



Seasonallity and correlation times in the total Arctic sea ice area

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Since the beginning of modern satellite observations, the Arctic sea ice extent has been showing a downward trend. The decline has been weaker in the March maximum than in the September minimum and masked by inter-annual fluctuations.

One of the less understood aspects of the sea ice response is the persistence times for fluctuations, which could provide a deeper understanding of the dominant physical processes behind the sea ice decline. To determine the fluctuation persistence times, however, it is necessary to first filter out the dominant effect of the seasonal cycle. In the current study, we thus develop a statistical model, which accurately decomposes the ice area changes into a: (1) variable seasonal cycle component with a constant shape and (2) a residual (short-term) fluctuation.

We find the persistence times of fluctuations to be only about three weeks, independently from season, which is substantially shorter than previously reported. One possible explanation to such short time scale is the dominance of atmospheric forcing. The shape of the seasonal cycle is surprisingly constant for the whole observational record despite the rapid decline. This is in agreement with the studies suggesting that the asymmetry of the seasonal cycle is an effect of Arctic land-sea geography, which has not changed with climate change.