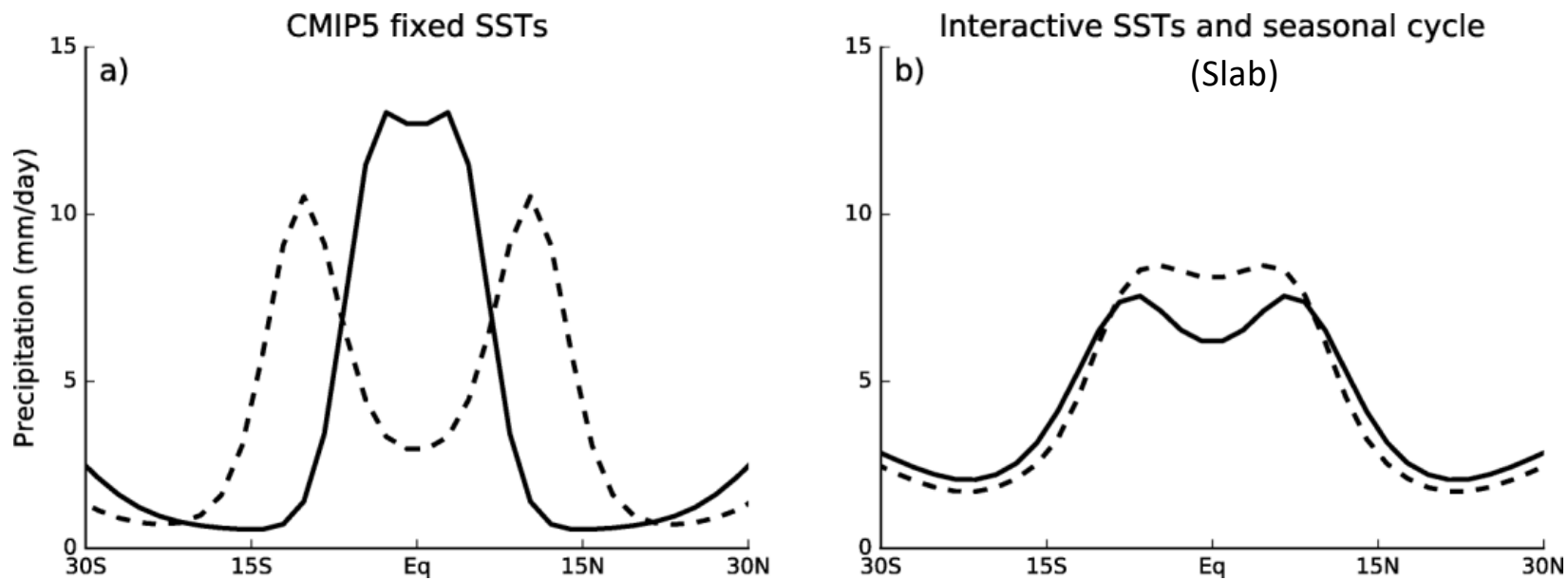


Apparté : différence de sensibilité océan Slab / SST fixes

- SST fixe : flux non contraints
- Slab : flux imposés, SST variable
- Contrainte plus forte sur les précipitations



*Précipitations en aquaplanète avec ECHAM,  
2 schémas de convection profonde. (Aiko Voigt)*

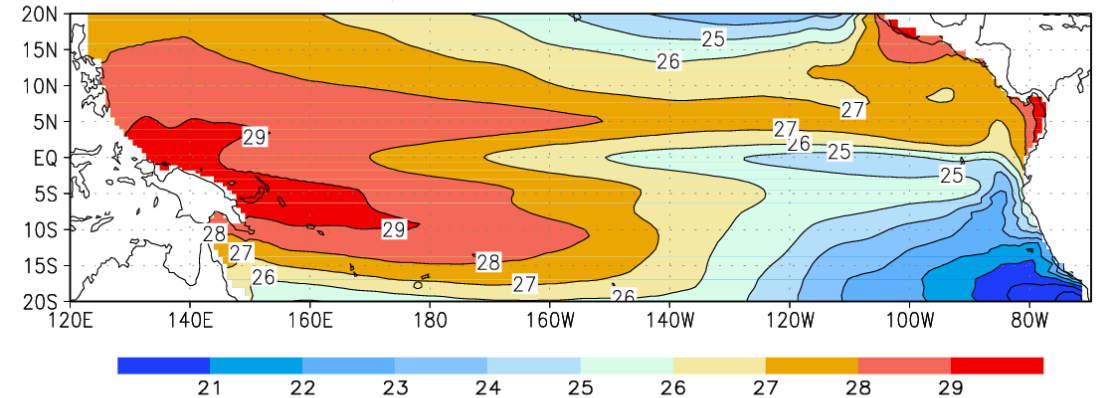
## Un exemple d'amélioration du climat tropical...

- Modèle couplé LMDZ – Pacifique tropical
- Résolution basse (Atm), haute (Oce)
- Physique délocalisée

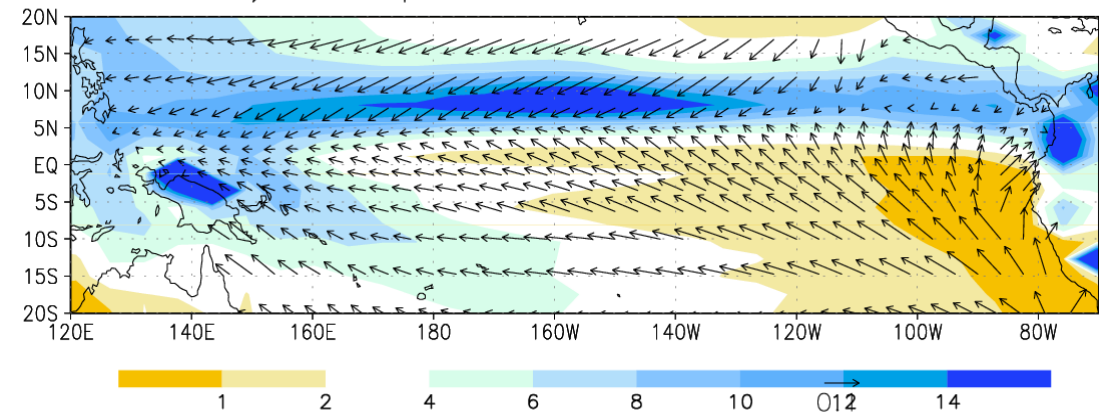
Biais classiques :

