Geophysical Research Abstracts
Vol. 15, EGU2013-5602, 2013
EGU General Assembly 2013

Precipitation associated with spring cut-off lows in South Africa

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500-hPa Cut-off Low (CoL) trajectories over Southern Africa and surrounding oceans are established following the method presented by Favre et al. (2011). The contribution of CoLs to precipitation has been quantified from 402 in situ records over South Africa and during the 1979 to 2006 period. By composite analysis, a geographical window in which the occurrence of CoLs is associated with precipitation over South Africa is defined. In the 2.5°E– 32.5°E/20°S–45°S targeted area, a total of 1,088 CoL days (∼39 days per year) is recorded. Annual and seasonal precipitation frequency and intensity associated with CoLs are next quantified and analyzed. On average, CoLs' precipitation is more widespread and intense in spring (October-November-December) than during other seasons (Favre et al. 2012). In spring, the proportion of heavy rainfall days (>75th percentile of rainy days) attributed to CoLs is larger over the country with a mean rate of ∼35% of the annual total of CoL heavy rainfall days. Over the studied period, a significant linear trend in spring CoLs' frequency shows an increase of about 74 % (mean = 9.2, standard deviation = 6.15). This trend is accompanied by a significant increase in the frequency of CoL rainfall days over the South and East of the country with an increase of the CoL precipitation intensity more clearly marked over the south escarpment (the Karoo). In parallel, it is shown that CoL daily precipitation frequency and intensity in spring are enhanced over the large part of the country during the developing phase of La Niña events.

References:

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