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Diurnal variations of dissolved oxygen at BFG, Lake Taihu and correlation with eddy CO_2 flux

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◆Outline

1 Background

2 Scientific issues

3 Diurnal variations of dissolved oxygen

4 the correlation between DO and eddy CO_2 flux

◆1 Background

- Dissolved oxygen (DO) level in natural aquatic systems is a highly informative variable.

- Diel DO concentrations measurements are widely used to support examine whole-ecosystem primary production and respiration in aquatic systems, particularly in lakes *(Cole et al. 2000; Hanson et al. 2008; Karakaya 2011; Staehr et al. 2010; Staehr and Sand-Jensen 2007)*

- Long-term monitoring of DO dynamics in lakes plays a significant role in quantification of lake metabolism.

- At lesser depths, the DO contents generally changed inversely with water temperature, reflecting solubility — lower in summer and higher in winter, O_2 is less soluble and saturates more quickly than soluble CO_2 . Thus, the concentration of O_2 in the saturated water would not change, but the concentration of CO_2 would still change roughly linearly with time.*(Noriko Nakayama et al .2000)*

- The differences in DO concentrations between surface and 2m above the bottom were big, the fluctuation in DO was small during a period of 48h,Oxygen fluxes also showed amarked spatio-temporal variation.*(Xuelu Gao,2008)*

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- Oxygen saturation was positively correlated with the log of the distance from shore, biological activity in the lake have obvious impact on the oxygen concentration, and there is a significant negative correlation between pCO_2 and saturation of O_2 in the study lakes.*(Ajaz Karim et al .2011)*

- The organic carbon flux correlated negatively with the overlying water O_2 concentration, The water O_2 concentration explained 43% of the variation in the organic carbon fluxes, At 23 ℃, molar CO_2 production and O_2 consumption were equal, At lower temperatures (16 ℃), more O_2 was consumed than CO_2 was produced.*(Noriko Nakayama et al. 2000)*

- Vegetated waters in which no flow was visible were the most depleted in O_2, Plant stems contained higher partial pressures of CO_2 and lower partial pressures of O_2 than the overlying air.*(Hamilton et al. 1995)*

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Dissolved oxygen

Temperature

ORP /Spc/pH

$N\text{-}NH^{+}/N\text{-}NO^{3-}$

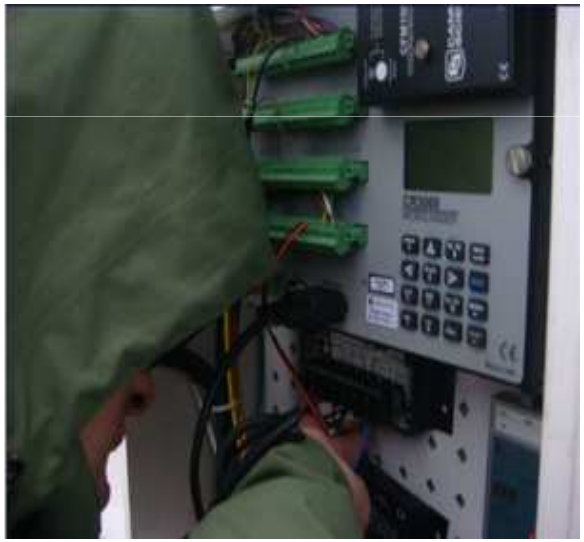

Fig.1 The instrument that measure the water quality and its working status at BFG, Lake Taihu

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◆ 2 Scientific issues

1 The ecosystem metabolism of Lake Taihu

2 The correlation between DO and eddy CO_2 flux

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◆3 Diurnal variations of dissolved oxygen