- Cold tongue trop étendue
- Trop chaud Pacifique est
- (mais pas de double ITCZ)

a) mean SST Ctrl 1

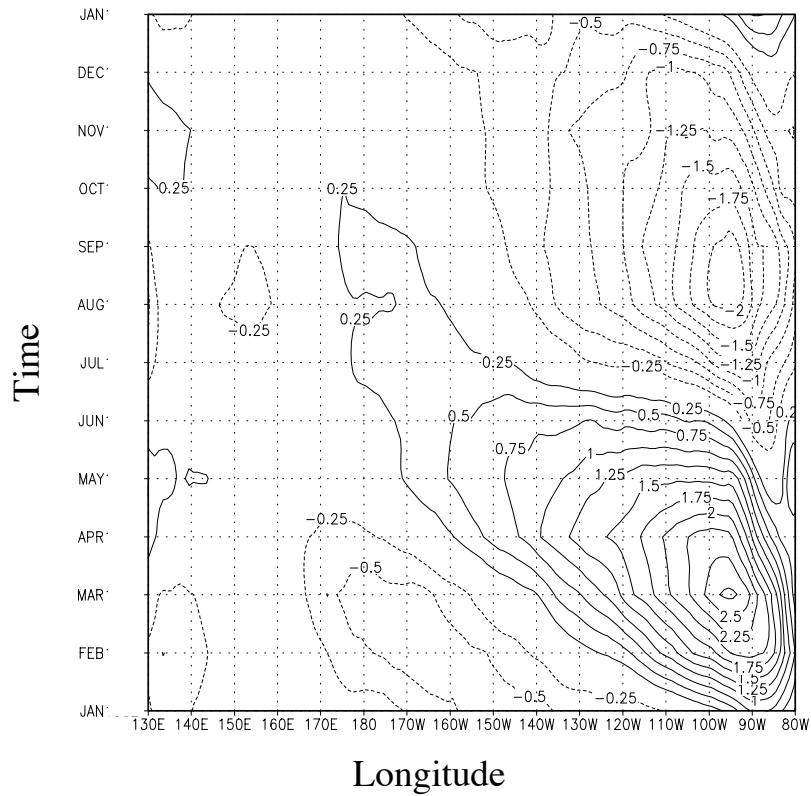


a) Precip. and Wind Stress Ctrl1

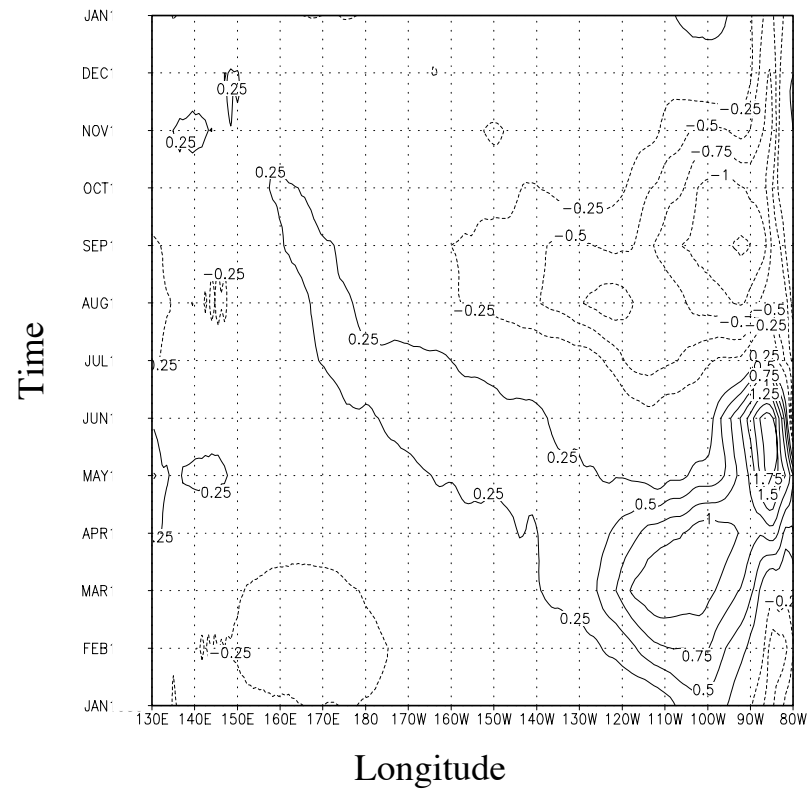


# Cycle saisonnier, SST Pacifique équatorial

## Observed