ENSO and its teleconnections

Present situation and future changes

Dai et al. 2000

Global ENSO teleconnections,

particularly precipitation anomalies, both annually and seasonally.

Dai et al. 2000

- How does this study justify its relevance?

Dai et al. 2000

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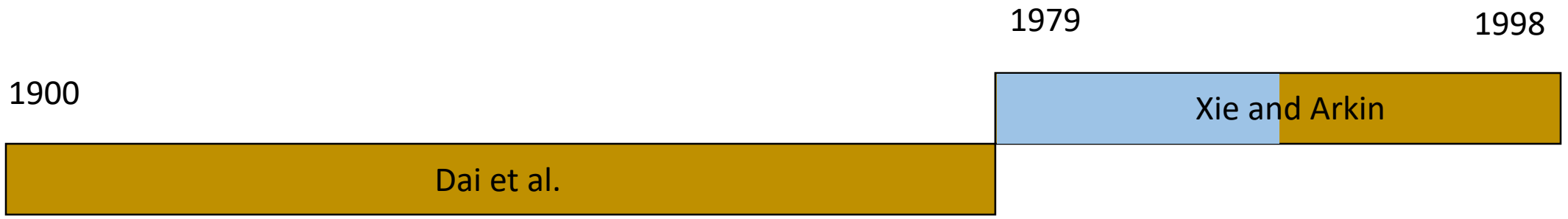
"ENSO-induced precipitation anomalies over various regions have been documented through analyses of rain-gauge records from **land stations**"

"X-A presented global maps of **composite** precipitation differences between warm and cold ENSO episode"

