Intraseasonal Variability of the Rainfall in Extratropical Western South America (South-central Chile: 35º-45ºS)

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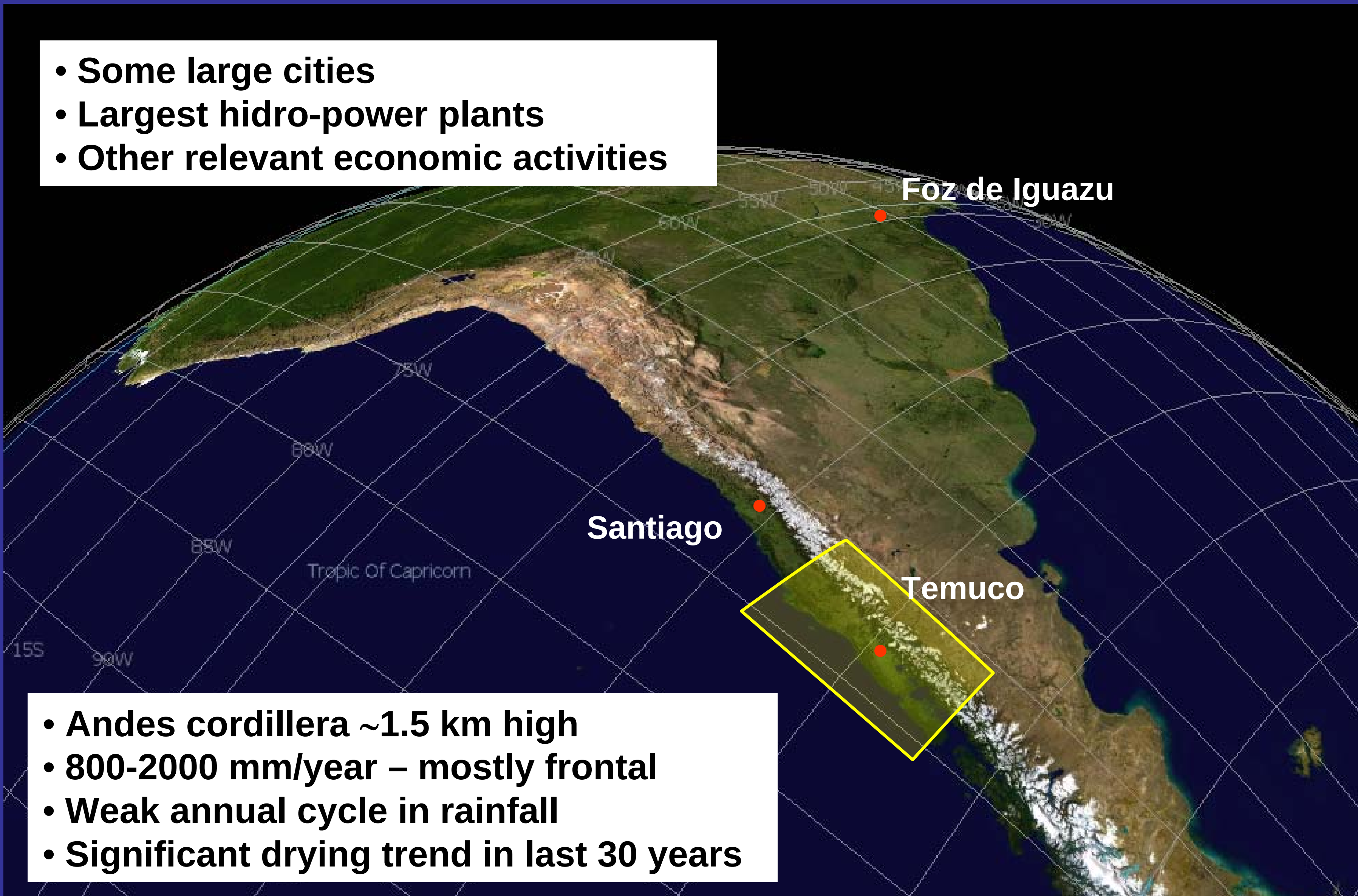
Study area: relevance and geographical setting



