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# Reduced Southern Hemispheric circulation response to quadrupled $CO_2$ due to stratospheric ozone feedback

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Due to computational constraints, interactive stratospheric ozone chemistry is commonly neglected in most climate models participating in intercomparison projects. The impact of this simplification on the modeled response to external forcings remains unexplored. In this work, we examine the importance of including interactive stratospheric ozone chemistry on the Southern Hemispheric circulation response to an abrupt quadrupling of $CO_2$. We find that including interactive ozone significantly reduces (by 20%) the response of the midlatitude jet to $CO_2$, even though it does not alter the surface temperature response. The reduction of the tropospheric circulation response is due to $CO_2$ induced ozone changes and their effects on the meridional temperature gradient near the tropopause. Our findings suggest that neglecting this stratospheric ozone feedback results in an overestimate of the circulation response to increased $CO_2$. This has important implications for climate projections of the Southern Hemispheric circulation response to $CO_2$. Stratospheric ozone responses to external forcing yield an important, and yet undocumented, negative feedback in the climate system.