SST

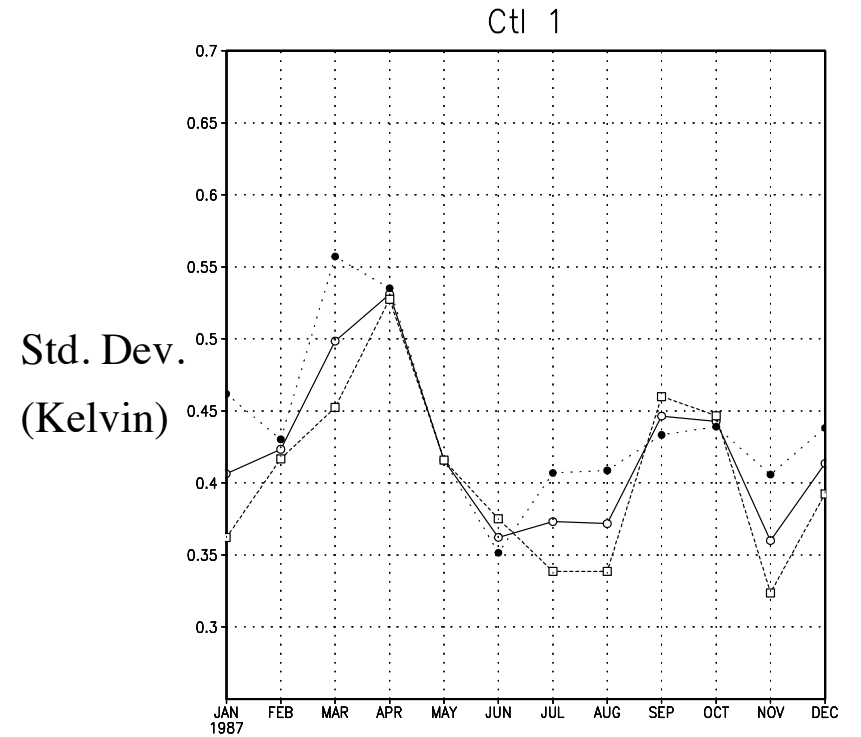
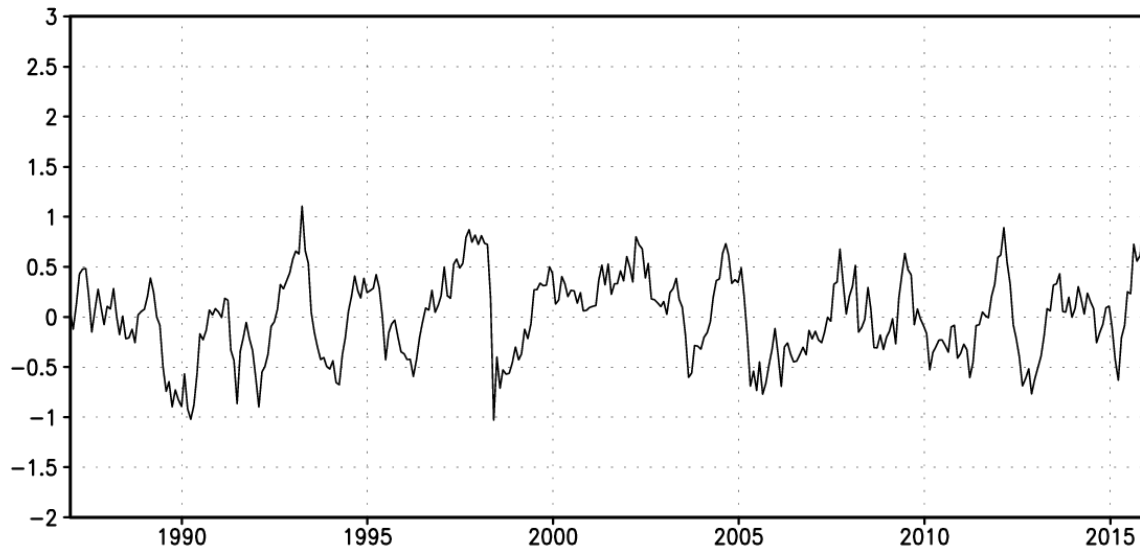


## a) Ctl



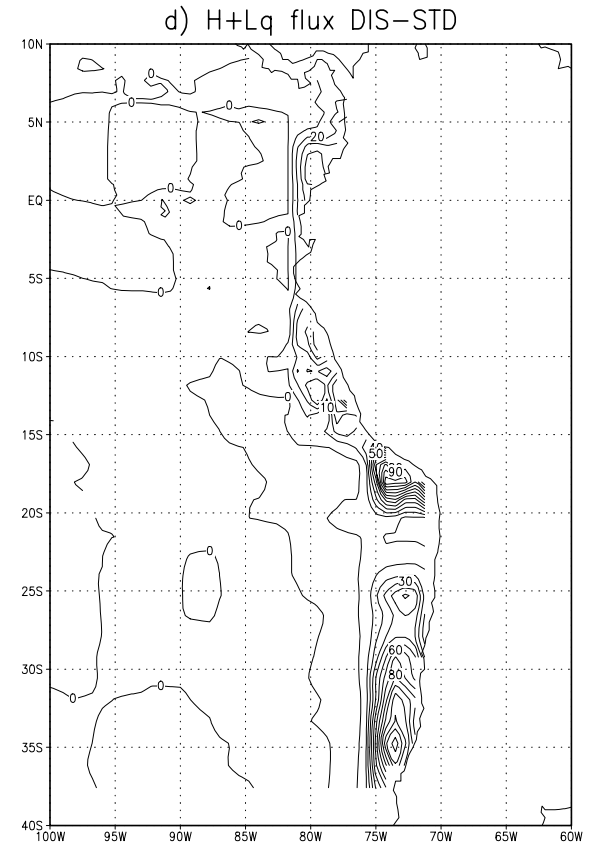
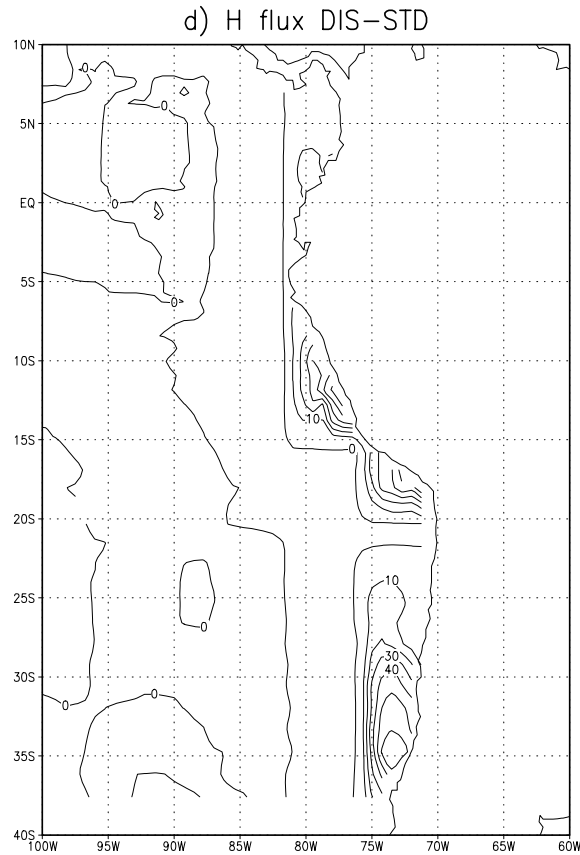
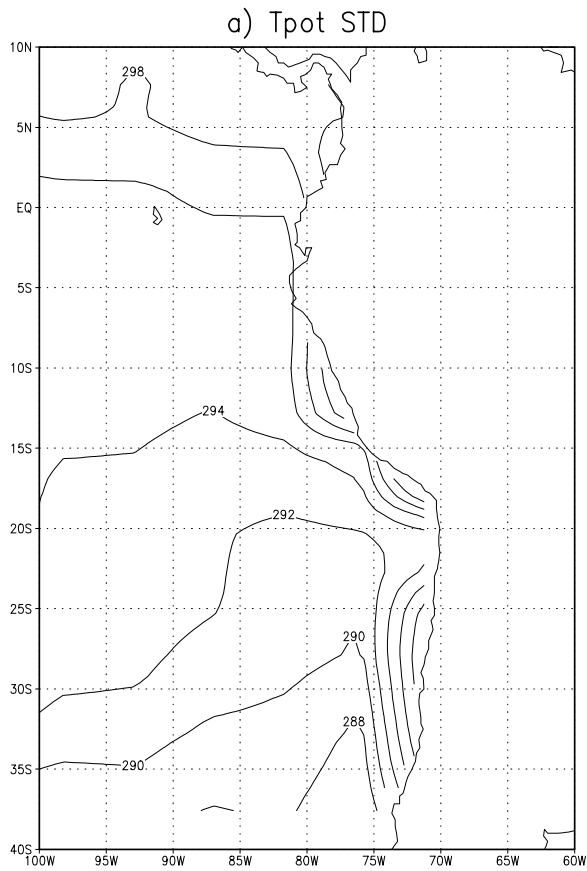
ENSO : amplitude trop faible,  
phase saisonnière mauvaise.

