

Correction a posteriori de t_{2m}/t_{2m_max}

Ionela Musat, Frédéric Hourdin,
Frédérique Cheruy, Yann Meurdesoif

Plan de la présentation

1. Instabilités des diagnostics à 2m
2. La détection des instabilités. Distribution et statistique des instabilités dans les simulations CMIP6
3. La méthode de correction
4. La validation
5. Les résultats CMIP6 avant et après correction

1. Instabilités des diagnostics à 2m (1/2)

Comment ?

- $t_{2m_max}(j) \gg t_{2m_max}(j-1)$
- $t_{2m_max}(j) \gg t_{2m_max}(j+1)$
- $q_{2m} < 0$

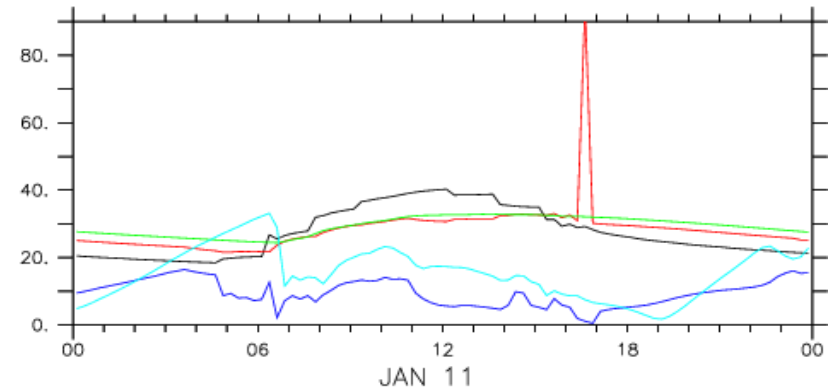
Quand ?

- cas stables
- vent très faible
- q_{surf} très élevé, près saturation
- q_{air} assez sec

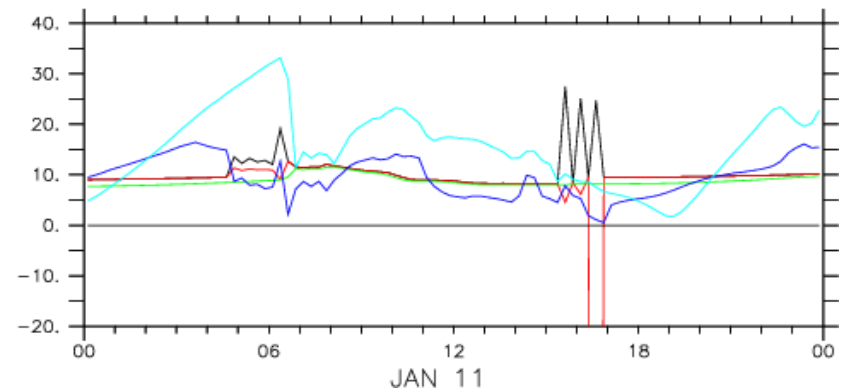
Où?

- S/ continents!

tsol, t2m, tair, 10*wind10m : 1979



qsurf, q2m, qair, 10*wind10m : 1979



1 Instabilités des diagnostics à 2m (2/2)

Comment ?

