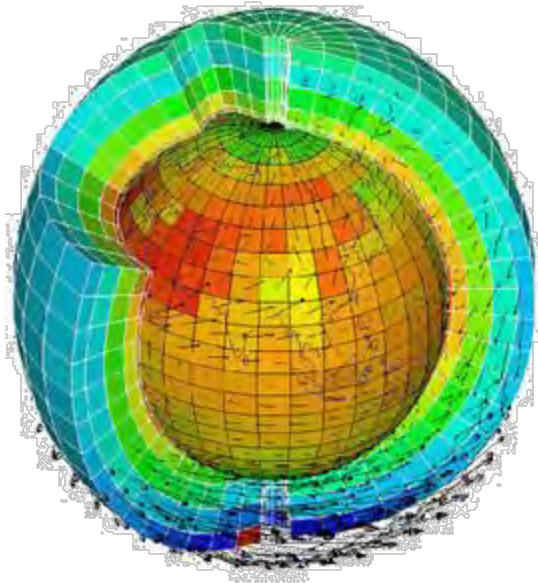


# Model-Data comparison of heat and momentum fluxes over tropical oceans



VS.



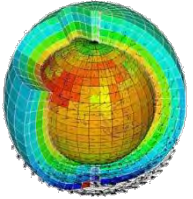
**Alina Găinușă-Bogdan, Pascale Braconnot**

Laboratoire des Sciences du Climat et de l'Environnement, Saclay, France



**Data...**

# Data...

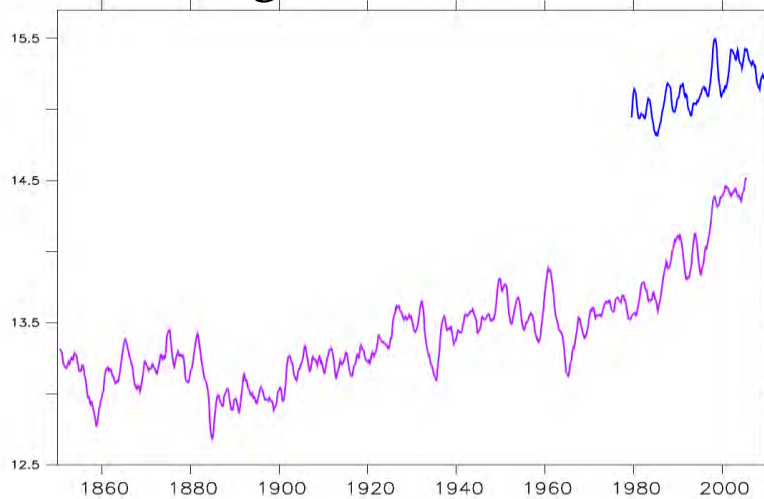


IPSL historical simulations:

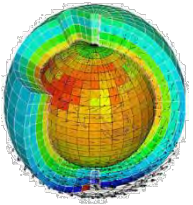
Coupled – “IPSL-CM5A” (3 exp.)

Atmosphere stand-alone – “AMIP” (5 exp.)

global ST (°C)



# Data...

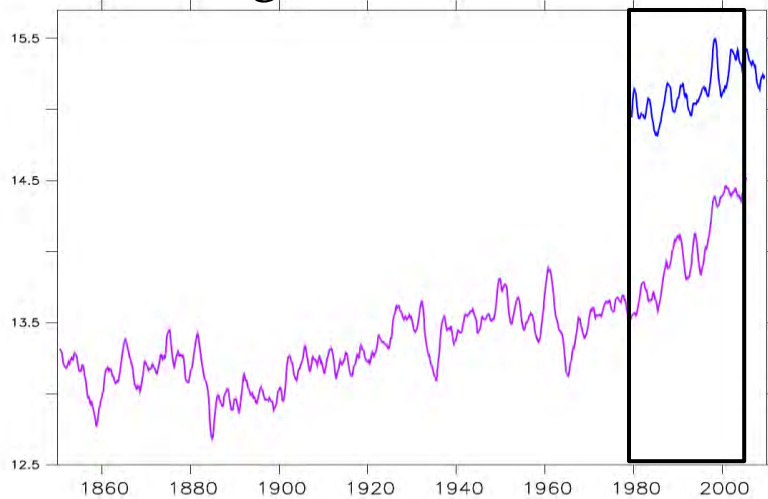


IPSL historical simulations:

Coupled – “IPSL-CM5A” (3 exp.)

