BASHARIN, DIAS PINTO, KAHRAMAN, LLAMEDO, REBOITA, SAVENKOVA

Influence of Tropical SST Anomalies on Climate Fluctuations over South America

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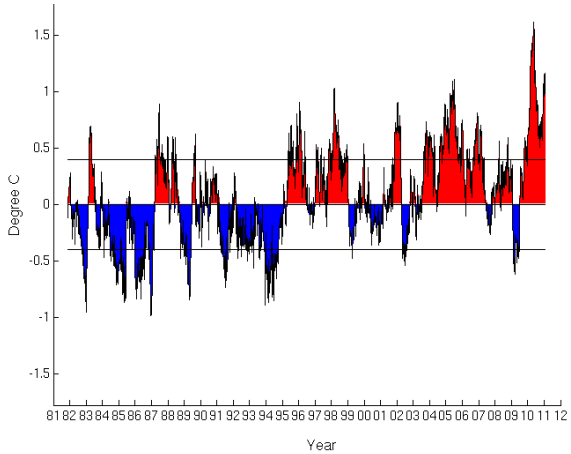
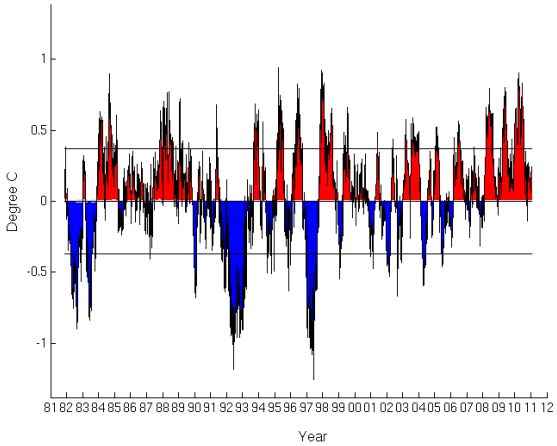
- TNA, TSA & TNA-TSA, NIÑO3,4
- TNA & TSA vs Global Precipitation Anomalies
- Regional Anomalies of Meteorological Variables
- Principle Component Analysis of the Precipitation field over the South America
- Discussion

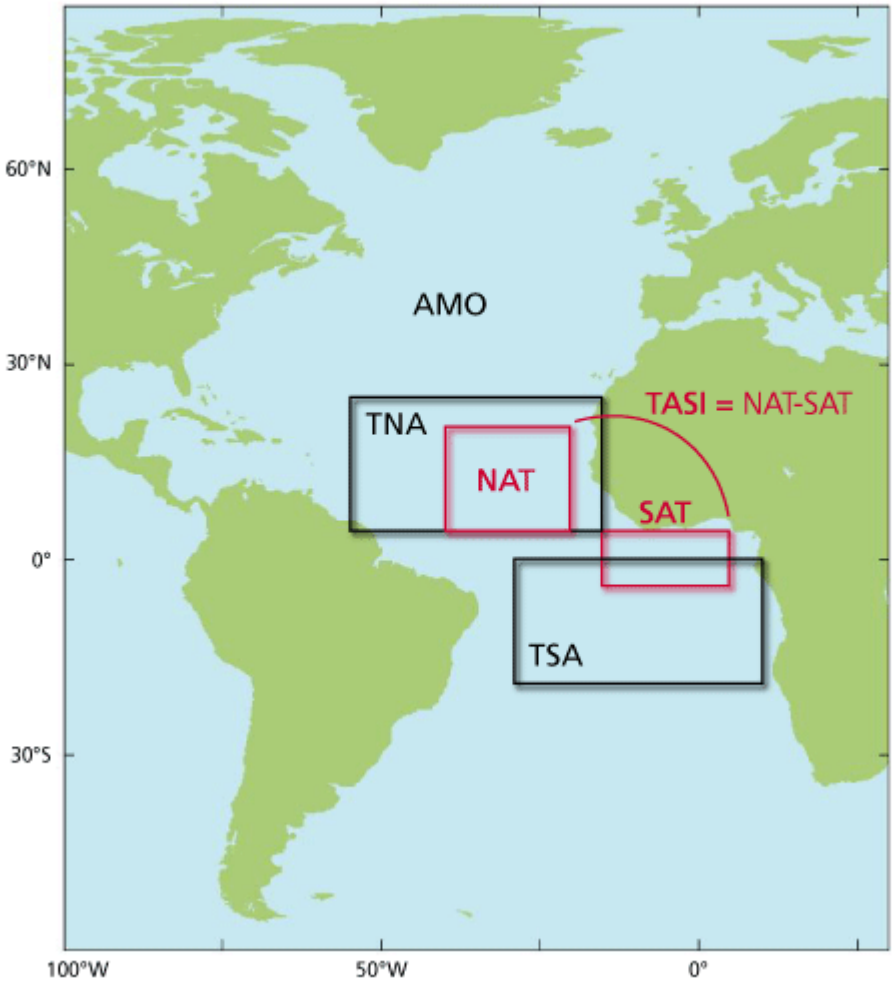
Data

- Monthly index data between 1980-2001 is obtained from IRI Data Library. The index is calculated using the NOAA Optimum Interpolation Sea Surface Temperature Analysis (Reynolds OIv2 SST Analysis).
- ERA40 is used as Atmospheric Data (ECMWF).
- GPCP precipitation data.





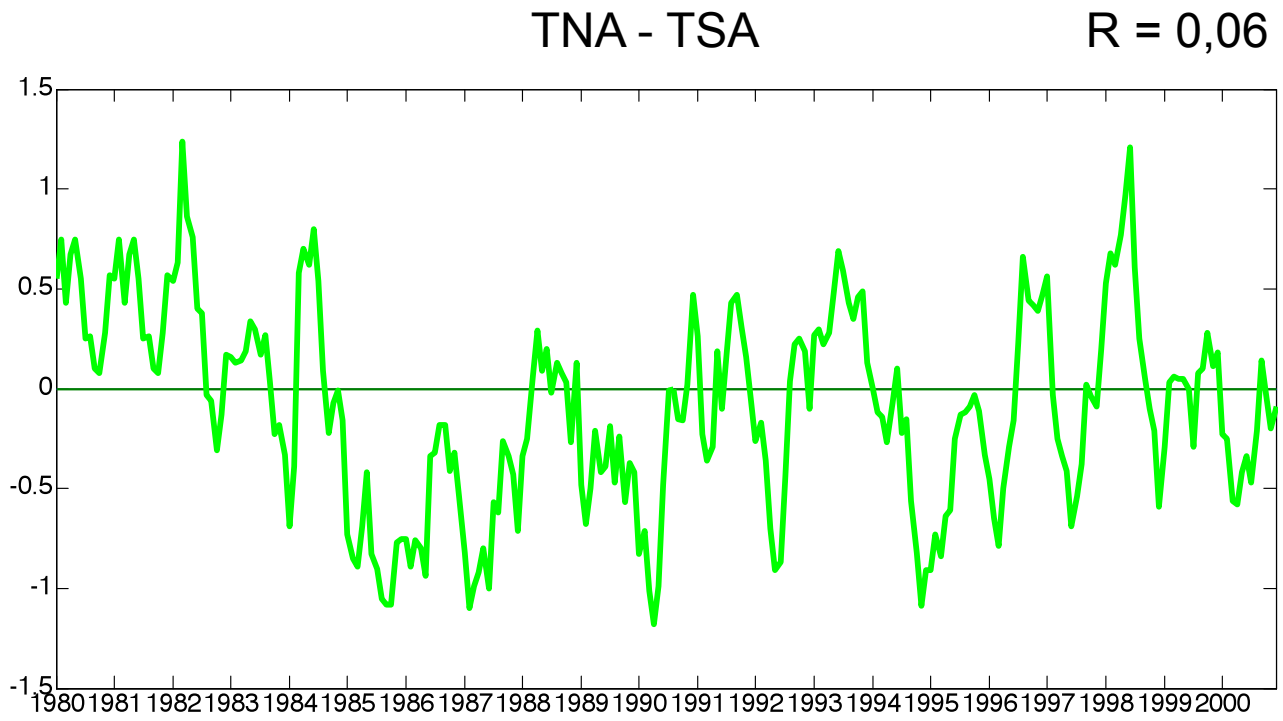
TNA & TSA



- Tropical Northern Atlantic Index (TNA)
- The TNA SST anomaly index is an indicator of the surface temperatures in the eastern tropical North Atlantic Ocean. It is calculated with SSTs in the box 55°W - 15°W, 5°N - 25°N.

