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Upper Level Wind Circulation over South America: Impact on Precipitation over Southeastern South America and Relation with ENSO and the Pacific South American Modes

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The existence of a significant simultaneous correlation between bi-monthly mean precipitation over South Eastern (SE) South America (SA) and either the first or the second (depending on season) leading mode of interannual variability of upper level wind over SA is demonstrated in all seasons, except in winter. The pattern associated with these modes of variability is similar in all seasons, and consists of a continental-scale vortex centered over the eastern coast of subtropical SA. The vortex has a quasi-barotropic structure in all seasons and at lower levels, depending on its phase, it conveys or diverts moisture from the South American Low Level Jet and eastern Brazil to SESA creating precipitation anomalies there. The vortex is related to the Pacific South American modes from spring to fall, and it appears to be forced by ENSO in spring but not in the other seasons when it is the result of the internal variability of the Southern Hemisphere. Evidences and reproducibility of the pattern with GCMs will be presented at the conference.

On the basis of the correlation between upper level winds and precipitation, an empirical method to produce long-range forecasts of bi-monthly mean precipitation over SESA is developed. Tests of the method in hindcast mode for the period 1959 – 2001 show a potential for reliable predictions in the southern spring, summer and fall. In an experimental mode, forecasts are skillful in spring only, with highest skill in El Nino Southern Oscillation (ENSO) years. In summer and fall, the DEMETER forecasts of wind anomalies limit the method's capability on making reliable real predictions.