

# Contrasting diurnal variation of dissolved carbon monoxide in the surface mixed layer of the North Pacific and the Amundsen Sea

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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 strong diurnal cycle being produced by photolytic decomposition of chromophoric dissolved organic matter (CDOM), consumed by microbes, and outgassed by the gas exchange process. To investigate dominant processes that govern the budget of dissolved CO in the mixed layer, we measured air-sea CO flux and microbial consumption of CO during the two expeditions in the Amundsen Sea and the North Pacific in summer season of 2012. In the North Pacific, the sea-to-air flux ( $F_{CO}$ ) was about twice higher than in the Amundsen Sea. The irradiation for the photolytic production was also twice more intense in the North Pacific. Onboard dark incubation experiments revealed that microbial consumption rate of the CO are quite different. The mean residence time against the microbial consumption in the North Pacific was 4.1 hours while 163 hours in the Amundsen Sea. Our observation indicates that the amplitude of diurnal variation of dissolved CO appears to be determined by both photolytic production and microbial consumption of CO in the surface mixed layer with small contribution by air-sea gas exchange. In the presentation this will be further discussed with a simple box model of the upper ocean applied to the two different regions.