Ocean acidification trend in the Canada Basin since the 2000s

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With the increasing release of anthropogenic carbon dioxide, ocean acidification has been recognized as an important issue in research of global environmental change. Calcium carbonate undersaturation of seawater is one of the most serious threat of ocean acidification. In the Arctic Ocean, known as an extremely sensitive region to ocean acidification, calcium carbonate undersaturation of surface water has been observed in the Canada Basin since 2008. In this study, we have analyzed observations between 2008 and 2016 obtained during the Joint Ocean-Ice Project in the Canada Basin and have found that calcium carbonate saturation state in surface water does not grow steadily worse with the continuing increasing of atmospheric CO_2. The sharp drop in sea ice coverage in 2007-2008 induced a great mount of fresh water discharge into the surface of Canada basin, which accounted for the decrease of calcium carbonate undersaturation. However, after 2009, sea ice coverage decline has slackened and a net export of freshwater to outside of the Canada Basin or to deeper layers has increased salinity and alkalinity of the surface water. This resulted in a rebound in calcium carbonate saturation state in surface water after 2009, transient good news for the marine ecosystem in the arctic.

Keywords: Ocean acidification, Calcium carbonate saturation state, Rebound, Sea ice melt, Arctic Ocean