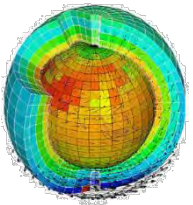
Atmosphere stand-alone – “AMIP” (5 exp.)

global ST (°C)



1979 - 2005

# Data...

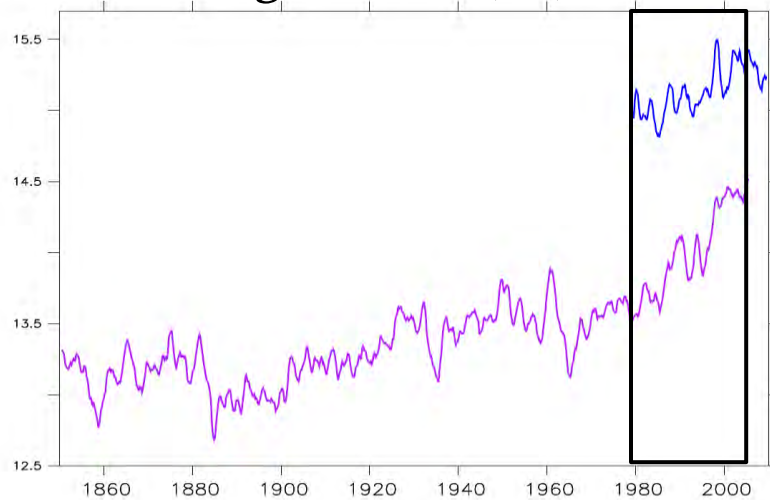


IPSL historical simulations:

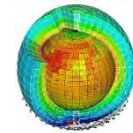
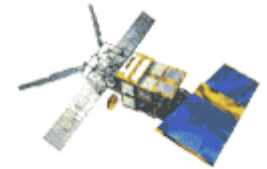
Coupled – “IPSL-CM5A” (3 exp.)

Atmosphere stand-alone – “AMIP” (5 exp.)

global ST (°C)



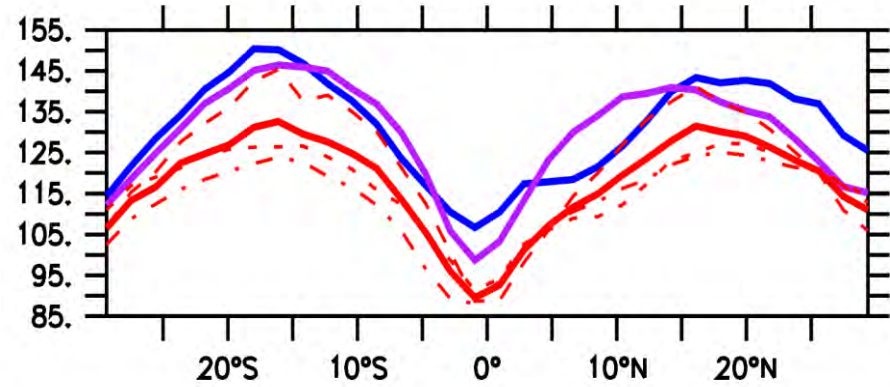
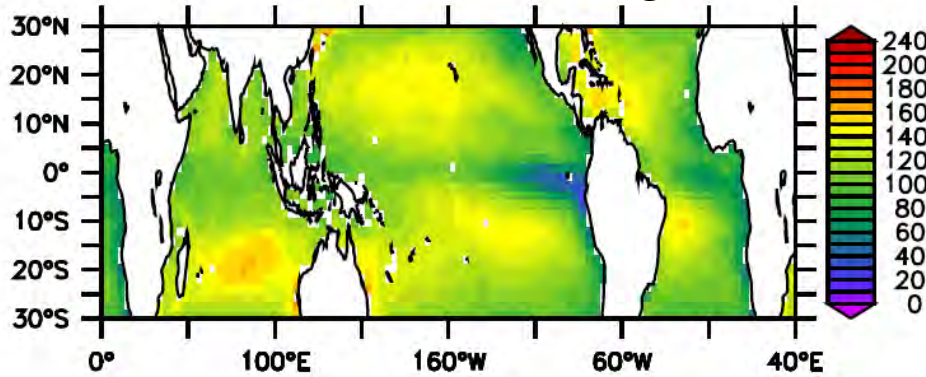
1979 - 2005