Nino3 interannuel Ctrl1



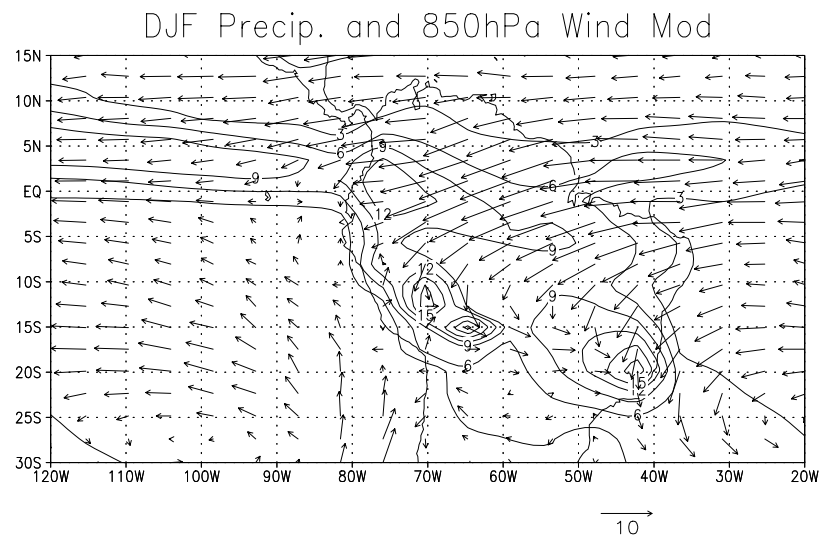
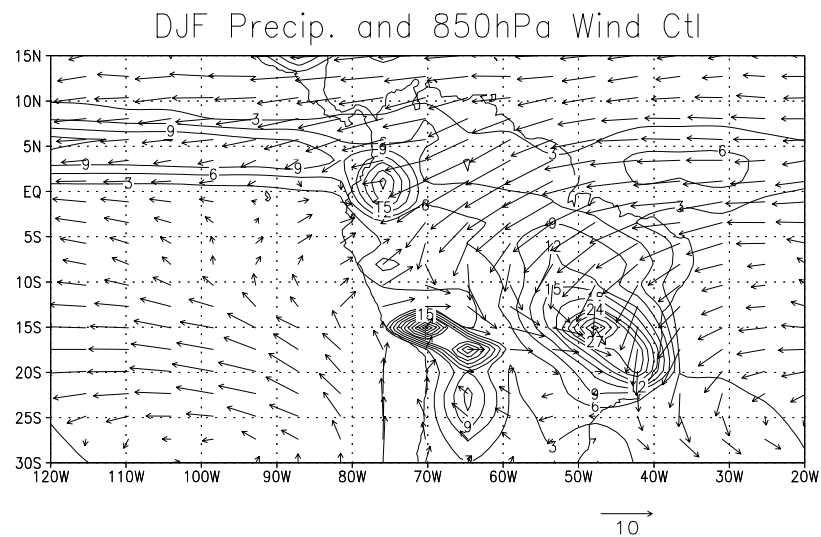
# Changement 1 : couplage à la côte (mailles mixtes atmos-océan)

