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Disentangling the air-sea interaction in the South Atlantic Convergence Zone

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Air-sea interaction in the region of the South Atlantic Convergence Zone (SACZ) is disentangled using Granger causality as a measure of directional coupling. Calculation of the area weighted connectivity indicates that the SACZ region is the one with largest mutual air-sea connectivity in the south Atlantic basin during summertime. Focusing on the leading mode of daily coupled variability, Granger causality allows distinguishing four regimes characterized by different coupling: there are years in which the forcing is mainly directed from the atmosphere to the ocean, years in which the ocean forces the atmosphere, years in which the influence is mutual, and years in which the coupling is not significant. A composite analysis shows that ocean-driven events have atmospheric anomalies that develop first and are strongest over the ocean, while in events without coupling anomalies develop from the continent where they are strongest and have weaker oceanic extension.