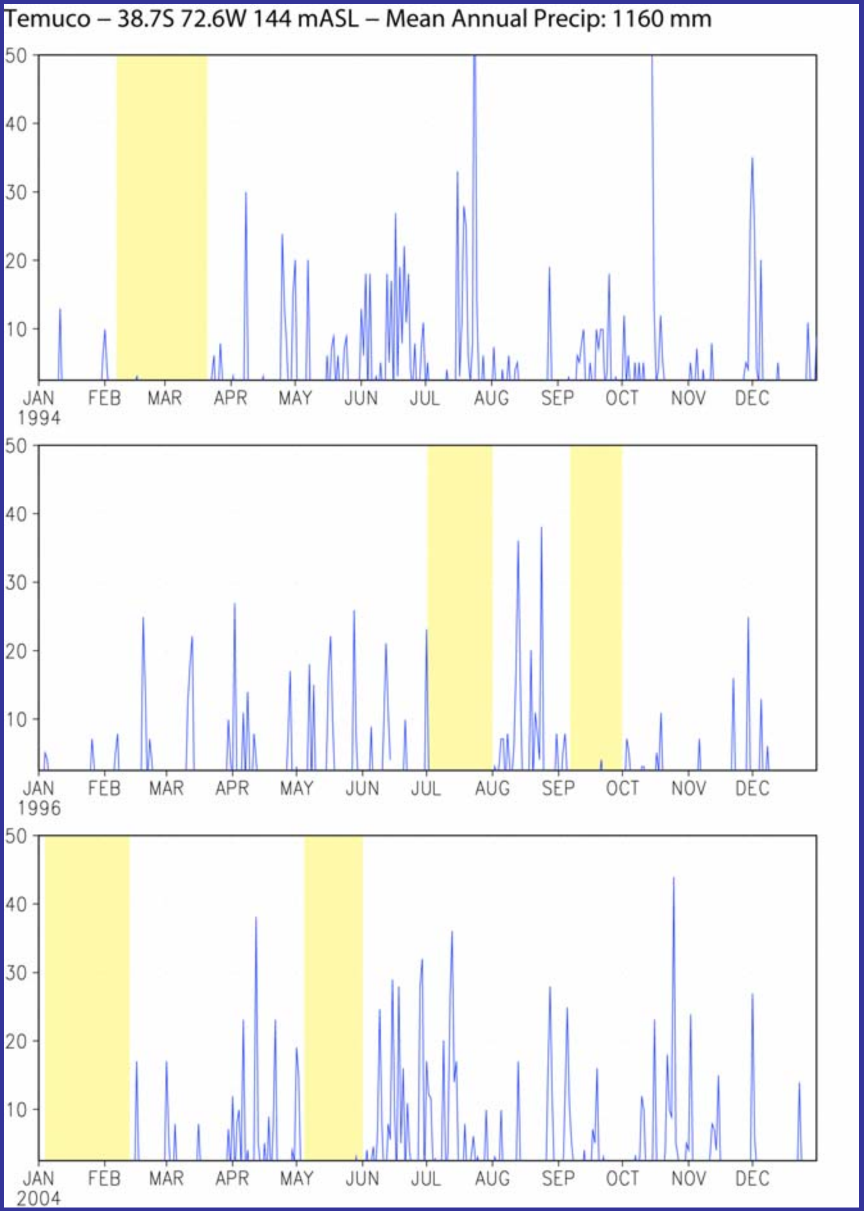
Extended dry periods – IS Variability

•During fall-winter-spring, rainy episodes are separated in average for 3-6 days (depending on latitude).

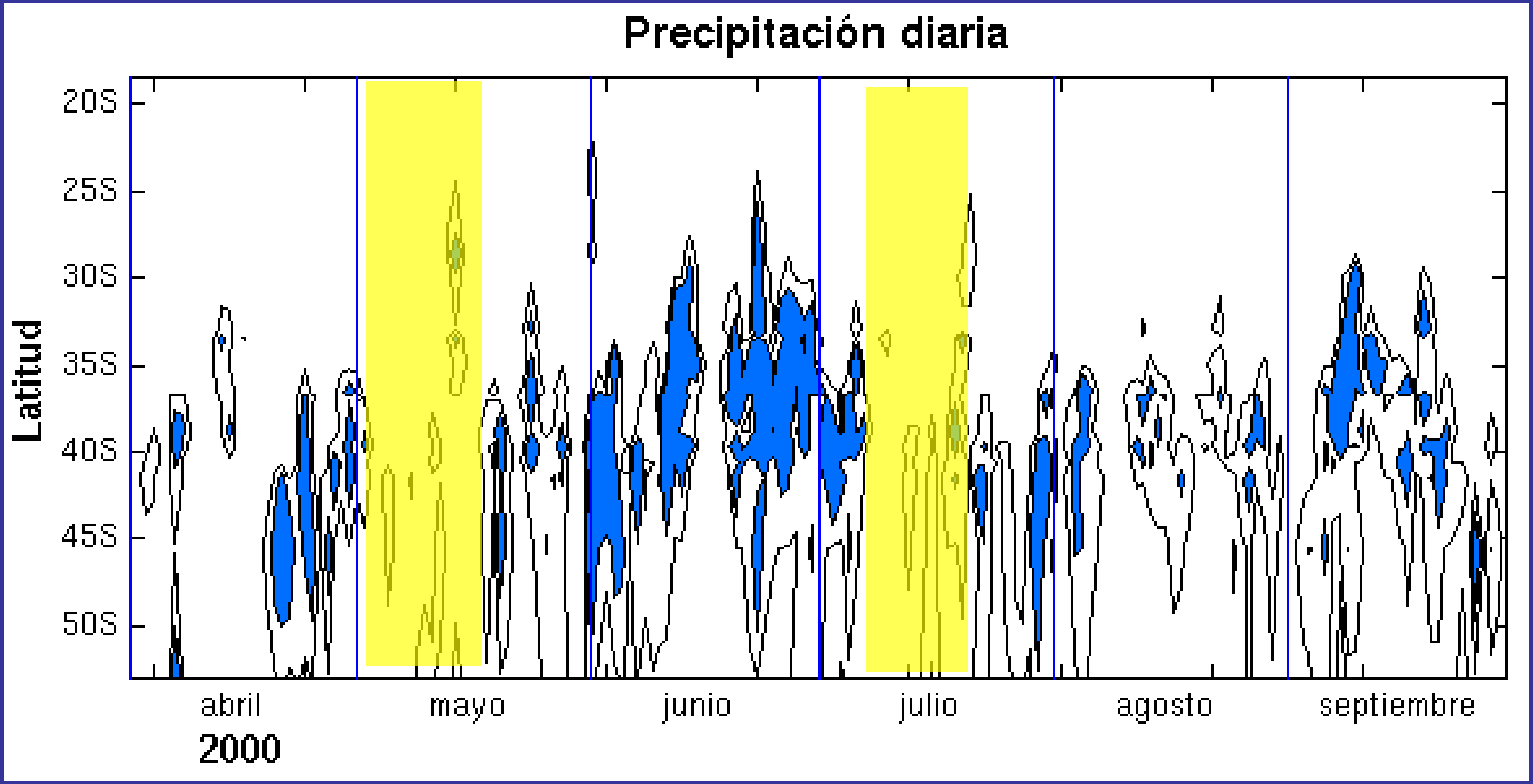
• Yet, extended periods of dry conditions (e.g., >15 days with no (or negletible) rainfall) are found almost all years.

• The longest dry periods (20-30 days) are the focus of this on-going research, as they have significant impacts on human activities / environmental systems.

•These <u>extended dry periods</u> represent <u>intraseasonal variability</u>, which source is not yet well understood.