Pb : flux turbulents erronés car profil unique sur océan/continent



## Problème 2 : précipitations orographiques

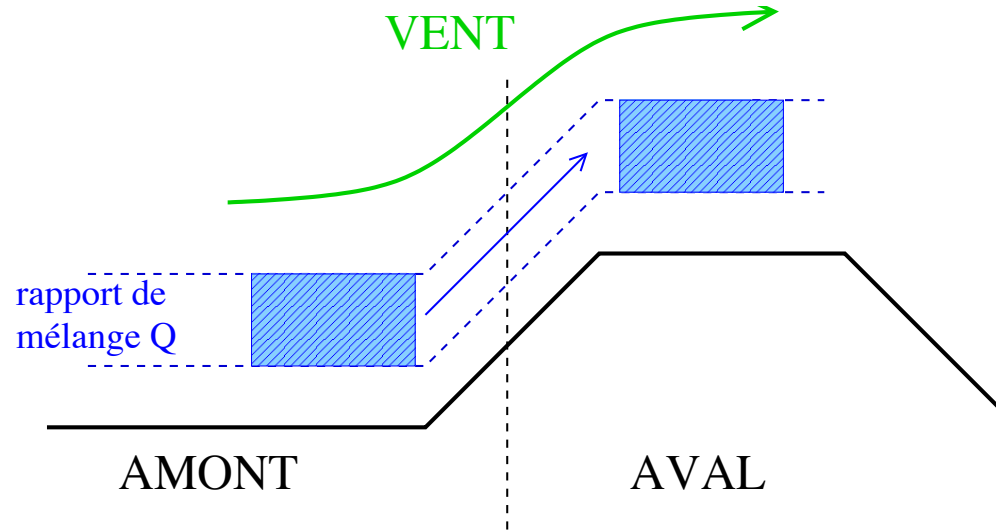
- Anomalies de vent de surface (et de pompage d'Ekman) à l'est du bassin (DJF surtout)



Pas de condensation  
au cours du transport



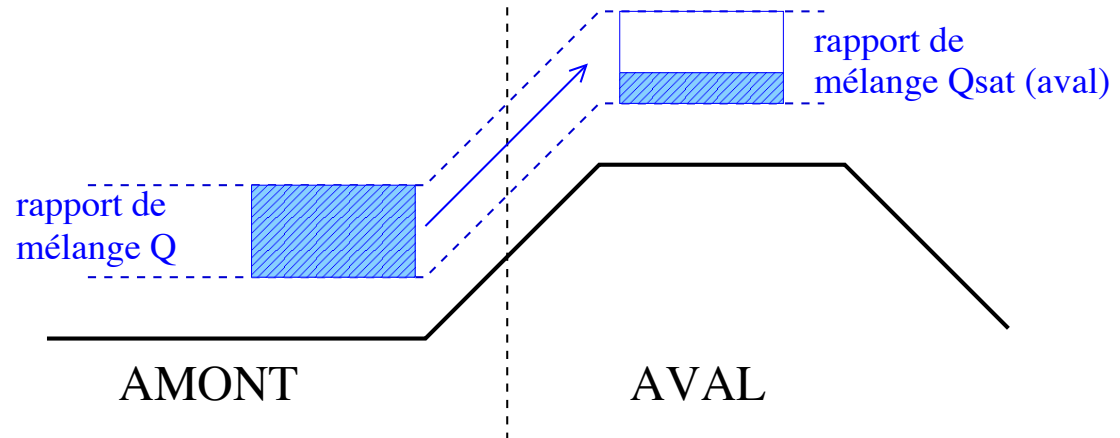
Précipitations sur  
les sommets.



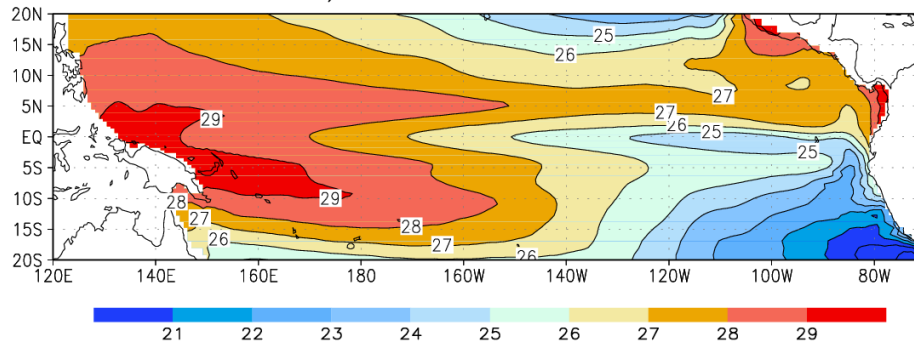
Condensation  
au cours du transport



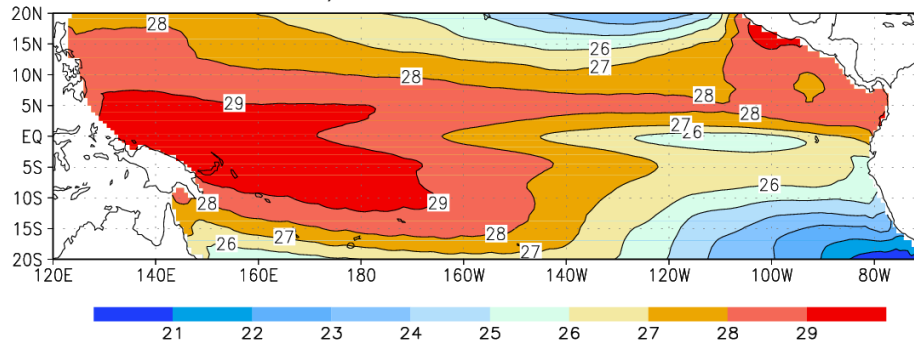
Précipitations sur  
les pentes.



