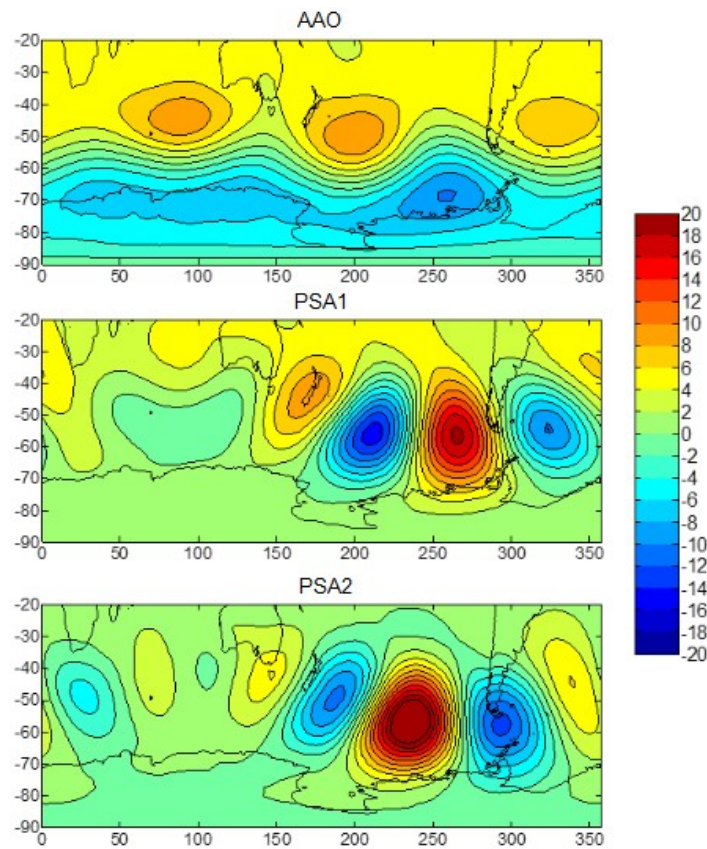


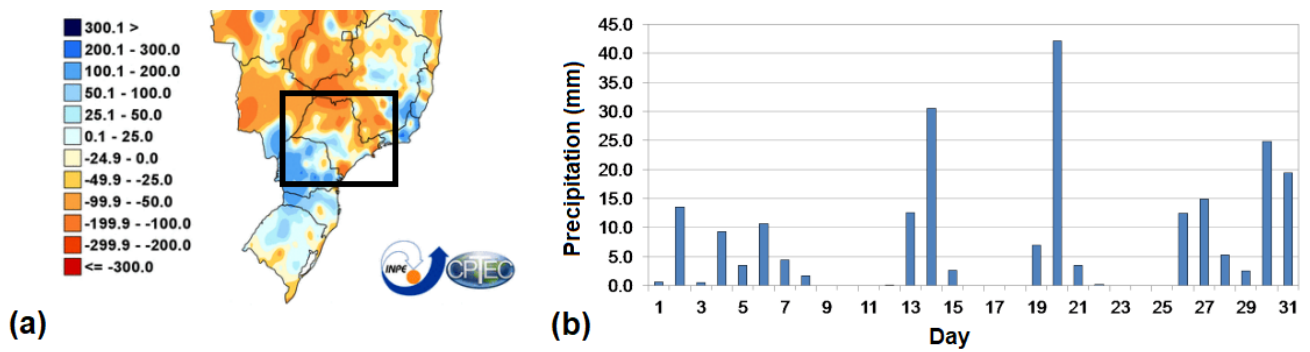
Supplementary Material

Supplementary Table 1. Oceanic Niño Index (ONI) for the period October-November-December/2017 to November-December-January/2018. Periods with the index absolute value greater than 0.5 for at least five consecutive overlapping seasons are highlighted in red and blue. Source: National Oceanic and Atmospheric Administration (NOAA).