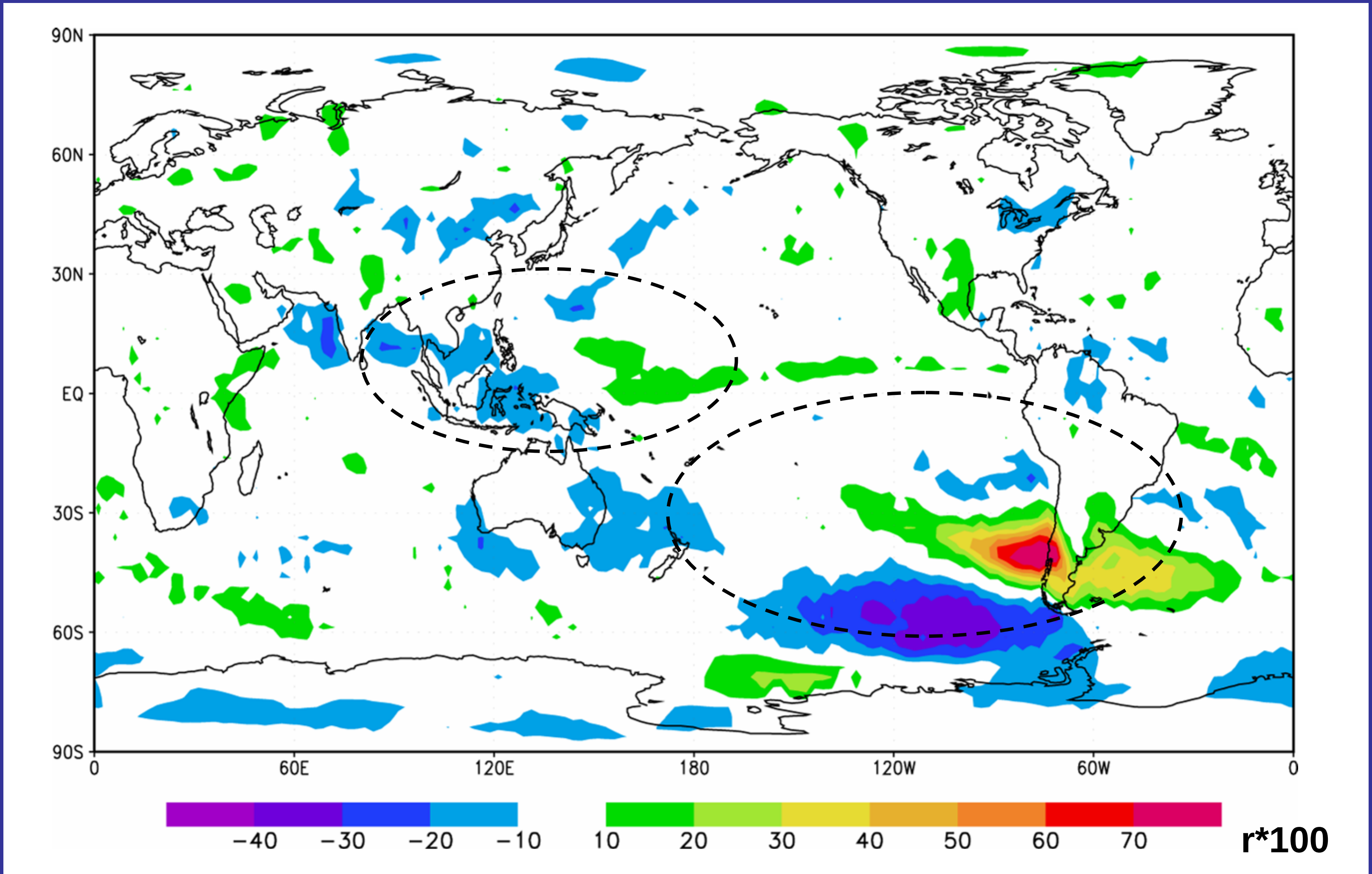


Extended dry periods – IS Variability



Extended dry periods – Spatial patterns

Rainfall anomalies regressed upon IS band-pass filtered (15-45 days retained) rainfall at 40ºS-75ºW



