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Large decadal scale changes of polar ozone suggest solar influence

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Abstract. Long-term measurements of polar ozone show an unexpectedly large decadal scale variability in the mid-stratosphere during winter. Negative ozone anomalies are strongly correlated with the flux of energetic electrons in the radiation belt, which is modulated by the 11-year solar cycle. The magnitude of the observed decadal ozone changes ($\approx 20\%$) is much larger than any previously reported solar cycle effect in the atmosphere up to this altitude. The early-winter ozone anomalies subsequently propagate downward into the lower stratosphere and may even influence total ozone and meteorological conditions during spring. These findings suggest a previously unrecognized mechanism by which solar variability impacts on climate through changes in polar ozone.

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