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

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Outline

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.

2 Experimental method

2.1 Site description and sample collection

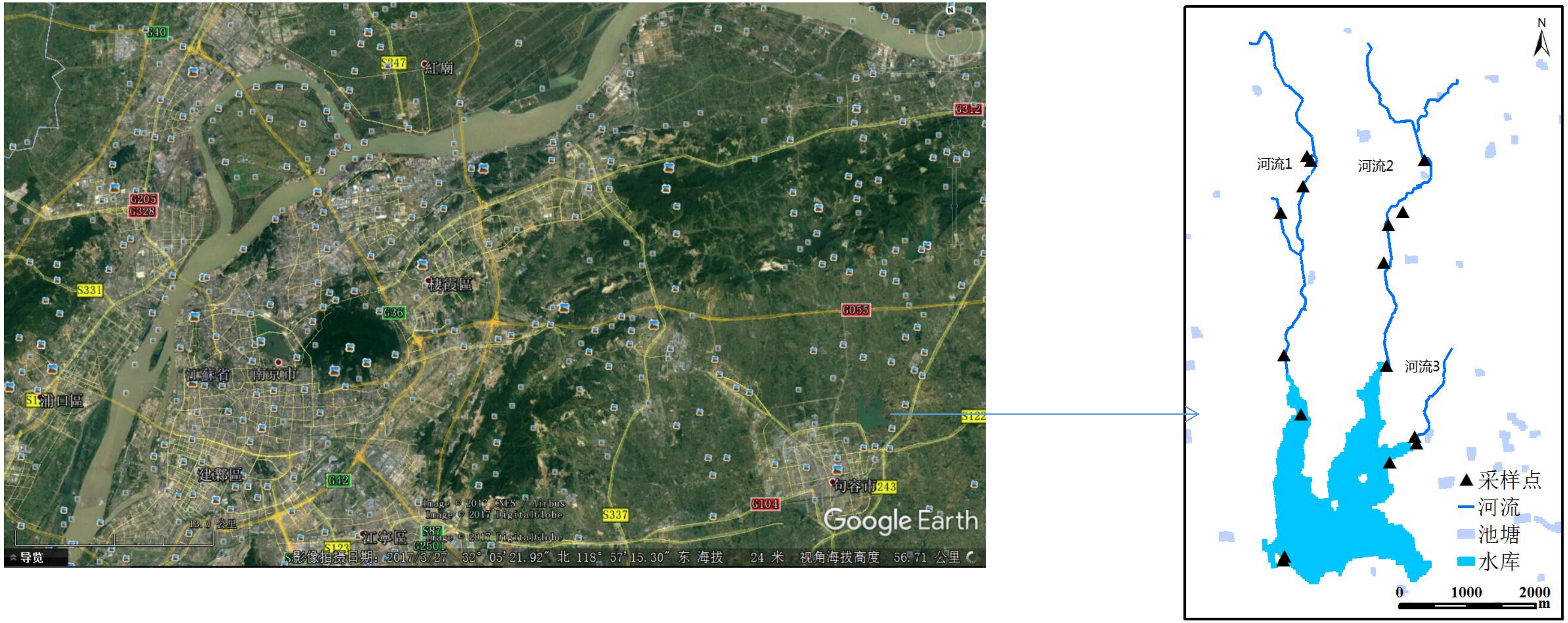

Fig.1 Location and sampling map of the Jurong Reservoir watershed.