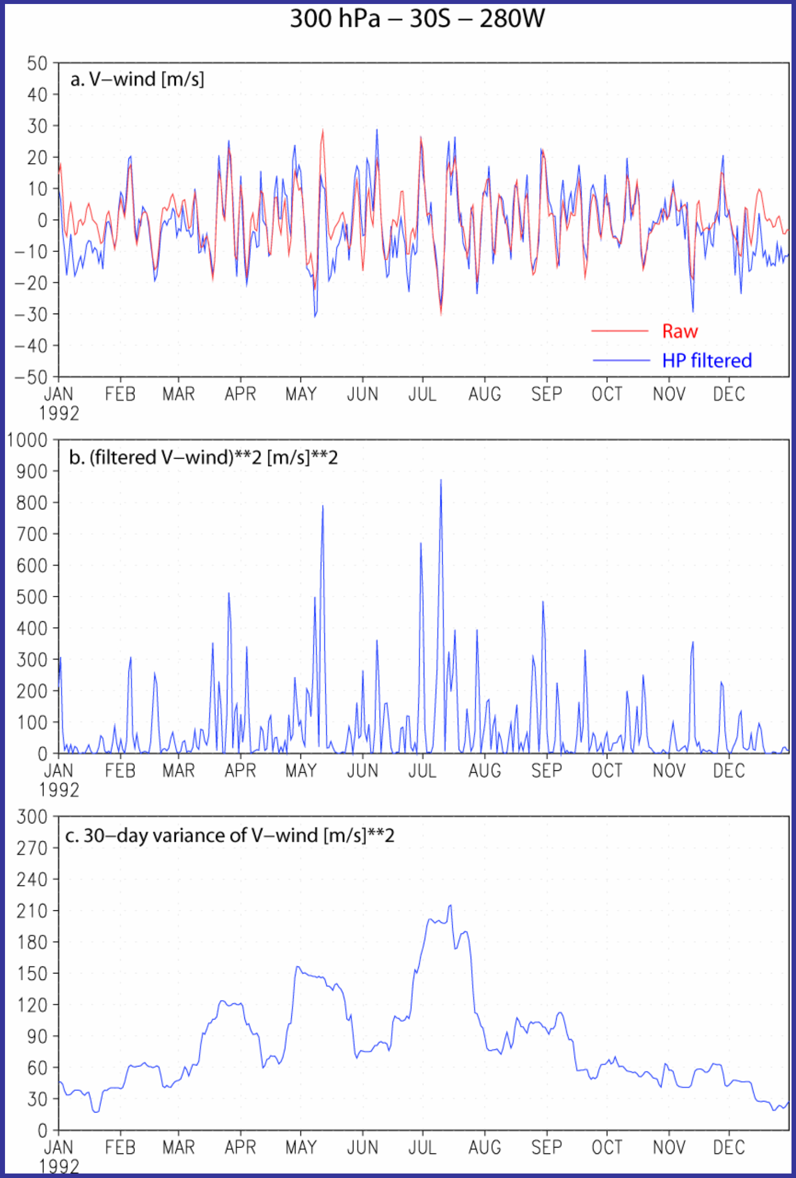
Extended dry periods – Hypothesis

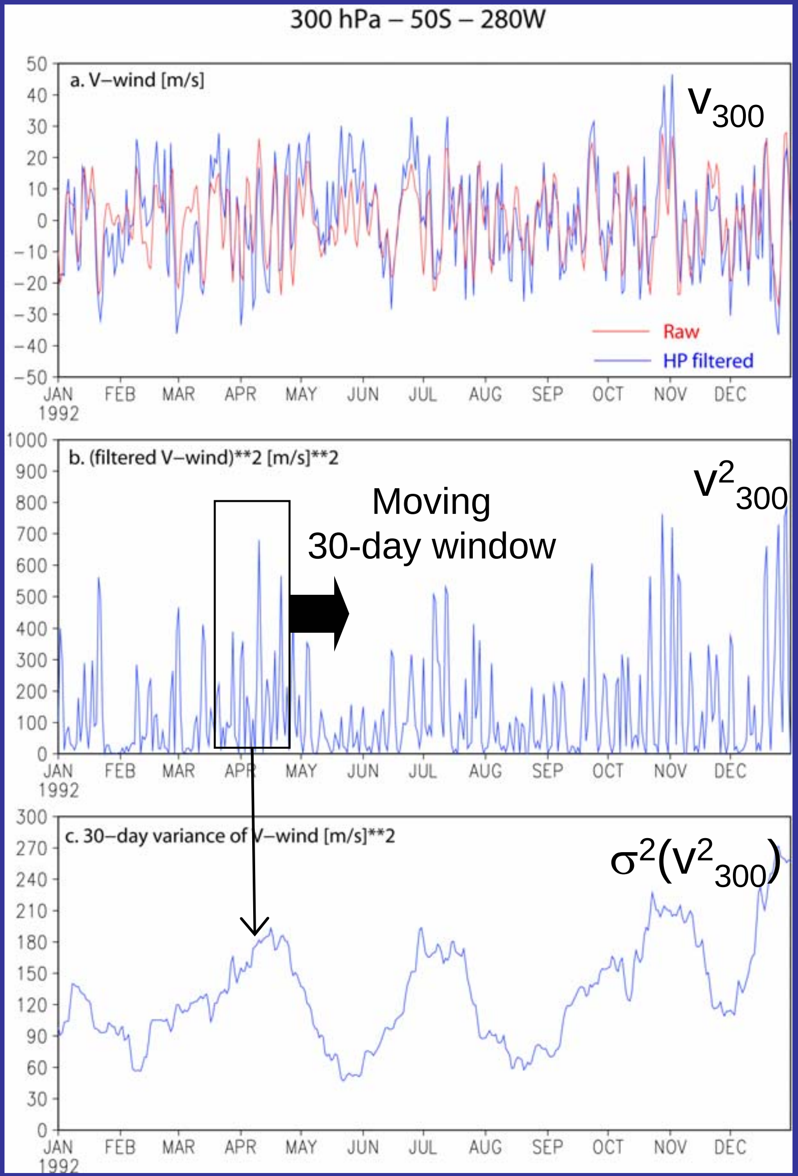
• Since rainfall in south-central Chile is mostly due to frontal systems, IS rainfall variability is modulated directly by changes in the position and/or intensity of the storm track.

• Changes of the storm track are in turn due to IS variability in the large scale zonal wind, forced either by the tropical (e.g., MJO) or high latitude (e.g., AAO) phenomena.

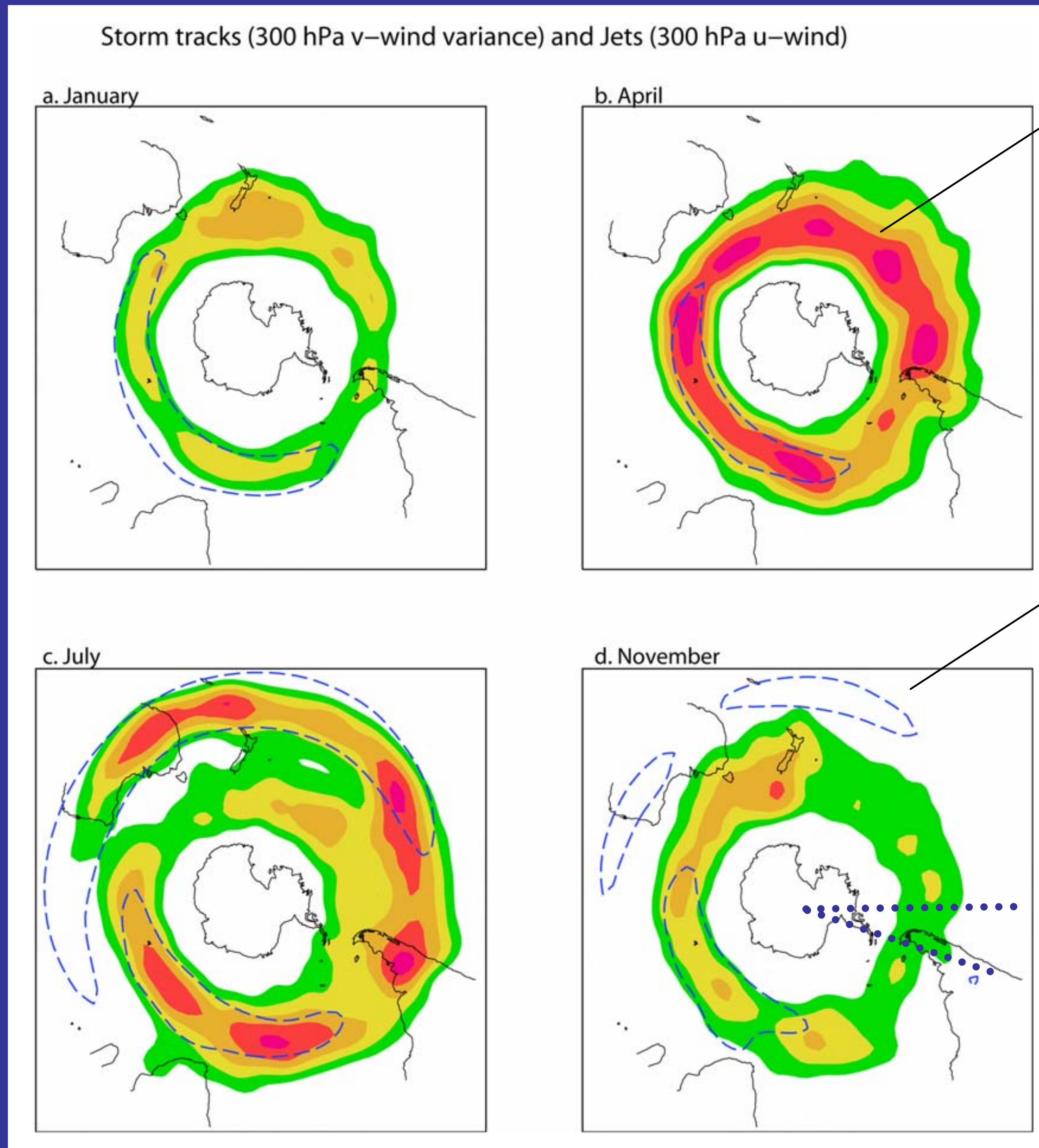
→ We need to characterize IS variability in the SH storm track