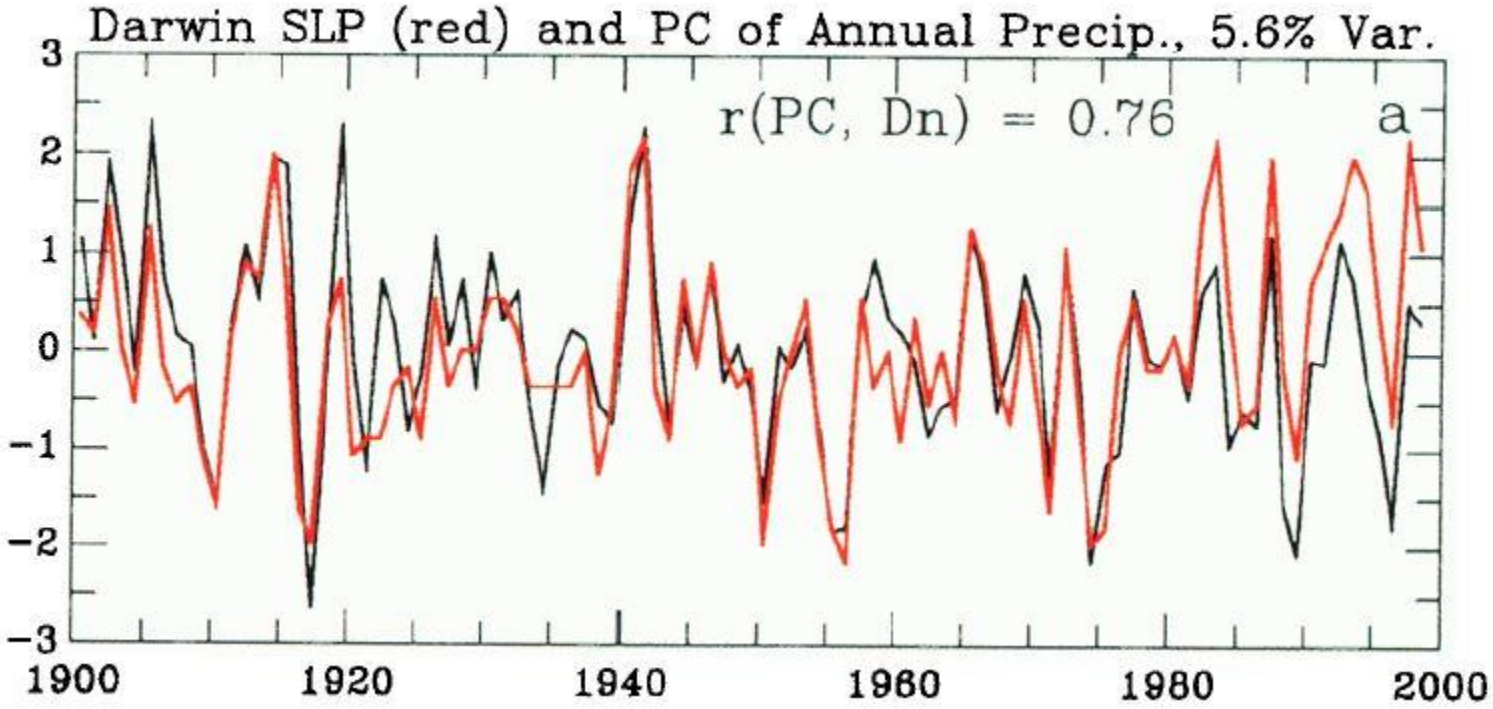
Dai et al. 2000

- What could be a concern about the data? How is it overcome?



