SWIO SST - Possible role of local and remote impact

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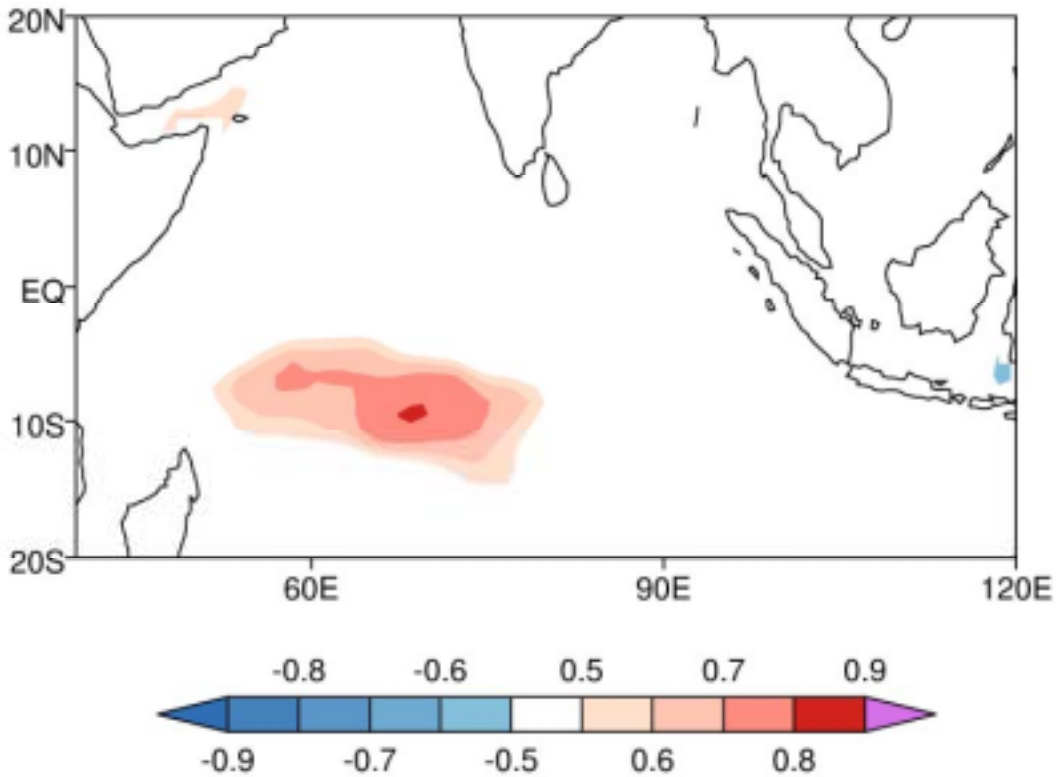
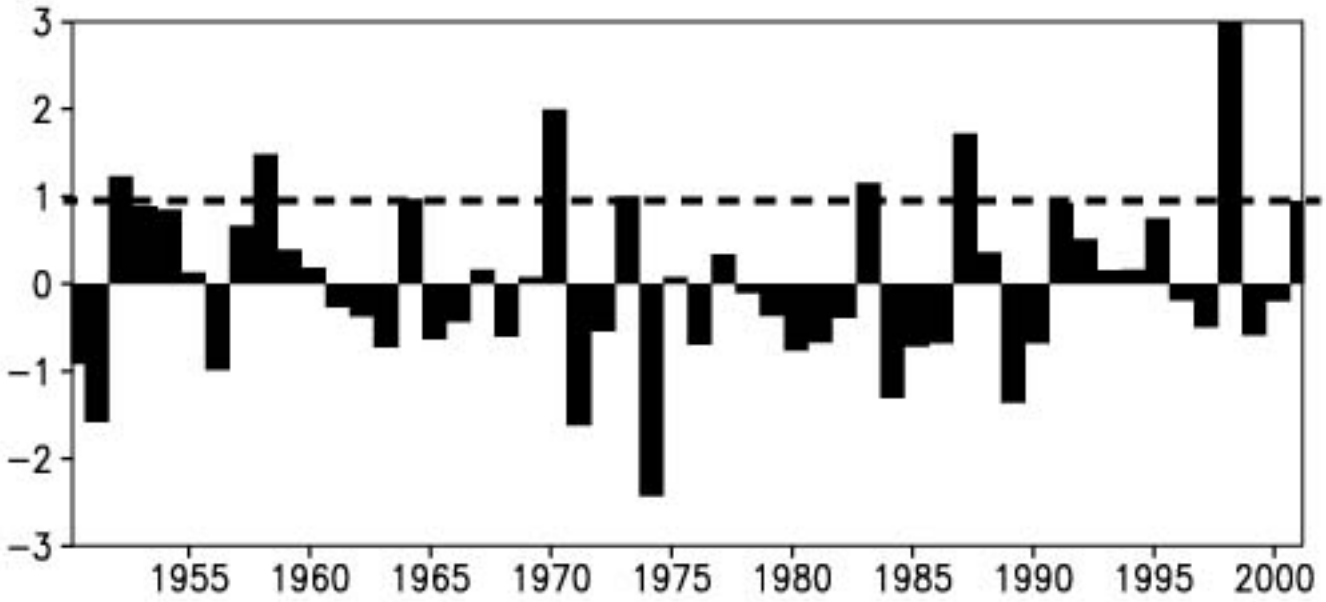
Dec-May: Correlation (*h* versus SST)



Xie, Annamalai, Schott and McCreary (2002)

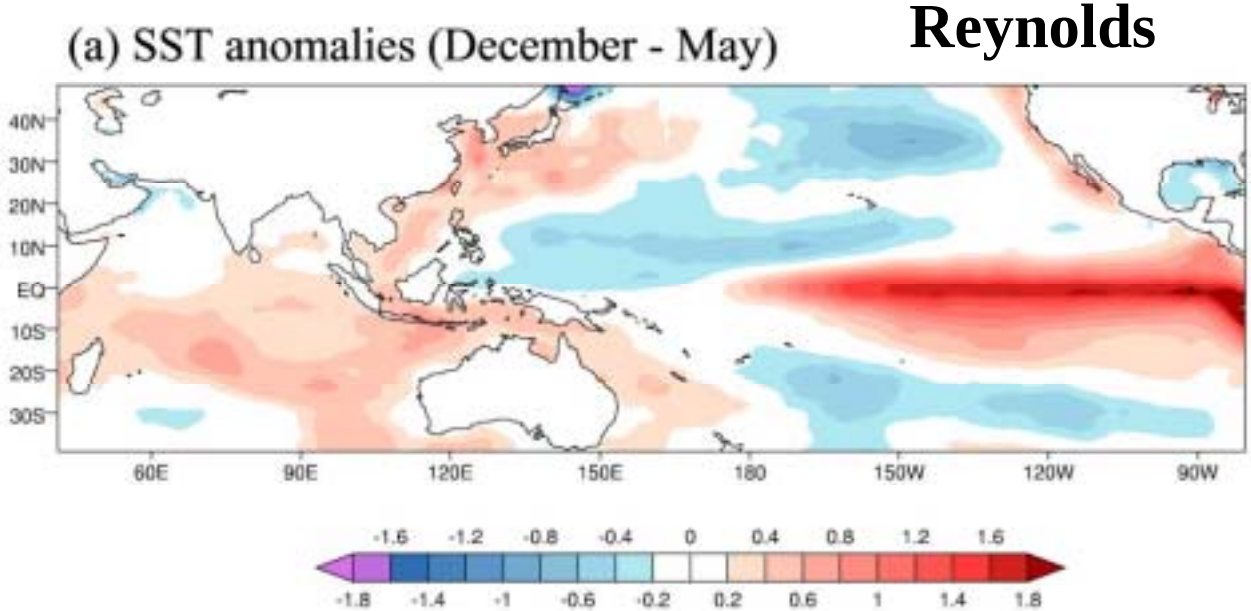
Huang and Kinter (2002)

SST anomalies over SWIO (50 – 70E, 17.5 – 7.5S)