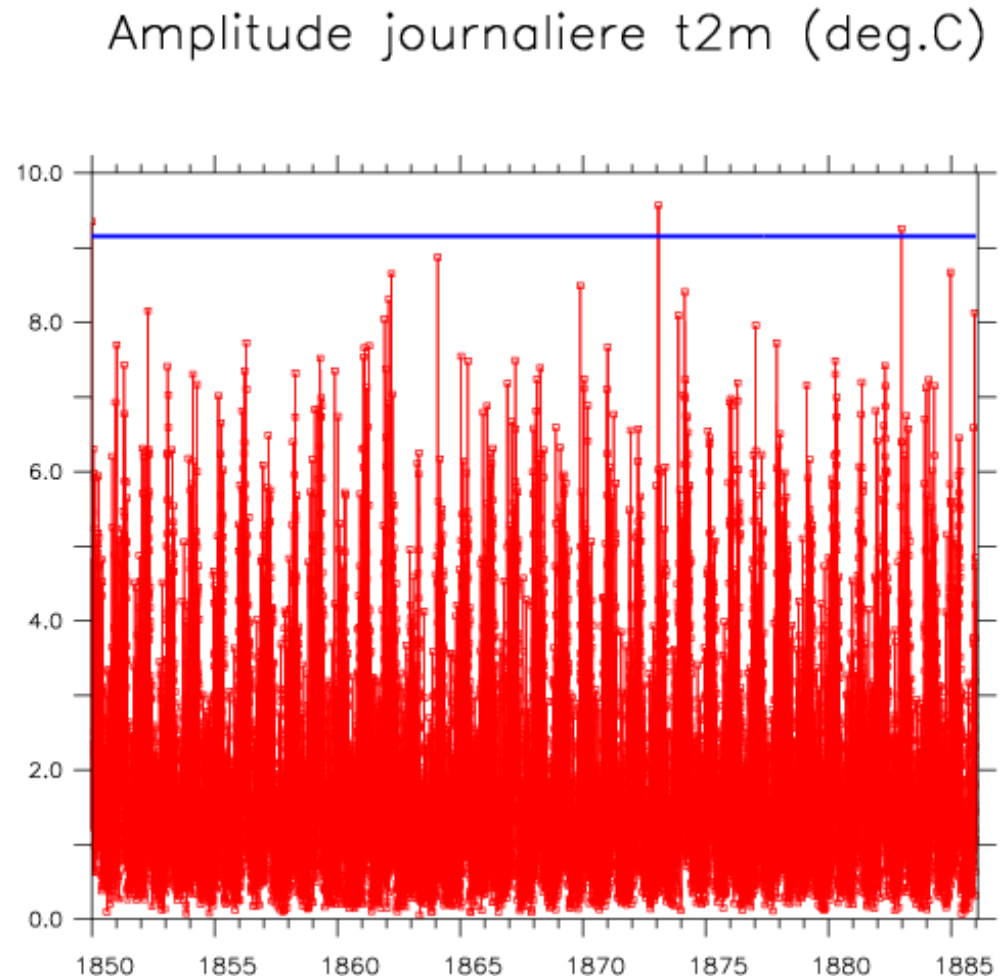
- $DAJ > \text{Seuil_DAJ}$
 $DAJ = t2m_max - t2m$
 $\text{Seuil_DAJ} = \text{fact} * DAJmax ;$
 - $\text{fact}=1.2$
 - $DAJmax = \max(DAJ)$ sur 36 ans
- $q2m > 0$

Quand ?

- cas stables
- vent très faible
- q_{surf} très élevé, près saturation
- q_{air} assez sec

Où ?

- S/ mailles mixtes océan-continent !



2. La détection (1/5)

- Les critères :

$$q2m_min < 0 \text{ ou } DAJ > \text{Seuil_DAJ}$$

$$DAJ = t2m_max - t2m$$

$$\text{Seuil_DAJ} = \text{fact} * DAJmax$$

$$\text{fact} = 1.2$$

$$DAJmax = \text{maximum DAJ sur 36 ans d'une simulation AmipA-Limit}$$

- Les simulations supplémentaires sur ada :