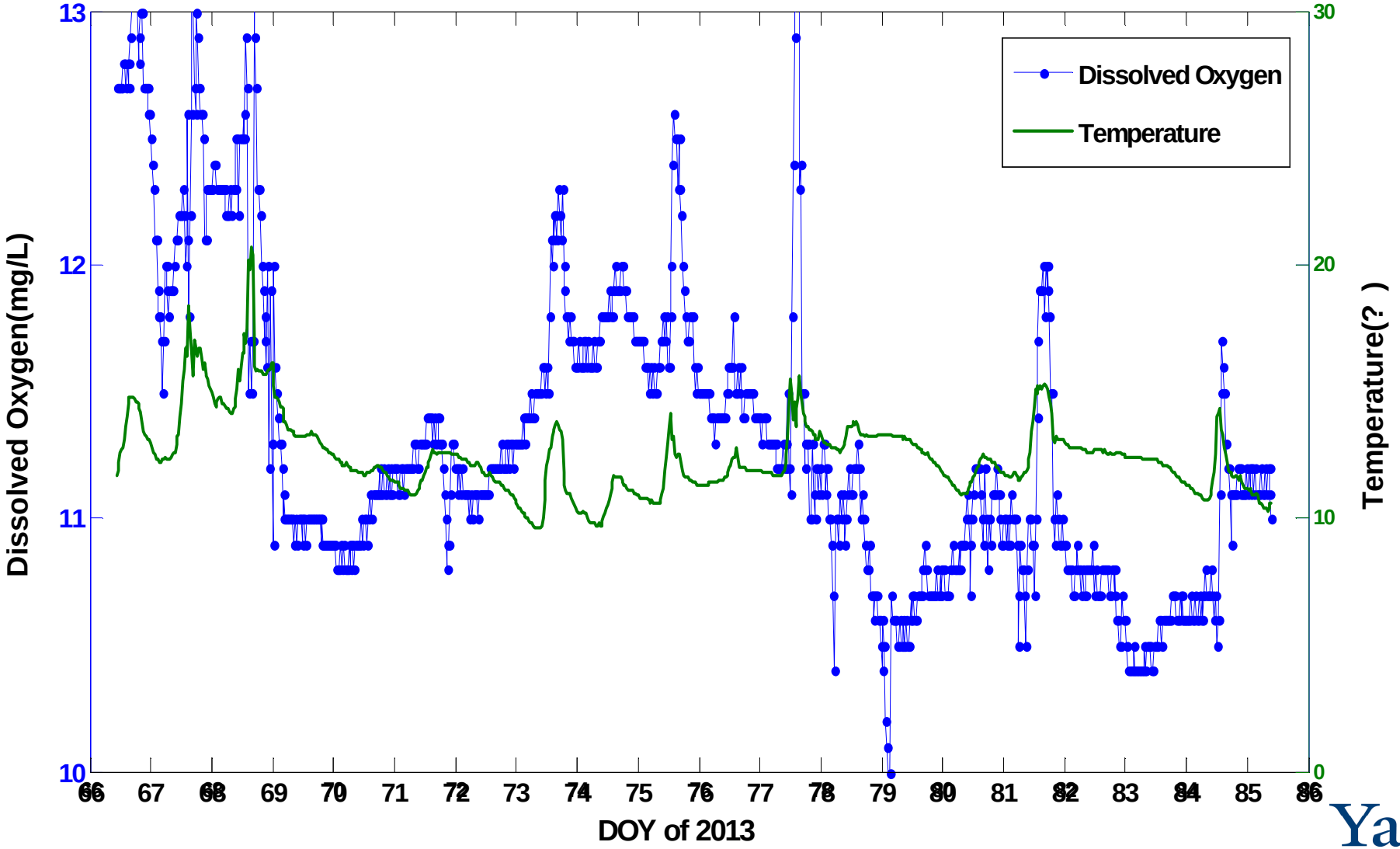


Fig.2 the variations of DO in time series