2 Experimental method

2.2 Sample analyses

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

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

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

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

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

3 Results and Discussion

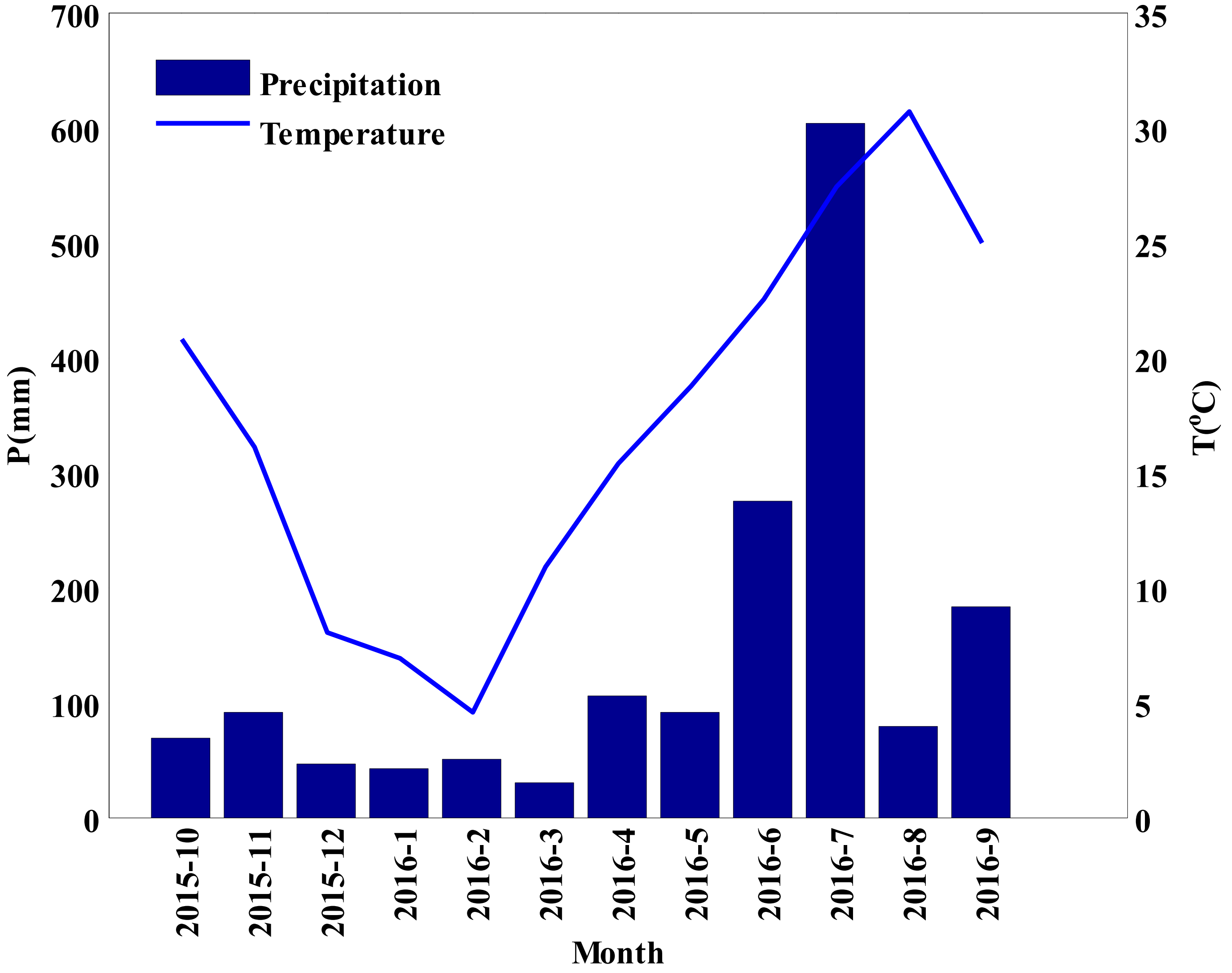

Fig.2 The change of meteorological data at Jurong Reservoir watershed.