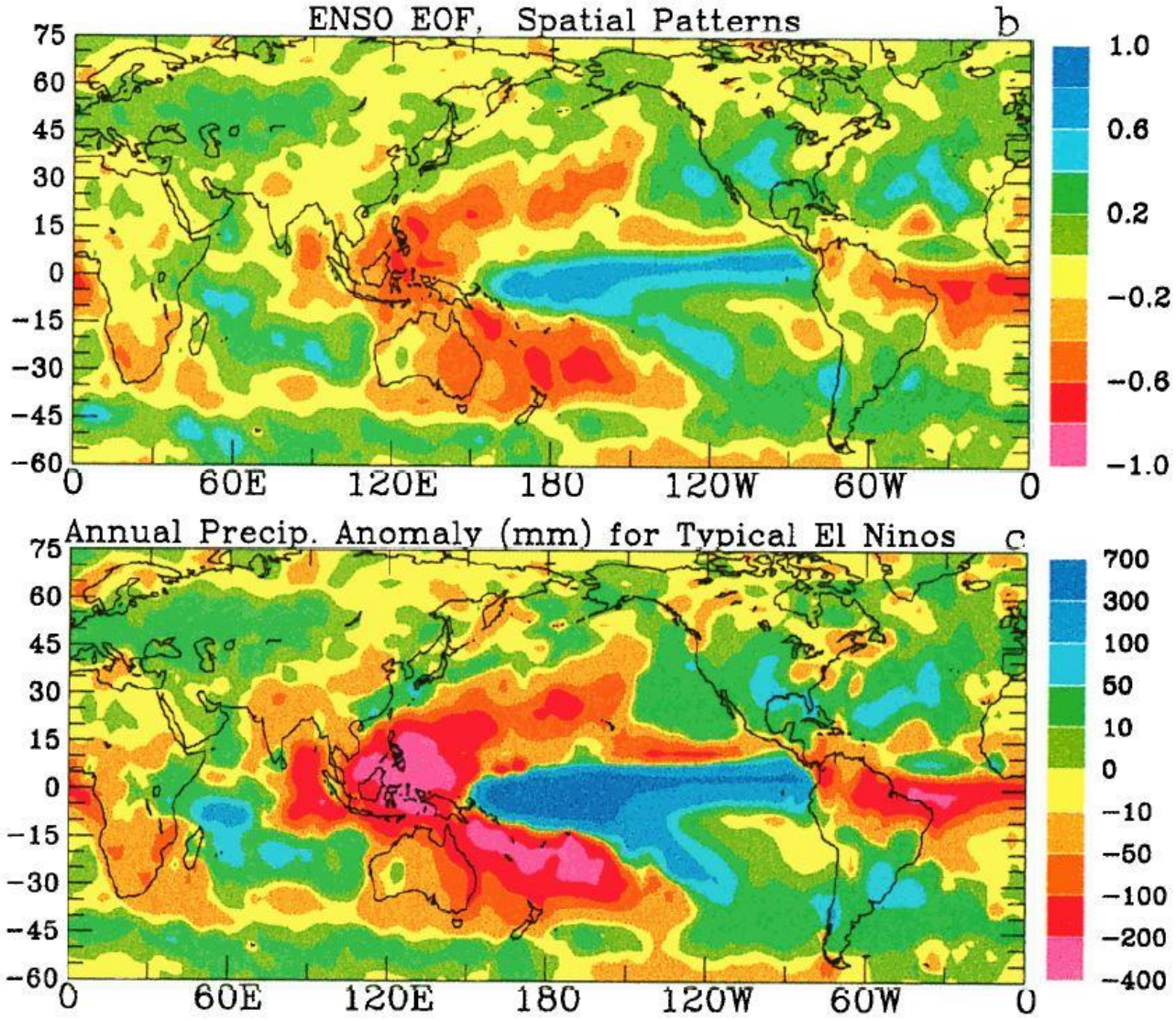
Dai et al. 2000

- What is the information that Figure 1a provides?



