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Relationships between climate and southern hemispheric cyclones and resultant impacts on trace gas and aerosol transport

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Very few studies have described the variability of mid-latitude cyclones in the southern hemisphere during austral winter. This study will highlight how cyclone characteristics vary according to climate phase, particularly the El Nino Southern Oscillation (ENSO). The southern hemispheric mid-latitude cyclones play an important role in the distribution and transport of trace gases and aerosols during this time of peak emission for both mineral dust and pyrogenic aerosols. The cyclones affect both long-range transport and local distribution of these atmospheric constituents. Westerly waves affect low and mid-level tropospheric stability and create distinct frontal passage signatures in column measurements of aerosol concentrations, particularly for southern Africa. The variability of intensity, frequency and equatorward extent of mid-latitude cyclones, as correlated with climate phase, exerts an important interannual influence on the distribution and transport of southern hemispheric trace gases and aerosols. A mechanistic description will be given for the primary linkages between climate, mid-latitude cyclones, and trace gases and aerosols in the southern hemisphere during austral winter.