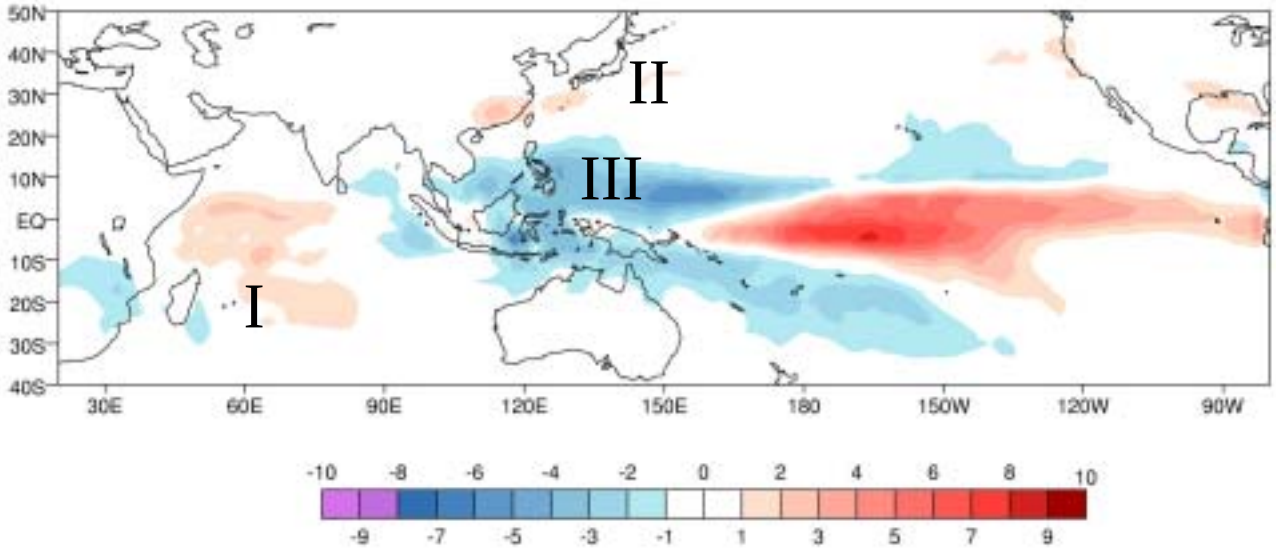


Eight Years (1952, 58, 64, 70, 73, 83, 87, 98) Warm Phase of ENSO

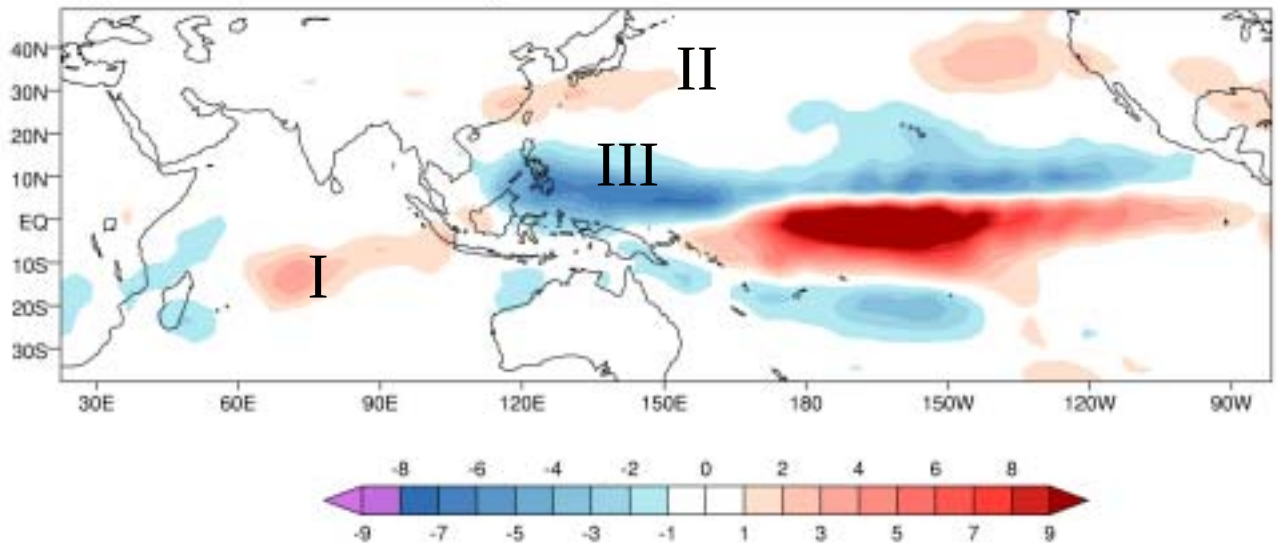
Reynolds


(a) SST anomalies (December - May)
40N
30N
20N
10N
EQ
10S
20S
30S
60E
90E
120E
150E
180
150W
120W
90W
-1.6
-1.2
-0.8
-0.4
0
0.4
0.8
1.2
1.6
-1.8
-1.4
-1
-0.6
-0.2
0.2
0.6
1
1.4
1.8

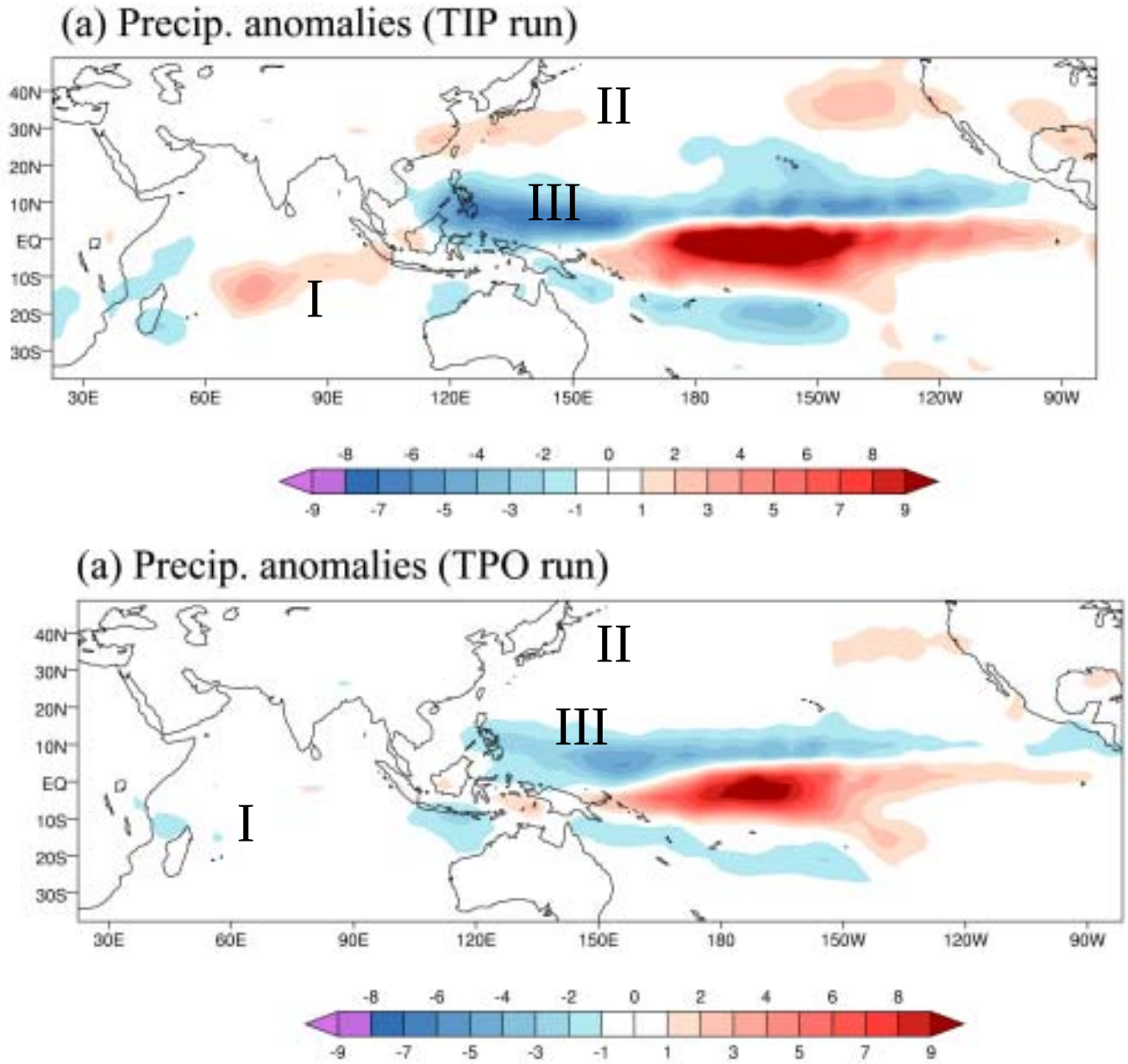
(b) Precipitation anomalies (December - May)



(a) Precip. anomalies (TIP run)

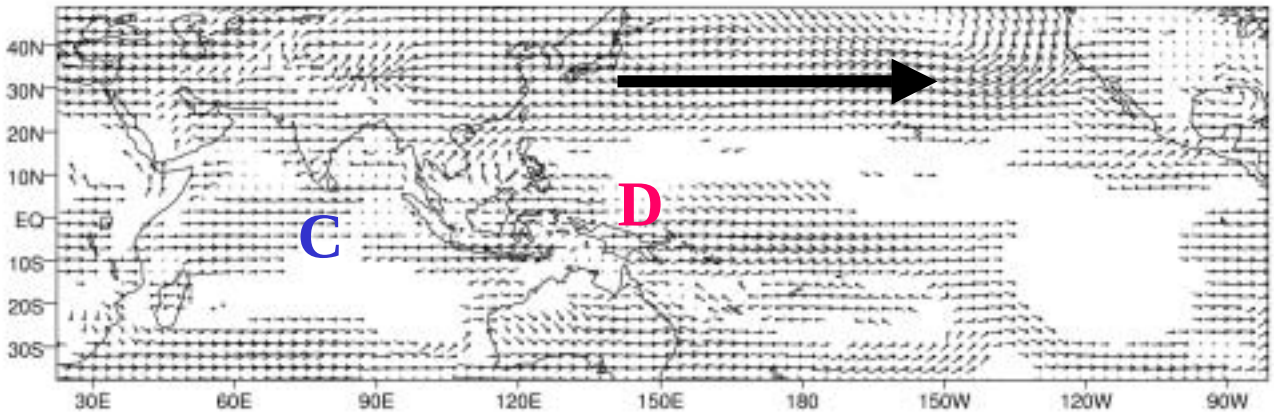


In general, model precip anomalies are stronger !