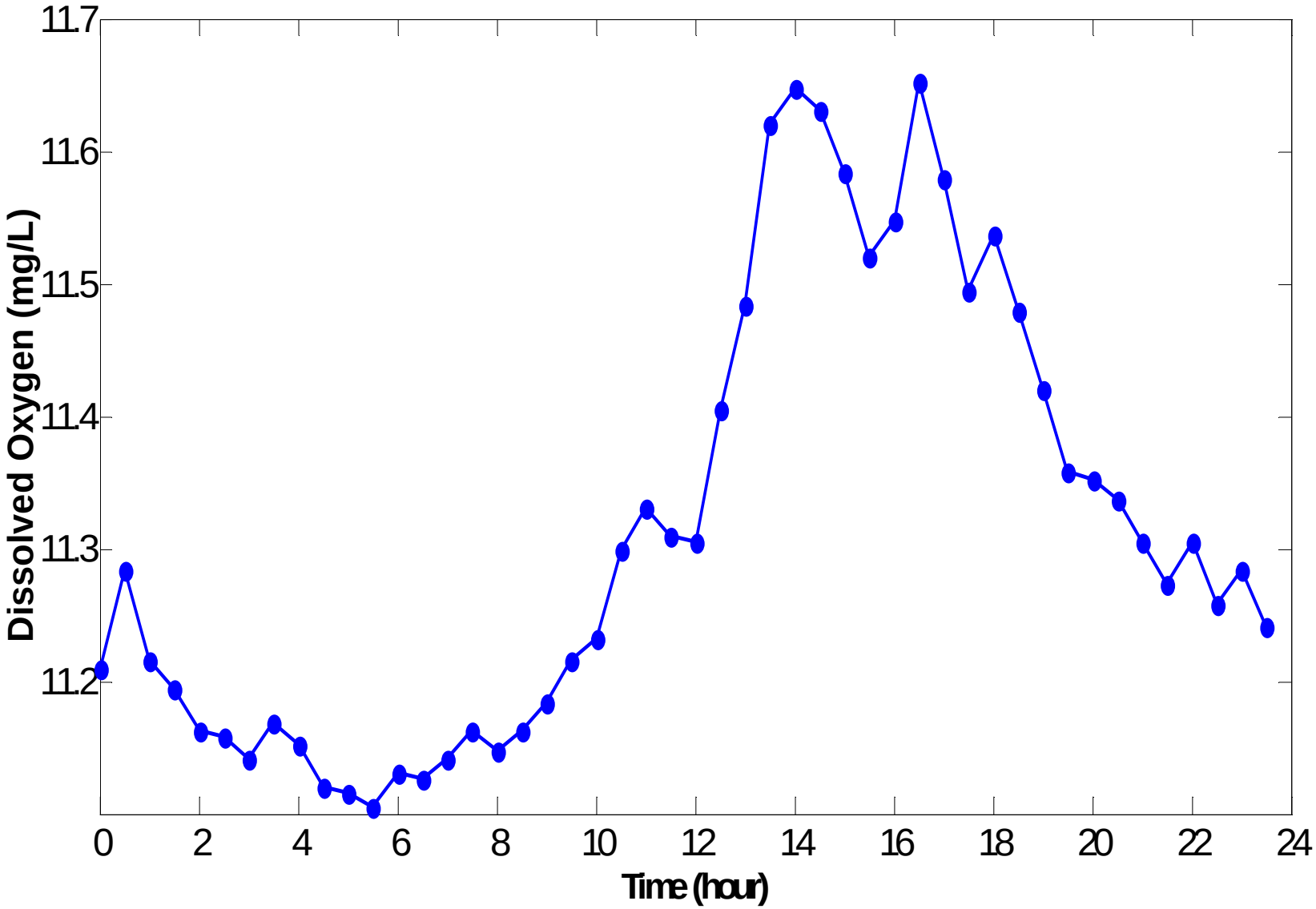


Fig.3 The diurnal variations of DO

4 The correlation between DO and eddy CO_2 flux

