Climatology of Low-Level Jet East of the Andes as derived from the NCEP reanalyses. Temporal and spatial variability

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The LLJ east of the Andes

- A “river of atmospheric moisture” at lower levels of the atmosphere east of the Andes (1000-1600 magl) that transports moisture from the Amazon to higher latitudes.
- This moisture feeds convective systems responsible for rain in S/SE Brazil-Paraguay-Uruguay-N. Argentina.
- In addition it also transport smoke and aerosols.
- It is important for weather and climate forecast
- Issue: Would long term change in regional circulation affect LLJ and the moisture transport, and thus meridional moisture transport would affect climate in Amazonia and Southeastern South America?
Conceptual model of the SALLJ physical environment during the wet season (Marengo et al. 2002)
Methodology

- NCEP reanalyses
- PACS-SONET Pilot balloons in Bolivia and Paraguay

Conditions that must be meet to detect a LLJ, and that are applied to a NCEP reanalyses grid box during all observation times (000, 0600, 1200 and 1800 UTC)

1- \( v < 0 \) – Northerly flow

2- \( v > u \) – Meridional winds more predominant that zonal winds

3- \( V(850) \geq 12\text{m/s} \) – Wind speed equal or higher than 12 m/s at 850 hPa (Bonner criterion 1);

4- \( V(850) - V(700) \geq 6\text{m/s} \) – Wind speed above the jet must decrease at a rate of at least 6 m/s per km. Also, the level of maximum wind should be at or below the 3 km level (Bonner criterion 1).
LLJ in Santa Cruz and in Rondonia

A. Wind Speed (m.s\(^{-1}\))
   Santa Cruz - 925 hPa

B. Meridional Wind (m.s\(^{-1}\))
   Santa Cruz - 925 hPa

C. Wind Speed (m.s\(^{-3}\))
   R. B. Jaru - 925 hPa

D. Wind Speed (m.s\(^{-1}\))
   Rolim de Moura - 925 hPa
Warm season- 850 hPa wind and integrated moisture transport during LLJ episodes in Santa Cruz-Bolivia