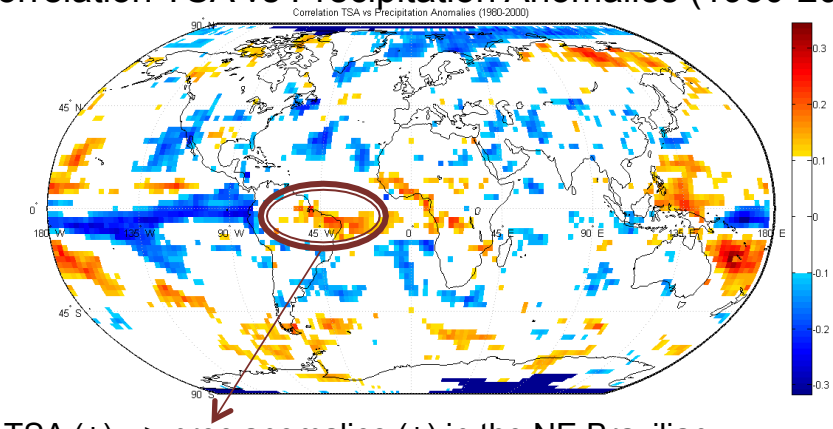
- Tropical Southern Atlantic Index (TSA)
- The TSA SST anomaly index is an indicator of the surface temperatures in the Gulf of Guinea, the eastern tropical South Atlantic Ocean. It is calculated with SSTs in the box 30°W - 10°E, 20°S - 0°.

TNA-TSA


TNA - TSA
R = 0,06
1.5
1
0.5
0
-0.5
-1
-1.5
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000

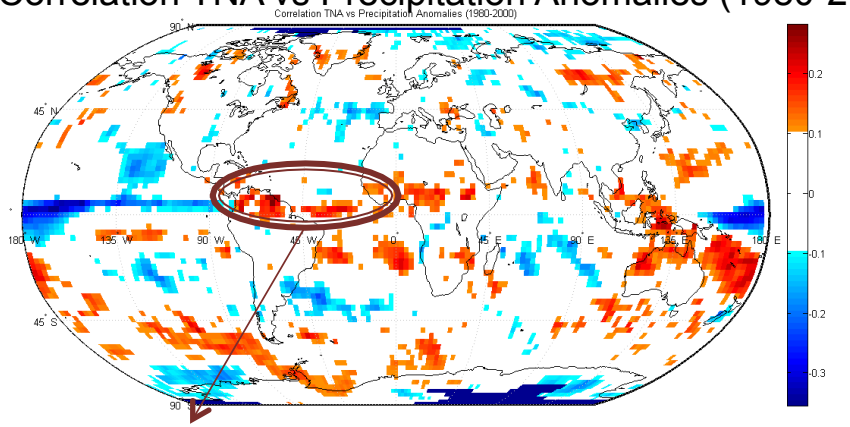
A large view: TNA-TSA vs precipitation anomalies

Correlation TSA vs Precipitation Anomalies (1980-2000)



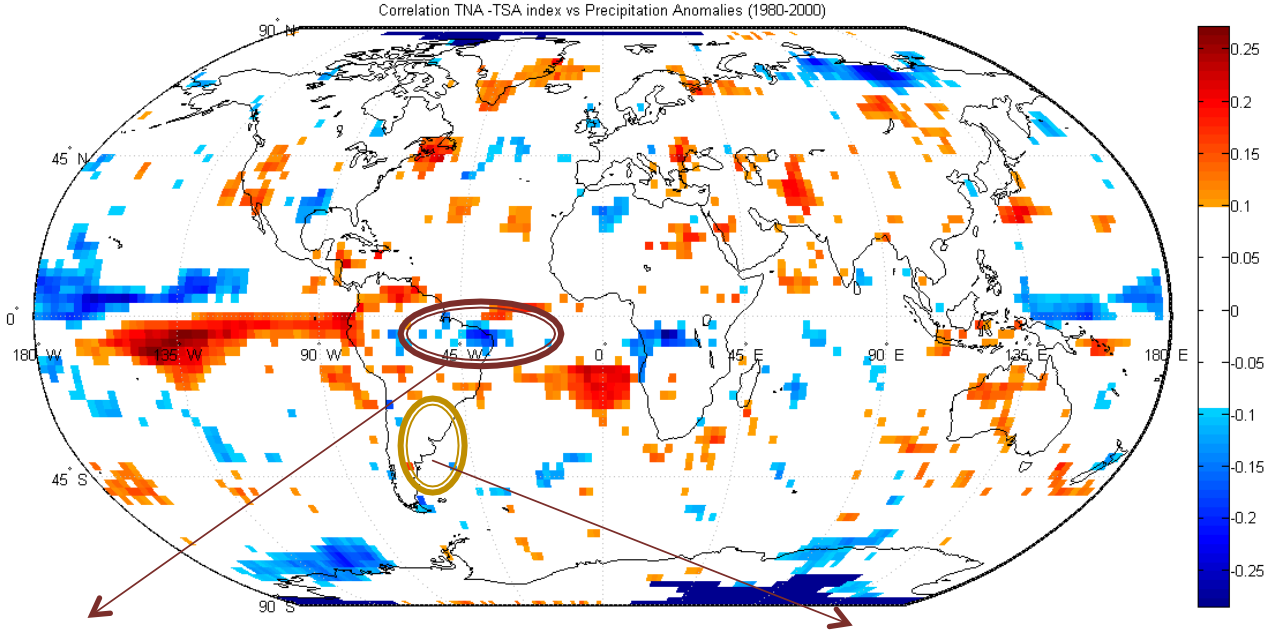
TSA (+) --> prec anomalies (+) in the NE Brazilian

Correlation TNA vs Precipitation Anomalies (1980-2000)



TNA (+) --> prec anomalies (+) in the north of South America

Correlation TNA - TSA vs Precipitation Anomalies (1980-2000)

