S1. Table S1 Dissolved N_2O concentrations and water physiochemical factors of all the samplings sites in the Yiluo River basin in the dry season

S2. Table S2 Dissolved N_2O concentrations and water physiochemical factors of all the samplings sites in the Yiluo River basin in the wet season

Table S1. Dissolved N_2O concentrations and water physiochemical factors of all the samplings sites in the Yiluo River basin in the dry season

Sites	Elevation (m)	Dissolved N_2O concentrations ($nmol \cdot L^{-1}$)	Temperatures (℃)		pH	DO ($mg \cdot L^{-1}$)	ORP	DIC ($mg \cdot L^{-1}$)	DOC ($mg \cdot L^{-1}$)	NH_4^+-N ($mg \cdot L^{-1}$)	NO_3^--N ($mg \cdot L^{-1}$)	TDP ($mg \cdot L^{-1}$)
			Air	Water								
Mainstream												
LR1	1251	13.90±0.92	9.00	10.20	8.19	8.71	181.43	4.62±0.50	4.19±0.22	0.20±0.01	3.57±0.23	0.045±0.003
LR 2	895	13.80±0.94	16.50	17.40	8.07	8.37	169.93	12.14±1.80	6.24±0.58	0.36±0.078	2.10±0.04	0.146±0.023
LR 3	797	13.62±0.11	21.00	16.30	7.97	8.40	177.63	11.59±1.73	5.51±0.31	0.09±0.01	2.19±0.06	0.025±0.013
LR 4	702	8.89±7.70	10.50	15.00	8.06	8.55	199.03	9.29±2.36	4.54±0.45	0.26±0.18	1.59±0.03	0.084±0.030
LR 5	596	13.19±0.33	24.30	18.10	7.97	8.96	183.20	9.25±1.92	5.45±0.51	0.12±0.05	1.50±0.04	0.028±0.000
LR 6	548	12.64±0.18	17.40	16.60	8.06	8.17	203.43	6.66±1.39	4.29±0.35	0.06±0.02	1.34±0.04	0.049±0.010
LR 7	527	16.93±0.98	19.10	18.30	7.99	7.78	207.10	9.73±1.31	4.99±0.30	0.14±0.03	1.62±0.09	0.044±0.005
LR 8	513	/	/	/	/	/	/	/	/	/	/	/
LR 9	388	20.88±4.13	17.10	11.70	8.14	9.53	202.40	5.72±0.46	5.11±0.70	0.60±0.14	2.68±0.83	0.174±0.016
LR 10	291	17.76±2.65	20.30	17.00	8.10	9.02	172.20	7.43±3.98	4.54±1.14	0.28±0.11	2.11±0.18	0.059±0.005
LR 11	247	16.31±0.91	23.50	16.60	8.06	8.73	183.37	7.95±0.77	4.79±0.18	0.68±0.10	2.52±0.08	0.028±0.000
LR 12	190	10.47±9.07	20.40	17.90	8.13	8.38	173.00	5.00±1.93	5.21±0.41	0.20±0.04	1.68±0.02	0.023±0.010
LR 13	130	14.07±0.45	24.40	22.00	8.19	8.29	191.73	11.50±0.36	5.83±0.47	0.12±0.11	2.23±0.15	0.028±0.000
LR 14	115	36.69±11.09	26.40	24.40	7.87	7.90	194.40	11.15±0.64	6.23±0.19	0.54±0.03	3.05±0.04	0.032±0.003
YR1	1022	13.46±0.16	19.00	17.8	8.16	8.54	182.07	6.41±0.31	4.94±0.08	0.68±0.39	3.70±0.01	0.177±0.037

