

Influences of the Antarctic Ozone Hole on Southern Hemispheric Summer Climate Change

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Over the past three decades, Antarctic surface climate has undergone pronounced changes. Many of these changes have been linked to stratospheric ozone depletion. Here we show that the ozone hole links not only to Antarctic but also Southern Hemisphere (SH) mid-latitude surface temperatures in the summer season. We find that since the onset of the ozone hole, there have been significant shifts in the distributions of both the summer seasonal mean and daily maximum temperatures in many parts of the SH mid-latitude regions between high and low ozone years, particularly over dry inland areas in southeast Australia and southern Africa. Linkages to the ozone hole are associated with circulation changes that affect precipitation and cloudiness, exerting a strong control on these dry areas. Unusually hot summer extremes in these locations are associated with anomalously high ozone in the previous November, including the recent very hot austral summers of the past two years. If the relationship found in the past three decades continues to hold, the level of late springtime ozone over Antarctica has the potential to be part of a useful predictor set for the following summer's conditions.