- AmipA-Cmip6 : identique Amip Cmip6 effectuée sur curie

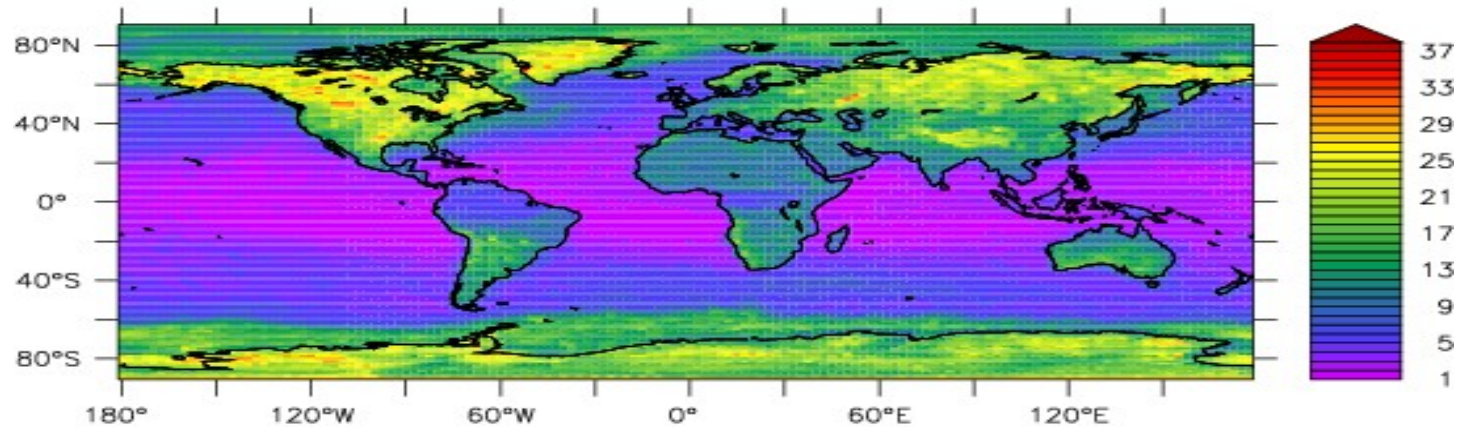
- AmipA-Limit : identique AmipA-Cmip6 + bornage t2m et q2m