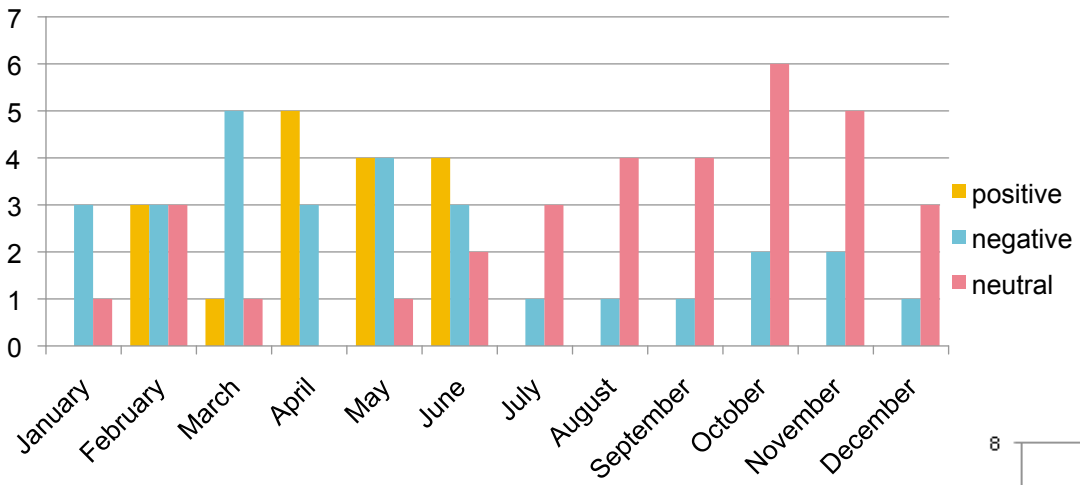


TNA > TSA --> prec anomalies (-) in the NE Brazilian

What happens here?

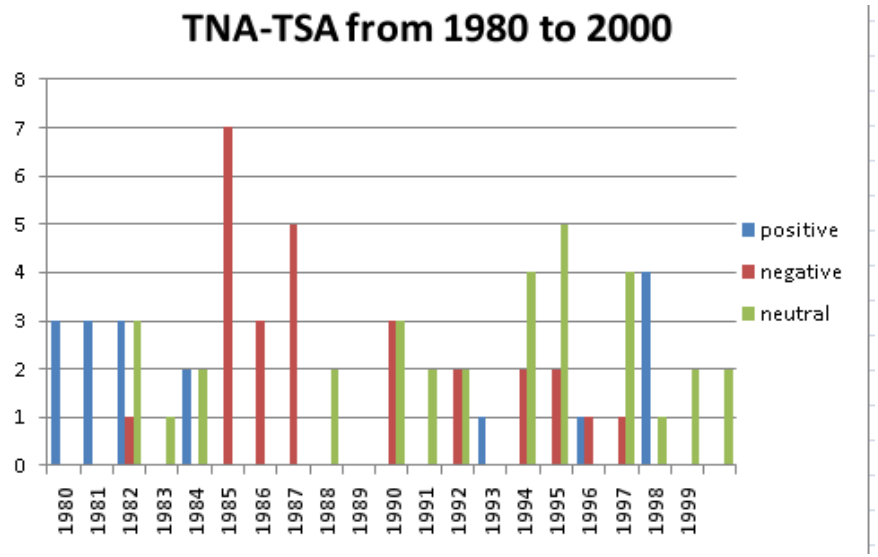
TNA - TSA

Number of months between 1980-2000 which has (>1.5dp) positive, (<-1.5dp) negative and neutral (±0.2dp) values of TNA-TSA



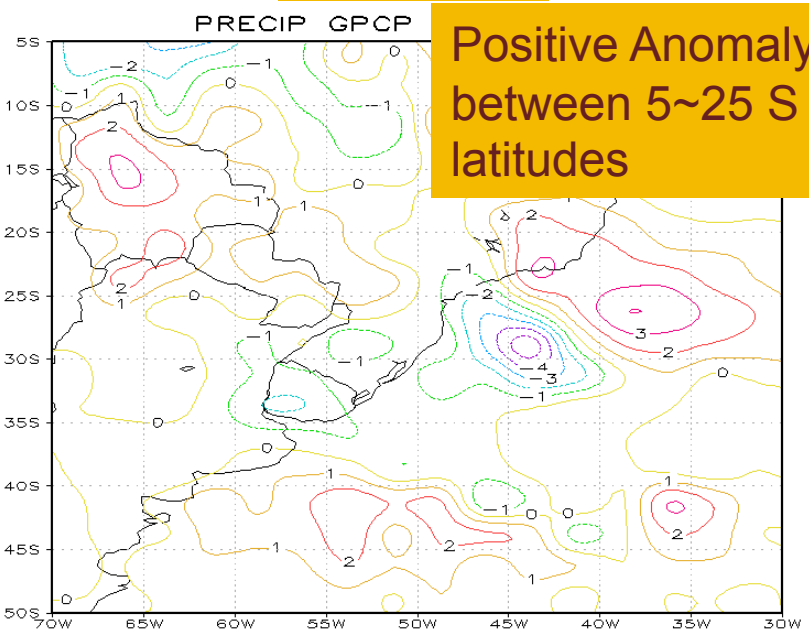
TNA - TSA index definitions for the study:

