

SEASONAL VARIATIONS OF THE ANTARCTIC COASTAL OCEAN IN AND OFF LÜTZOW-HOLM BAY (ABSTRACT)

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In 1990–1992, extensive observations of the ocean have been carried out throughout the two years in and off Lützow-Holm Bay to understand the seasonal variations of the Antarctic coastal ocean. AXBT observations off Lützow-Holm Bay suggest that the thickness of the upper-cold layer shows clear seasonal variations in the coastal ocean: the thickness is about 500 m or more from April to October, while it decreases to 300–400 m from November to March. CTD observations under fast ice in Lützow-Holm Bay also show similar seasonal variations: the thickness of the upper-cold-fresh layer becomes maximum in fall and minimum in summer. The associated density variation of the water column explains only about one-fourth of the seasonal variations in sea level at Syowa Station. These variations seem to be common in every year. Both the current measurements and temperature profile features suggest that the water in Lützow-Holm Bay comes from the offshore ocean. Thus the ocean structure in Lützow-Holm Bay is considered to reflect that of the offshore coastal ocean. At least in Lützow-Holm Bay, the ocean is stratified by a vertical salinity gradient throughout the year, which suggests that deepening of the upper layer is not caused by convection from the surface. Freshening of the coastal ocean in fall corresponds to the melting of sea-ice thickness of a couple of meters. Hence, the deepening and freshening of the upper layer is caused by the accumulation of advected fresh water, not by the local balance. We propose that these seasonal variations are caused by the seasonal cycle of the wind system in the Antarctic coastal ocean: in fall the prevailing westward wind becomes strongest, then the Ekman convergence of the upper-cold-fresh water becomes maximum in the coastal ocean, and *vice-versa* in summer.

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