Time serie of V_{300} as an indicator of the storm-activity



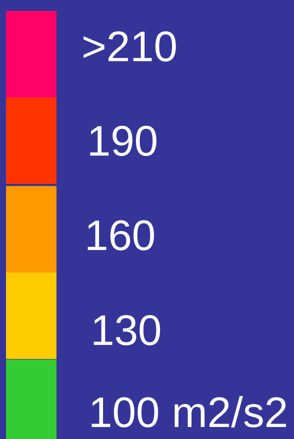


Thus, a daily time serie (1990-2005) of σ^2 was constructed for every grid point. Let's take a look of its climatology.



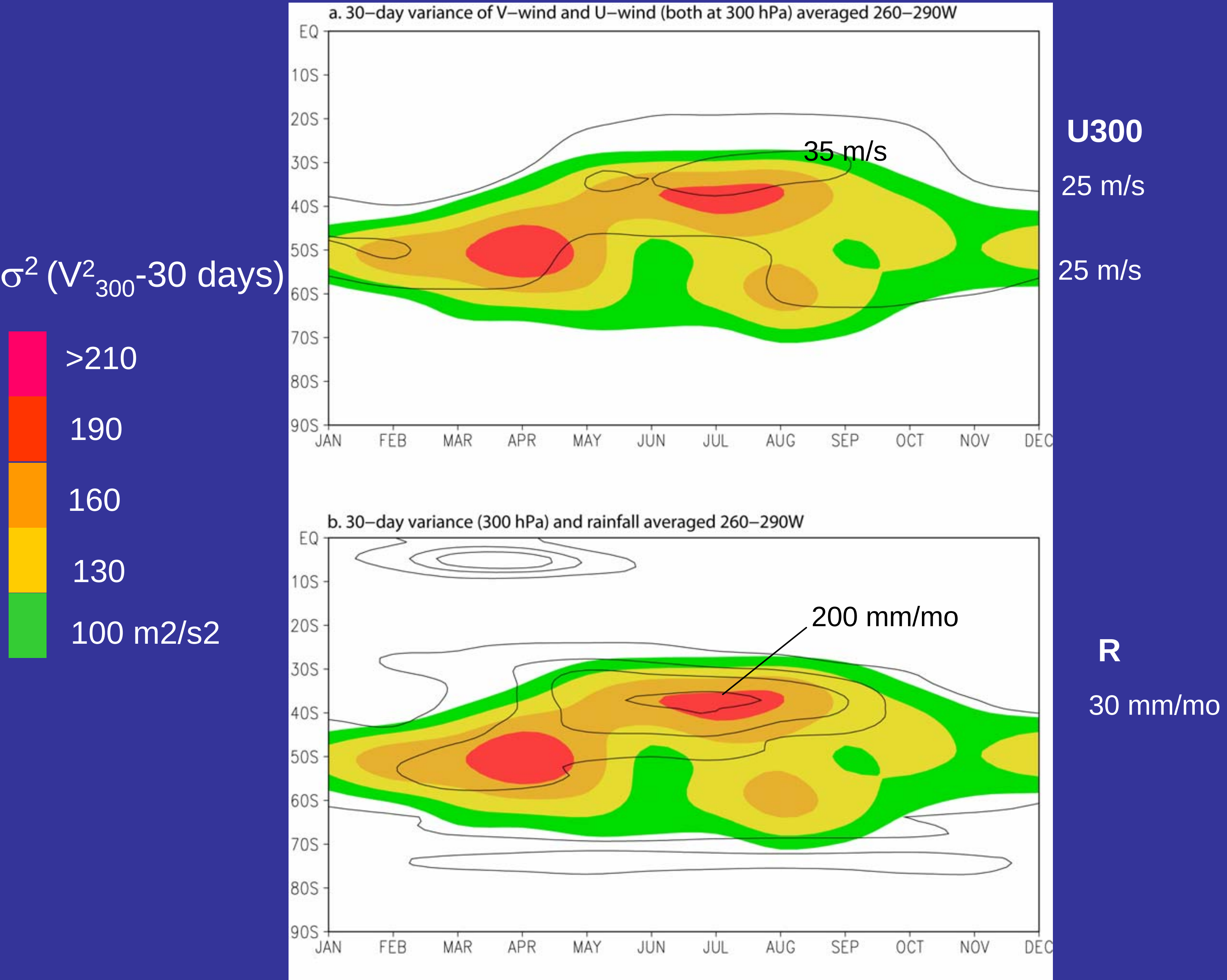
Large values of σ^2 indicates storm track