YR2	790	16.97±0.59	24.70	19.6	7.88	8.20	204.43	13.12±0.15	5.61±0.22	0.11±0.11	3.07±0.94	0.084±0.012
YR3	734	17.46±0.42	24.60	19.7	8.06	7.68	214.37	12.76±2.20	6.00±0.71	0.77±0.66	4.21±0.15	0.091±0.054
YR4	502	12.86±0.54	19.90	21.6	8.15	8.32	142.53	14.52±0.39	6.30±0.44	0.17±0.13	0.79±0.21	0.032±0.013
YR5	330	15.07±1.70	24.00	17.9	7.66	8.20	158.07	12.57±0.91	5.44±0.28	0.71±0.39	4.22±0.27	0.073±0.016
YR6	310	13.85±0.03	25.10	19.8	7.83	8.03	156.83	14.72±0.25	6.44±0.30	0.38±0.08	2.45±0.11	0.049±0.029
YR7	282	16.11±1.26	33.30	12.5	8.12	9.29	205.10	16.09±0.26	6.23±0.16	0.59±0.24	1.85±0.17	0.029±0.018
YR8	176	14.07±0.44	33.10	27.1	7.73	8.81	204.70	24.94±2.64	8.28±1.17	1.31±0.10	4.04±0.68	0.104±0.043
YR9	128	39.92±6.91	26.90	23.80	8.06	9.32	213.17	10.04±1.79	5.77±0.28	0.27±0.02	3.21±0.14	0.039±0.000
YR10	113	469.42±81.27	25.40	23.60	7.68	9.15	150.60	9.98±0.17	6.65±0.73	3.36±0.17	5.42±0.49	0.153±0.018
YLR1	112	41.47±4.95	24.00	20.80	7.80	8.12	203.03	14.10±2.65	5.92±0.53	1.37±0.07	3.33±0.06	0.059±0.000
YLR2	106	25.20±6.38	24.20	20.20	7.79	7.61	193.40	10.99±0.82	6.53±0.30	0.71±0.05	1.85±0.35	0.181±0.01
Tributaries												
SPS	1050	/	/	/	/	/	/	/	/	/	/	/
WYH	1019	14.11±0.37	12	14.3	7.90	8.43	197.93	5.13±0.76	4.74±0.25	0.23±0.00	3.07±0.55	0.059±0.000
MPH	896	12.78±0.09	16.7	16.3	7.97	8.52	185.57	17.40±0.11	6.75±0.12	0.29±0.01	4.11±0.38	0.424±0.161
XHS	890	18.22±0.70	16.5	16.5	7.94	8.32	175.57	14.26±2.31	7.10±0.80	0.26±0.10	2.33±0.30	0.045±0.007
XSH	843	14.97±0.40	19.8	16.1	8.22	9.88	194.17	10.22±1.26	5.22±0.36	0.28±0.11	1.13±0.09	0.254±0.036
SPH	817	13.03±0.23	24.4	16.5	8.24	8.90	186.83	4.12±0.91	3.68±0.13	0.43±0.002	1.49±0.04	0.002±0.004
ZSH	812	13.43±0.10	25.2	17.1	8.20	9.66	184.27	8.17±1.58	5.06±0.50	0.22±.006	1.07±0.05	0.163±0.021
LH	769	12.89±0.36	24.9	15.5	8.10	8.27	152.20	11.17±0.78	5.17±0.21	0.17±.006	0.12±0.03	0.240±0.044
DSH	777	14.15±0.27	19.90	14.60	8.03	8.19	190.40	10.50±0.50	5.60±0.19	0.21±0.03	1.33±0.35	0.243±0.030
LCH	710	14.45±1.54	13.00	14.70	7.94	8.22	191.53	9.77±0.59	5.27±0.32	0.10±0.02	1.73±0.03	0.000±0.000