"Positive" > 1.5 dp
"Neutral" ± 0.2 dp
"Negative" <-1.5 dp

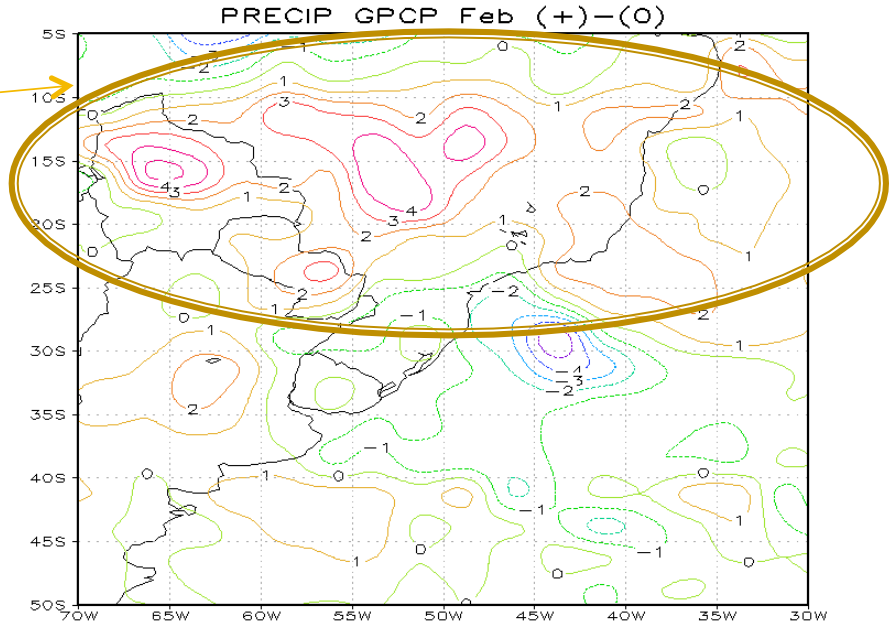


(-)-(0) **(+)-(0)**

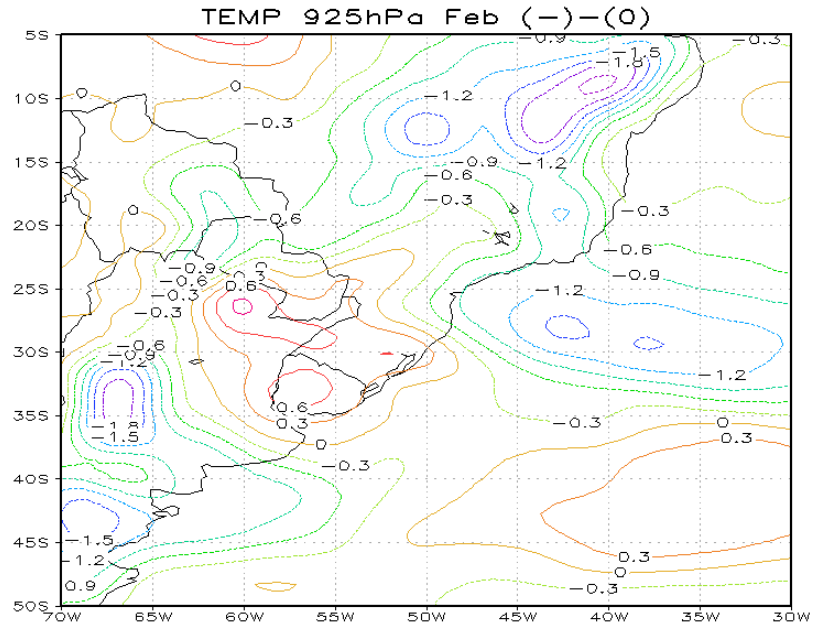
Precipitation Anomaly, February

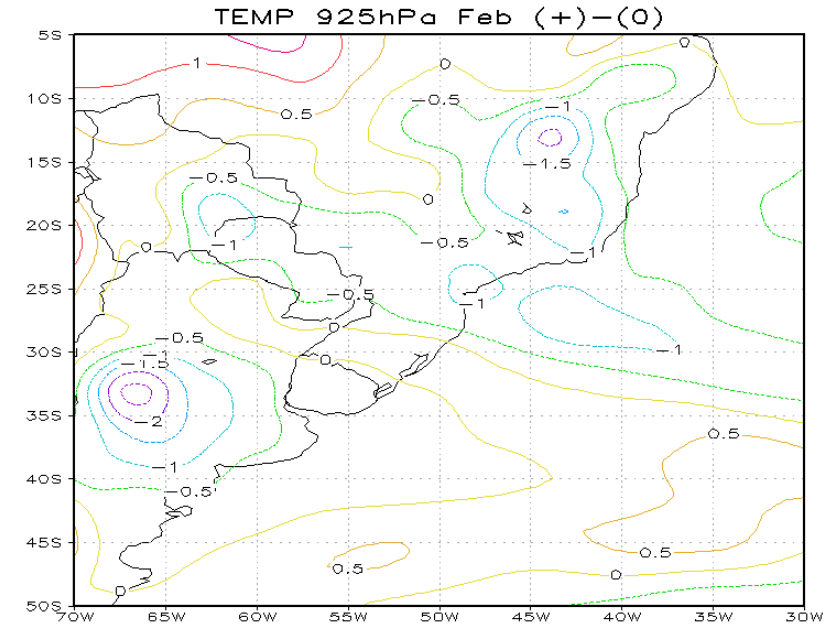


Positive Anomaly between 5~25 S latitudes



925mb Temperature Anomaly, February



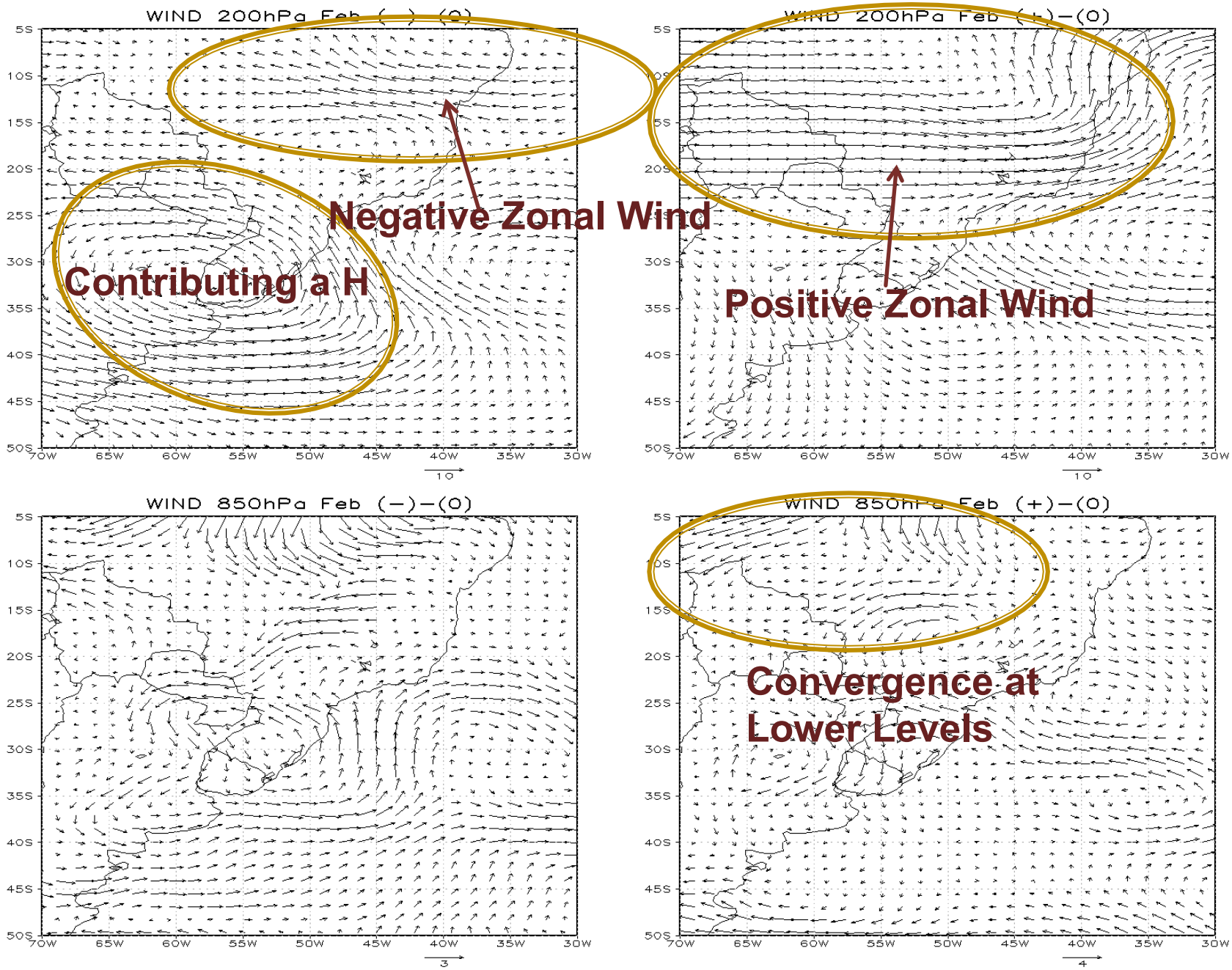


(-)-(0)

(+)-(0)