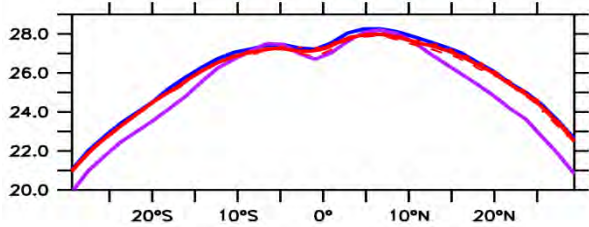
**HOAPS<sub>3</sub>** (1988-2005)  
**Da Silva** (1945-1989)  
**OAF<sub>lux</sub>** (1958-2009)  
**ERS** (1993-1998)

# Latent heat flux – climatological annual mean [W/m<sup>2</sup>]

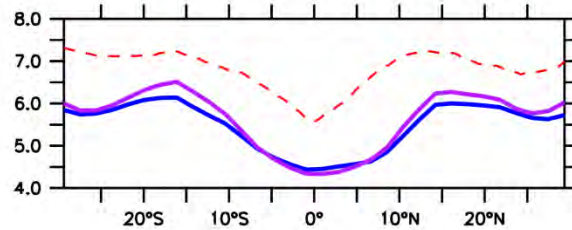
Observational average



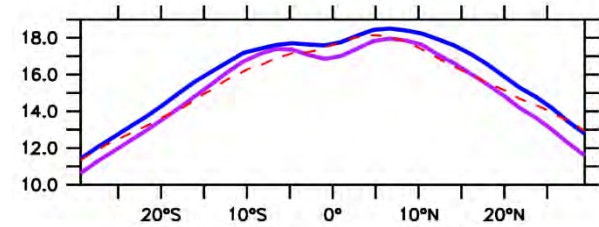
Sea surface temperature [°C]



Surface wind [m/s]



Specific humidity [g/kg]

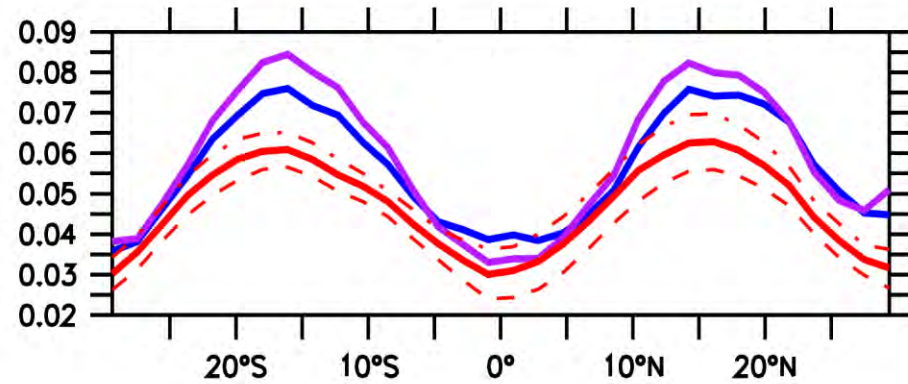
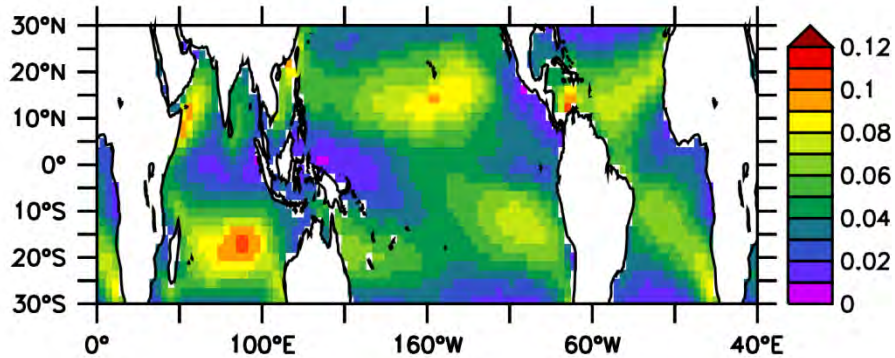