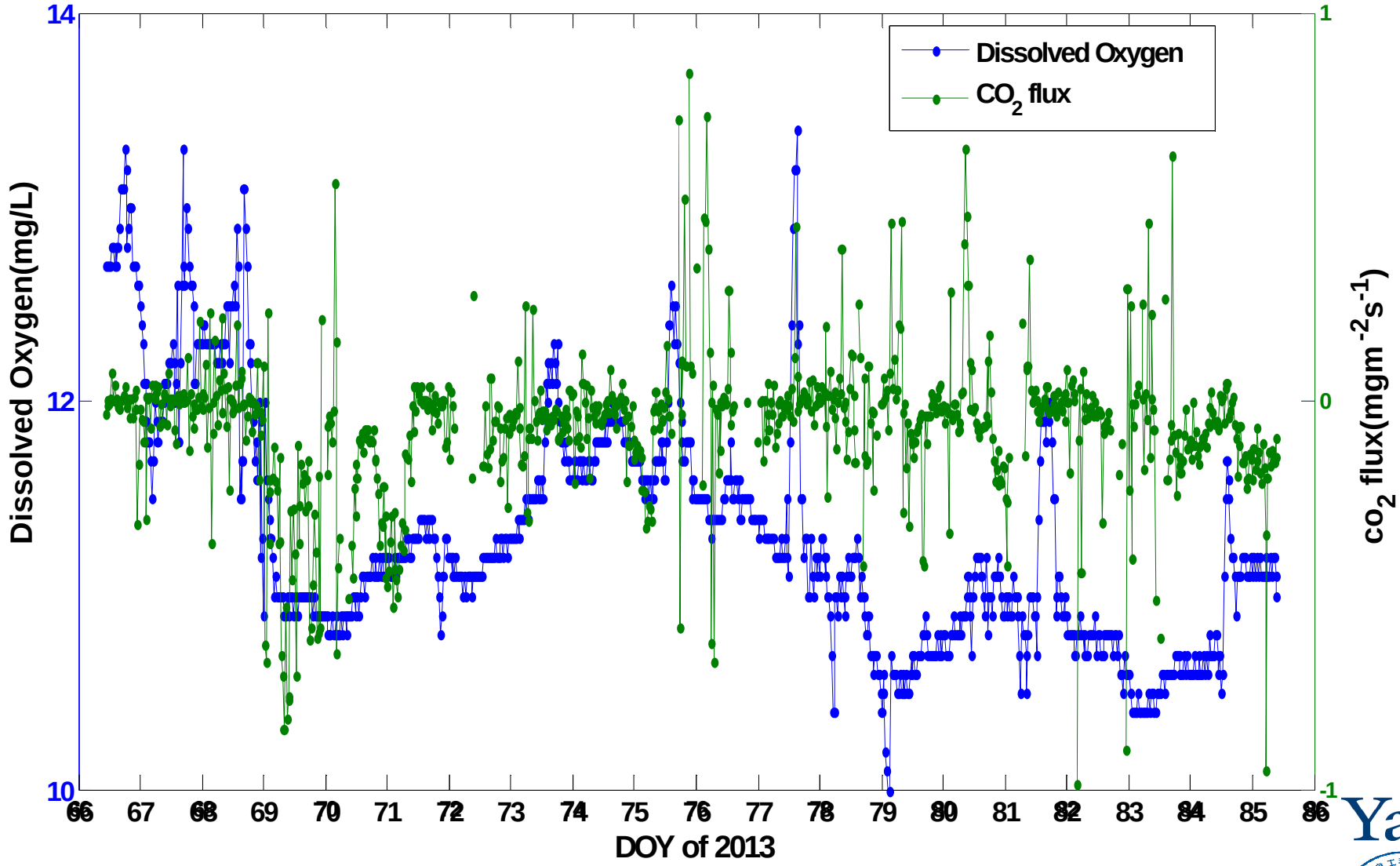


Fig.4 DO time series together with CO_2 