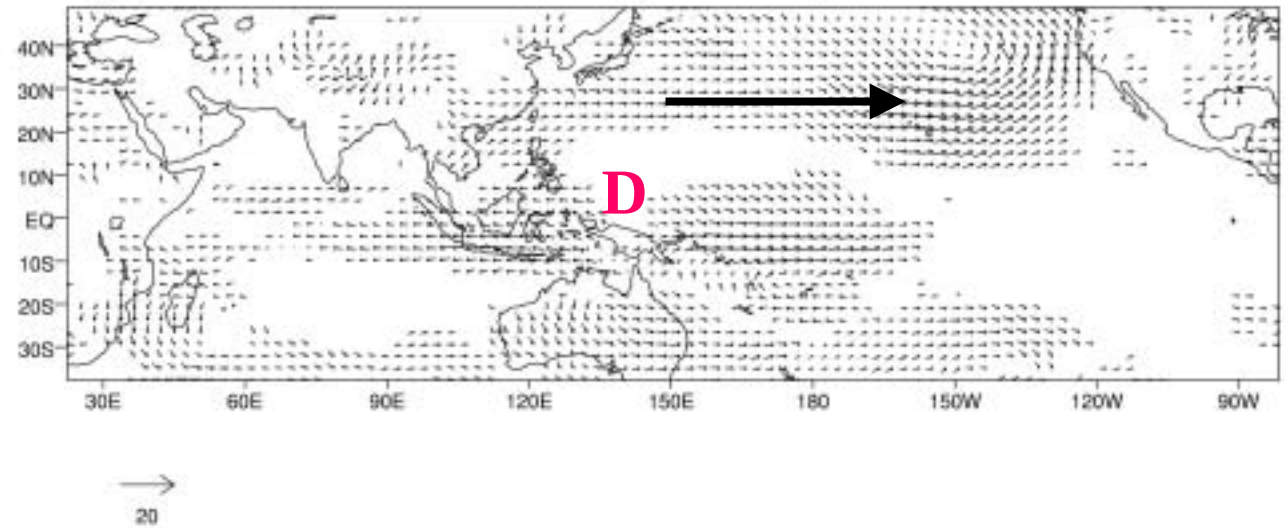


TPO precip. anomalies are weaker than in TIP EVERYWHERE

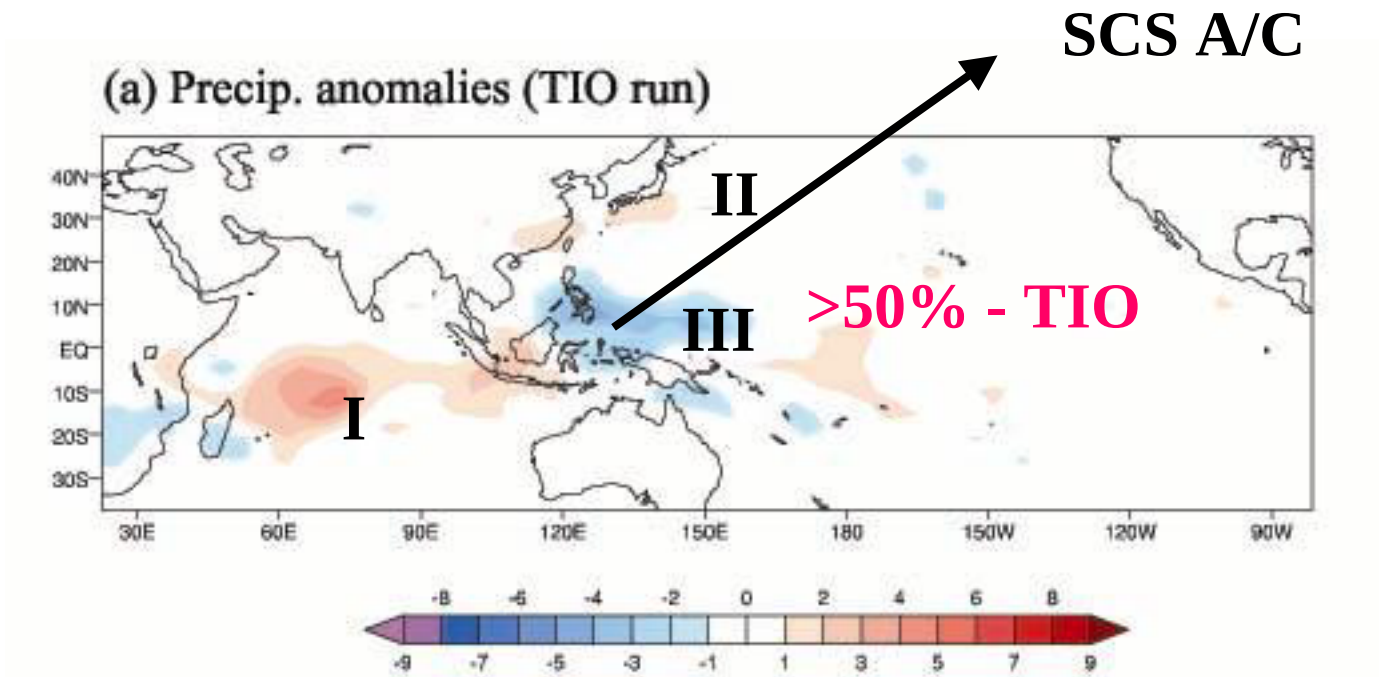
(b) 850 hPa wind anomalies (TIP run)



(b) 850 hPa wind anomalies (TPO run)