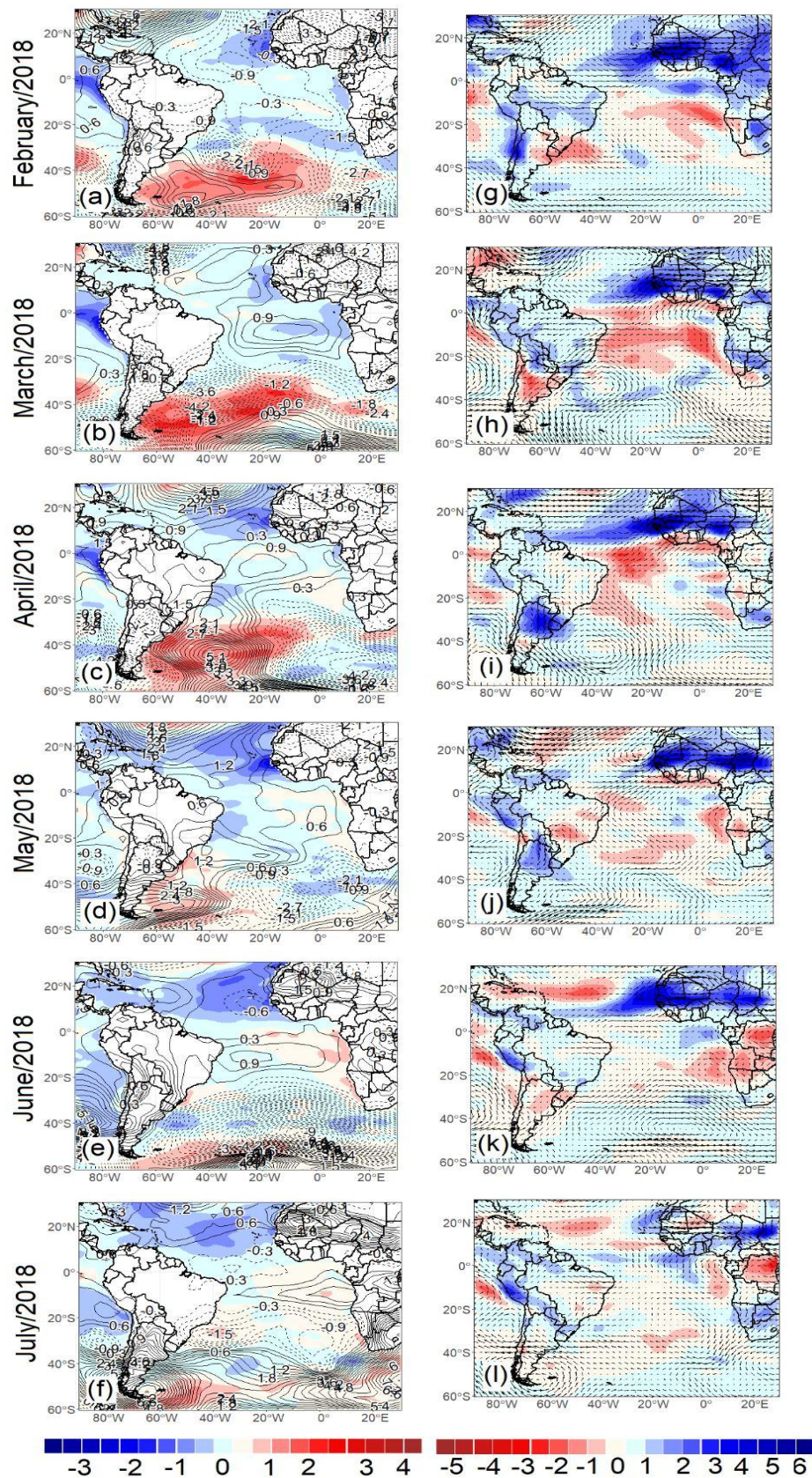
| Period | ONI |
|----------|------|
| OND/2017 | -0.8 |
| NDJ/2017 | -1.0 |
| DJF/2018 | -0.9 |
| JFM/2018 | -0.9 |
| FMA/2018 | -0.7 |
| MAM/2018 | -0.5 |
| AMJ/2018 | -0.2 |
| MJJ/2018 | 0 |
| JJA/2018 | 0.1 |
| JAS/2018 | 0.2 |
| ASO/2018 | 0.5 |
| SON/2018 | 0.8 |
| OND/2018 | 0.9 |
| NDJ/2018 | 0.8 |