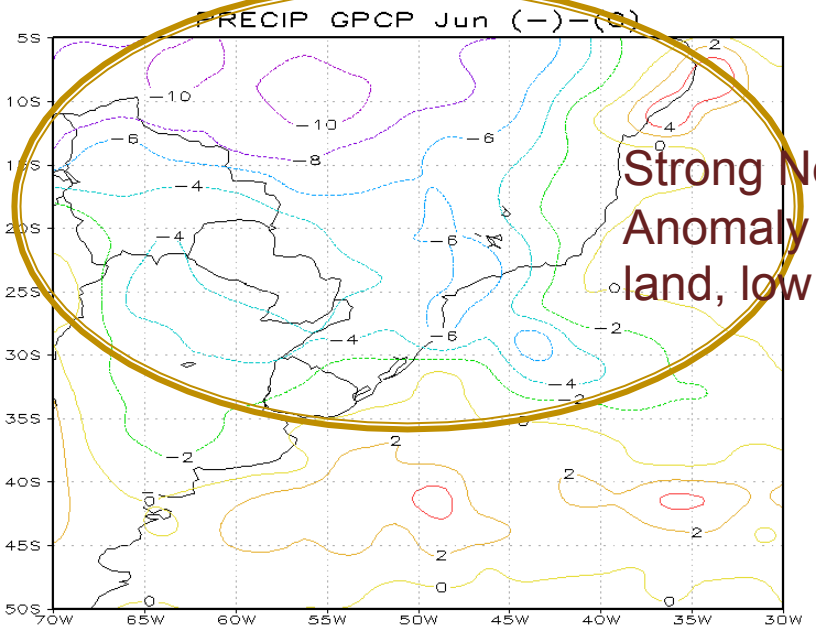
200 mb Wind Anomaly, February

850 mb Wind Anomaly, February

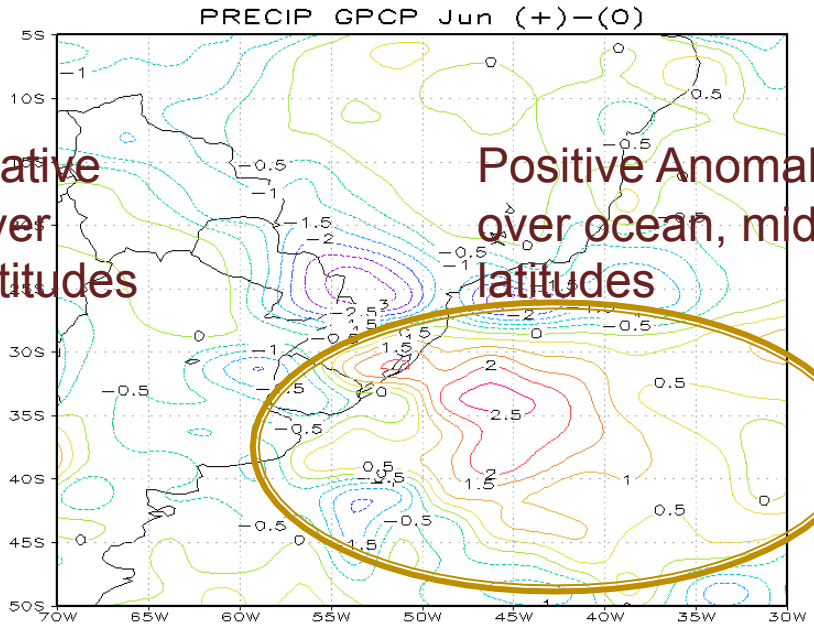


(-)-(0) **(+)-(0)**

Precipitation Anomaly, June

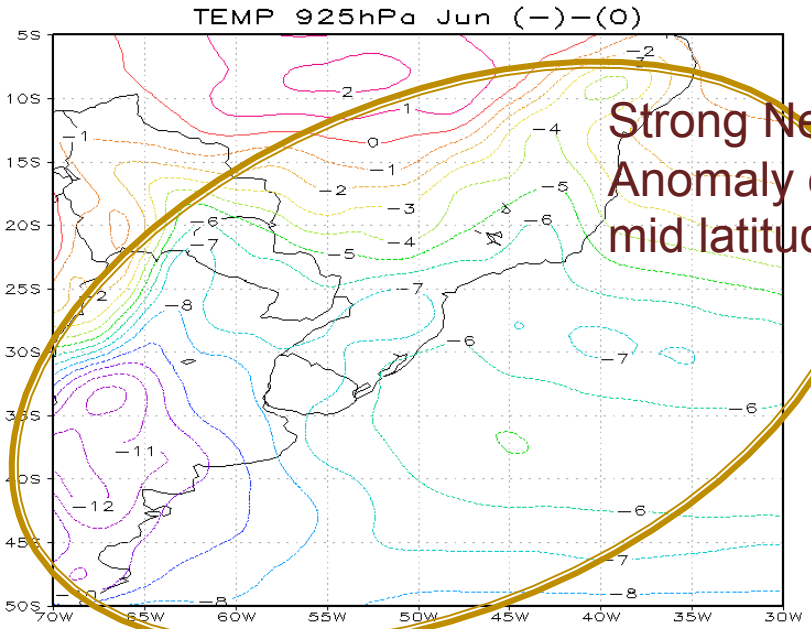


Strong Negative Anomaly over land, low latitudes

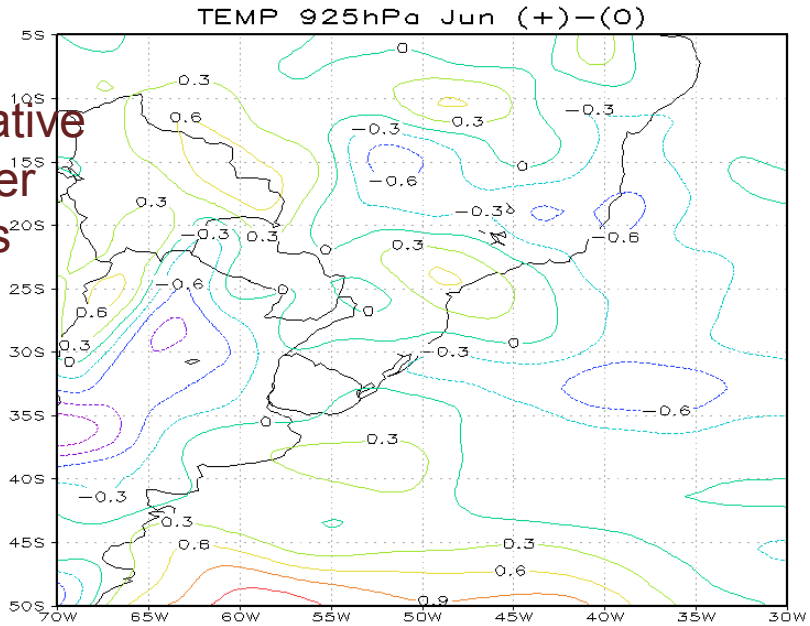


Positive Anomaly over ocean, mid latitudes

925mb Temperature Anomaly, June



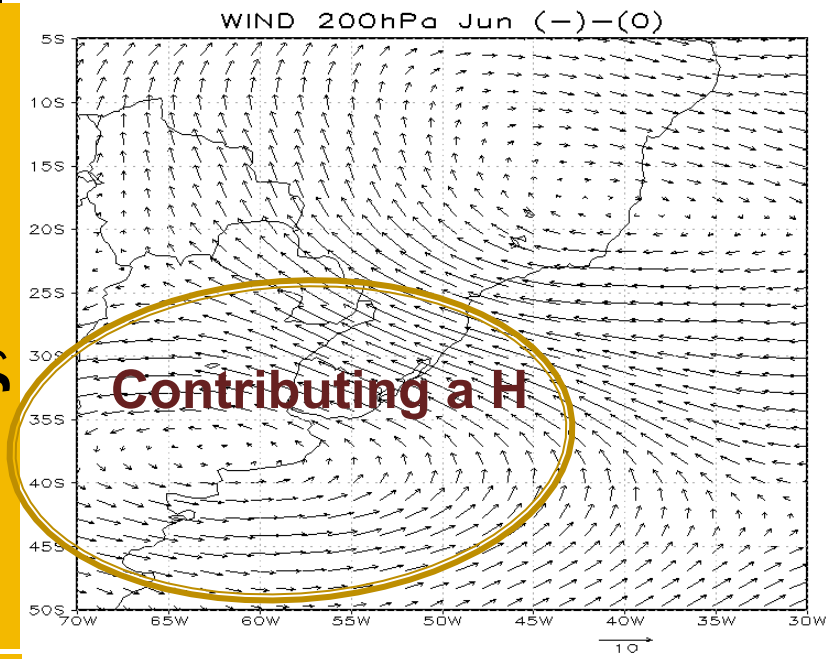
Strong Negative Anomaly over mid latitudes