flux time series

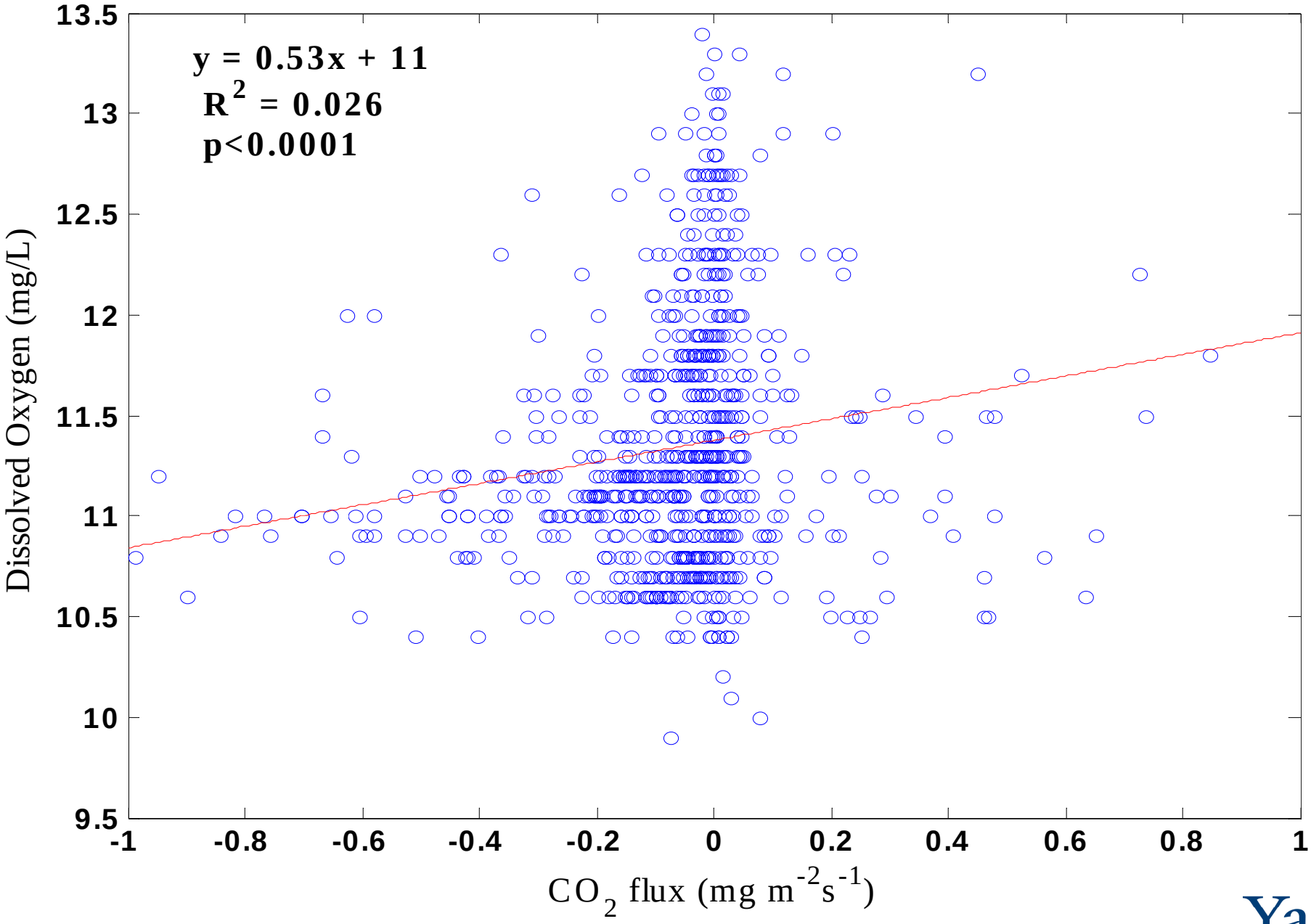
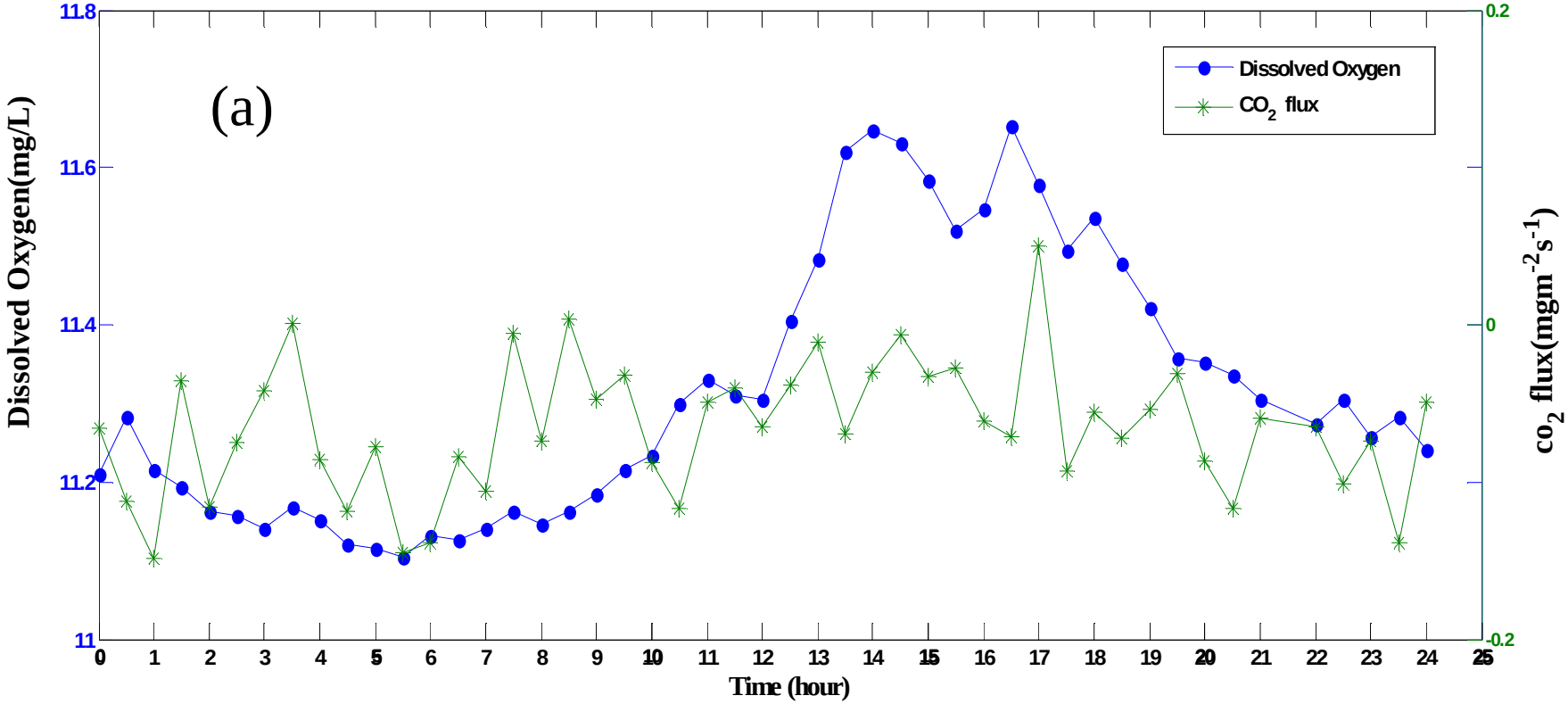