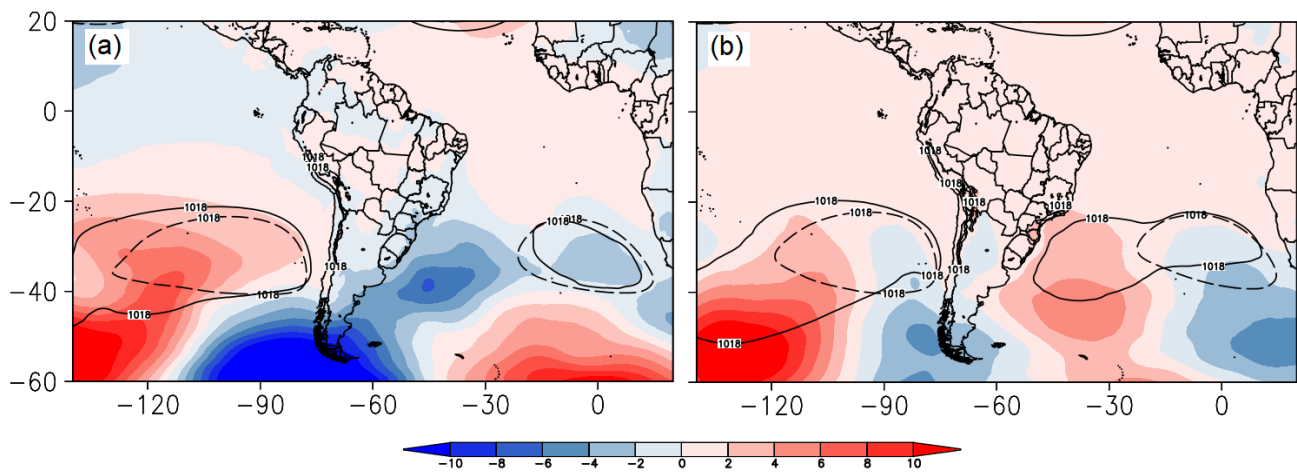
Supplementary Figure 1. Three main modes of 700-hPa geopotential height variability in the Southern Hemisphere, from Souza and Reboita (2021). Figures show the positive phase of the modes. In the case of AAO, it is characterized by low geopotential/surface pressure anomaly at higher latitudes, and high geopotential/surface pressure at midlatitudes (**upper panel**). For PSA1, there is a low geopotential/cyclonic circulation anomaly at the South Atlantic and a high geopotential anomaly at the South Pacific, near the South American coast (**middle panel**). The PSA2 mode tends to displace this wavetrain slightly to the west, with a stronger high geopotential anomaly at westernmost longitudes and the low geopotential anomaly nearer to the South American southern tip (**lower panel**). In the negative phase of the modes, the location of anomaly centers are the same, but their signal is inverted.



Supplementary Figure 2. (a) Precipitation anomaly (mm) in South/Southeast Brazil with respect to the 1981-2010 climatology (Source: CPTEC-INPE) and (b) Daily precipitation (mm) registered in Sao Paulo capital (eastern SP) weather station.



Supplementary Figure 3. (a)-(f) Sea surface temperature ($^{\circ}\text{C}$) and mean sea level pressure (hPa) anomalies, (g)-(l) 850 hPa horizontal winds (m s^{-1}) and specific humidity (g kg^{-1}) anomalies for February to July 2018 with respect to the 1981-2010 climatology. Sea surface temperature, mean sea level pressure, horizontal winds and specific humidity were obtained from the NCEP reanalysis. Precipitation anomalies were obtained from CRU TS4.05 dataset.



Supplementary Figure 4. (a) March and (b) April/2018 mean sea level pressure anomaly (shaded, hPa) with respect to the 1981-2010 climatology. Dashed lines show the climatological position of the 1018 hPa isobar (mean position of Subtropical Anticyclones) and solid lines show the 1018 hPa isobars for March and April/2018.