and N_2O was maximum in river, higher than that in ponds and reservior.

- The N_2O flux decreased gradually from upstream to downstream in River 1.

- N_2O concentration in rivers presented obviously postive correlation with ORP and DO, while is negative with pH.N_2O flux had the obviously postive correlation with T_W and negative correlation with DO and ORP.

Thank you for your attention!