



## Diurnal variations of surface seawater pCO<sub>2</sub> in contrasting coastal environments

Dai, Minhan, Zhongming Lu, Weidong Zhai, Baoshan Chen, Zhimian Cao, Kuanbo Zhou, Wei-Jun Cai, Chen-Tung Arthur Chen

Limnol. Oceanogr., 54(3), 2009, 735-745 | DOI: 10.4319/lo.2009.54.3.0735

**ABSTRACT:** We examined diurnal variations of surface seawater pCO<sub>2</sub> (partial pressure of CO<sub>2</sub>) in a suite of coastal marine environmental systems in the vicinity of the South China Sea (SCS) from inshore and nearshore settings in Xiamen Bay, Shenhui Bay, and the southwestern Taiwan Strait, to offshore sites in the basin and on the slope of the northern South China Sea as well as in a coral reef system at Xisha Islands in the middle of the SCS. There were significant diurnal changes of surface pCO<sub>2</sub>, ranging from 1.0 Pa to 1.6 Pa (10–16 μatm) in the offshore and oligotrophic sites, ~4.1 Pa in the Taiwan Strait, 5.1–15.2 Pa in Xiamen Bay and Shenhui Bay, to as high as 60.8 Pa in the coral reef system at Xisha Islands. Processes that modulate these pCO<sub>2</sub> diurnal variations were temperature, tide or current, and biological controls. Temperature was a major driver of the pCO<sub>2</sub> diurnal variability in the oligotrophic regions, while tidal effects were important in the nearshore. In the coral reef system, biological metabolism dominated variability. Diurnal variability could have a potentially important implication on the estimate of air-sea CO<sub>2</sub> fluxes, which may result in an uncertainty of ±0.48–0.77 mmol C m<sup>-2</sup> d<sup>-1</sup> for the offshore sites in the SCS. Such uncertainties were larger in nearshore settings.

### Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

### Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles are moved into Open Access after three years.