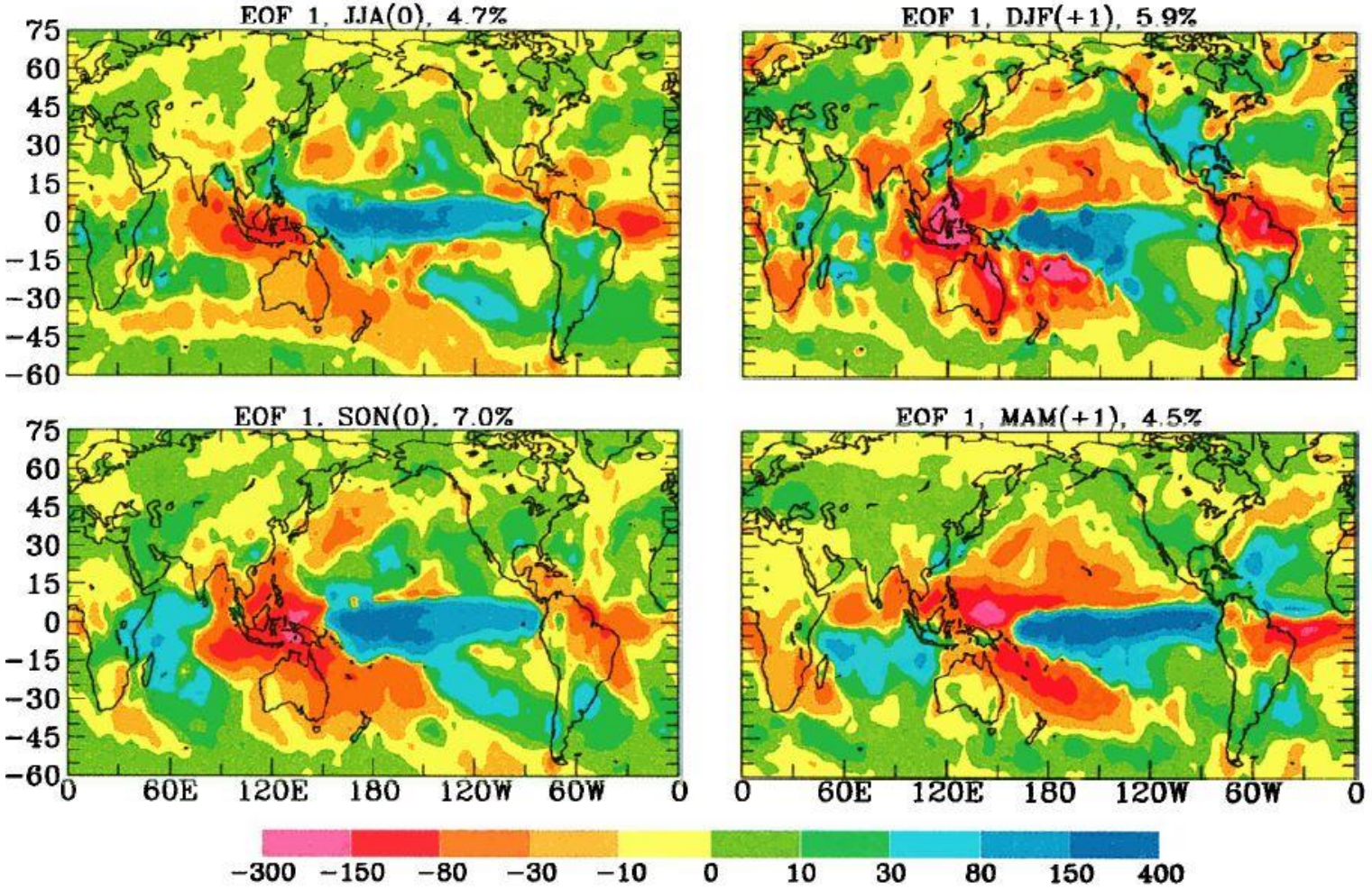
Dai et al. 2000

- What is the difference between
  Figures 1b and 1c?



