

Arctic Ocean multiyear sea ice area balance: Quikscat observations

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The climatic significance of multiyear ice coverage of the Arctic Ocean can be attributed to its strong relation to the summer ice concentration. If changes in the climate cause persistent decreases in the summer ice concentration, it would be reflected in decreases in the winter multiyear ice coverage. This reduction would be due to increased melt during the previous summer or ice export through the Fram Strait. Over three winters, the daily coverage of the perennial ice zone (PIZ) of the Arctic Ocean is estimated using a simple backscatter-based classification of Quikscat fields. The time-dependent decrease of PIZ coverage over the winter is a function of ice export and deformation. This area balance allows us to examine the validity of the estimated coverage. On the average, the PIZ occupies 70% of the Arctic Ocean at the beginning of October and only 4.5×10^6 km² of that area remains at the end of May. The loss of PIZ coverage can be explained almost entirely by ice export, and to a smaller fraction ice divergence, derived from passive microwave ice motion. After accounting for export and deformation, the PIZ area remains almost constant throughout the winter. This gives confidence in our estimates. The three winters of PIZ coverage and its variability are discussed.