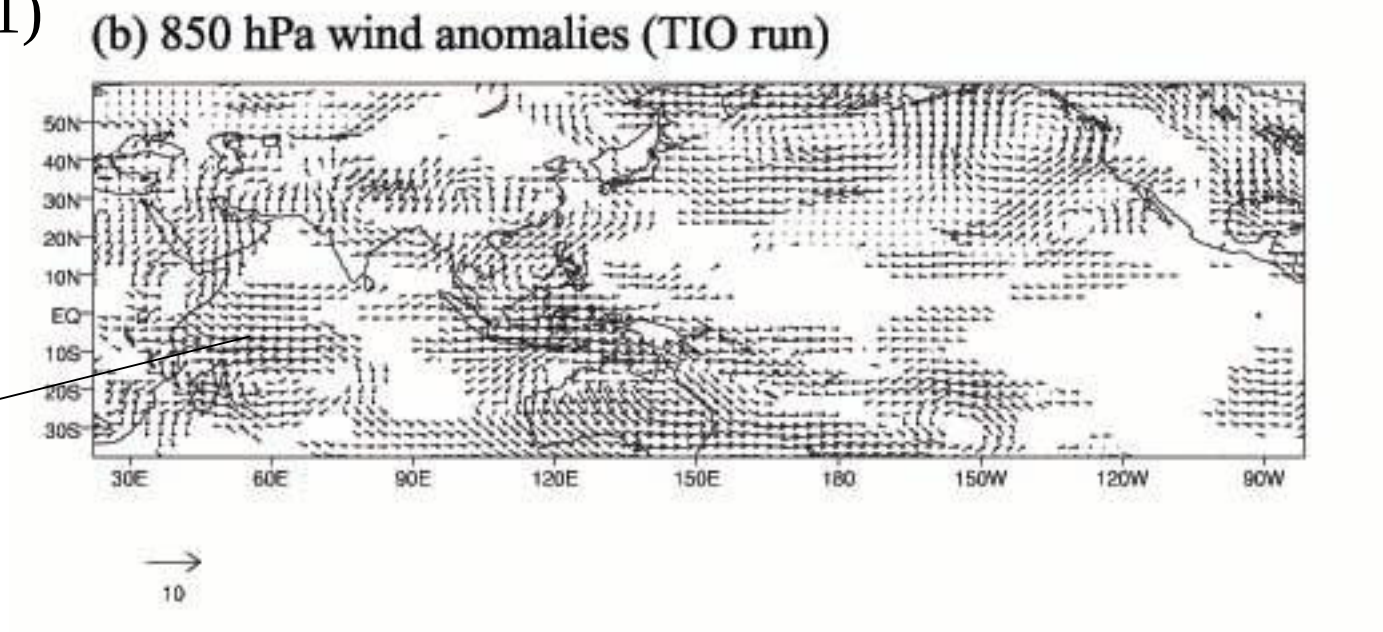


Effect on EAM



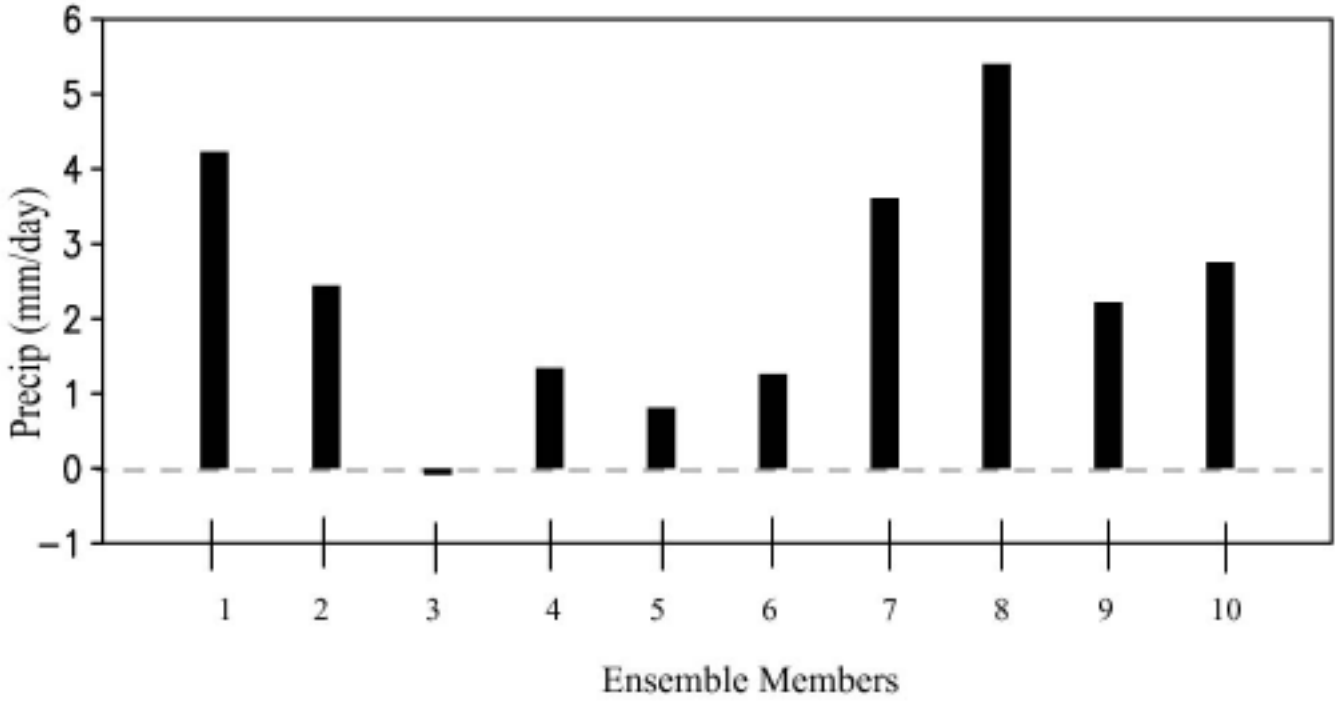
Wang et al. (2001)

Lau et al. (2003)



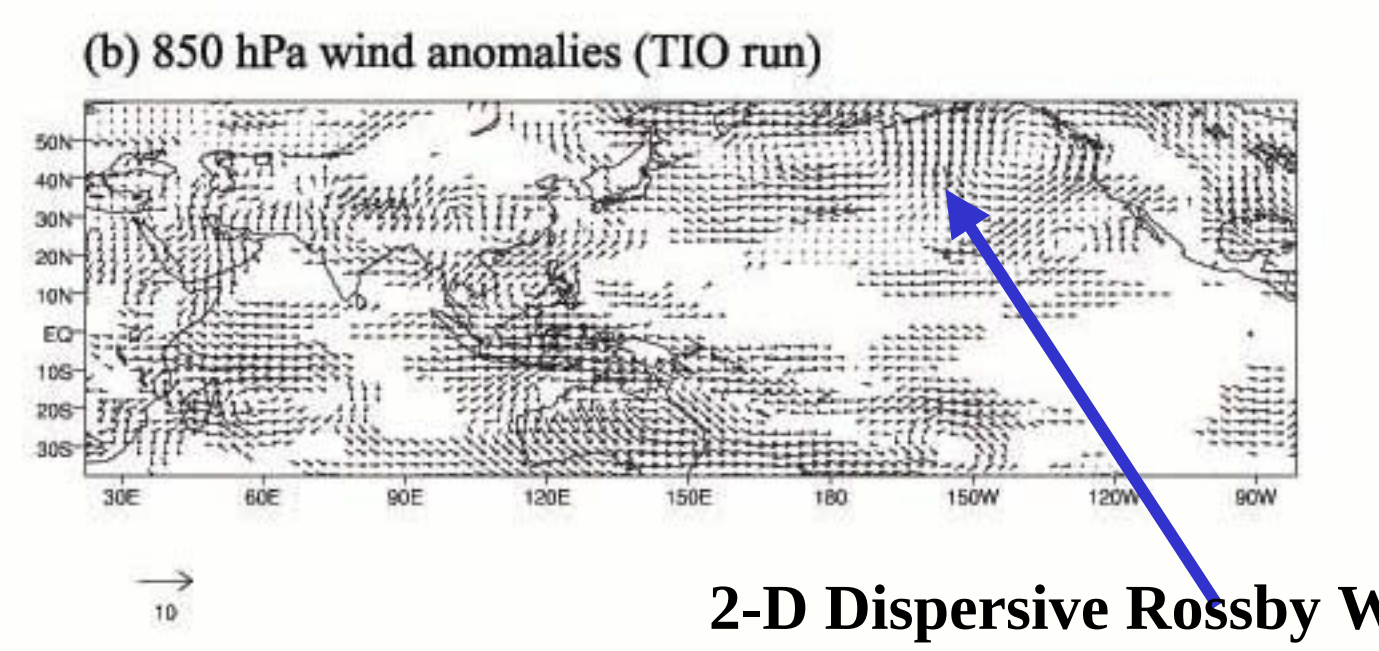
Rossby-wave response

Rainfall anomalies over SWIO



Potential Predictability

Annamalai, Liu and Xie (2004, JC)



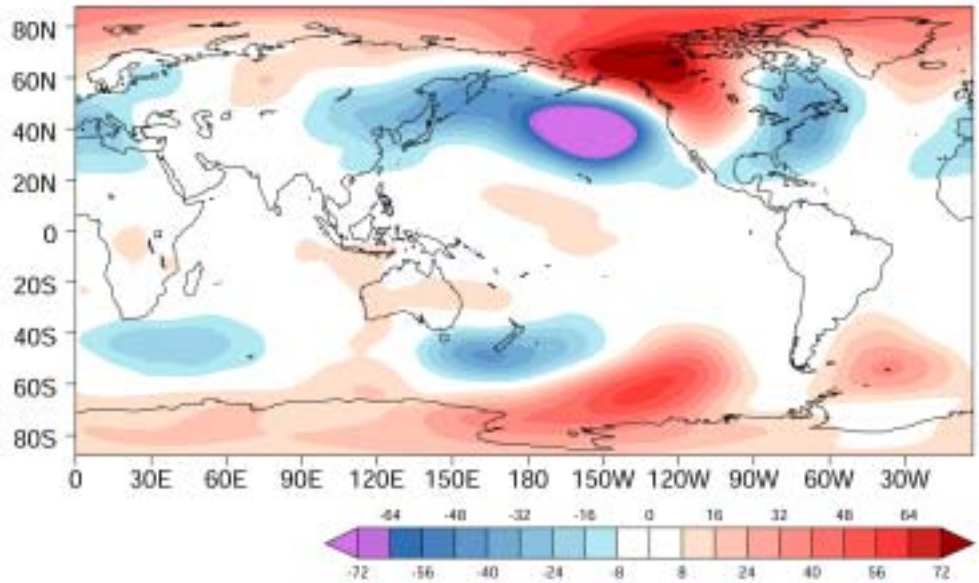
2-D Dispersive Rossby Waves?

(Equivalent Barotropic)

Impact on the Northern Hemispheric Circulation ?