Dai et al. 2000

- Some results from the plots in Figure 2 are stronger and others are weaker, why?



Dai et al. 2000

- What are the main “vehicles” of ENSO teleconnection? Where are the resulting effects more robust?

Dai et al. 2000

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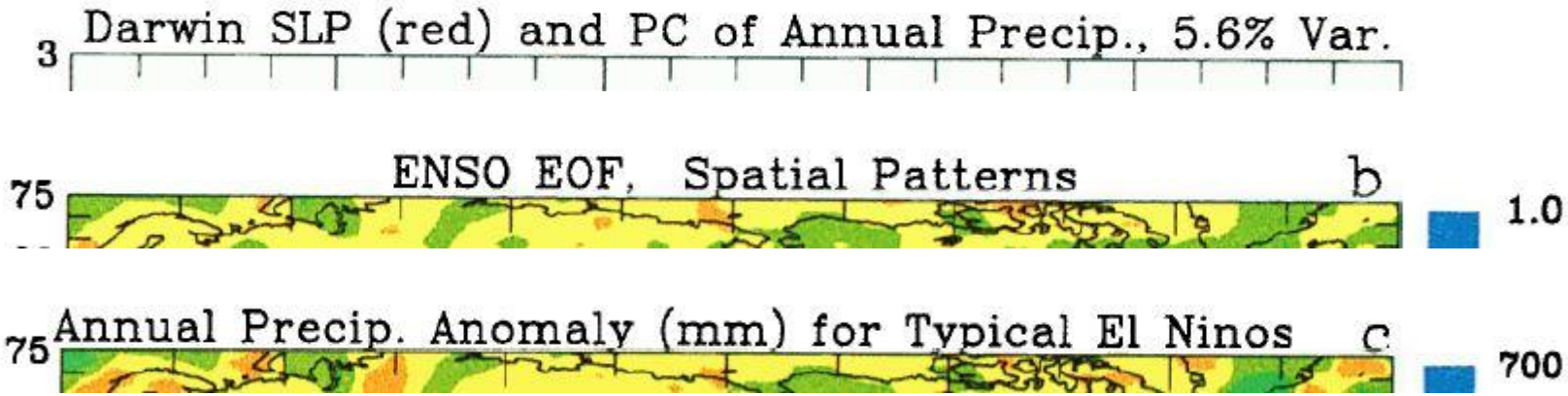
“changes in the Walker circulation”

“ITCZ shift”

“shift of the South Pacific Convergence Zone”

Dai et al. 2000

- In light of last week's discussion, what is an underling assumption that we could rightfully doubt?



Li, X., Ting, M. 2015

Specific teleconnection ENSO-monsoon,
and attribution of its changes over time.

Li, X., Ting, M. 2015

- How do they separate the forcing of internal variability and radiative forcing in the relation between ENSO and monsoon?

Simulated preindustrial SST

Simulated preindustrial SST

EOF analysis on the (climate) noise matrix

Simulated preindustrial SST

⇩

EOF analysis on the (climate) noise matrix

⇩

Spatial removal of (climate) noise from ensemble mean

Simulated preindustrial SST

⇩

EOF analysis on the (climate) noise matrix

⇩

Spatial removal of (climate) noise from ensemble mean

⇩

EOF analysis on (ensemble mean – noise)

⇩

1st principal component = forced index

Simulated preindustrial SST

⇩

EOF analysis on the (climate) noise matrix

⇩

Spatial removal of (climate) noise from ensemble mean

⇩

EOF analysis on (ensemble mean – noise)

⇩

1st principal component = forced index

$$SST_{forced}(x, y, t) = \text{Cov}(\text{SST}, \text{PC1}) \cdot \frac{PC1(t)}{\sigma_{PC1(t)}}$$

$SST_{natural}(x, y, t) = SST_{total}\ (x, y, t)$ - $SST_{forced}(x, y, t)$ ⟹ Niño 3.4 indices

Li, X., Ting, M. 2015

- What do they mean with RCP8.5 scenario?

Li, X., Ting, M. 2015

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Representative Concentration Pathway:

rising radiative forcing leading to 8.5 W/m2 in 2100, it’s the worst case scenario in the fifth IPCC.

Li, X., Ting, M. 2015

- What is the effect of ENSO on the monsoon in the observation data?