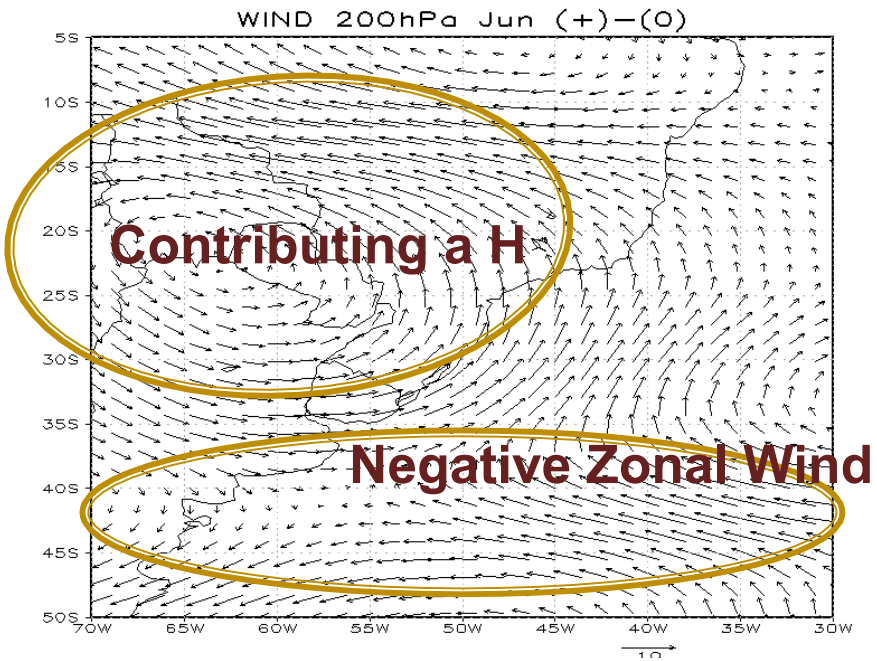


(-)-(0)

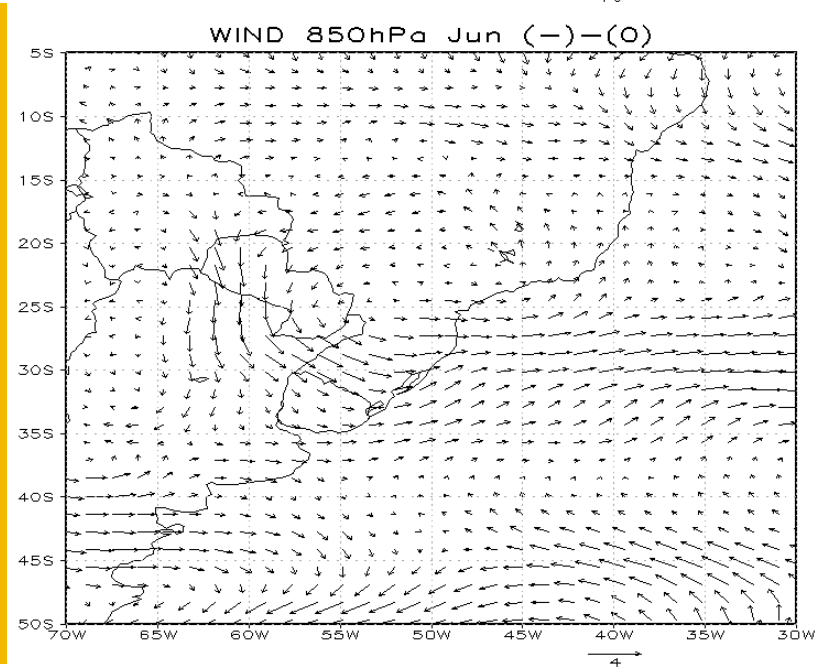
(+)-(0)