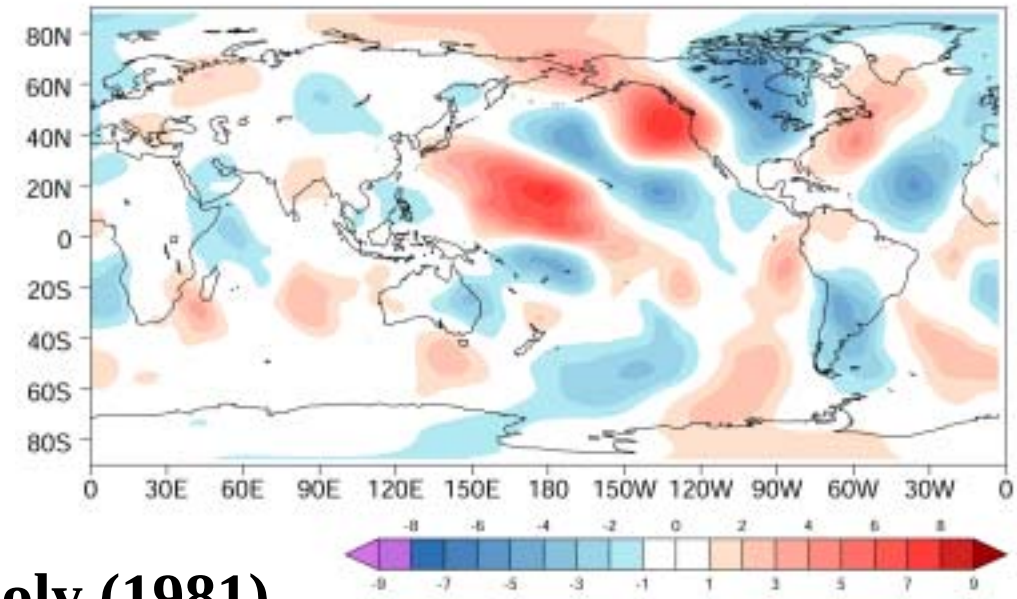
JFM

Z 500 - TPO



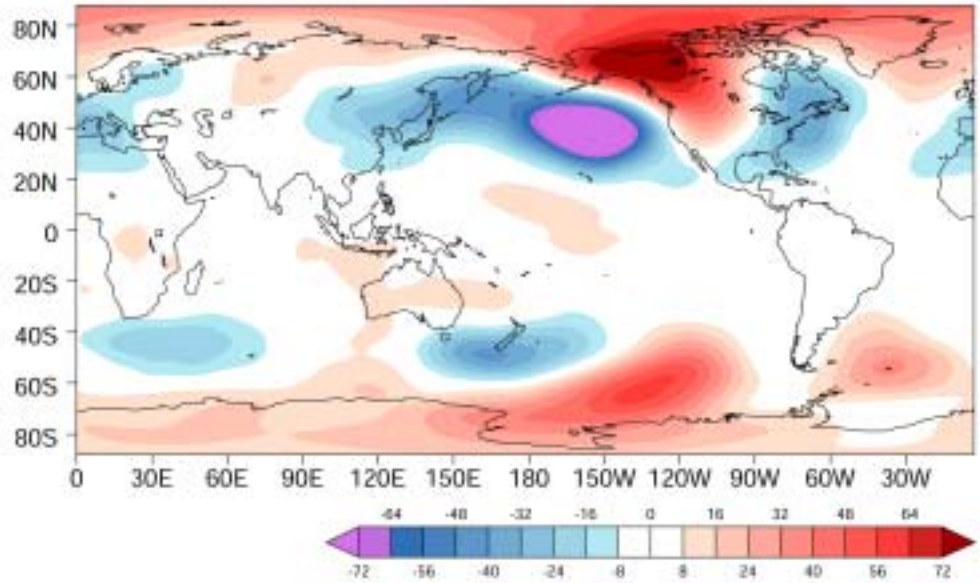
PNA

V200 - TPO

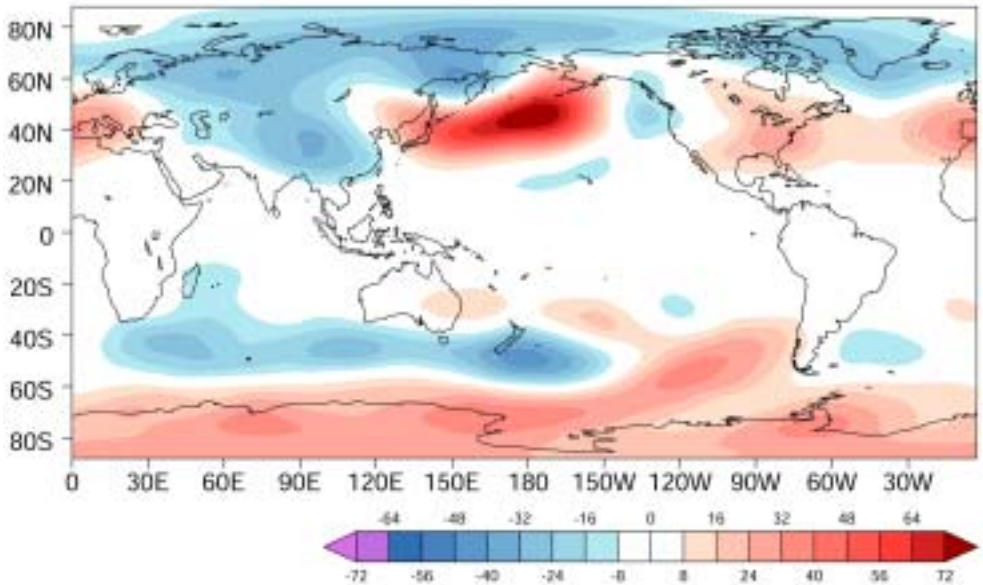


Hoskins and Karoly (1981)

Z500 TPO



Z500 TIO

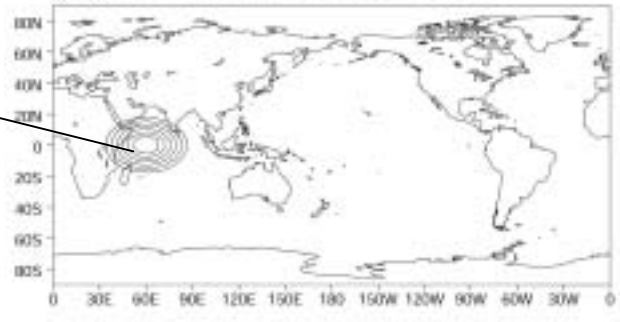


Kumar and Hoerling (1996)

Farra et al. (2000)

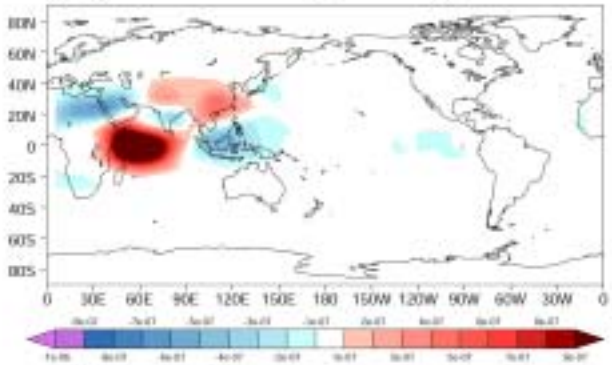
(Forced response OPPOSE each other)

(a) Heating Imposed



AGCM Precip.

(c) 200 Div. (t = 5)



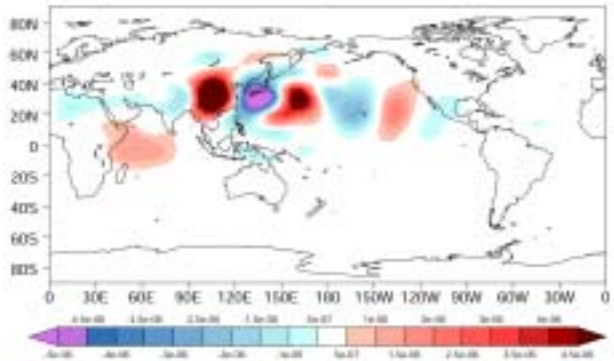
E-W Walker

Local Hadley

(b) 200 Psi (t = 15)

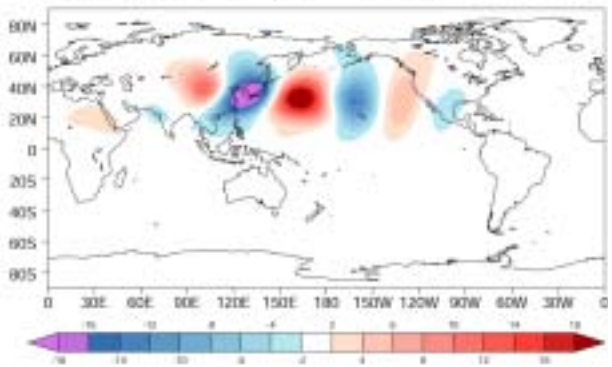
Japan

(d) 200 Div. (t = 20)



Sardeshmukh Hoskins (1988

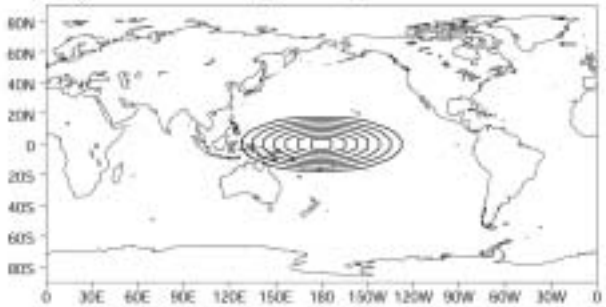
(e) 200 V (t = 20)



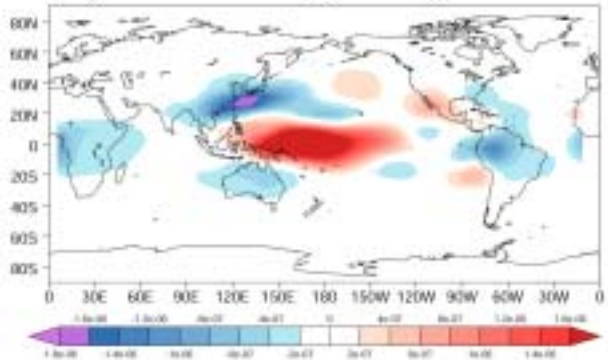
Jin and Hoskins (1995)