3 Results and Discussion

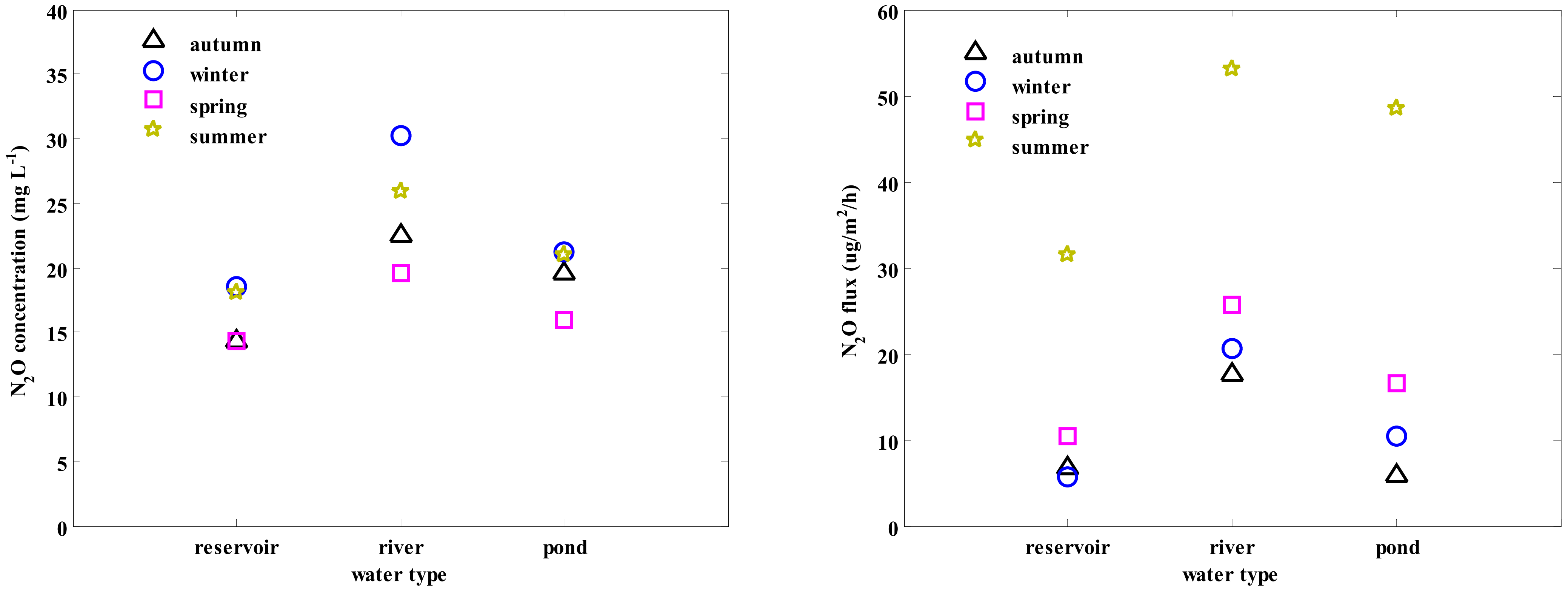

Fig.3Temporal variation of dissolved N_2O concentration and flux in different water spaces.