Fig.5 The correlation between DO and eddy CO_2 flux



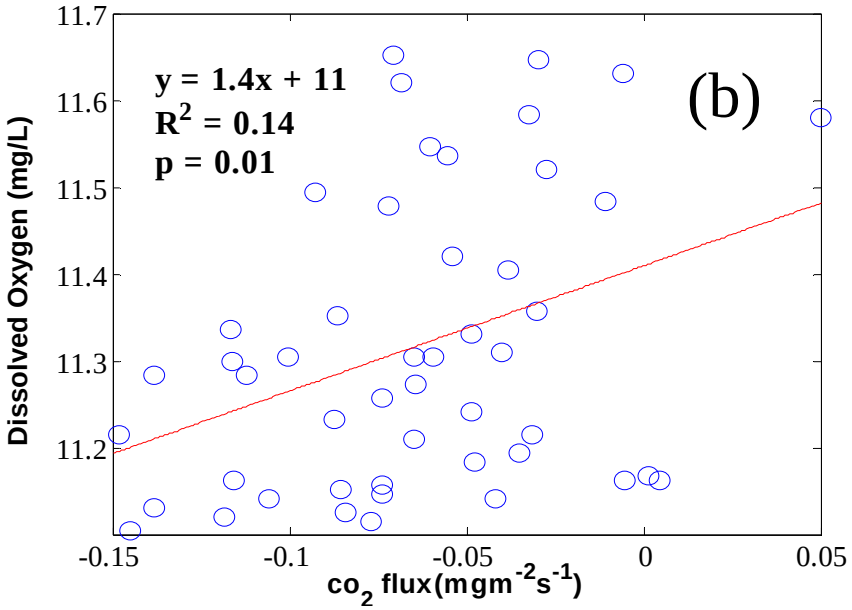


Fig.6 (a) The diurnal variations of DO together with diurnal variation of CO_2 flux time series
(b) The correlation between DO and eddy CO_2 flux in diurnal variation