- |   |   |
|---|---|
| <span style="color: blue;">—</span> Atmospheric model (1979-2005) | <span style="color: red;">- - -</span> HOAPS (1988-2005)    |
| <span style="color: purple;">—</span> Coupled model (1979-2005)   | <span style="color: red;">- · -</span> Da Silva (1945-1989) |
| <span style="color: red;">—</span> Observational average          | <span style="color: red;">- - -</span> OAFIux (1958-2009)   |



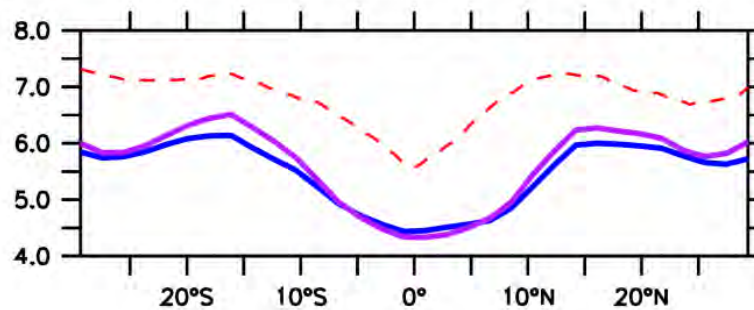
# Surface wind stress – climatological annual mean [Pa]

Observational average



--- ERS (1993-1998)  
- - - Da Silva (1945-1989)

## Surface wind [m/s]

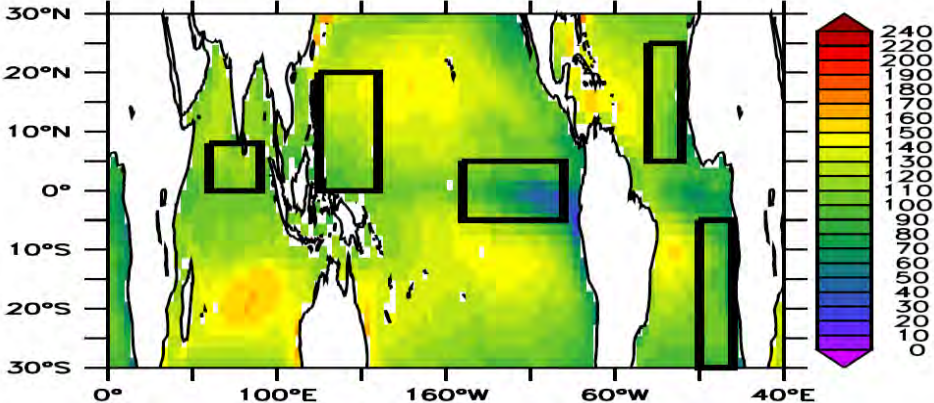


— Atmospheric model (1979-2005)    - - - HOAPS (1988-2005)  
— Coupled model (1979-2005)  
— Observational average

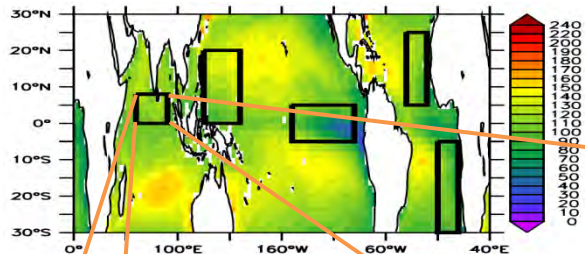
# Latent heat flux

## Seasonal variations

Latent heat flux – climatological annul mean [W/m<sup>2</sup>]



