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The effect of variability in the Antarctic Oscillation on boundary layer structure at the South Pole

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During a series of atmospheric chemistry experiments carried out in 1998, 2000, and 2003 (Investigation of Sulfur Chemistry in the Antarctic Troposphere, ISCAT; Antarctic Tropospheric Chemistry Investigation. ANTCI), boundary layer characteristics during November and December of each of these years varied greatly and resulted in significant interannual variability in surface nitric oxide (NO) concentrations. Because boundary depth serves the major control on nitric oxide concentrations (Davis et al., 2004; Neff et al., 2007) we examined how variability in the large-scale circulation over Antarctica (typically quantified in terms of the Antarctic Oscillation (AAO) or Southern Annular Mode (SAM) indices) affects surface wind speed, direction, temperature, stability and boundary layer depth (only directly observed in 2003).