$$t2m \in [tsol, temp]$$

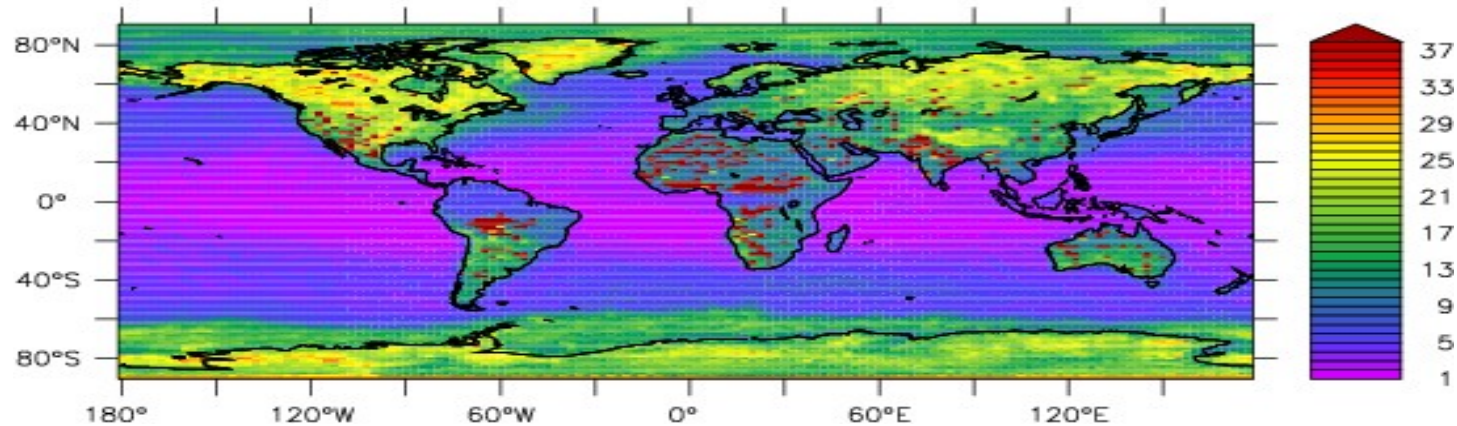
$$q2m \in [qsurf, ovap]$$

2. La détection (2/5)

DAJ Maximale : AmipA–Limit, 1979–2014

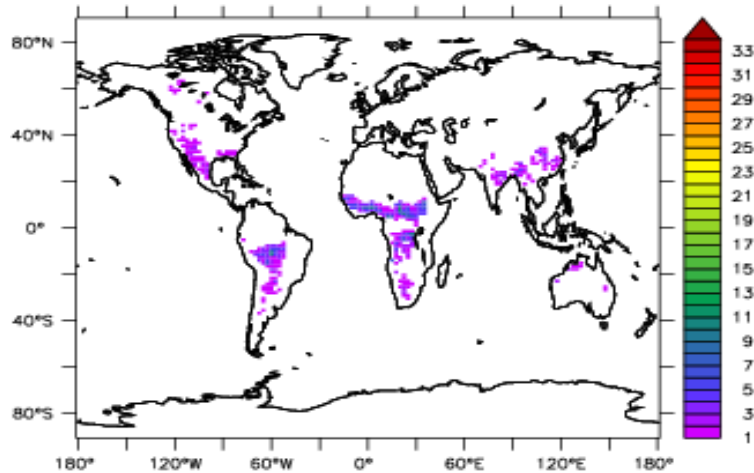


DAJ Maximale : AmipA–Cmip6, 1979–2014

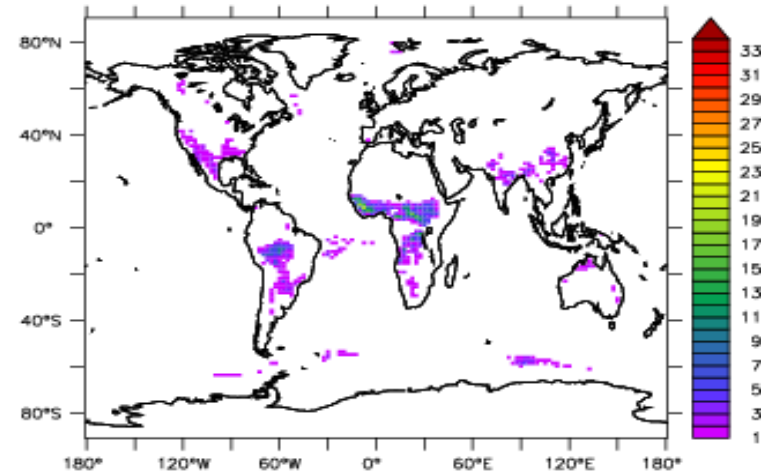