3 Results and Discussion

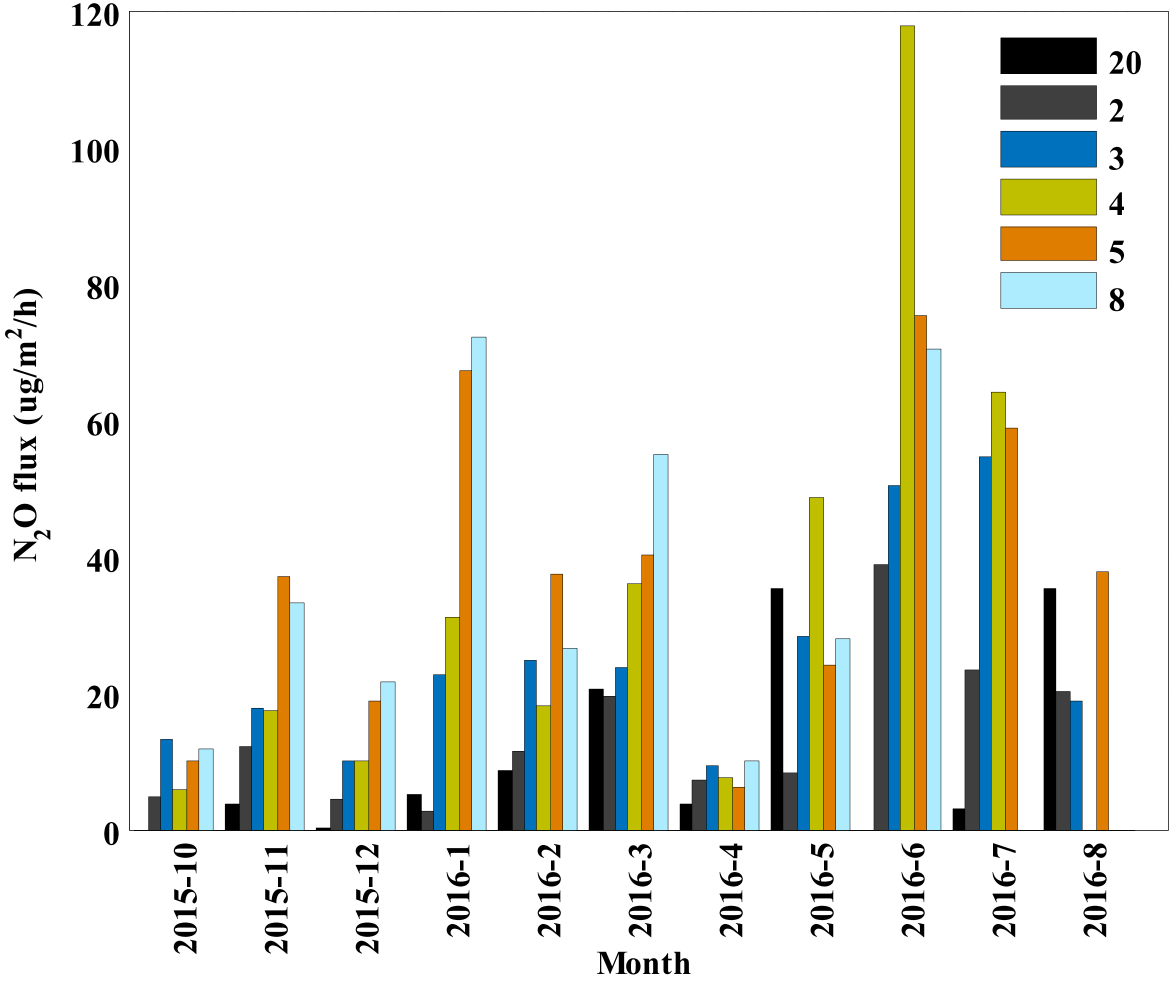

Fig.4 The N_2O flux of six sites in different months in River 1.

3 Results and Discussion

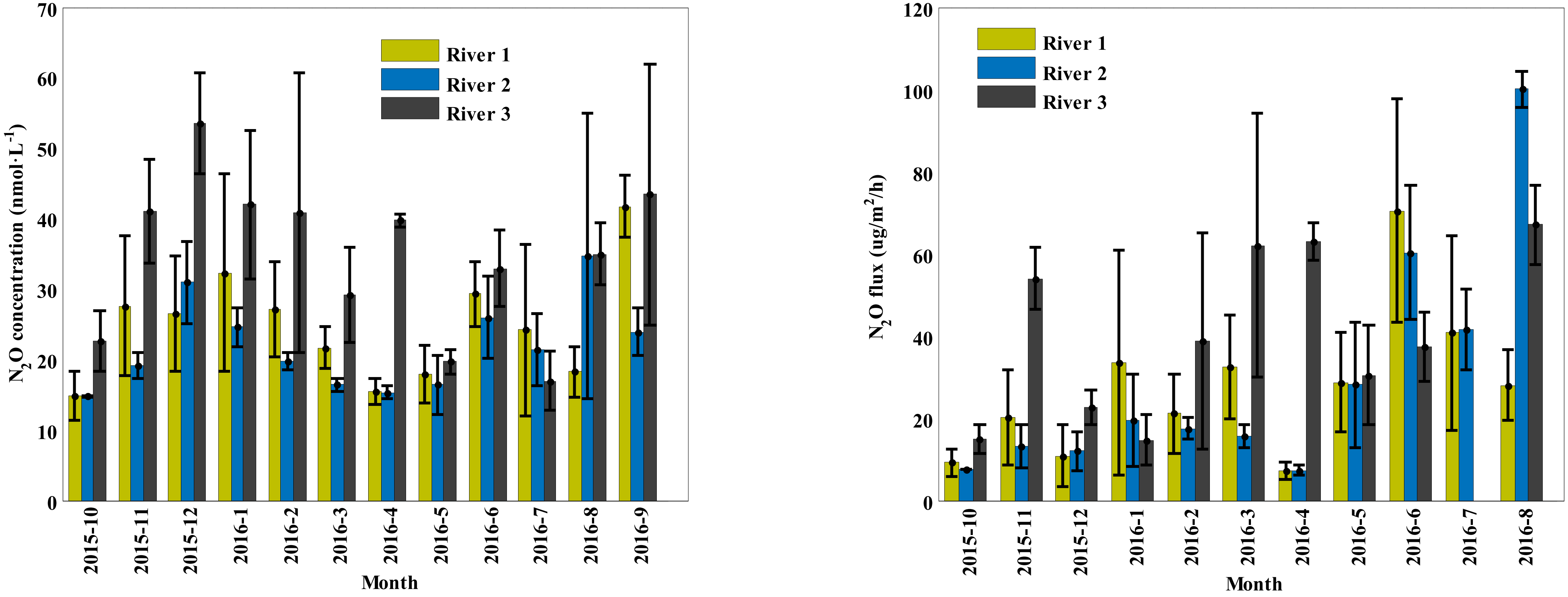

Fig.5Temporal variation of dissolved N_2O concentration and flux in different rivers.