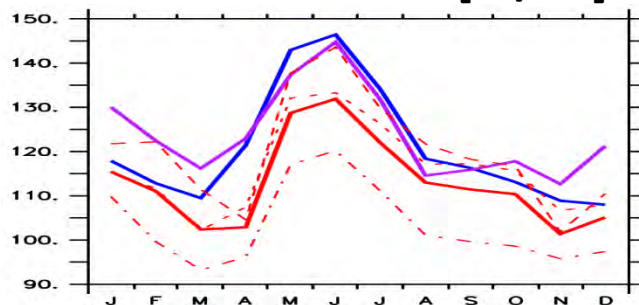




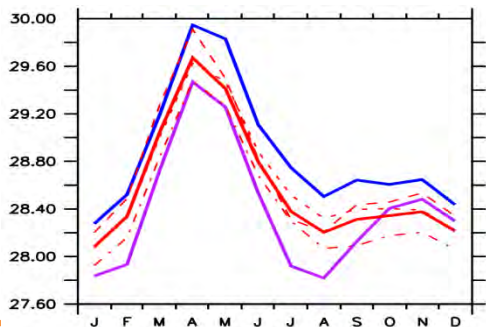
# Latent heat flux Seasonal variations

Indian Ocean ( $60^\circ\text{E}-90^\circ\text{E}; 0^\circ\text{N}-8^\circ\text{N}$ )

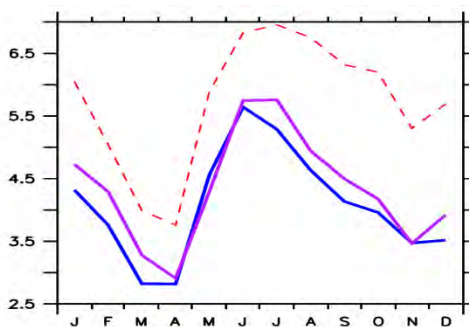
Latent heat flux [ $\text{W}/\text{m}^2$ ]



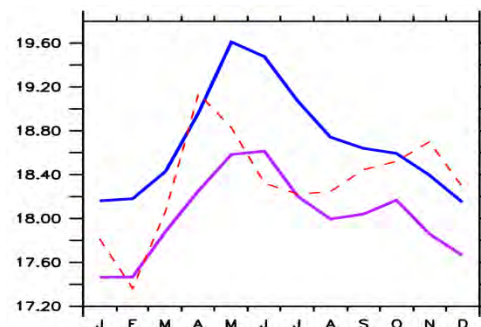
Sea surface temperature [ $^\circ\text{C}$ ]



Surface wind speed [ $\text{m}/\text{s}$ ]

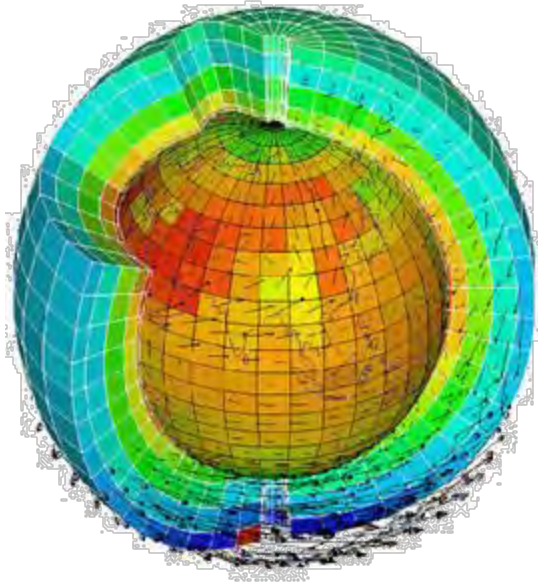


Specific humidity [ $\text{g}/\text{kg}$ ]



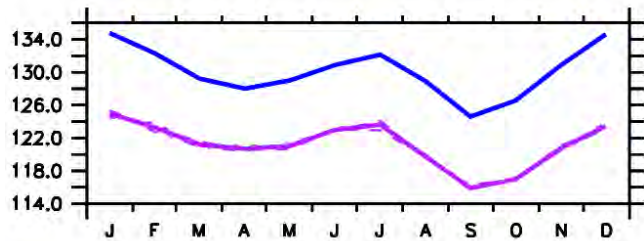
- |   |   |
|---|---|
| <span style="color: blue;">—</span> Atmospheric model (1979-2005) | <span style="color: red;">- - -</span> HOAPS (1988-2005)      |
| <span style="color: purple;">—</span> Coupled model (1979-2005)   | <span style="color: red;">- . - .</span> Da Silva (1945-1989) |
| <span style="color: red;">—</span> Observational average          | <span style="color: red;">- - -</span> OAFlex (1958-2009)     |