U300 > 40 m/s

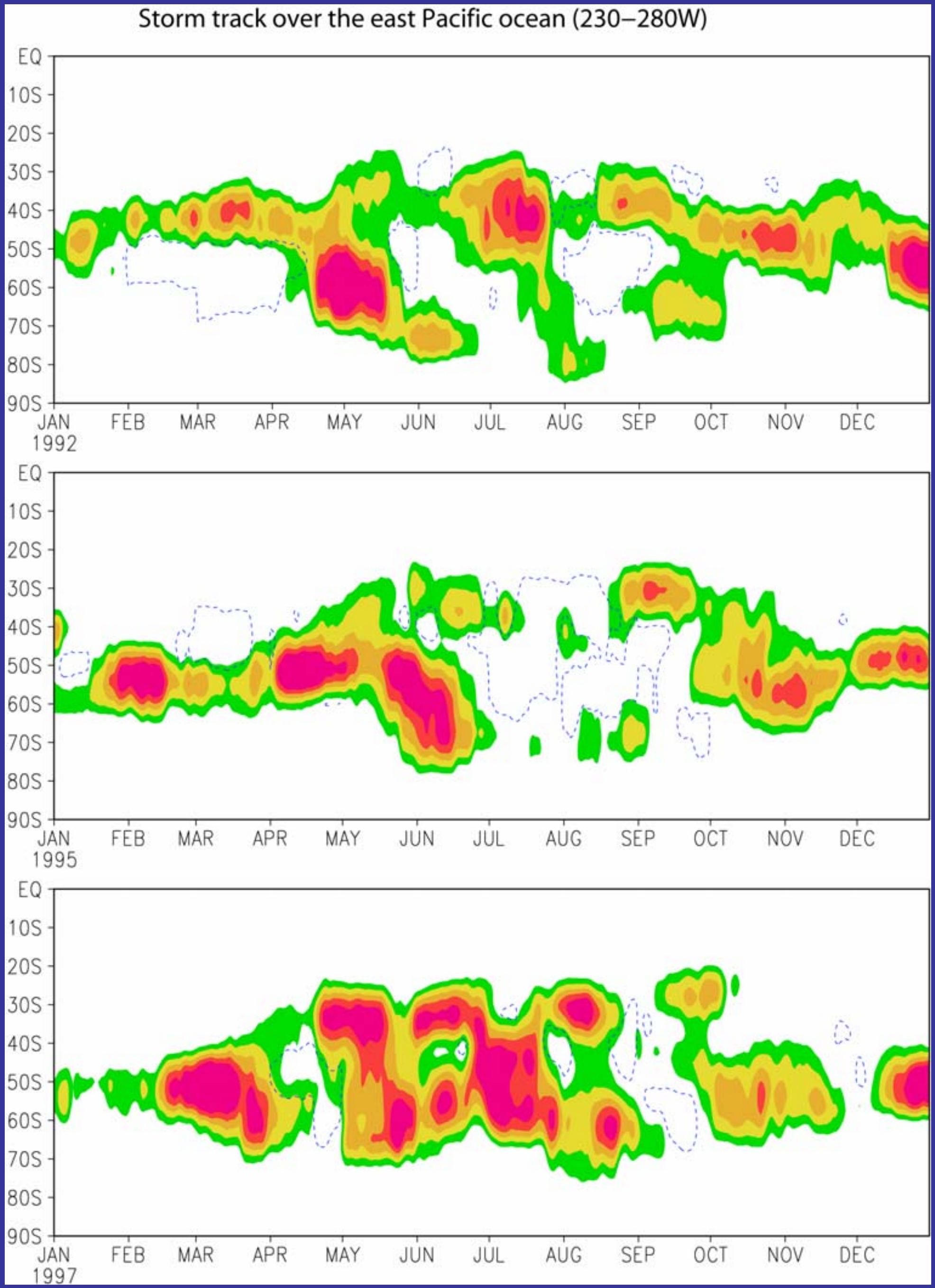


Mean annual cycle of σ^2 averaged 100-70ºW (Chilean coast)

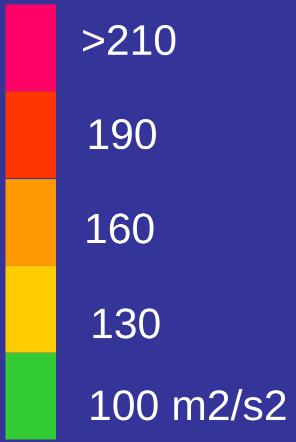
σ^2 (V^2_{300}-30 days)



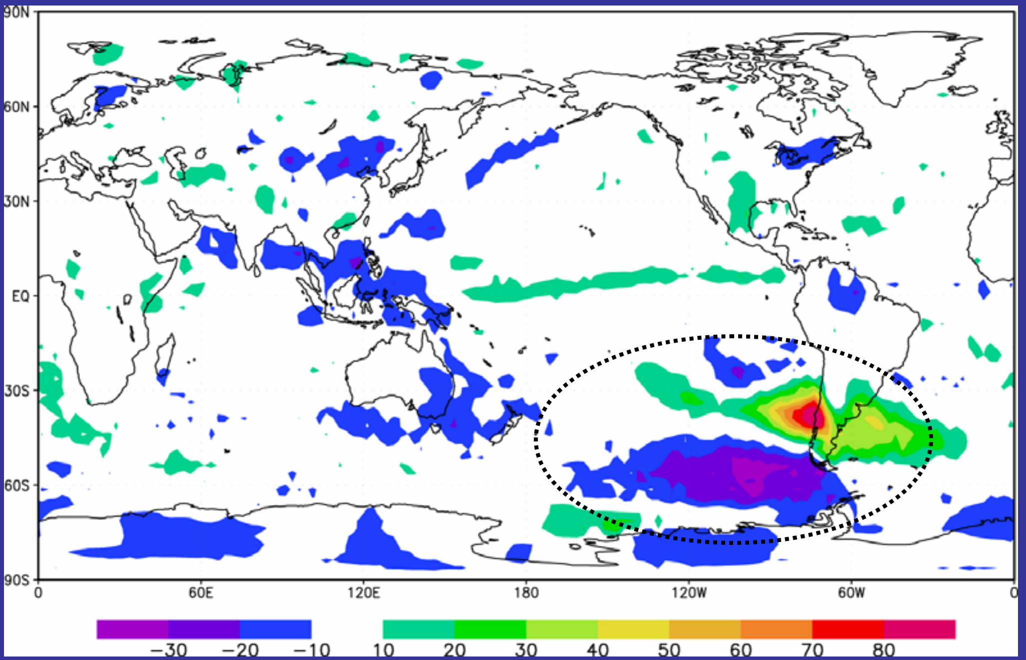
Annual cycle of σ^2 averaged 100-70ºW (Chilean coast) for individual years