3 Results and Discussion

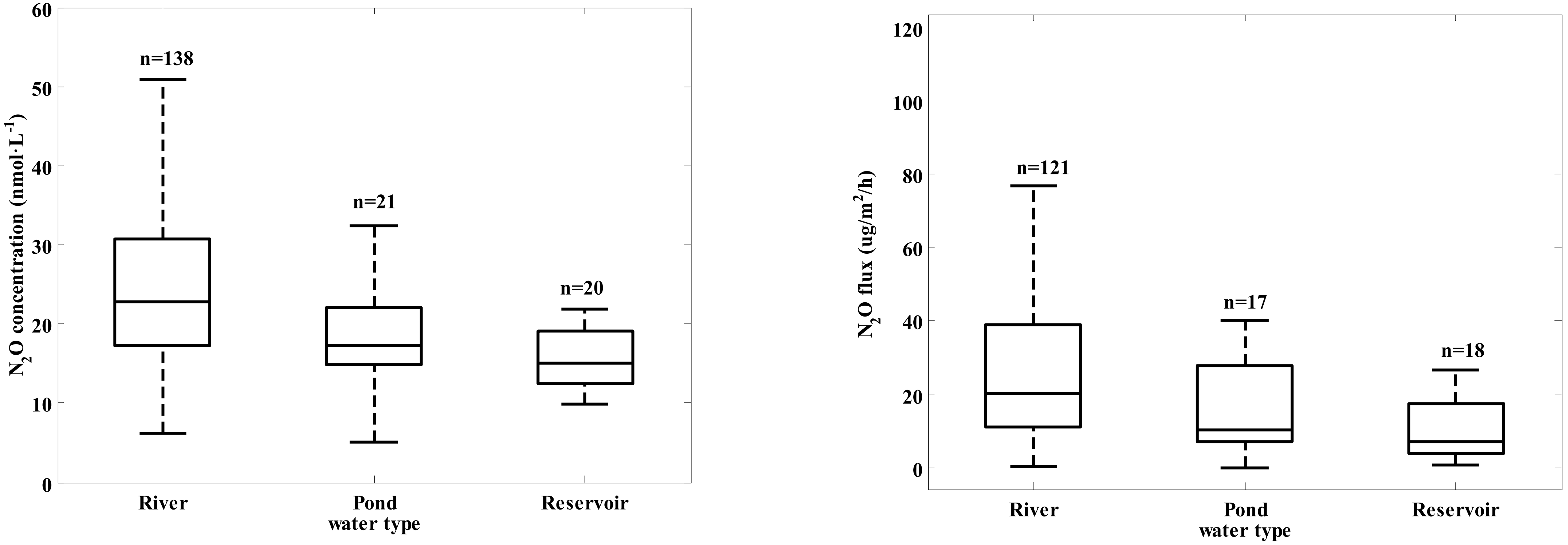

Fig.6 The dissolved N_2O concentration and flux in different water spaces.