GPH	706	13.08±32.70	16.40	18.50	7.89	8.47	181.57	6.17±1.26	5.27±0.95	0.43±0.11	1.35±0.06	0.013±0.005
SHL	574	13.37±0.07	24.70	18.20	7.97	9.11	176.73	8.94±0.51	5.14±0.11	0.43±0.03	1.56±0.15	0.028±0.000
FLH	533	13.31±0.27	19.50	15.10	8.11	8.38	199.13	9.70±1.05	4.82±0.44	0.78±0.15	0.82±0.03	0.267±0.000
XHH	443	42.86±32.70	14.30	12.10	7.89	8.28	186.33	12.70±1.35	5.82±0.22	0.76±0.17	5.84±0.14	0.096±0.026
DZH	364	29.31±7.75	19.80	13.80	7.94	9.71	205.53	8.99±0.43	4.83±0.13	0.25±0.07	4.20±0.01	0.084±0.021
DYH	291	33.66±3.01	20.90	18.10	7.79	9.24	199.60	14.57±1.65	5.96±0.28	1.00±0.04	1.81±0.18	0.073±0.015
JHY	241	24.86±4.46	26.60	19.00	7.76	8.89	171.90	13.00±1.90	5.97±0.28	0.81±0.11	7.97±0.44	0.250±0.037
CZ	213	40.01±5.56	25.30	19.50	7.91	9.37	153.80	8.66±0.85	6.46±0.14	1.38±0.20	14.61±0.70	0.236±0.018
SD	215	36.21±11.54	22.70	15.90	7.89	9.25	147.70	16.57±1.02	7.09±0.29	1.76±0.23	2.91±0.03	0.118±0.017
JHL	145	36.69±2.55	20.40	16.80	7.89	8.20	204.87	13.73±2.36	6.63±0.81	1.71±0.07	4.66±0.15	0.104±0.003
CH	128	62.36±15.71	26.40	19.90	7.58	7.03	191.53	12.72±2.96	7.63±0.91	2.95±0.12	4.66±0.12	0.049±0.022
LCB	735	15.14±1.00	21.8	18.6	7.92	8.77	194.53	28.27±0.14	8.39±0.59	0.11±0.07	2.60±0.11	0.136±0.018
HLH	696	21.36±2.04	21.9	18.3	7.72	8.00	159.10	6.51±0.30	4.95±0.19	2.06±0.05	3.78±0.32	0.118±0.015
XH	522	12.93±0.44	19.9	22.5	8.34	10.05	185.73	15.68±0.72	6.39±0.22	0.49±0.12	1.50±0.06	0.066±0.003
MBH	484.6	27.43±13.44	15.8	16.6	7.52	4.41	169.40	11.89±0.28	7.21±0.24	1.22±0.21	5.47±2.49	0.250±0.023
DZH	432	32.34±9.19	20.1	16.5	7.94	8.29	210.97	19.30±0.24	6.71±0.33	0.59±0.08	12.56±0.48	0.084±0.018
MYH	376	21.45±5.95	21.2	15.5	7.99	8.63	219.23	21.80±0.24	7.31±0.06	0.31±0.19	5.32±0.47	0.094±0.009
JJC	282.5	20.63±7.94	30.3	16.9	7.89	8.90	164.47	26.02±0.51	8.00±0.25	0.54±0.03	9.42±0.23	0.056±0.009
BJH	131	66.93±31.30	30.9	21.1	7.65	7.13	208.13	34.33±0.14	12.03±0.43	2.84±0.04	8.38±0.05	0.222±0.003
LJH	115	15.76±0.51	29.60	28.30	4.61	3.76	159.4	23.64±4.65	14.20±2.70	12.99±0.02	2.16±0.08	4.024±0.094

Table S2. Dissolved N_2O concentrations and water physiochemical factors of all the samplings sites in the Yiluo River basin in the wet season

Sites	Elevation (m)	Dissolved N_2O concentrations ($nmol \cdot L^{-1}$)	Temperatures (℃)		pH	DO ($mg \cdot L^{-1}$)	ORP	DIC ($mg \cdot L^{-1}$)	DOC ($mg \cdot L^{-1}$)	NH_4^+-N ($mg \cdot L^{-1}$)	NO_3^--N ($mg \cdot L^{-1}$)	TDP ($mg \cdot L^{-1}$)
			Air	Water								
Mainstream												
LR1	1251	14.73±0.24	7.10	10.80	7.95	8.40	107.80	5.58±0.27	5.78±0.08	0.11±0.02	2.94±0.00	0.049±0.004
LR 2	895	15.45±0.45	9.00	12.30	8.03	8.41	148.00	9.57±0.09	6.28±0.20	0.16±0.11	6.87±0.01	0.036±0.001
LR 3	797	14.94±0.26	10.10	12.20	8.29	8.89	114.50	11.49±0.32	6.63±0.05	0.08±0.01	4.99±0.01	0.007±0.001
LR 4	702	/	/	/	/	/	/	/	/	/	/	/
LR 5	596	14.57±0.73	11.90	13.60	8.45	8.18	133.30	8.67±0.22	5.94±0.14	0.13±0.04	3.27±0.01	0.016±0.002
LR 6	548	14.72±0.10	11.50	13.70	8.35	9.87	128.80	9.03±1.36	6.20±0.10	0.38±0.05	3.75±0.01	0.013±0.002
LR 7	527	13.85±0.54	12.80	16.90	8.13	/	118.80	9.05±0.94	6.18±0.12	0.13±0.01	1.77±0.00	0.010±0.003
LR 8	513	15.34±0.41	13.10	18.90	8.19	6.86	136.10	8.75±0.65	5.93±0.14	0.30±0.02	1.47±0.03	0.011±0.002
LR 9	388	15.87±0.50	12.80	15.10	8.52	8.61	142.90	7.49±0.12	5.34±0.20	0.24±0.02	2.11±0.01	0.016±0.001
LR 10	291	15.70±0.22	12.20	13.70	8.08	9.90	123.70	7.71±1.51	6.12±0.52	0.62±0.04	3.67±0.04	0.009±0.003
LR 11	247	13.73±0.44	15.20	15.20	8.16	8.63	147.00	7.34±0.73	5.65±0.11	0.09±0.01	2.76±0.00	0.009±0.002
LR 12	190	17.08±0.69	16.10	15.30	8.29	9.77	119.50	7.71±0.64	5.79±0.34	0.11±0.01	2.80±0.03	0.012±0.002
LR 13	130	13.76±0.29	15.70	15.00	8.21	10.10	107.50	6.66±0.78	5.00±0.25	0.15±0.04	2.75±0.01	0.023±0.006
LR 14	115	22.64±5.38	16.70	15.90	8.06	8.48	160.20	7.90±0.76	6.21±0.23	0.60±0.08	3.41±0.00	0.073±0.013
YR1	1022	14.19±0.50	13.30	11.50	8.44	8.79	182.30	5.38±0.15	6.42±0.03	0.06±0.02	2.26±0.01	0.009±0.003

