

Figure S1. Climatology of DJF precipitation (mm day⁻¹) and 200 hPa streamlines over the Pacific basin and South America for (a-c) present (1980–2005) and (d-f) future (2070–2099) climates under the RCP 8.5 scenario for groups (a, d) A (nonlinear ENSO characteristics and SACZ), (b, e) B (nonlinear ENSO characteristics), and (c, f) C (cannot simulate nonlinear ENSO characteristics).

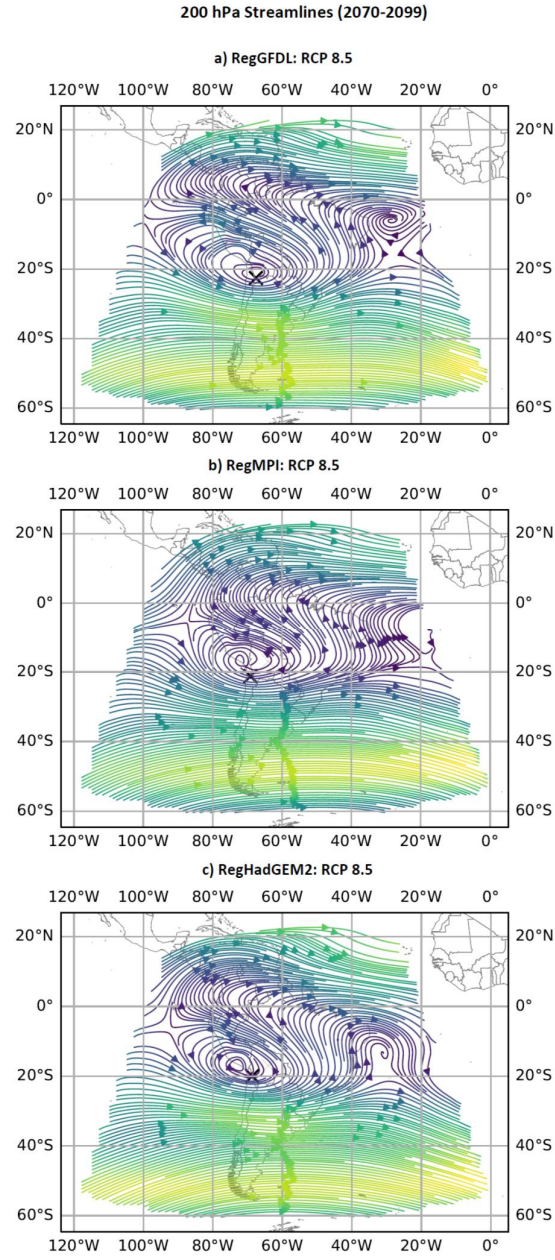


Figure S2. Climatology of DJF 200 hPa circulation over South America for the future climate (2070-2099): **a)** RegGFDL, **b)** RegMPI, and **c)** RegHadGEM simulations. The RegHadGEM2 simulation covers the 2070-2098 period. The black cross represents the position of the Bolivian high in the historical climate (1980-2005).