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Local and remote Rossby wave responses to an anomalously dry or wet Australian continent

Olivia Martius¹, Kathrin Wehrli², and Sonia Seneviratne²

¹University of Bern, Institute of Geography, Institute of Geography, Bern, Switzerland (olivia.martius@giub.unibe.ch)

²ETH Zurich, Institute for Atmospheric and Climate Science

An ensemble of CESM atmosphere only experiments with varying soil moisture anomalies over Australia (+1, 0, -1 STD) is analysed with respect to the atmospheric response. Locally an intensification of the surface heat low and an upper-level anticyclone is found for the negative anomaly. The local response to the low soil moisture content is driven by increase sensible heat fluxes and associated positive near-surface temperature anomalies.

A remote response of the upper-level flow consists of a downstream Rossby wave train extending along the jet waveguide and an upstream response projecting upon the main mode of variability the southern annular. The downstream response is driven by linear wave dynamics while the upstream response is modulated by non-linear wave dynamics and associated eddy fluxes. The sensitivity of the response to the background flow, i.e., different phases of ENSO is explored.