Matthews, Hoskins (2004)

(a) Heating Imposed



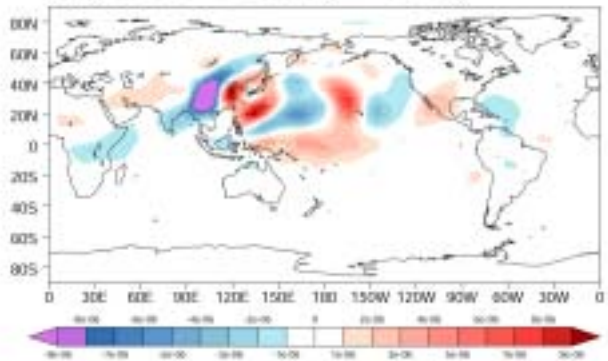
(c) 200 Div. (t = 5)



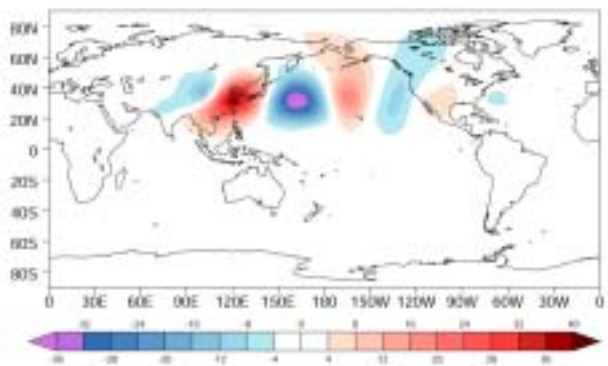
(b) 200 Psi (t = 15)

Japan

(d) 200 Div. (t = 20)

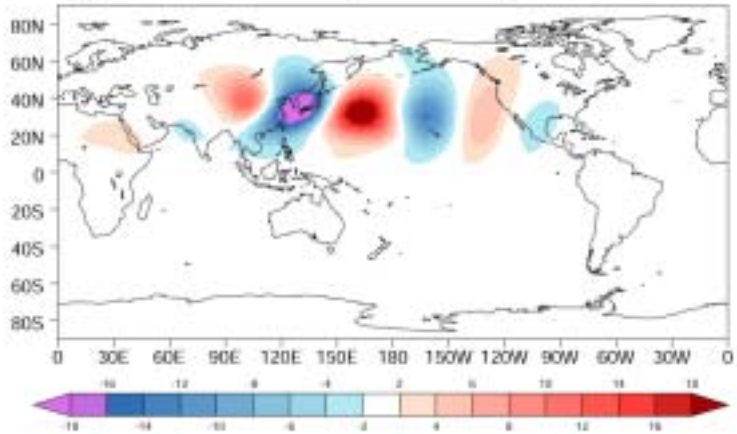


(e) V 200 (t = 20)



IO – Heating

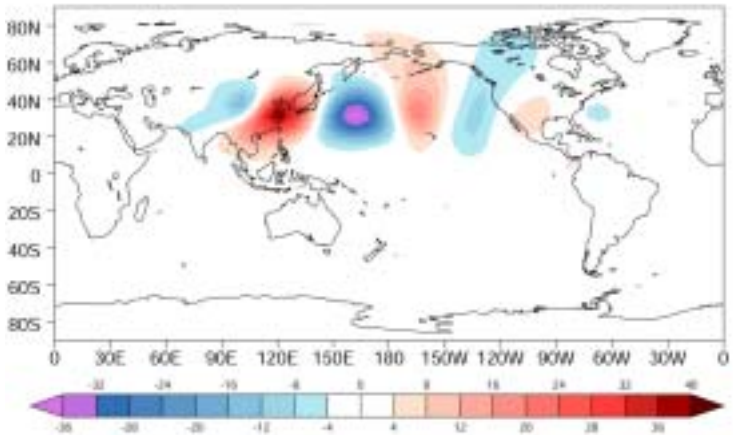
(e) 200 V (t = 20)



Japan/Hawaii

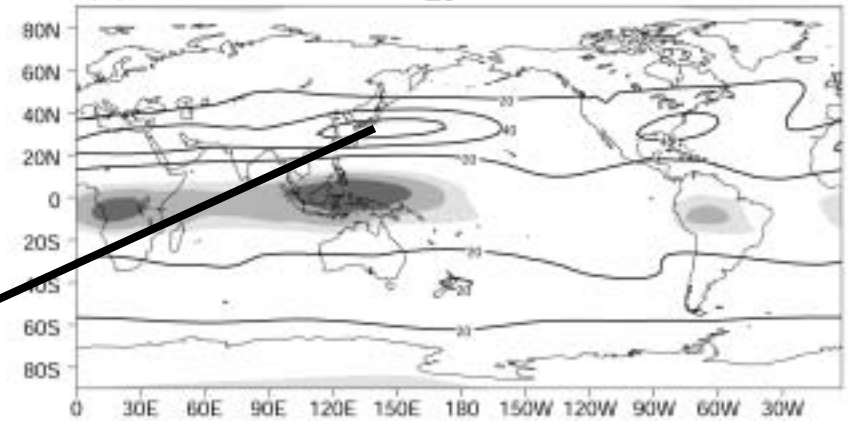
C. Pacific Heating

(e) V 200 (t = 20)

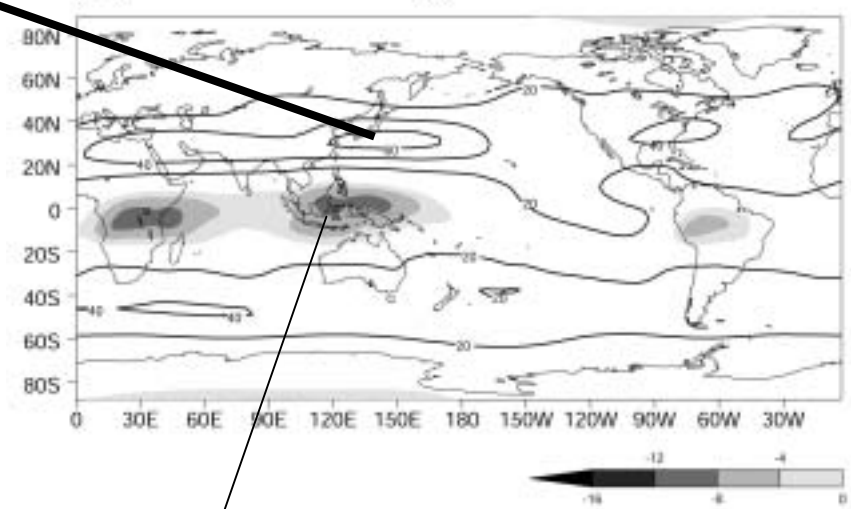


Forced response OPPOSE each other – Realistic Global Teleconnections – MAY need to consider the effect of TIO