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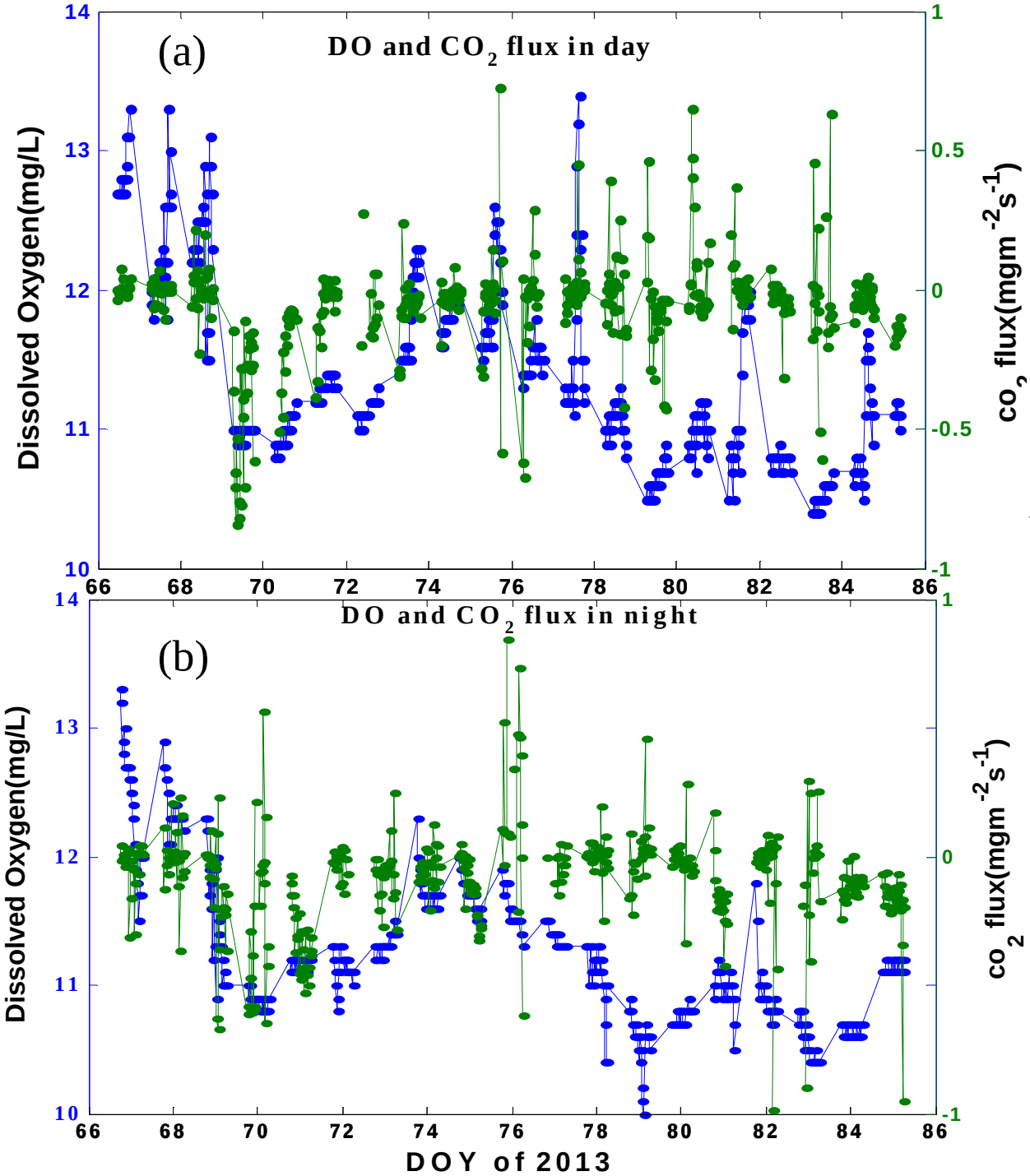