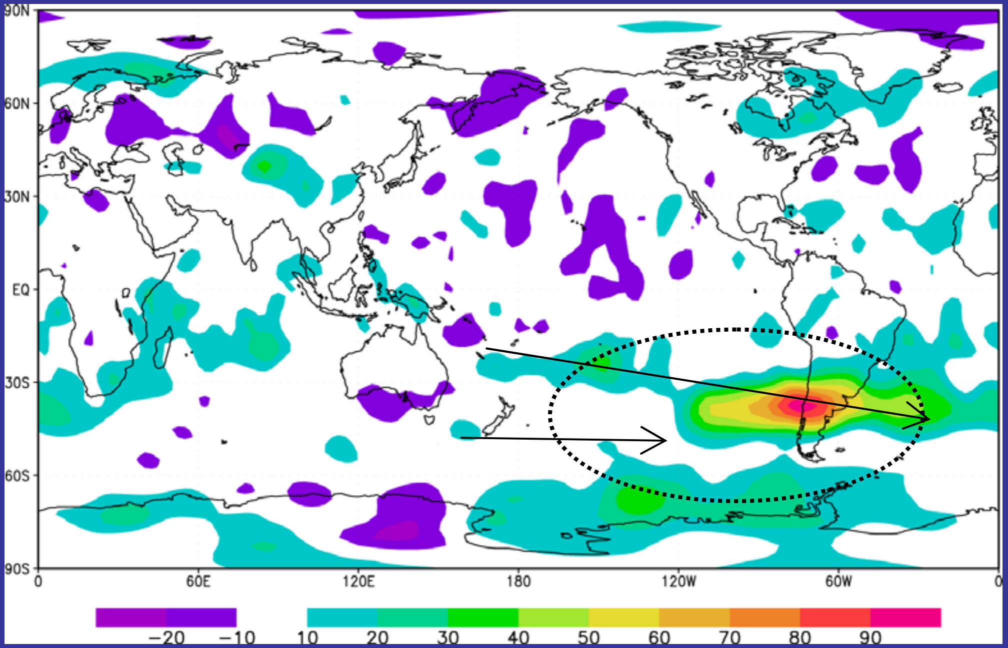
σ^2 (V^2_{300}-30 days)



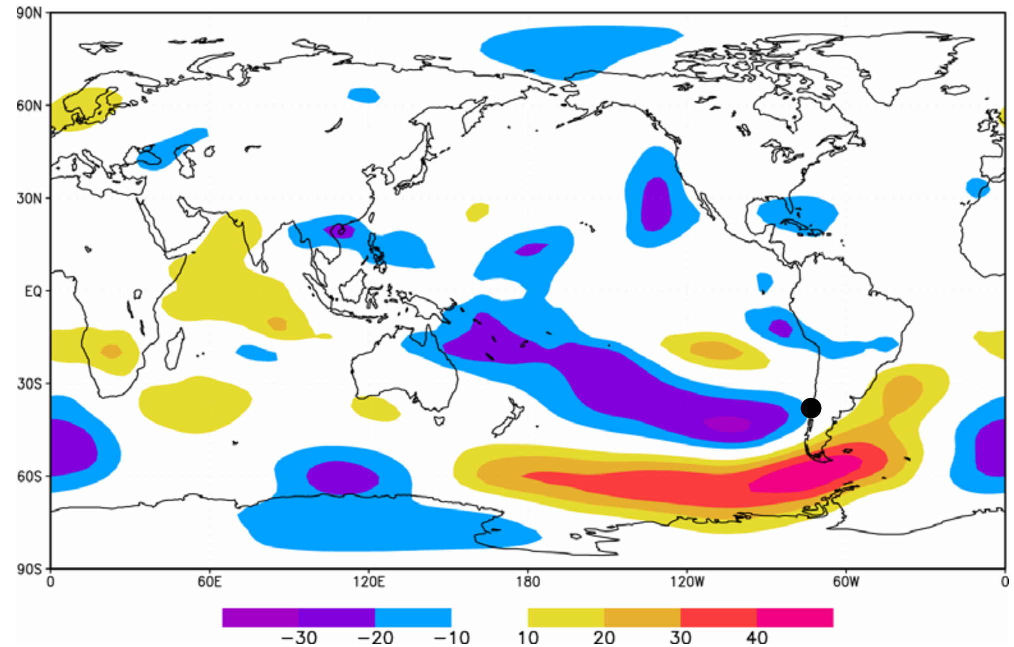
Rainfall anomalies regressed upon IS band-pass filtered (15-40 days retained) rainfall at 40ºS-75ºW (r*100)