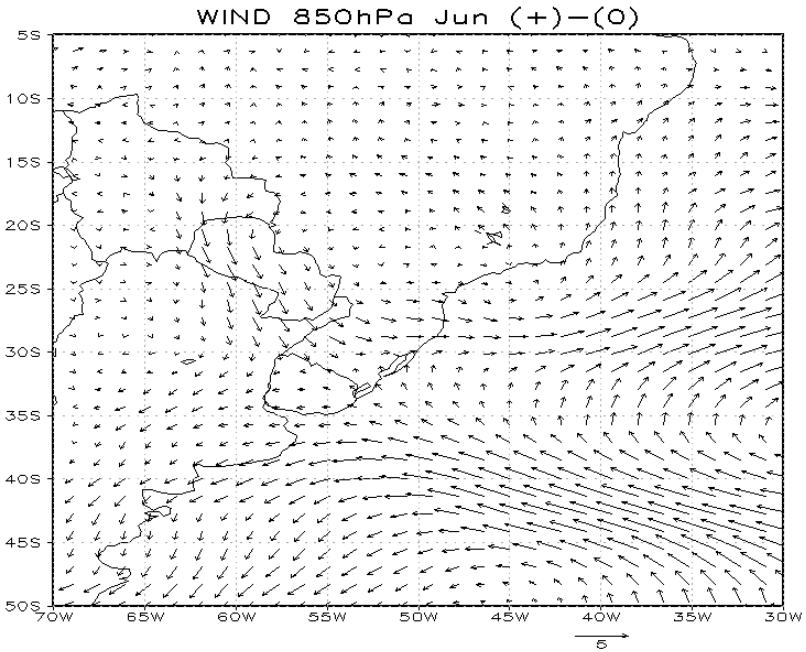
200 mb Wind Anomaly, June





850 mb Wind Anomaly, June

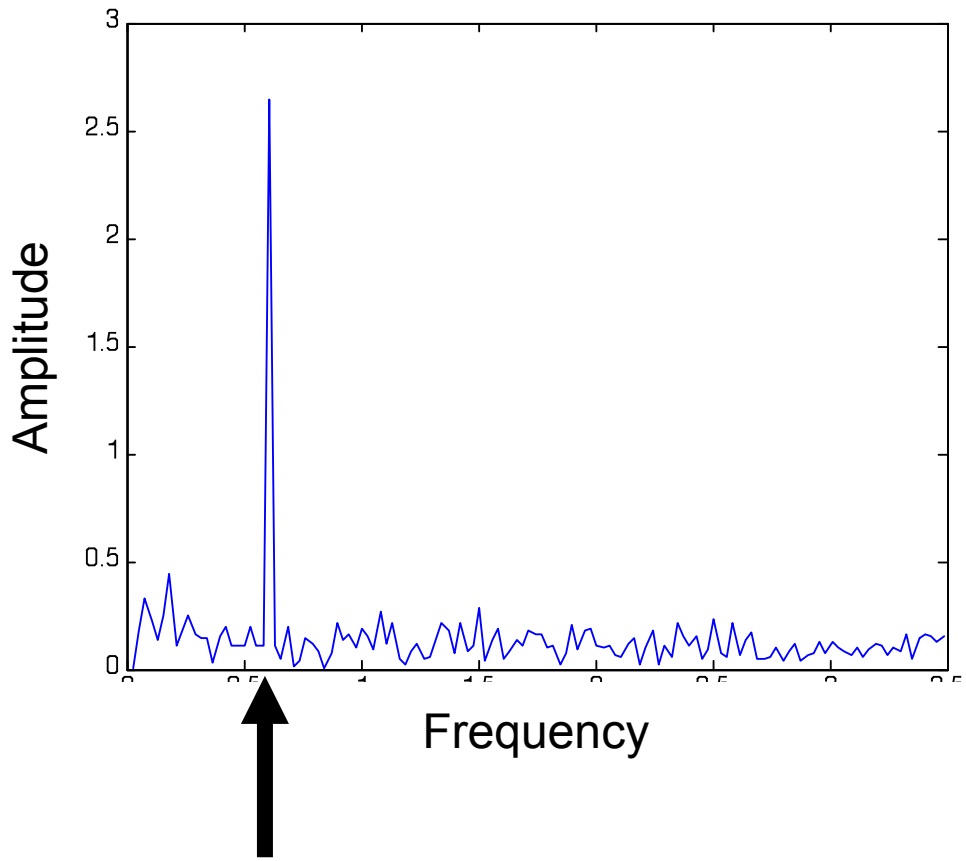




Principle Component Analysis of the Precipitation field over the Southern America

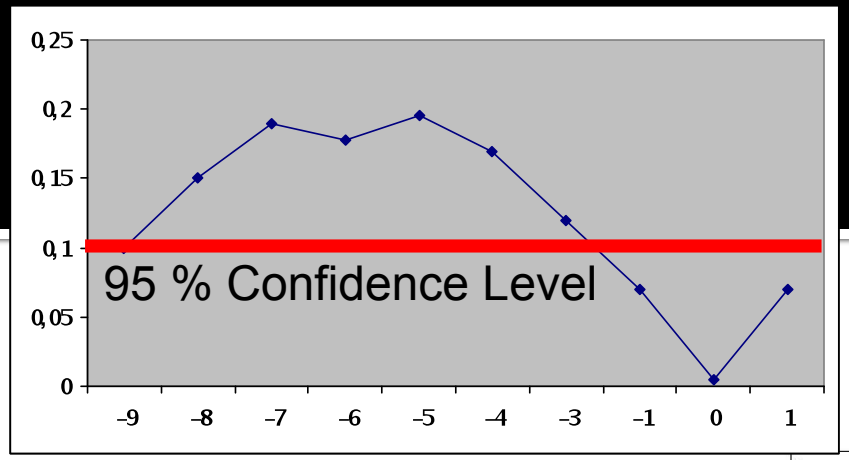
Analysis for Regional Precipitation

PC 1 (explained variance-23%)

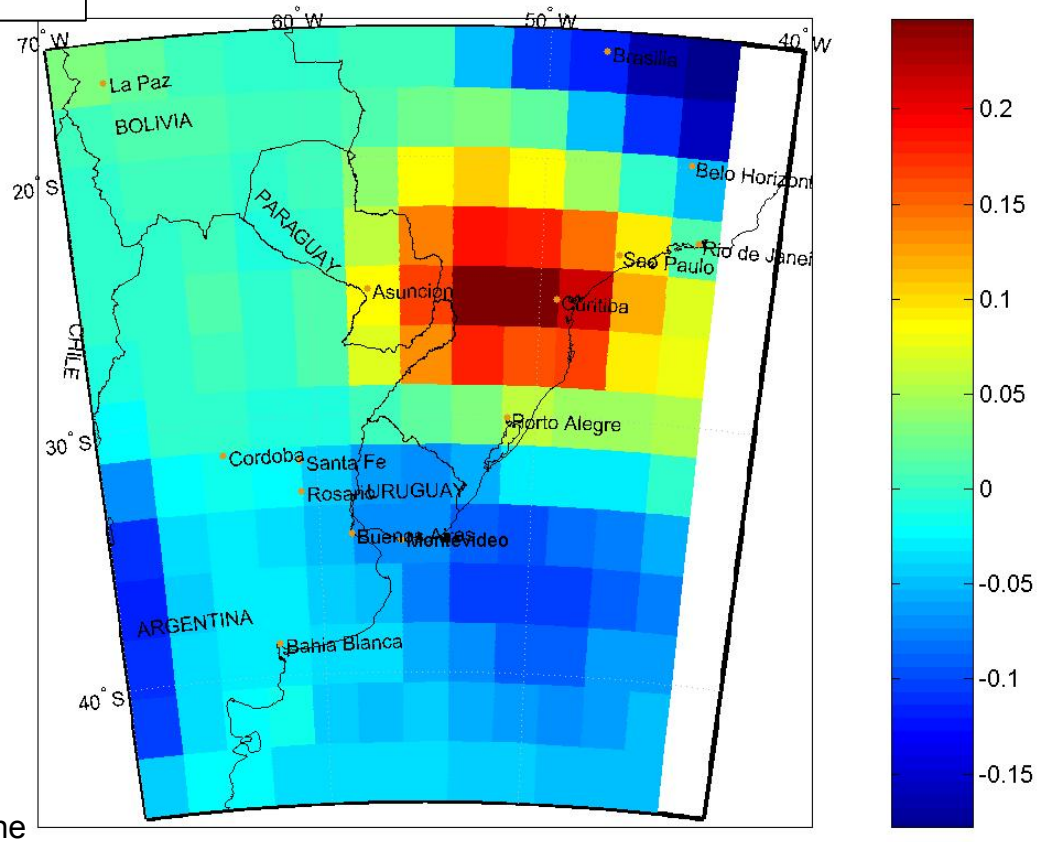


12 months

Cross-correlation PC3 and Niño3,4

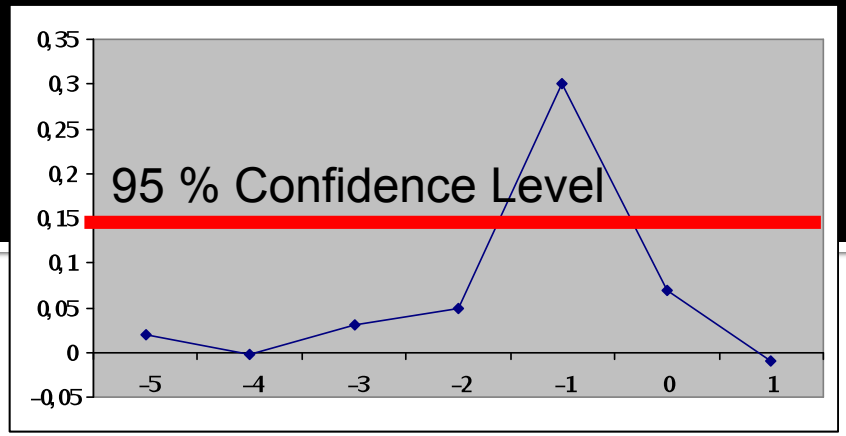


Pattern 3
(PC3, explained
varience-4%)