YR2	790	14.75±0.53	14.10	13.40	7.74	7.10	163.60	9.00±0.25	6.54±0.08	0.61±0.08	4.82±0.06	0.015±0.006
YR3	734	13.74±0.18	8.10	8.59	12.20	8.52	126.00	8.86±0.43	6.19±0.08	0.33±0.26	4.68±0.01	0.021±0.002
YR4	502	14.12±0.38	13.80	14.40	8.20	8.94	110.40	12.82±1.04	6.92±0.39	0.03±0.01	4.09±0.02	0.054±0.007
YR5	330	14.74±0.14	21.80	15.50	8.03	7.98	146.70	9.42±0.24	6.84±0.11	0.11±0.04	4.27±0.07	0.018±0.006
YR6	310	17.05±0.93	22.00	19.60	7.88	9.56	113.40	9.63±0.13	6.53±0.06	0.13±0.12	2.44±0.02	0.022±0.010
YR7	282	18.02±0.09	22.90	17.80	8.20	9.26	209.60	10.500.43	7.12±0.22	0.01±0.01	2.50±0.08	0.0115±0.003
YR8	176	15.84±1.60	18.90	18.30	8.02	9.03	167.10	13.10±0.74	7.19±0.32	0.12±0.15	2.70±2.15	0.032±0.013
YR9	128	14.21±0.20	14.60	15.90	7.96	9.52	116.70	8.77±4.05	5.68±0.90	0.71±0.10	3.58±0.13	0.010±0.008
YR10	113	19.59±4.34	16.00	16.80	7.78	8.24	99.70	10.00±1.19	6.25±0.61	0.51±0.22	4.36±0.04	0.036±0.025
YLR1	112	21.67±1.52	17.60	16.50	7.98	8.37	137.60	10.33±0.44	6.65±0.12	1.31±0.20	3.66±0.01	0.165±0.036
YLR2	106	21.97±1.96	16.90	16.80	8.71	8.75	168.30	6.46±0.80	5.44±0.20	0.48±0.07	3.63±0.01	0.168±0.085
Tributaries												
SPS	1050	14.14±0.24	8.00	12.30	8.21	9.38	131.40	4.93±0.08	5.62±0.52	0.24±0.03	1.11±0.02	0.028±0.005
WYH	1019	13.99±1.04	8.30	11.20	7.42	9.30	74.30	0.52±0.15	5.16±0.14	0.87±0.02	3.86±0.08	0.003±0.001
MPH	896	14.86±0.10	9.80	11.90	8.31	9.22	141.40	9.02±0.60	5.94±0.17	0.56±0.03	4.84±0.01	0.005±0.001
XHS	890	15.76±0.40	8.80	12.30	7.97	9.33	138.00	11.15±0.48	6.97±0.05	0.03±0.02	7.05±0.02	0.043±0.002
XSH	843	16.61±1.43	9.40	12.70	8.15	8.90	125.80	8.23±0.47	6.24±0.20	0.15±0.03	8.01±0.01	0.034±0.003
SPH	817	14.11±0.75	9.70	12.30	8.11	8.79	126.50	11.90±0.41	6.55±0.23	0.11±0.02	3.35±0.02	0.053±.012
ZSH	812	14.80±0.84	9.70	13.00	8.14	7.75	139.20	14.58±0.59	7.47±0.18	0.13±0.00	6.99±0.00	0.035±0.00 7
LH	769	14.58±0.44	10.40	12.80	8.17	8.70	171.10	19.61±0.40	8.12±0.09	0.24±0.05	3.17±0.03	0.026±0.002
DSH	777	14.77±0.05	12.80	13.00	8.31	8.83	142.70	9.34±0.76	6.49±0.08	0.08±0.01	3.02±0.02	0.011±0.001
LCH	710	/	/	/	/	/	/	/	/	/	/	/