(a) U200 Climatology from ERA - JFM



(b) U200 Climatology from ECHAM - JFM

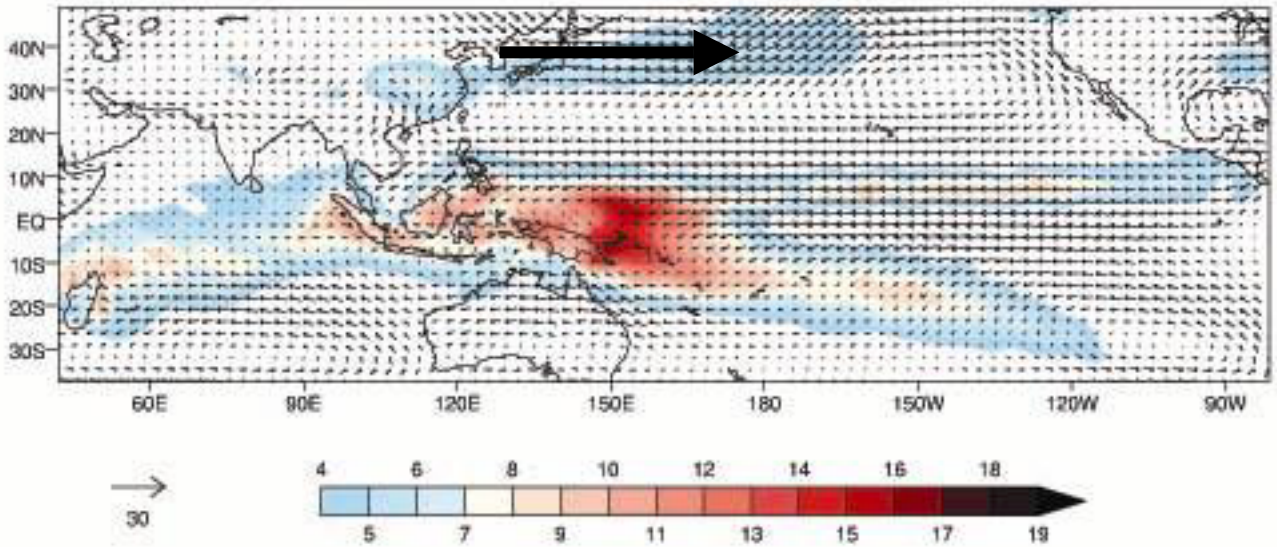


Easterlies

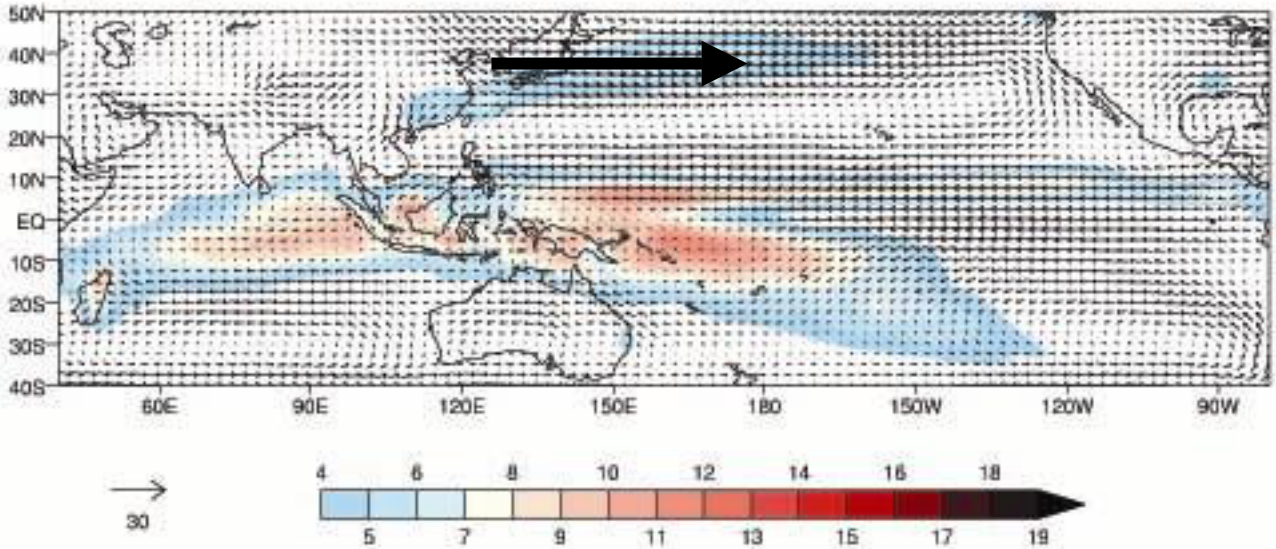
Summary

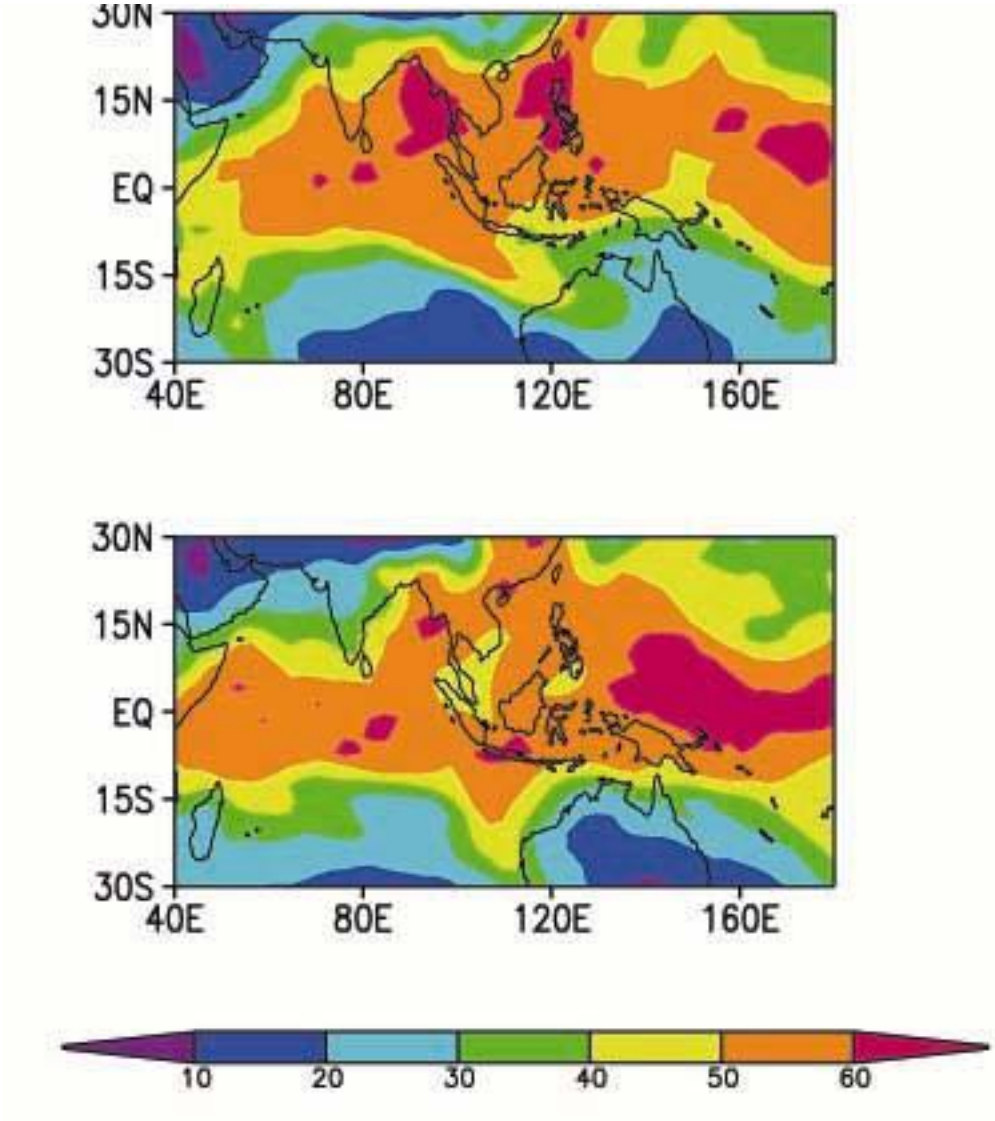
- **SWIO – Precipitation Anomalies – Highly Predictable**
- **SWIO – SST – East Asian Winter Monsoon**
- **SWIO – SST – Forces a Rossby-wave source – Teleconnection**
- **Needs to verified with other AGCMs**