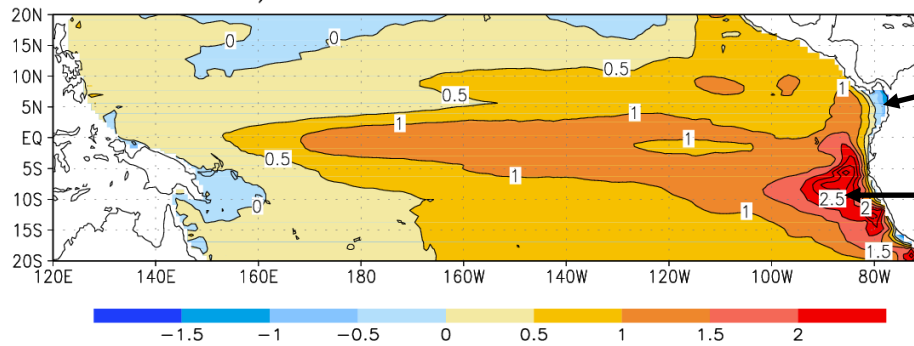
a) mean SST Ctrl 1



b) mean SST Ctrl 2



c) mean SST Ctrl 2 - Ctrl 1



Rétroactions dans bande équatoriale

➤ Conséquences globales dans le Pacifique

Improved coupling  
At the coast: cooling

Spurious upwelling  
Corrected: warming

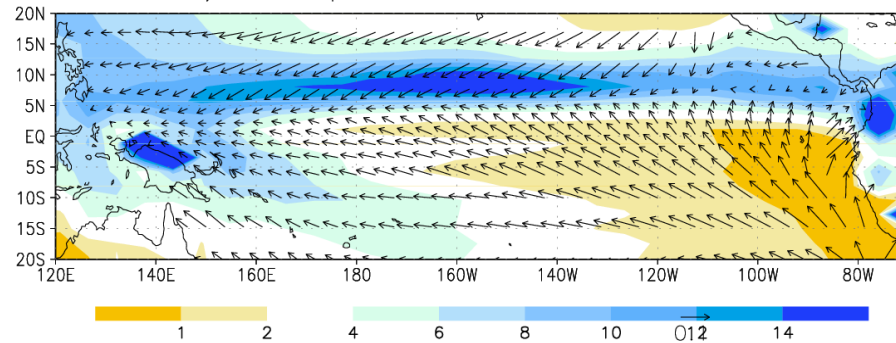


Précipitations : ITCZ plus proche de l'équateur (et plus de précips orographiques)

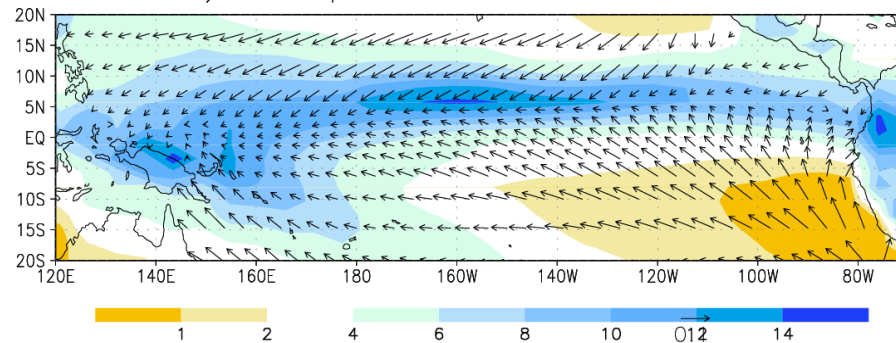
Precipitation and wind stress  
In the two models:

Ctrl2 (warmer):  
Weaker trade winds  
ITCZ closer to the equator  
+ local changes