# Thank You!



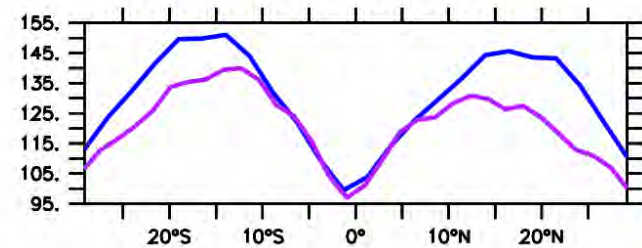
# CM5A vs CM4 latent heat flux comparison

FLAT seasonal cycle over ocean (spatial average) ( $W/m^2$ )



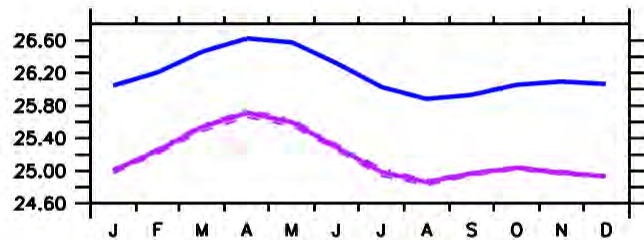
— IPSLCM4 (1979–2000)  
 — IPSLCM5A\_123(1979–2000)  
 - - IPSLCM5A\_1(1979–2000)  
 - - IPSLCM5A\_2(1979–2000)  
 - - IPSLCM5A\_3(1979–2000)

FLAT ANM ocean zonal means ( $W/m^2$ )



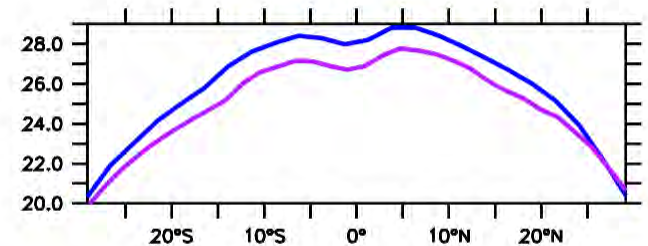
— IPSLCM4 (1979–2000)  
 — IPSLCM5A\_123(1979–2000)  
 - - IPSLCM5A\_1(1979–2000)  
 - - IPSLCM5A\_2(1979–2000)  
 - - IPSLCM5A\_3(1979–2000)

TSOL seasonal cycle over ocean (spatial average) ( $^{\circ}C$ )



— IPSLCM4 (1979–2000)  
 — IPSLCM5A\_123(1979–2000)  
 - - IPSLCM5A\_1(1979–2000)  
 - - IPSLCM5A\_2(1979–2000)  
 - - IPSLCM5A\_3(1979–2000)

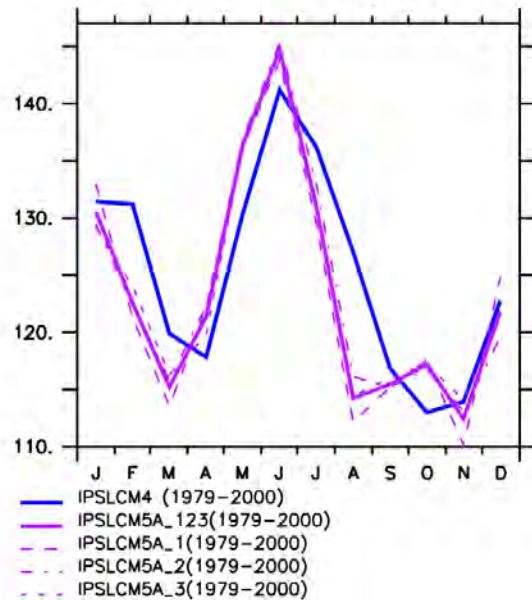
TSOL ANM ocean zonal means ( $^{\circ}C$ )



— IPSLCM4 (1979–2000)  
 — IPSLCM5A\_123(1979–2000)  
 - - IPSLCM5A\_1(1979–2000)  
 - - IPSLCM5A\_2(1979–2000)  
 - - IPSLCM5A\_3(1979–2000)

# CM5A vs CM4 latent heat flux seasonality over the Indian Ocean

FLAT seasonal cycle Indian Ocean box (spatial average) ( $W/m^2$ )



TSOL seasonal cycle Indian Ocean box (spatial average) ( $^{\circ}C$ )