(a) Precipitation and 850 hPa wind climatology - AGCM

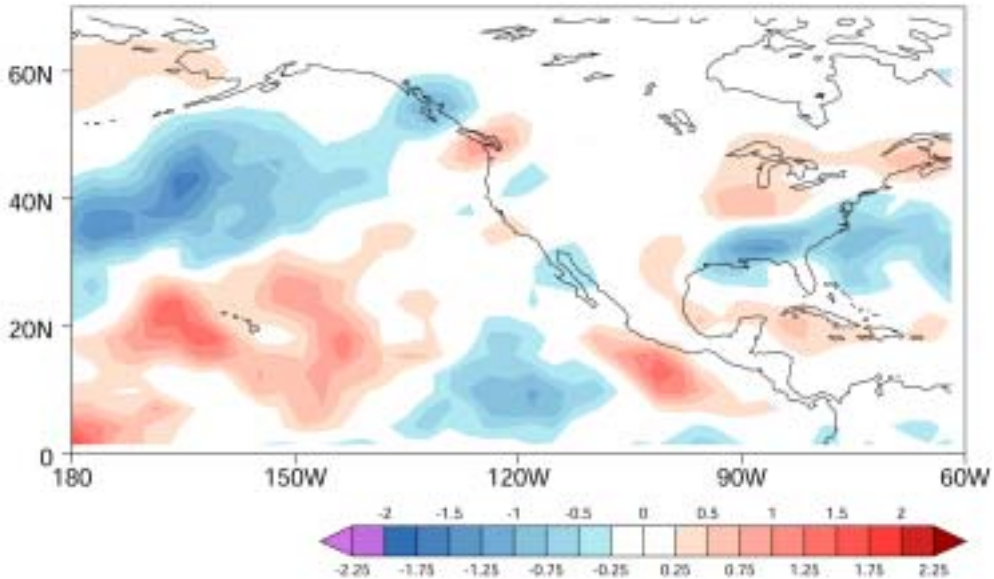


(b) Precipitation and 850 hPa wind climatology - Observations

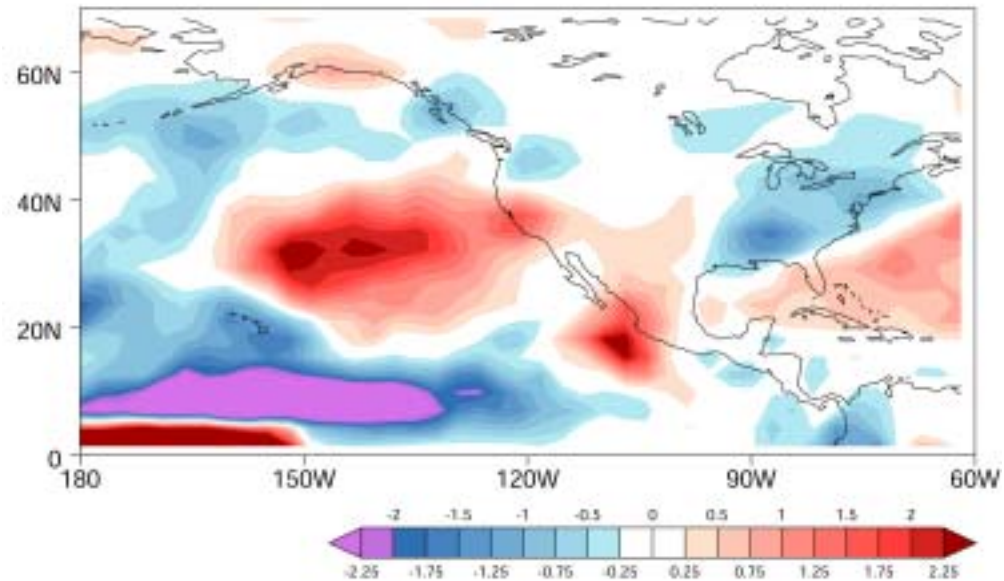


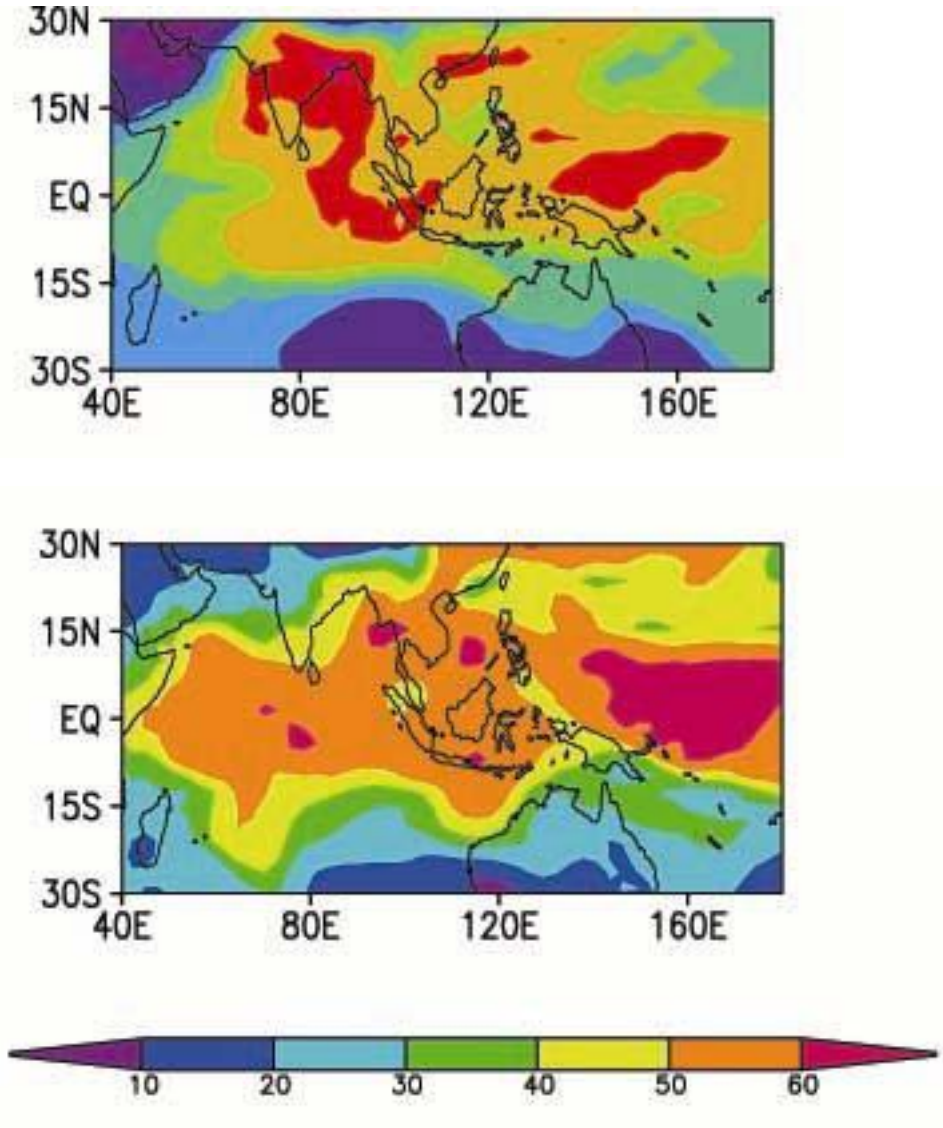

30N
15N
EQ
15S
30S
40E
80E
120E
160E
30N
15N
EQ
15S
30S
40E
80E
120E
160E
10
20
30
40
50
60

Precip - TIO

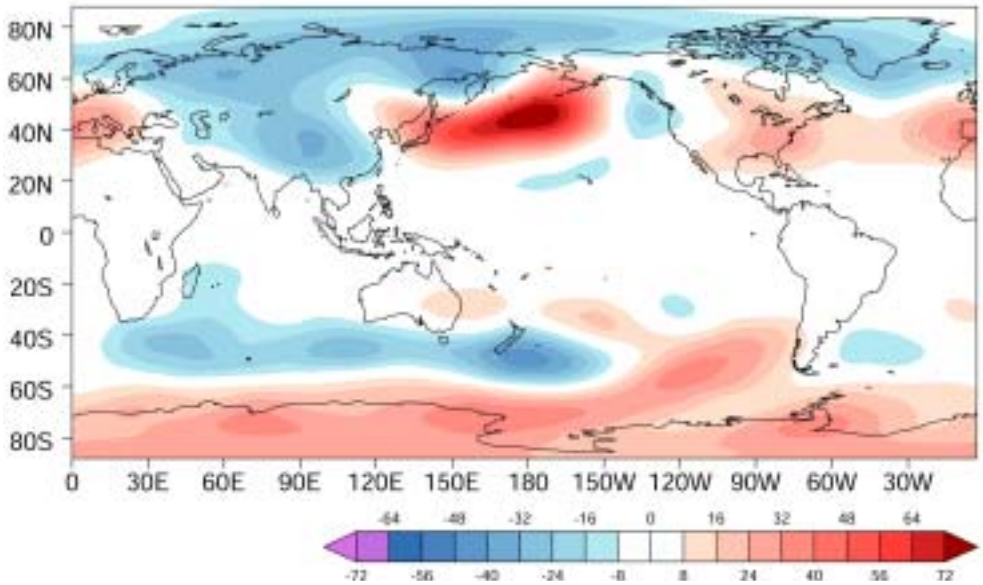


Precip - TPO

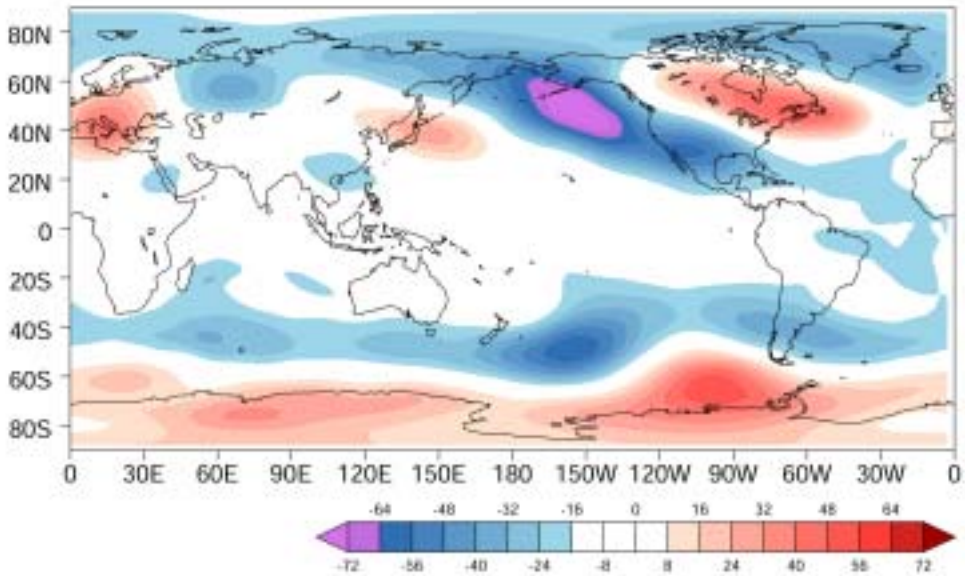



30N
15N
EQ
15S
30S
40E
80E
120E
160E
30N
15N
EQ
15S
30S
40E
80E
120E
160E
10
20
30
40
50
60

Z 500 - TIO



Z500 (TIP – TPO)



Anomaly correlation between (Ensemble mean and members **> 0.9**)
Over north central Pacific