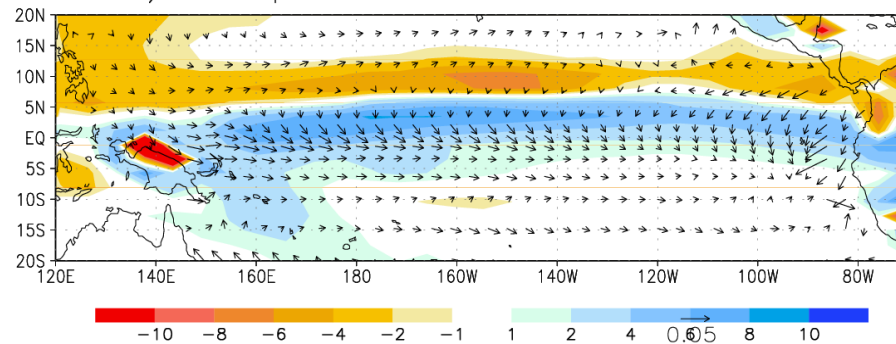
a) Precip. and Wind Stress Ctrl1



b) Precip. and Wind Stress Ctrl2

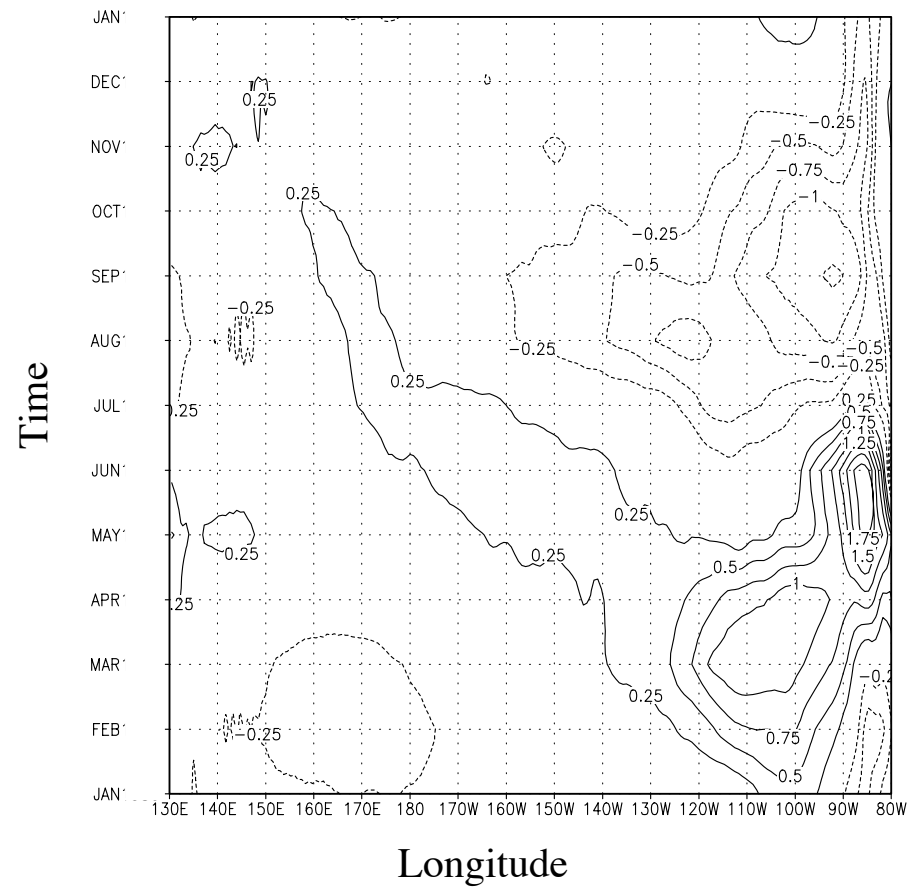


c) Precip. and Wind Stress Ctrl2-Ctrl1

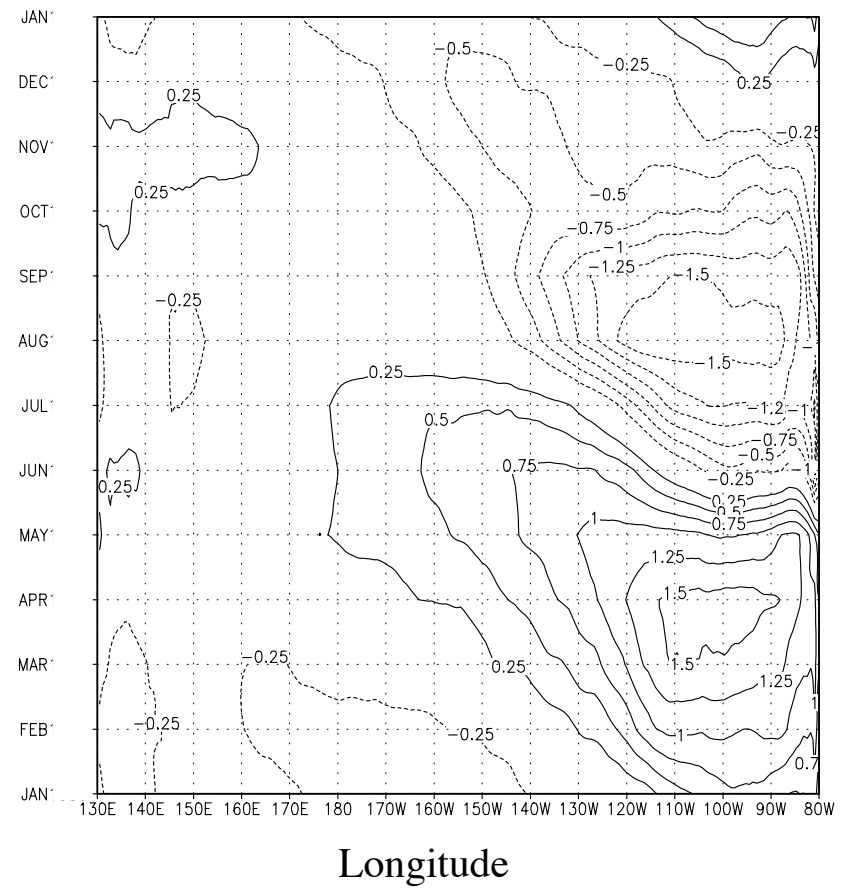


# Cycle saisonnier (presque) corrigé

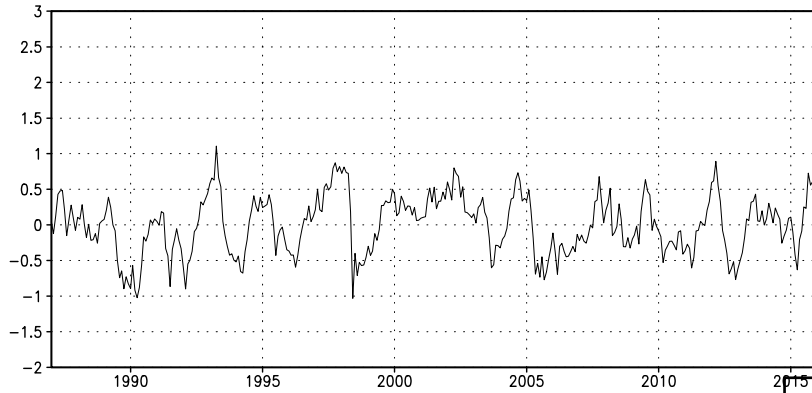
a) Ctl



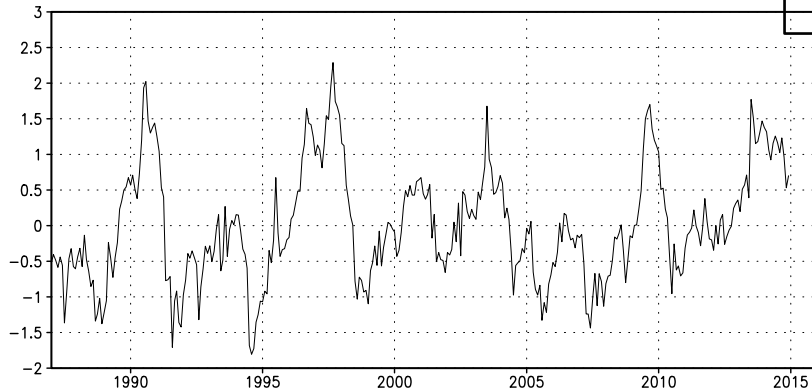
b) Mod



Nino3 interannuel Ctrl1



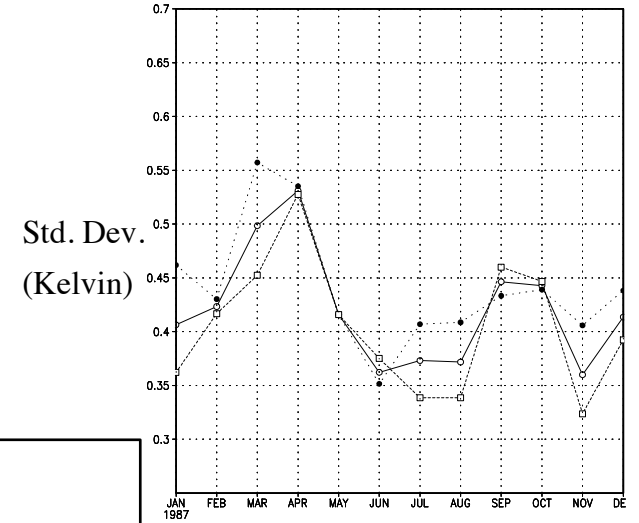
Nino3 interannuel Ctrl2



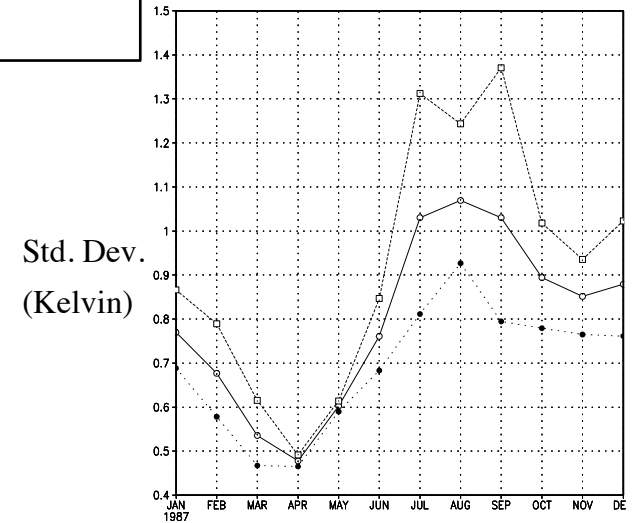
**ENSO :**

- Amplitude, période, skewness
- Cycle saisonnier

Ctrl 1



Ctrl 2

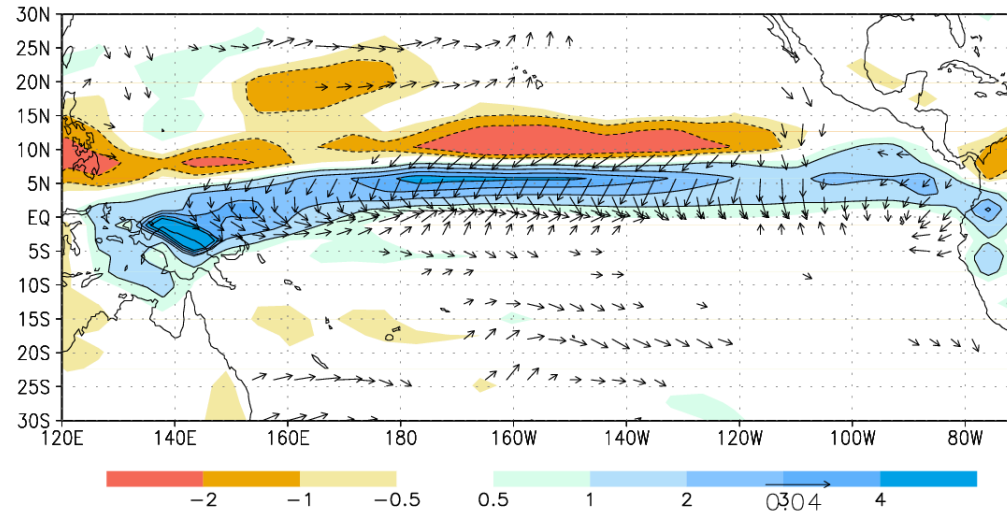


# Cause ? ITCZ position

Ctrl1:  
ITCZ move North-South  
