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Mooring-based long-term observation of oceanographic condition in the Chukchi Ses and Canada Basin of the Arctic Ocean

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Changes of the Arctic Ocean environment are well known as one of the most remarkable evidences of global warming, attracting social and public attentions as well as scientists'. However, to illustrate on-going changes and predict future condition of the Arctic marine environment, we still do not have enough knowledge of Arctic sea ice and marine environment. In particular, lack of observation data in winter, e.g., under sea ice, still remains a key issue for precise understanding of seasonal cycle on oceanographic condition in the Arctic Ocean. Mooring-based observation is one of the most useful methods to collect year-long data in the Arctic Ocean. We have been conducting long-term monitoring using mooring system in the Pacific sector of the Arctic Ocean. Volume, heat, and freshwater fluxes through Barrow Canyon where is a major conduit of Pacific-origin water-masses into the Canada Basin have been observed since 2000. We show from an analysis of the mooring results that volume flux through Barrow Canyon was about 60 % of Bering Strait volume flux. Averaged heat flux ranges from 0.9 to 3.07 TW, which could melt 88,000 to 300,000 km2 of 1m thick ice in the Canada Basin, which likely contributed to sea ice retreat in the Pacific sector of the Arctic Ocean. In winter, we found inter-annual variability in salinity related to coastal polynya activity in the Chukchi Sea. In collaboration with Distributed Biological Observatory (DBO) project, which is one of the tasks of Sustaining Arctic Observing Network (SAON), we also initiated year-long mooring observation in the Hope Valley of the southern Chukchi Sea since 2012. Interestingly, winter oceanographic conditions in the Hope Valley are greatly different between in 2012-2013 and in 2013-2014. We speculate that differences of sea ice freeze-up and coastal polynya activity in the southern Chukchi Sea cause significant difference of winter oceanographic condition. It suggests that recent sea ice reduction in the Pacific sector of the Arctic Ocean presumably influences marine environment not only in summer but also in winter.