Geophysical Research Abstracts, Vol. 9, 03474, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03474

Climate Patterns and The Forcing of The Polar Stratosphere in Winter

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In the northern hemisphere, large-scale waves originating in the troposphere strongly condition the wintertime circulation of the stratosphere, and the PSC formation potential. The PSC volume is an important parameter in ozone research as, when scaled by chlorine loading, it shows a compact relation to mean ozone loss. Using ERA-40 re-analyses over the period 1959-2001, we re-examine the inter-annual variability of the PSC volume and other vortex parameters, in light of the underlying tropospheric forcing.

Both the North Atlantic Oscillation and North Pacific anomalies play a role in warming/cooling the lower stratosphere. We find evidence that PSC volume strongly depends on North Pacific ridging events, which display decadal variability.