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Extreme winds in a WRF downscaling for the SAM-22 CORDEX domain for the 1979-2018 Historical Period

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This study aims to evaluate how extreme winds (above the 95th percentile) are represented in a downscaling using the regional model WRF over the CORDEX South American domain in an approximate 25 km (0.22 degrees) horizontal resolution, along with CFSR as input. The main focus of the analysis resides over the coastal Brazilian region, given a large number of offshore structures from oil and gas industries subject to impact by severe events. Model results are compared with a reanalysis product (ERA5), estimates from satellites product (Cross-Calibrated Multi-Platform Wind Speed), and available buoy data (Brazilian National Buoy Project). Downscaling results from WRF show an underestimation of maximum and extreme wind speeds over the region when compared to all references, along with overestimation in the continental areas. This directly impacts results for extreme value estimation for a larger return period and severity evaluation of extreme wind events in future climate projections. To address this, a correction procedure based on the linear relationship between severe wind from satellite and model results is applied. After linearly corrected, the extreme and maximum wind speed values increase and errors in the representation of severe events are reduced in the downscaling results.