Heating off-equator  
Stronger off-equatorial curl  
Weaker equatorial wind

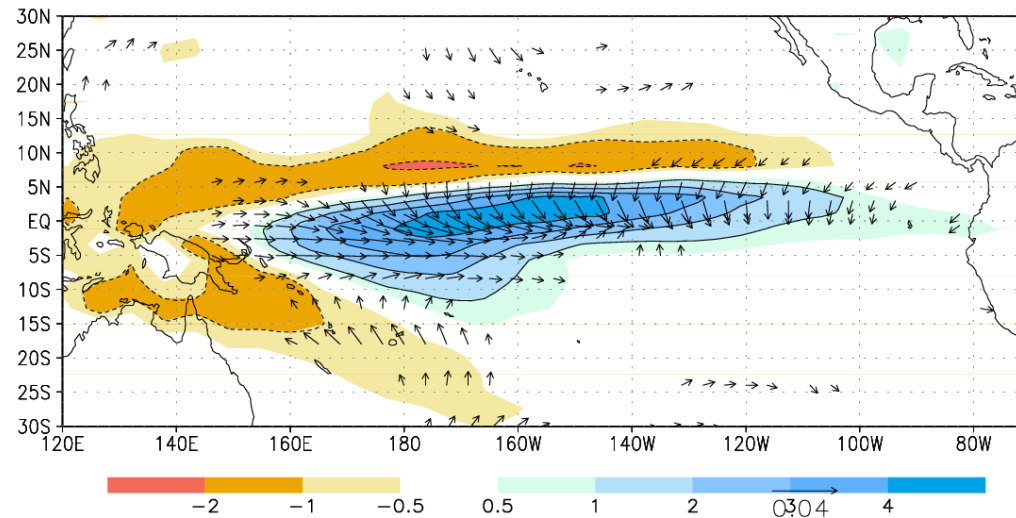
### Precipitation and wind stress regression on ENSO

#### Ctrl 1



Ctrl2:  
ITCZ moves also West-East  
Heating on equator  
Weaker curl  
Stronger equatorial wind

#### Ctrl 2



## Morale(s)

- En présence de (très) fortes rétroactions, difficile d'identifier l'origine d'erreurs.  
En particulier, la structure spatiale peut être très différente de celle d'ENSO / état moyen  
Sources potentielles très variées
- Stratégie = revenir aux fondamentaux ?
- ENSO : besoin d'une « warm pool » (mouvements est-ouest de l'ITCZ)
- Phasage : cycle saisonnier Pacifique est (upwelling / mélange, pas SST)