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Life cycle assessment of easterly wave disturbances on tropical south Atlantic and their impact over northeast Brazil

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A 21 years climatology of Easterly Waves Disturbances (EWDs) over the Tropical South Atlantic (TSA) has been examined using data from the European Centers for Medium-Range Weather Forecasting (ECMWF) interim reanalysis (ERAI), Tropical Rainfall Measuring Mission (TRMM), daily mean outgoing longwave radiation (OLR) data from the National Oceanic and Atmospheric Administration (NOAA) and Meteosat 7 satellite data. The identification of EWDs was obtained subjectively through satellite images in infrared channel and fields of streamlines and relative vorticity at the levels 1000, 850, 700, 500 and 200 hPa from ERAI reanalysis. During this period, 518 EWDs were identified, where 97% (3%) of these waves hit (not hit) the Northeast Brazil (NEB) region, 64% (36%) were convective (non-convective) and 14% (86%) reached the Amazon region. The main systems that influenced the development of the EWDs were: Intertropical Convergence Zone (ITCZ), Upper-Tropospheric Cyclonic Vortices (UTCV), Cold Fronts (FF) and convective clusters from the west coast of Africa (AF). On average, it was observed approximately 25 waves per year, with maximum (minimum) frequency between April and August (September and March) and, with pronounced interannual variability. The life cycle of EWDs was evaluated objectively using an automatic method (TracKH) for the identification and tracking. From the 518 events identified in the subjective analysis, TracKH was able to capture 342 waves ($\sim$ 66%). From this detection, the characteristics of their life cycle were analyzed at 850 hPa level, showing a prominent peak around of 35°W-15°W and 20°S-5°N associated with density genesis. The trajectory and dissipation are concentrated over east coast of the NEB, between the states of Alagoas and Rio Grande do Norte, but the dissipation occurs once the systems enter the continent. The synoptic patterns associated with EWDs were analyzed by composing anomaly during the period of maximum (wet) and minimum (dry) frequency from 3 days before until one day after the EWDs reaching the NEB coast. During the wet period, the circulation presented cyclonic and confluent anomaly, negative vorticity and convergence at all levels except at 200 hPa which only showed a trough characteristic, while for the dry season, this feature was only observed at low levels. Negative anomalies of vertical movements and temperature and positive humidity associated with EWDs were observed in both seasons, but reaching higher intensity during the dry period.