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Role of ozone on the solar cycle modulation of the North Atlantic Oscillation

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The effect of ozone on the 11-year solar cycle modulation of the winter-mean North Atlantic Oscillation (NAO) is examined through analyses of observational data and assimilated ozone data from 1958 to 2000. It is found that a significant ozone anomaly is created in winter in high solar (HS) years only. This anomaly is pronounced from spring to summer and creates a large temperature anomaly in the lower stratosphere in summer when daytime is longest in the northern hemisphere. The appearance of the surface signal in summer is similar to the summer Arctic Oscillation, and it is generated by wave forcing in the upper troposphere created by the ozone-induced stratospheric temperature anomaly.