

Variability of sea-ice thickness in the northeastern coastal Chukchi Sea revealed by a moored ice-profiling sonar

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Using a moored ice-profiling sonar, time-series ice-draft data were obtained in a coastal region of the northeastern Chukchi Sea during 2009-10 for the first time. Time-series data show seasonal growth of sea-ice draft, which is occasionally interrupted by the appearances of coastal polynya and upwelled Atlantic Water. The sea-ice draft distribution indicates the abundance of thicker ice comparable or less than in the adjacent Beaufort Sea. The rapid increase of thicker ice from December to January corresponded to the minimal offshore drift in January and the resulting rapid decrease of level-ice fraction indicating dynamical thickening processes. The mean draft and its converted thickness are 1.27 and 1.54 m, respectively. Heat losses are calculated with ice-thickness data averaged over various time scales corresponding to various spatial scales. Comparing to the estimate with ice-thickness data every second, these estimates are roughly two thirds and a half for the cases with spatial averaging over ~20 and 100 km, respectively. The heat-loss estimate based on thin-ice data derived from the AMSR-E corresponds well with the estimate based on the 1-second observed ice-thickness data, indicating the validity of a thin-ice thickness algorithm and the resulting heat-loss estimate based on the AMSR-E data.

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