



Atmospheric circulation variability at the Southern Hemisphere and its association with the ENSO cycle.

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The variability of anomalies of the atmospheric circulation at the Southern Hemisphere is examined. The main goal is to estimate interactions between the tropical zone and mid- and high latitudes. These interactions were revealed between El-Nino - Southern Oscillation (ENSO) features and the variability of atmospheric circulation over the Southern Hemisphere, because the most striking anomalies during ENSO are developing exactly at the Southern Hemisphere.

The empirical orthogonal functions (EOF) analysis was applied for investigation of the low-frequency atmospheric circulation variability at the Southern Hemisphere. Geopotential and zonal velocity daily fields on 850 and 200 hPa pressure levels from NCEP/NCAR reanalysis (54 Januaries from 1958 to 2012) used for this EOF decomposition. The variability of atmospheric circulation on the whole of 54 years and during the most extreme warm (1982/83 and 1997/98 years) and cold (1974/75, 1984/85 and 2010/11 years) ENSO events.

The main centers of variability during 54 years are associated with fluctuations both of macro-scale processes and different recurrence of synoptical scale processes explicitly. These processes are caused by warm and cold ENSO events obviously, and became apparent in the spatial distribution of zonal velocity anomalies. It is corresponding to well-known canonical schemes of development and culmination of ENSO both at upper, and at lower troposphere. Moreover, these variability centers have intensified, amplified, some secondary ones have appeared most of cases during the several years. The correspondence of temporal behavior of anomalies during the several years was ascertained with the El-Nino(1982/83 and 1997/98) and La-Nina (2010/11) events chronology. Clear interactions recognized between centers of variability at tropical, midlatitudes and antarctic latitudes of Pacific. At that, the most striking interactions appears where the main ENSO cycle's events occur. Similar chains can be interpreted as the following coupled consequence of anomalies: discharge of cold air from Antarctica – intensification of the extra-tropical cyclogenesis at the Great Western Transfer – strengthening of the conclusive anticyclone at the cyclonic series rear on the polar front – regeneration of subtropical anticyclone – intensification of the tropical trade winds circulation – amplification of the South-Pacific Convergence Zone, appearing in activation of tropical cyclogenesis.