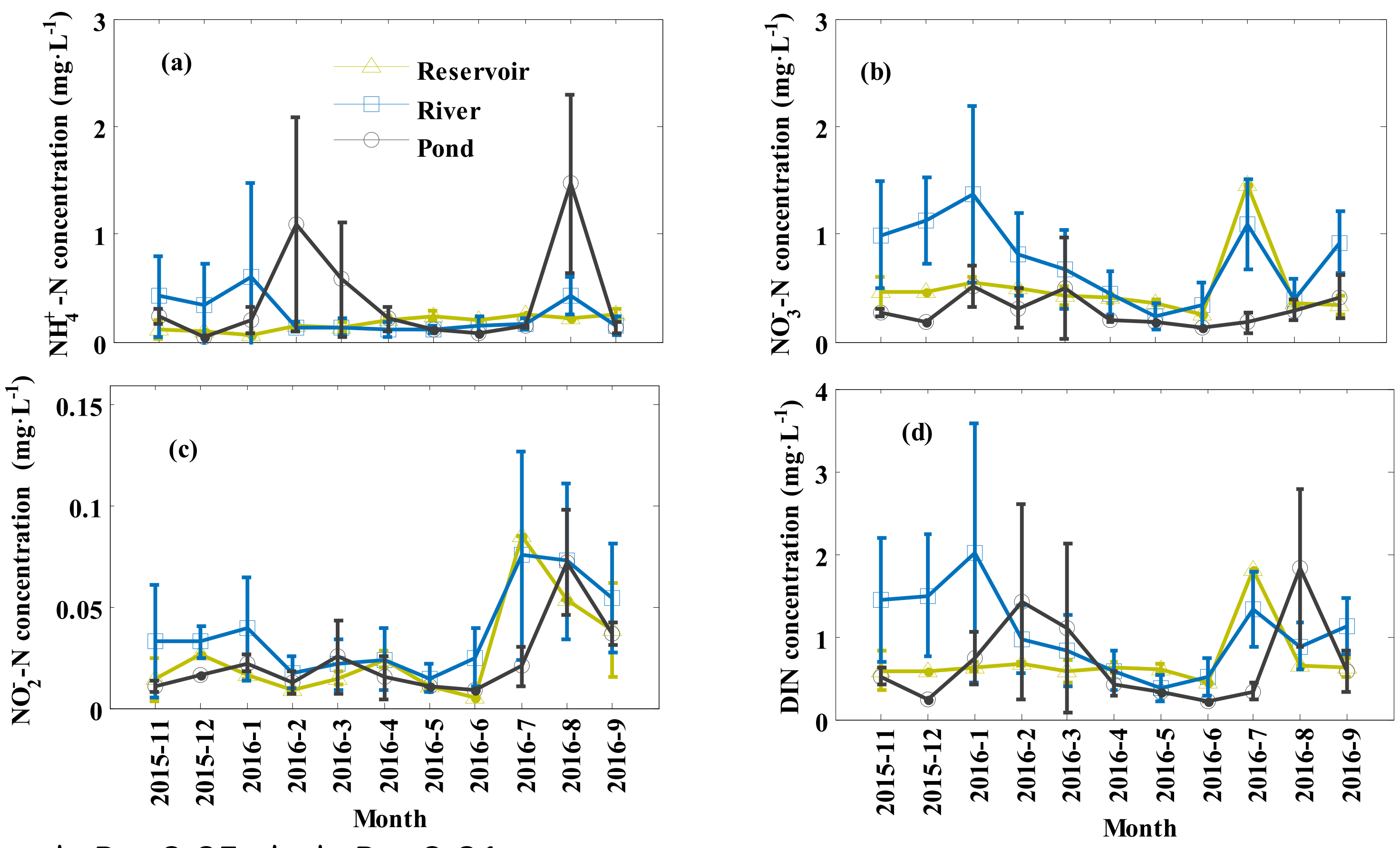

Fig.7 (a)NH_4+-N，(b)NO_3^--N，(c)NO_2^--N and (d)DIN concentrations in different water space.

注：＊ $P < 0.05$, ＊＊ $P < 0.01$。

	NH_4^+-N	NO_3^--N	NO_2^--N	DIN
River	0.46**	0.61**	0.42**	0.63**
Reservoir	-0.15	-0.06	-0.28	-0.10
Pond	0.78**	0.32	0.74**	0.76**
Total	0.45**	0.60**	0.45**	0.64**

Table.1Correlation analysis between N_2O concentration and Inorganic salt.

