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The Impact of the Extreme 2015-16 El Niño on the Mass Balance of the Antarctic Ice Sheet

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Interannual variations associated with El Niño-Southern Oscillation can alter the surface-pressure distribution and moisture transport over Antarctica, potentially affecting the contribution of the Antarctic ice sheet to sea level. Here, we combine satellite gravimetry with auxiliary atmospheric datasets to investigate interannual ice-mass changes during the extreme 2015-16 El Niño. Enhanced precipitation during this event contributed positively to the mass of the Antarctic Peninsula and West Antarctic ice sheets, with the mass gain on the peninsula being unprecedented within GRACE's observational record. Over the coastal basins of East Antarctica, the precipitation-driven mass loss observed in recent years was arrested, with pronounced accumulation over Terre Adélie dominating this response. Little change was observed over Central Antarctica where, after a brief pause, enhanced mass-loss due to weakened precipitation continued. Overall, precipitation changes over this period were sufficient to temporarily offset Antarctica's usual (approximately 0.4 mm yr^{-1}) contribution to global mean sea level rise.