Features of the Arctic Stratosphere during IPY

^ Figure 1
GEOS-5 1 hpa (top) and 10hPa (bottom) zonal-mean zonal winds during (left to right) the 2006—2007, 2007—2008, and 2008—2009 Arctic winters. The black line is at 60°N latitude.

^ Figure 2
MLS zonal mean 70°N zonal-mean temperatures in (top to bottom) 2006-2007, 2007-2008, and 2008-2009. Overlaid contours are zonal mean winds of -30, 0, 30 and 60 m/s, with negative (easterly) and zero values in black, positive (westerly) values in white.
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< Figure 3
Maps of GEOS-5 scaled potential vorticity (sPV) (e.g. Manney et al., 1994) in the lower (490K), middle (850K), upper stratosphere (1700K), and in the lower mesosphere (2500K), on a date in each year 2007 through 2009 that was at the beginning of the major SSW in that year.

v Figure 4
Vortex averages (calculated as described by Manney et al., 2007) of long-lived trace gas measurements from ACE-FTS during the IPY winters. Top to bottom: CO, CH$_4$, and N$_2$O. CO and CH$_4$ are shown from 400 to 2500K (through the typical stratopause level); N$_2$O is shown from 400 to ~1600 K, into the upper stratosphere.
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**Figure 5**
Three-dimensional representation of the Arctic vortex (coloured with temperature) and anticyclones (black) (Harvey et al., 2002) on a date in each year 2007 through 2009 that was at the beginning of the major SSW in that year.

**Figure 10**
EqL-time series of MLS (top to bottom) HCl, ClO and O₃ in the (left to right) 2006-2007, 2007-2008, and 2008-2009 Arctic winters. Only data from the day (ascending) side of the orbit are shown for ClO. Overlays are PV contours in the vortex edge region.
Features of the Arctic Stratosphere during IPY

\[< \text{Figure 11}\]
Vortex-averaged (within a scaled PV contour, e.g. Manney et al., 2007) MLS (top to bottom) \(\text{HNO}_3\), \(\text{HCl}\), \(\text{ClO}\) and \(\text{O}_3\) during the (left to right) 2006-2007, 2007-2008, and 2008-2009 Arctic winters.

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\[< \text{Figure 1}\]
Zonal mean temperature for the latitude range 85\(^\circ\)S to 65\(^\circ\)S as a function of time and altitude derived from Aura MLS version 2.2 retrievals. The individual profiles were converted to a uniform grid in geopotential height through linear interpolation before creating the daily zonal averages. Bias corrections have not been applied to individual measurements. The red contour delineates the NAT frost point evaluated using observed MLS temperature and mixing ratios of \(\text{HNO}_3\) and \(\text{H}_2\text{O}\). The dashed vertical lines mark the time of the austral spring equinox.