3 Results and Discussion

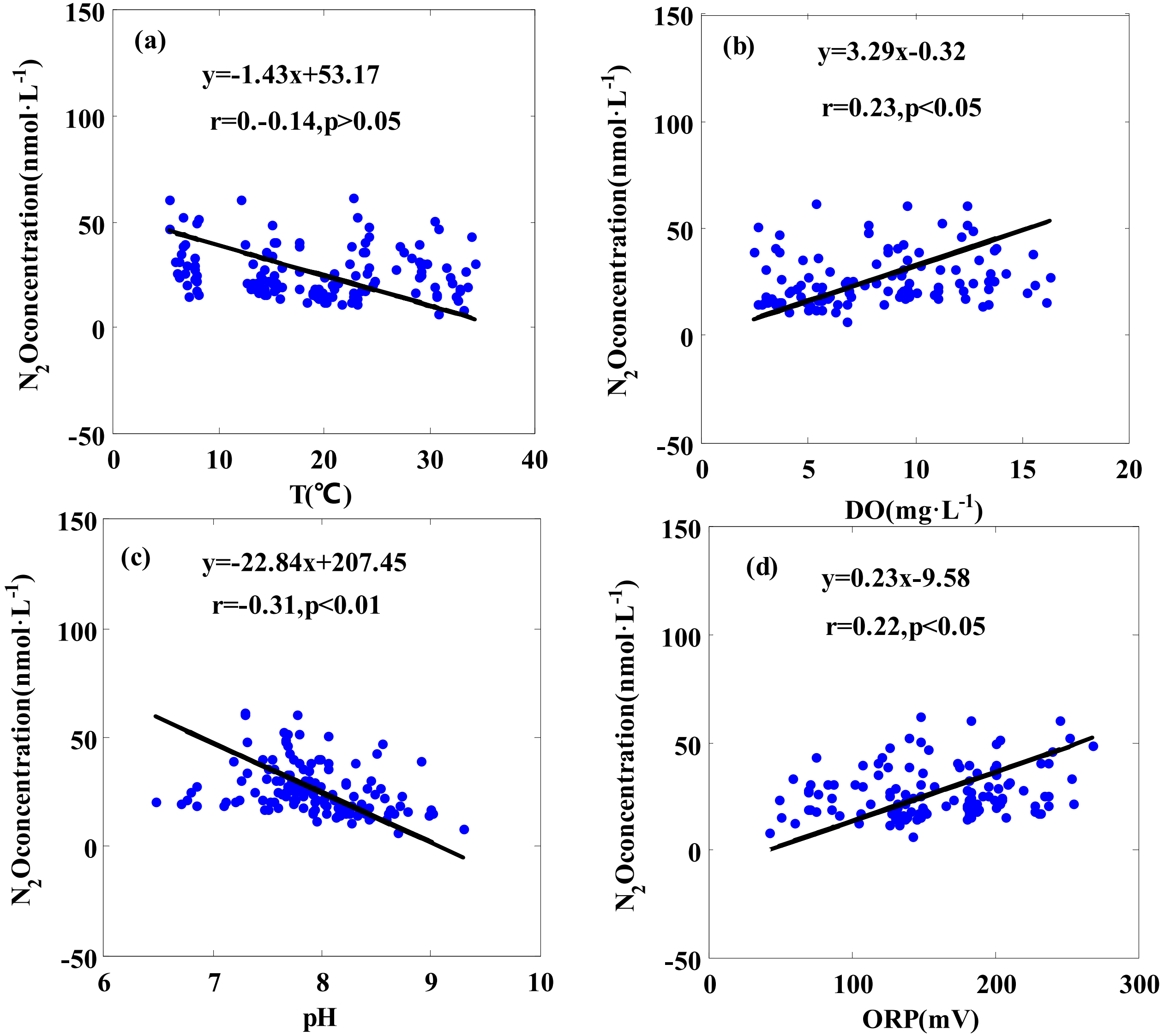

Fig.8 The relationship between N_2O concentration and (a)T (b)DO (c)pH(d)ORP.

