# Marine Carbon Monoxide Cycles in the North Pacific and the Amundsen Sea, Antarctica

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Carbon monoxide (CO) plays a primary role in regulating the oxidizing power of the atmosphere. In the upper ocean, CO exhibits a typical diurnal cycle by means of photolytic production from the decomposition of chromophoric dissolved organic matter (CDOM), microbial consumption, and outgassing through air-sea gas exchange. To investigate dominant processes that govern the budget of dissolved CO in the marine surface mixed layer, we measured air-sea CO flux, microbial oxidation, and CDOM concentration during the two expeditions in the North Pacific and the Amundsen Sea, Antarctica, in summer season of 2012. In the North Pacific, the sea-to-air flux density was ~2 $\mu mol/m^2/d$, which is slightly larger than that in the Amundsen Sea although the Amundsen Sea was more supersaturated with respect to the CO in the overlying air. Irradiation for the photolytic production was also twice more intense in the North Pacific. Dark incubation experiments conducted onboard revealed that microbial consumption rate of the CO in the mixed layer are quite different. The mean residence time against the microbial consumption in the North Pacific was ~6 hours while ~100 hours in the Amundsen Sea. The surface mixed layer depth was far deeper in the Amundsen Sea than in the North Pacific. Our observation indicates that indistinct diurnal variation of dissolved CO in the Amundsen Sea likely due to deep mixed layer and slow microbial consumption while the shallow mixed layer and intense microbial consumption of dissolved CO in the North Pacific render diurnal variation to be stronger.