Fig.7 DO time series together with CO_2 flux time series in day **(a)** and night **(b)**

day: 6:00 — 18:00
night: 18:00 — 6:00(tomorrow)

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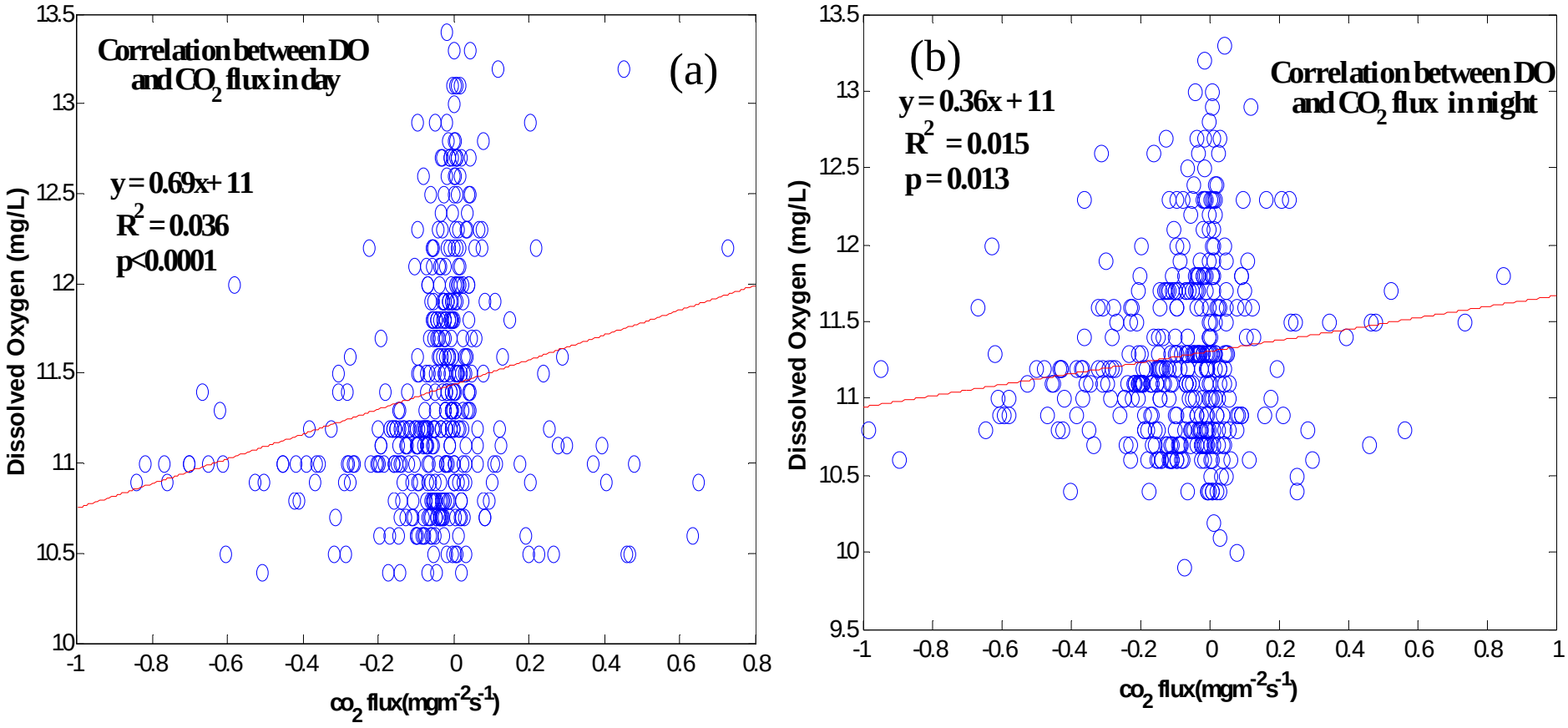

Fig.8 The correlation between DO and eddy CO_2 flux in day **(a)** and night **(b)**

day: 6:00 — 18:00

night: 18:00 — 6:00(tomorrow)

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Thank You