Li, X., Ting, M. 2015

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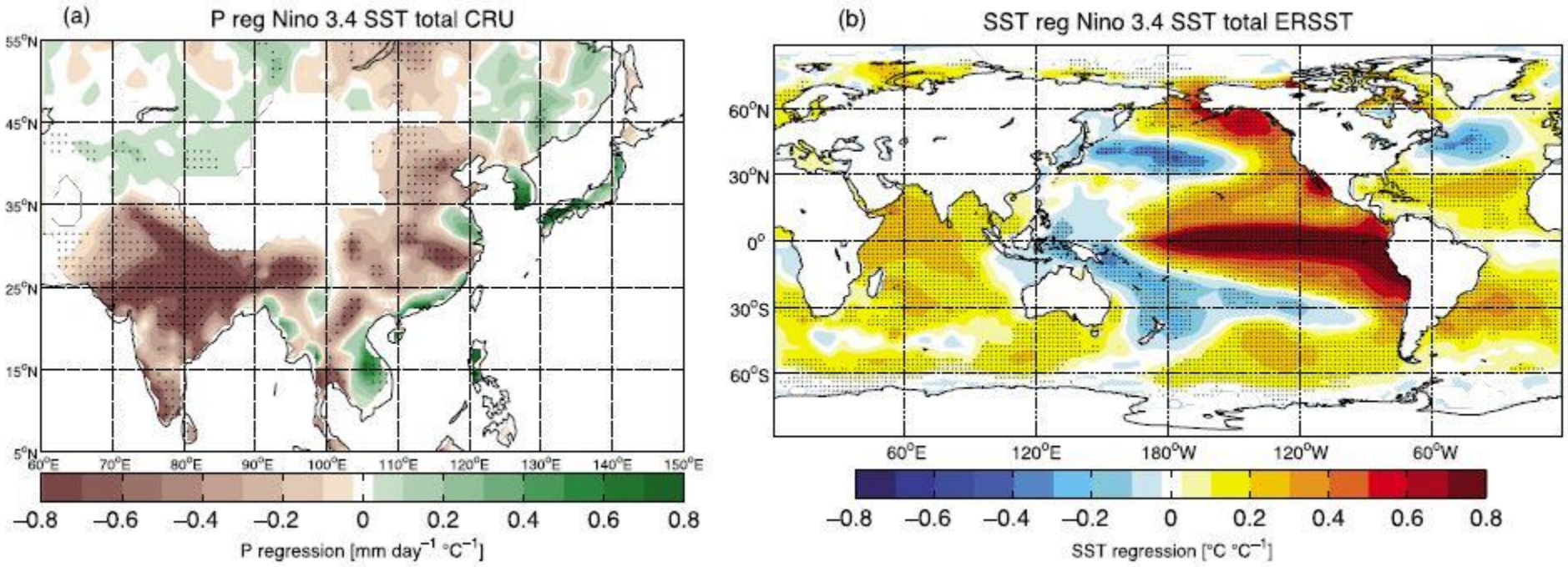
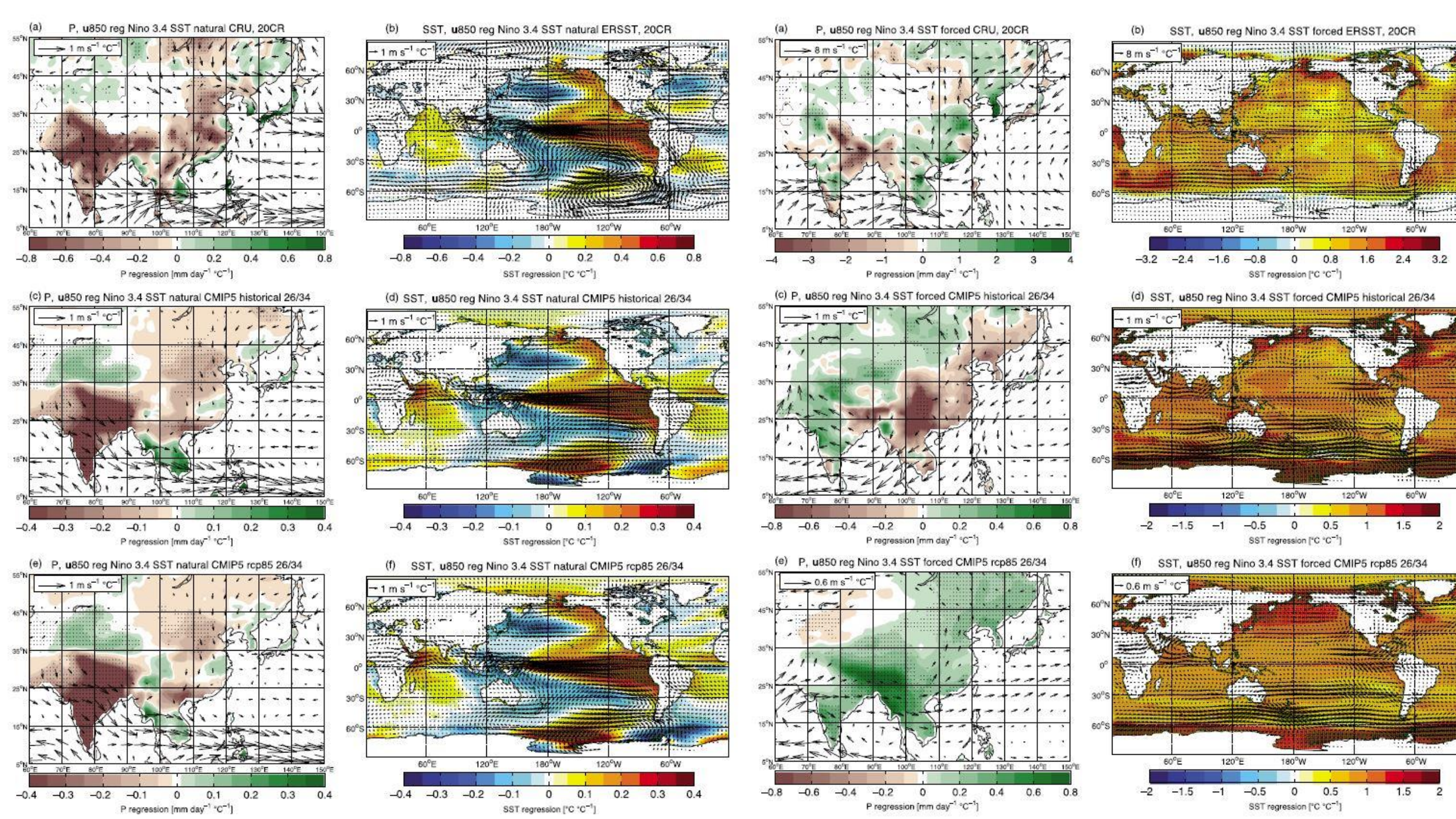