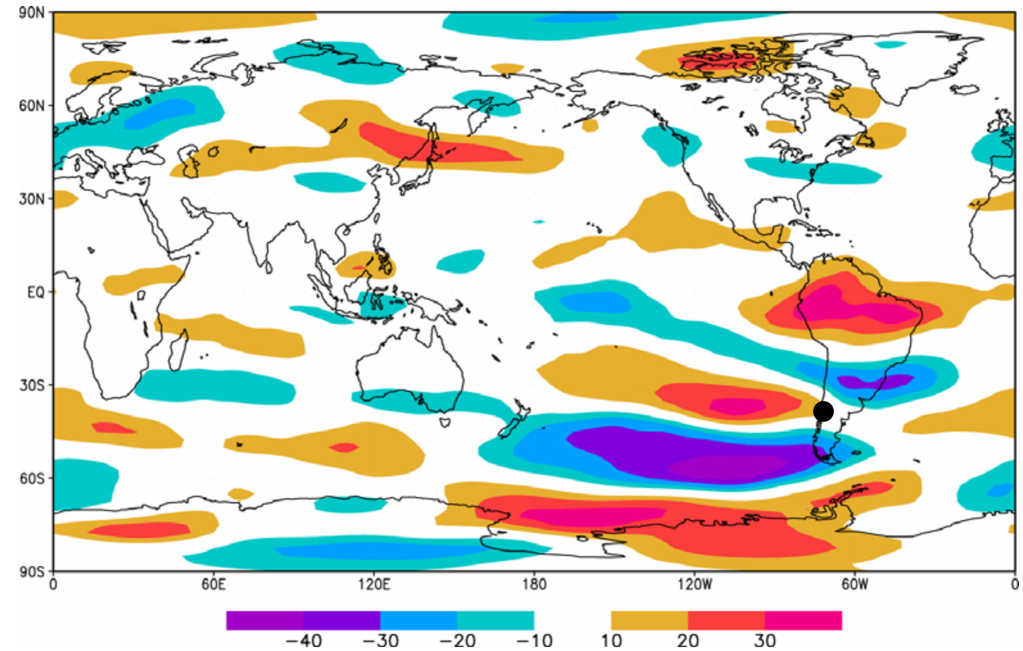
σ^2 (i.e., storm track) regressed upon IS band-pass filtered (15-40 days retained) rainfall at 40ºS-75ºW (r*100)



Z500 regressed upon IS band-pass filtered rainfall at 40ºS-75ºW (r*100)

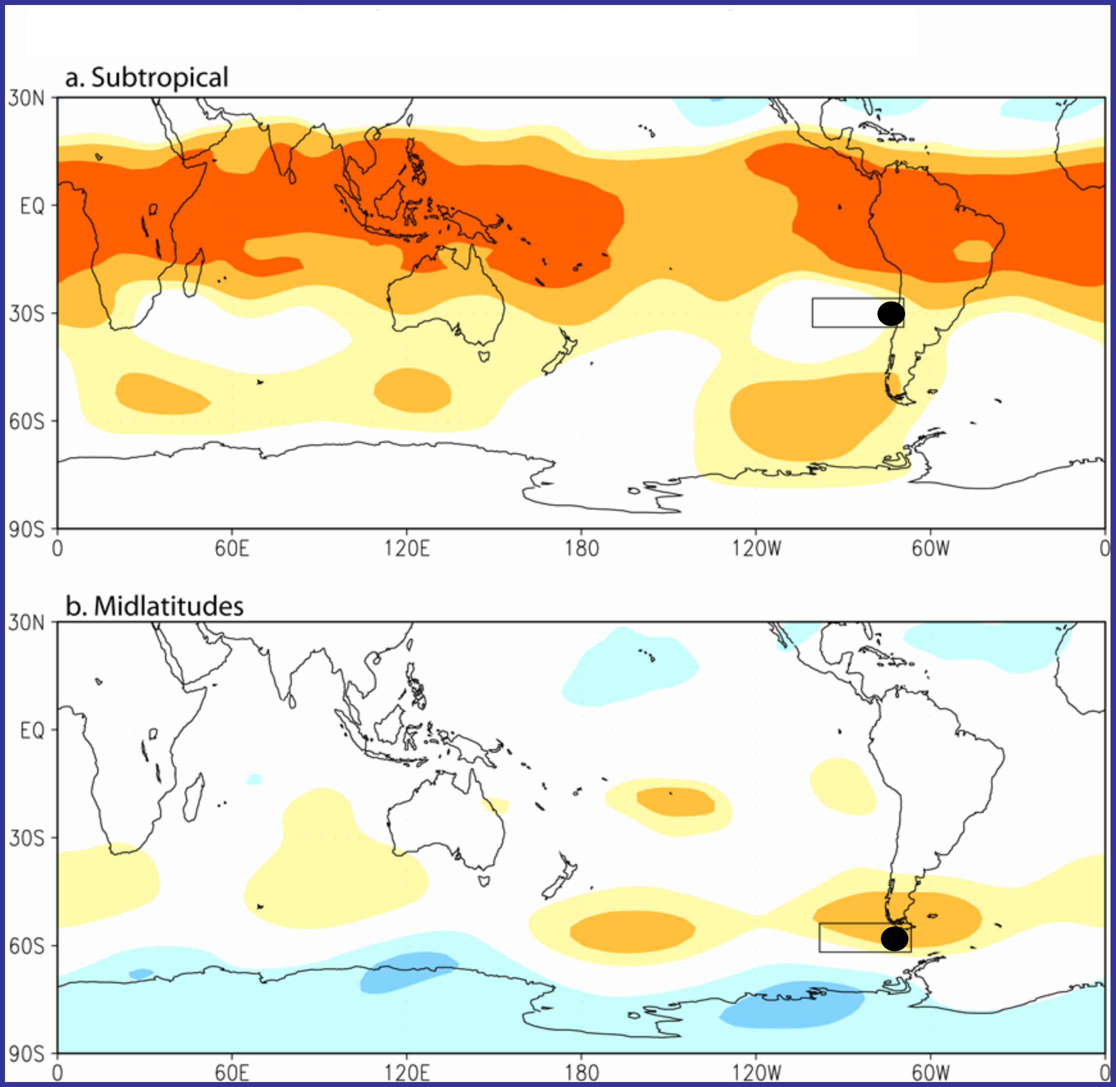


σ^2 (i.e., storm track) regressed upon IS band-pass filtered rainfall at 40ºS-75ºW (r*100)



Z500 regressed upon IS band-pass filtered rainfall at 27ºS-85ºW (r*100)

Z500 regressed upon IS band-pass filtered rainfall at 60ºS-80ºW (r*100)



Preliminary conclusions