GPH	706	13.14±0.11	10.30	12.90	8.24	9.75	132.80	8.14±0.89	6.08±0.36	0.20±0.01	4.16±.001	0.012±0.002
SHL	574	12.95±0.26	11.40	13.90	8.15	8.51	117.50	10.28±0.75	6.61±0.06	0.09±0.01	2.73±0.01	0.011±0.001
FLH	533	13.92±0.23	11.50	13.30	8.56	/	138.30	10.93±0.66	6.46±0.33	0.05±0.01	2.18±0.07	0.013±0.004
XHH	443	15.62±0.69	11.70	14.90	8.29	9.68	133.40	7.98±0.68	5.84±0.13	0.09±0.00	5.51±0.02	0.066±0.002
DZH	364	15.87±0.84	12.90	14.40	8.27	9.46	140.40	8.02±0.60	6.16±0.09	0.14±0.01	5.41±0.03	0.015±0.005
DYH	291	14.98±0.26	13.90	16.30	8.28	9.36	144.00	7.43±1.07	6.50±0.39	0.17±0.01	5.30±0.02	0.011±0.007
JHY	241	16.96±0.03	16.00	16.80	8.26	9.17	138.00	7.17±0.99	5.11±0.20	0.48±0.02	6.44±0.01	0.038±0.004
CZ	213	14.77±1.02	16.30	15.60	8.04	8.82	134.80	9.56±0.49	5.23±0.18	0.67±0.55	7.87±0.06	0.030±0.014
SD	215	13.73±0.32	16.90	15.30	8.04	9.50	129.50	15.93±1.48	5.46±0.17	0.20±0.04	2.17±0.01	0.034±0.003
JHL	145	18.80±1.57	15.80	18.90	7.95	8.76	114.80	10.94±0.72	6.04±0.17	0.11±0.04	5.13±0.01	0.079±0.007
CH	128	31.17±2.85	14.20	18.50	7.72	8.64	104.10	12.48±2.87	6.96±0.56	0.97±0.22	6.32±0.05	0.092±0.006
LCB	735	13.89±0.34	13.20	14.60	7.88	8.71	171.80	19.28±0.40	7.55±0.11	0.02±0.02	5.97±0.02	0.116±0.039
HLH	696	15.53±1.02	11.80	11.60	8.68	/	118.00	3.87±0.23	5.77±0.05	0.08±0.00	1.99±0.01	0.055±0.009
XH	522	13.38±0.53	12.70	14.70	8.21	9.58	141.80	12.93±0.61	6.87±0.14	0.01±0.00	4.16±0.02	0.042±0.001
MBH	484.6	14.57±0.20	18.30	14.00	8.26	9.10	153.80	5.48±0.05	7.29±0.07	0.07±0.00	2.74±0.04	0.049±0.001
DZH	432	19.73±6.13	19.00	17.70	7.84	8.92	129.60	9.62±0.26	6.86±0.15	0.63±0.08	8.51±0.02	0.042±0.005
MYH	376	15.00±0.15	20.90	17.40	7.97	9.07	168.50	8.64±0.03	6.27±0.10	0.30±0.02	6.38±0.02	0.068±0.002
JJC	282.5	31.95±9.35	19.20	16.90	7.86	7.32	173.00	11.62±0.35	7.31±0.06	0.06±0.01	4.34±1.33	0.017±0.005
BJH	131	28.01±12.77	17.30	17.90	7.75	7.50	137.40	20.28±0.27	8.27±0.11	0.30±0.04	7.30±0.00	0.159±0.001
LJH	115	15.27±0.35	15.4	7.74	0.27	-261.3	-261.3	21.17±8.74	17.24±4.29	1.48±0.00	1.39±0.17	1.226±0.033