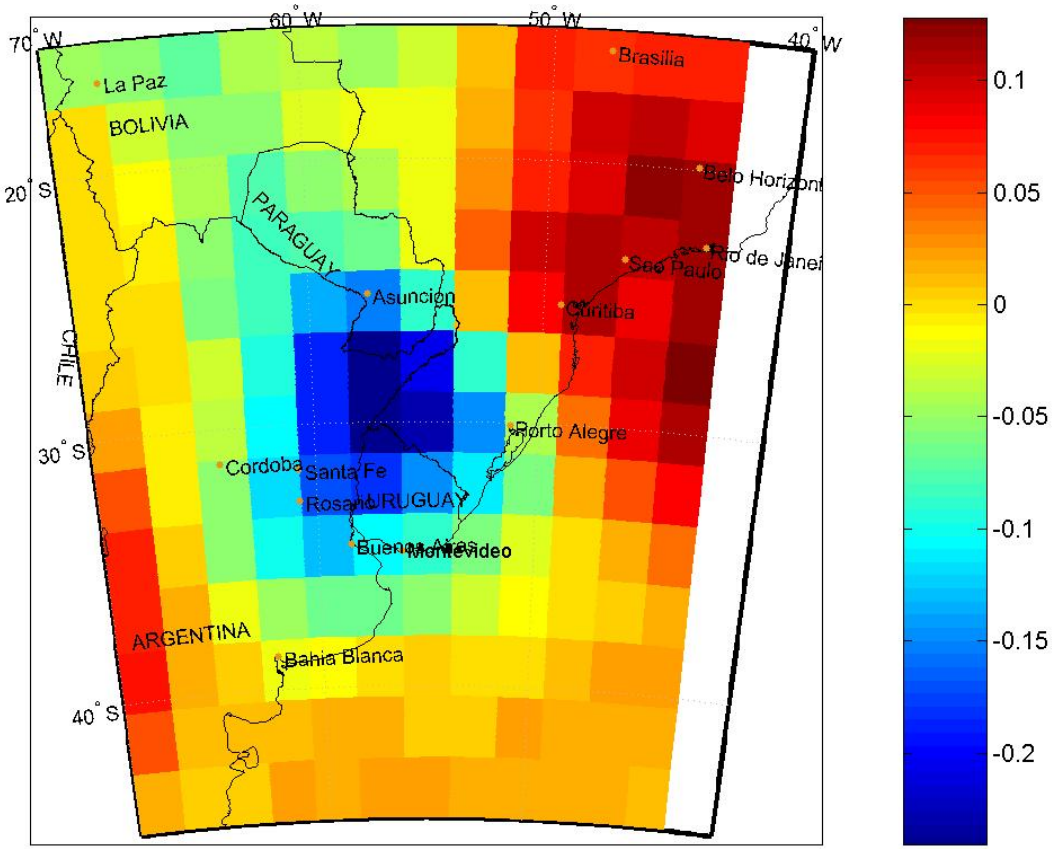


Takahashi, K., A. Montecinos, K. Goubanova, and B. Dewitte (2011), ENSO regimes: Reinterpreting the canonical and Modoki El Nino, Geophys. Res. Lett., 38,

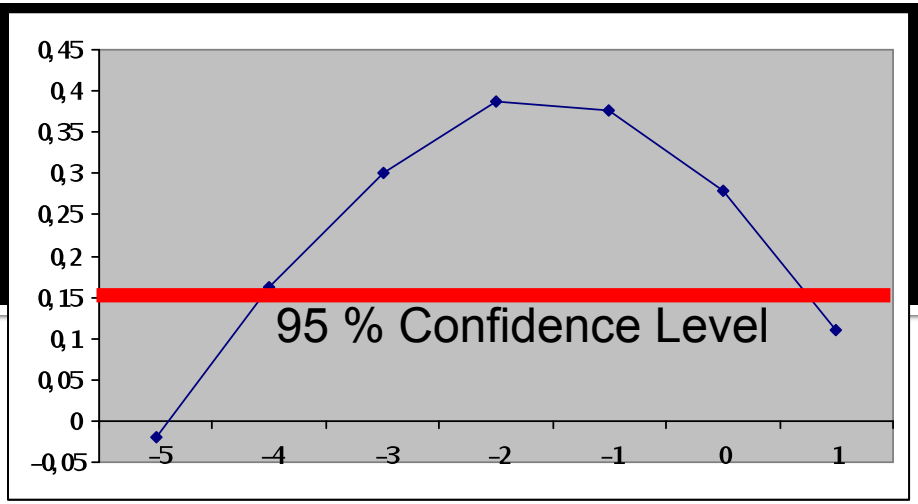
Cross-correlation PC4 and (TNA-TSA) index



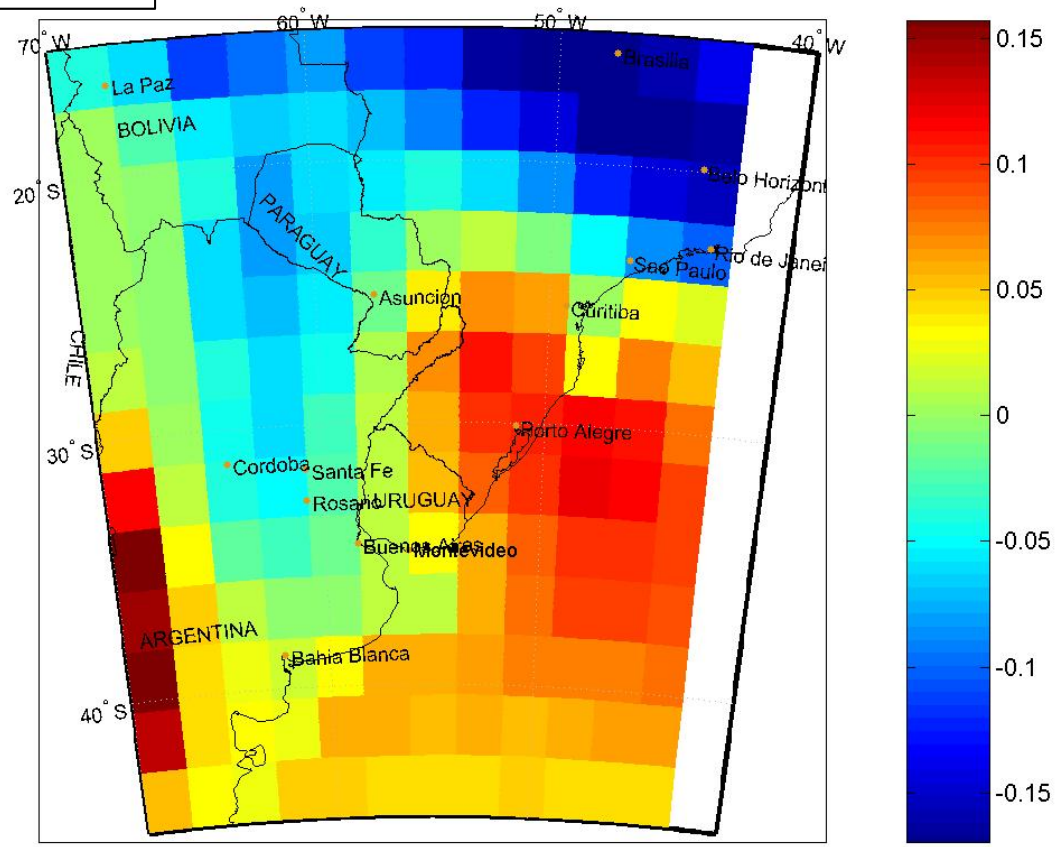
Pattern 4
(PC4, explained varience-3.3%)



Cross-correlation PC2 and Niño3,4



Pattern 2
(PC 2, explained varience-8%)



Discussion

- Physical Relationship between the indexes and climatological anomalies is not clear.
- It is necessary to try other methodologies, i.e. making SST sensitivity tests using mesoscale models.
- TNA & TSA index may not be appropriate for studying South America.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