

Interannual variation of solar heating in the Chukchi Sea, Arctic Ocean

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Arctic sea ice cover in summer has declined rapidly over the past few decades. The albedo of sea ice is much higher than that of open water; reduction of sea ice cover is associated with increase of solar heating in the Arctic Ocean. In this study, we focus on solar heating in the Chukchi Sea located in the Pacific side of the Arctic Ocean where remarkable sea ice reduction has occurred. The Chukchi Sea is a pathway of Pacific Water from the Bering Strait to the Arctic Basin. The heat transport of the Pacific Water through the Bering Strait, which has increased recently, plays an important role in a decrease in sea-ice formation during winter as well as sea-ice melt in summer in the Canada Basin. Although the Pacific Water heat transport through the Bering Strait is becoming clearer, we expect that solar heating significantly modifies the Pacific Water in the Chukchi Sea. Therefore, we estimate solar heating in the Chukchi Sea through analysis of satellite-derived sea ice concentration data as well as reanalysis data of shortwave radiation, and discuss the role of the solar heating in the Chukchi Sea in the heat transport into the Arctic Basin. We also use in-situ shortwave radiation data obtained by R/V Mirai to validate the reanalysis data of shortwave radiation in the Chukchi Sea.

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