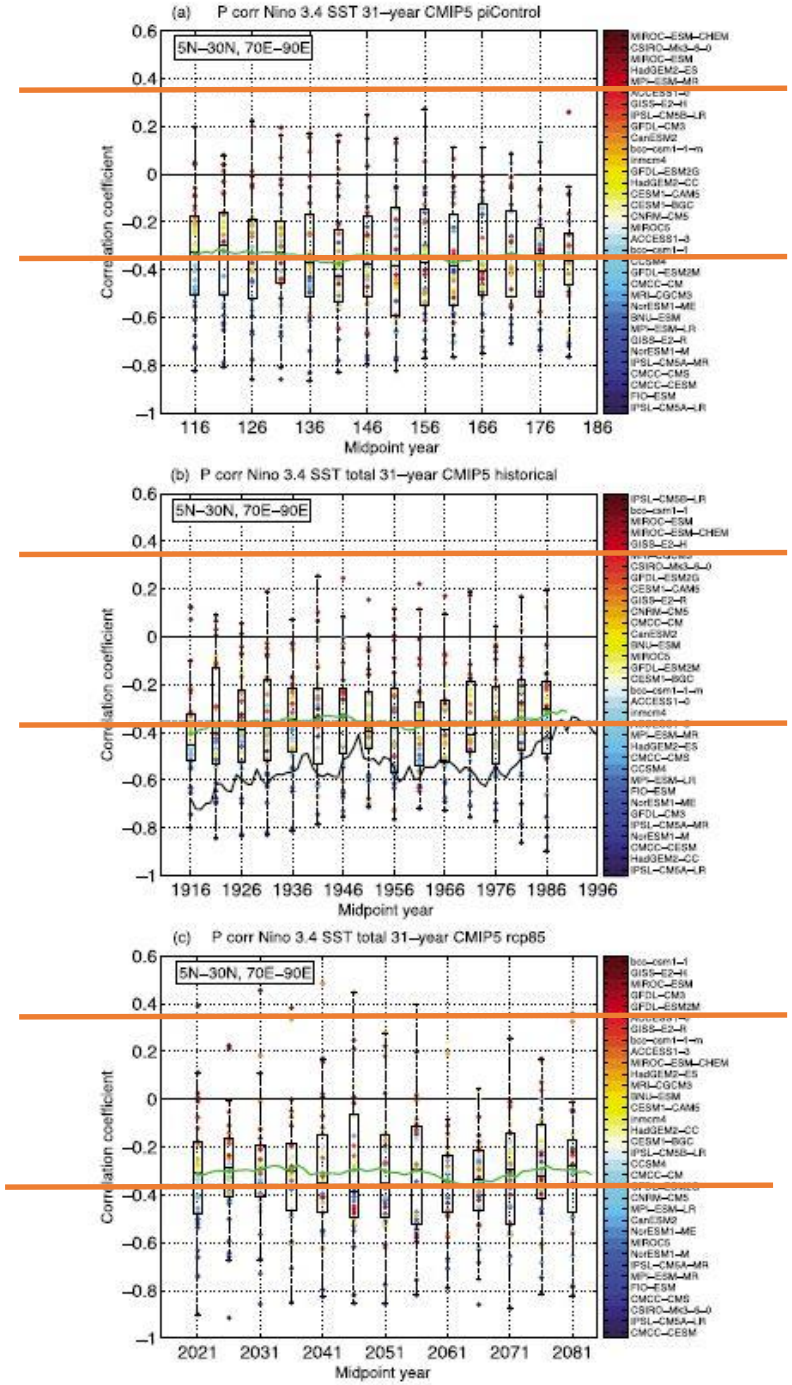
Li, X., Ting, M. 2015

- What are the differences in South-East Asia between forced and natural ENSO-monsoon relationship? And between historical data and simulations?


(a) P, u850 reg Nino 3.4 SST natural CRU, 20CR
1 m s−1 °C−1
P regression [mm day−1 °C−1]
(b) SST, u850 reg Nino 3.4 SST natural ERSST, 20CR
1 m s−1 °C−1
SST regression [°C °C−1]
(a) P, u850 reg Nino 3.4 SST forced CRU, 20CR
8 m s−1 °C−1
P regression [mm day−1 °C−1]
(b) SST, u850 reg Nino 3.4 SST forced ERSST, 20CR
8 m s−1 °C−1
SST regression [°C °C−1]
(c) P, u850 reg Nino 3.4 SST natural CMIP5 historical 26/34
1 m s−1 °C−1
P regression [mm day−1 °C−1]
(d) SST, u850 reg Nino 3.4 SST natural CMIP5 historical 26/34
1 m s−1 °C−1
SST regression [°C °C−1]
(c) P, u850 reg Nino 3.4 SST forced CMIP5 historical 26/34
1 m s−1 °C−1
P regression [mm day−1 °C−1]
(d) SST, u850 reg Nino 3.4 SST forced CMIP5 historical 26/34
1 m s−1 °C−1
SST regression [°C °C−1]
(e) P, u850 reg Nino 3.4 SST natural CMIP5 rcp85 26/34
1 m s−1 °C−1
P regression [mm day−1 °C−1]
(f) SST, u850 reg Nino 3.4 SST natural CMIP5 rcp85 26/34
1 m s−1 °C−1
SST regression [°C °C−1]
(e) P, u850 reg Nino 3.4 SST forced CMIP5 rcp85 26/34
0.6 m s−1 °C−1
P regression [mm day−1 °C−1]
(f) SST, u850 reg Nino 3.4 SST forced CMIP5 rcp85 26/34
0.6 m s−1 °C−1
SST regression [°C °C−1]

Li, X., Ting, M. 2015

- How can we conclude that there is a weakening in the ENSO-monsoon relationship? Do models agree?


(a) P corr Nino 3.4 SST 31–year CMIP5 piControl
5N–30N, 70E–90E
Correlation coefficient
Midpoint year
(b) P corr Nino 3.4 SST total 31–year CMIP5 historical
5N–30N, 70E–90E
Correlation coefficient
Midpoint year
(c) P corr Nino 3.4 SST total 31–year CMIP5 rcp85
5N–30N, 70E–90E
Correlation coefficient
Midpoint year