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Can Solar cyclic variability modulate winter Arctic climate?

This study investigates the role of the eleven-year solar cycle on the Arctic climate during 1979–2016. It reveals that during those years, when the winter solar sunspot number (SSN) falls below 1.35 standard deviations (or mean value), the Arctic warming extends from the lower troposphere to high up in the upper stratosphere and vice versa when SSN is above. The warming in the atmospheric column reflects an easterly zonal wind anomaly consistent with warm air and positive geopotential height anomalies for years with minimum SSN and vice versa for the maximum. Despite the inherent limitations of statistical techniques, three different methods –Compositing, Multiple Linear Regression and Correlation –all point to a similar modulating influence of the sun on winter Arctic climate via the pathway of Arctic Oscillation. Presenting schematics, it discusses the mechanisms of how solar cycle variability influences the Arctic climate involving the stratospheric route. Compositing also detects an opposite solar signature on Eurasian snow-cover, which is a cooling during Minimum years, while warming in maximum. It is hypothesized that the reduction of ice in the Arctic and a growth in Eurasia, in recent winters, may in part, be a result of the current weaker solar cycle.

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