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# Solar forcing of winter climate variability in the northern hemisphere

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Observational evidence indicates a link between the 11-year solar cycle and wintertime climate of the Northern Hemisphere. Here we use the Hadley Centre coupled ocean-atmosphere climate model in idealized experiments which represent the impact of the change in the ultraviolet (UV) component only of solar forcing on the difference in climate between the solar maximum and solar minimum. The UV perturbation is estimated from extrapolation of recent SIM/SORCE satellite data and is larger than that derived from earlier measurements. Our model responds with a clear signal throughout the depth of the extratropical winter atmosphere, with a surface response to solar minimum resembling the negative phase of the North Atlantic Oscillation/Arctic Oscillation. This allows low solar activity to drive cold winters in northern Europe and the U.S. and mild winters over southern Europe and Canada with little direct change in globally averaged temperature. The resulting surface climate anomalies are large enough to play an important role in decadal climate prediction.