3 Results and Discussion

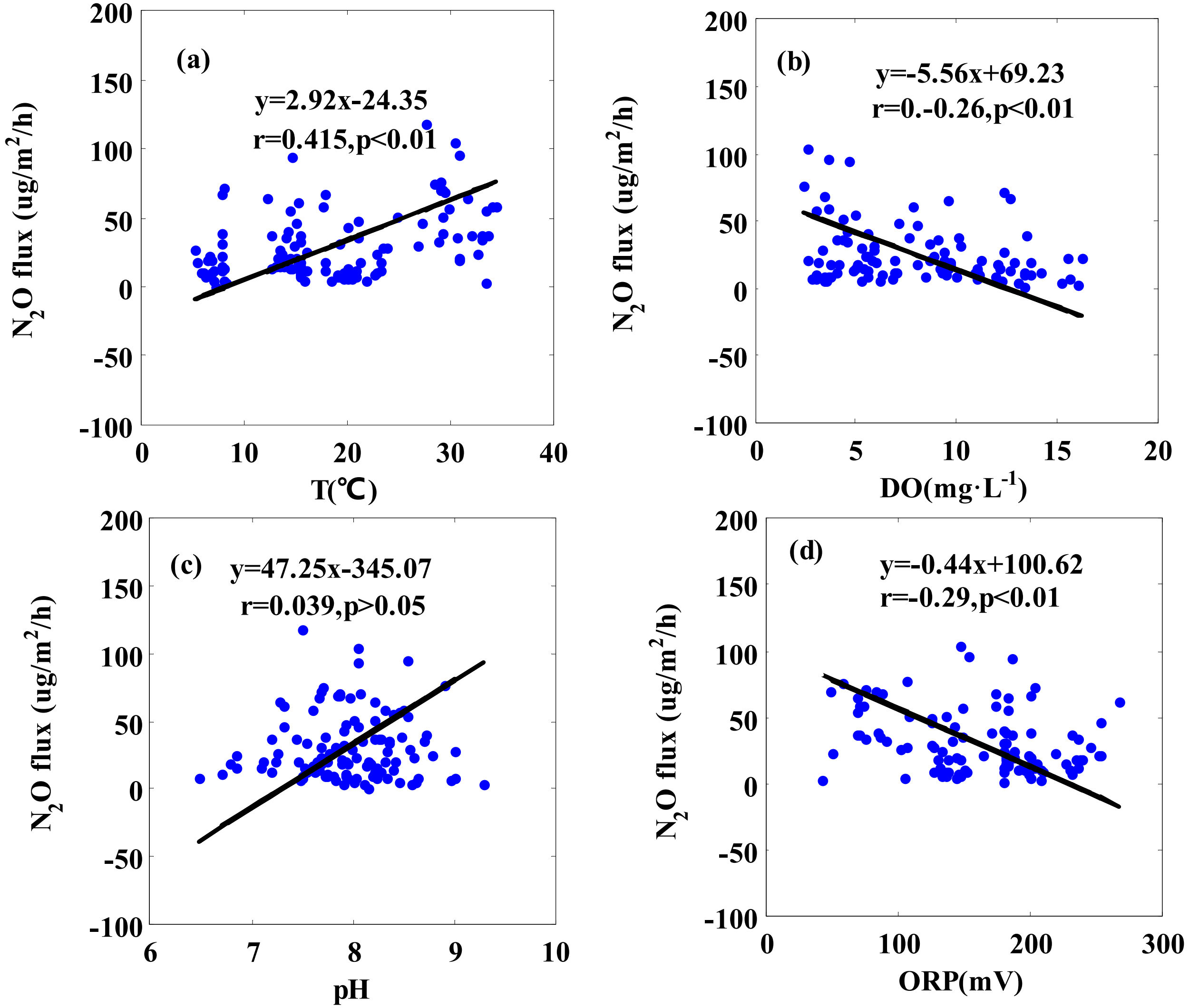

Fig.9 The relationship between N_2O flux and (a)T (b)DO (c)pH(d)ORP.

3 Results and Discussion

Table.2The level of dissolved N_2O flux in other rivers ponds ,and reservoirs.

water type	study area	time	N_2O flux	references
River	Jurong Reservoir watershed	2010.9~2012.9	12.9±21.8ug/m²/h	Xia et al.2013
	3 rivers runoff rivers	2006、2009、2010	18.0ug/m²/h	Wang et al.2013
	Tuojia watershed	2014.4~2015.4	32.5±56.4ug/m²/h	Zhang et al.2016
	Jurong Reservoir watershed	2015.10~2016.8	29.1±24.1ug/m²/h	this study
Pond	Jurong Reservoir watershed	2010.9~2012.9	4.5±16.3ug/m²/h	Xia et al.2013
	Jurong Reservoir watershed	2015.10~2016.8	20.4±24.0ug/m²/h	this study
Reservoir	Jurong Reservoir watershed	2010.9~2012.9	7.9±10.0ug/m²/h	Xia et al.2013
	Jurong Reservoir watershed	2015.10~2016.8	11.8±12.5ug/m²/h	this study

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!