

Recent variability of the central Arctic Ocean revealed by ice-drifting buoy

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In order to track and understand the current state and changes of the Arctic Ocean hydrography related to recent sea ice reduction, we have been conducting a sustainable time series observation of the Arctic Ocean by using ice-drifting buoys since 2000. This observation focuses both a variability of hydrographic distribution in the Arctic Ocean, which is linked to sea ice and atmospheric conditions, and the important processes of ocean-sea ice-atmosphere interaction, especially melting/freezing mechanism of sea ice. The interannual variability of the Arctic oceanographic conditions, which are indicated by ice-drifting buoy and hydrographic surveys, is significant. For example, frontal structure separating saline Atlantic-derived water from less saline Pacific-derived water shifted from a position over the Lomonosov Ridge before 1990 toward that over the Mendeleyev-Alpha Ridge in the 1990s. Also, convectively formed Lower Halocline Water (cLHW) extended toward the Lomonosov Ridge in late 1990s, although climatological data indicates that cLHW was present only in the Nansen Basin before 1990. Such changes correspond to a shift of a more cyclonic atmospheric circulation in the 1990s, i.e., a strengthening of the Arctic Oscillation (AO), with time delays. Oceanic heat flux from the warm Atlantic water into surface mixed layer is also examined using the ice-drifting buoy data. During the International Polar Year (IPY) we are scheduling to conduct synoptic snapshot hydrographic survey in the central and eastern Arctic Ocean, in addition to the time-series observation since 2000.