WCRP Conference for
Latin America and the Caribbean:
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IMPACTS OF AUSTRAL WINTER HADLEY CIRCULATION CHANGES ON STATIONARY ROSSBY WAVES PROPAGATION

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Tropical variability affects the extra-tropical atmospheric circulation due to the generation of Rossby waves that propagate from the tropics into the extra-tropics in a westerly background flow. Using the NCEP-DOE Reanalysis-2 dataset, the present study investigates how changes in the Hadley Cell (HC) intensity impact the stationary Rossby waves energy propagation in the Southern Hemisphere (SH) extra-tropics in the 1979-2010 period. Composites for weak and strong HC Intensity Index (HCI) were used in this analysis. The results for weak HC cases showed a wave train emanating from the subtropical central-west Indian Ocean in an arc-like route, with zonal wavenumber three in the polar jet waveguide, and reaching the north of South America. For strong HC cases, the wave train is also trapped inside the polar jet waveguide with zonal wavenumber four, emanating from subtropical central-east Indian Ocean and reaching the subtropical west coast of Africa. A weaker zonally orient ed wave train with zonal wavenumber five has been found in the subtropical region with opposite polarity for weak and strong HC cases. The CSIRO Mk3L general circulation model is also employed in simulations with observed sea surface temperatures from the HadISST dataset and time evolving historical carbon dioxide concentrations. The results shows that the model reproduces skilfully the Rossby wave trains in an arc-like route associated with weak and strong HC composites in the same period of the observations.