2. Distribution géographique des instabilités dans les simulations CMIP6 (3/5)

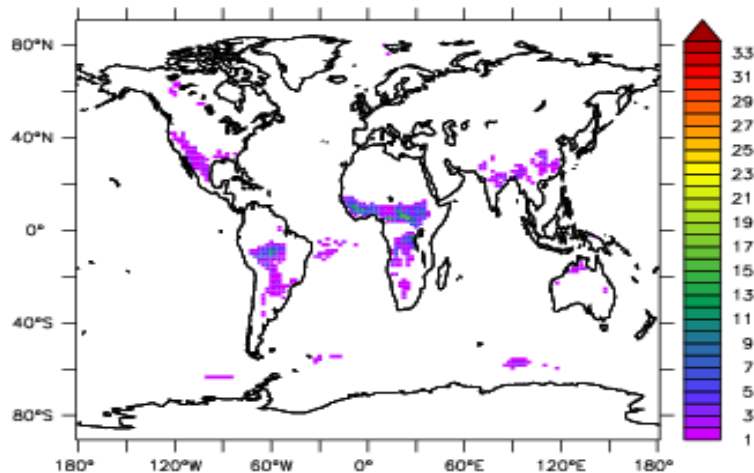
Nb. jours errones /an Amip



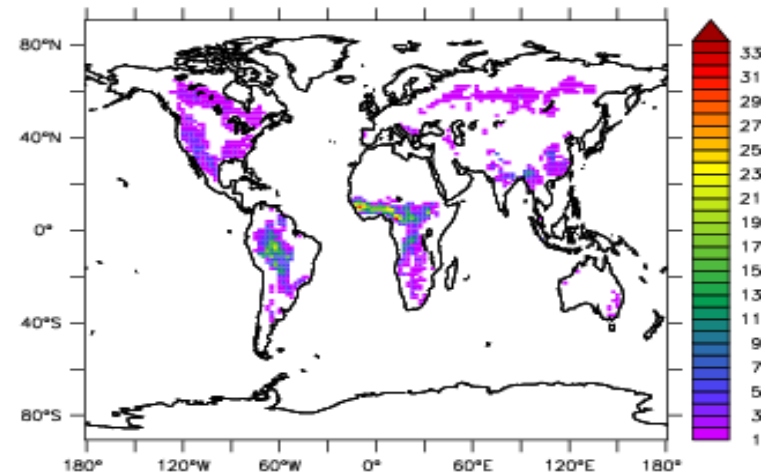
Nb. jours errones /an piControl



Nb. jours errones /an Historical

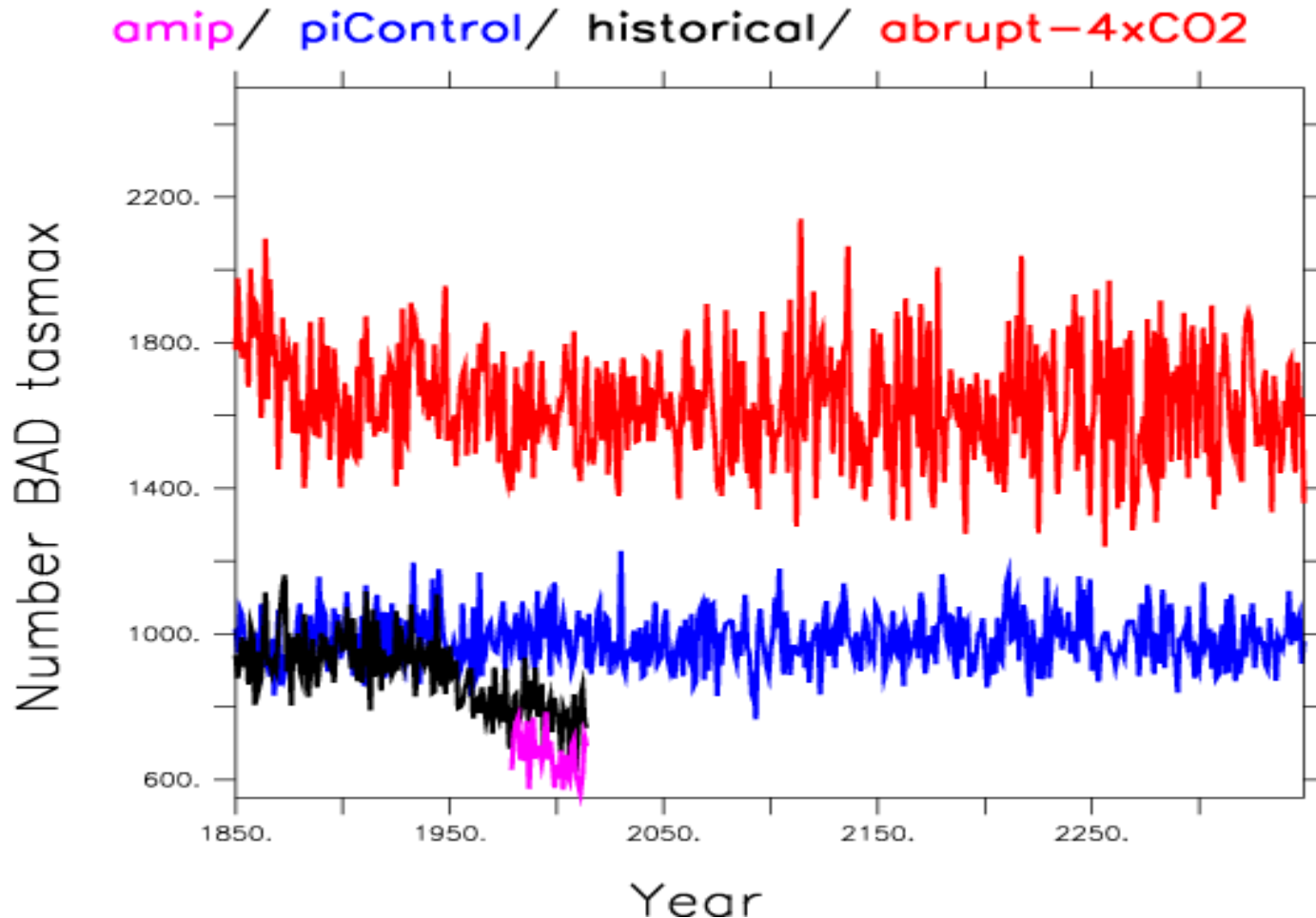


Nb. jours errones /an abrupt-4xCO2

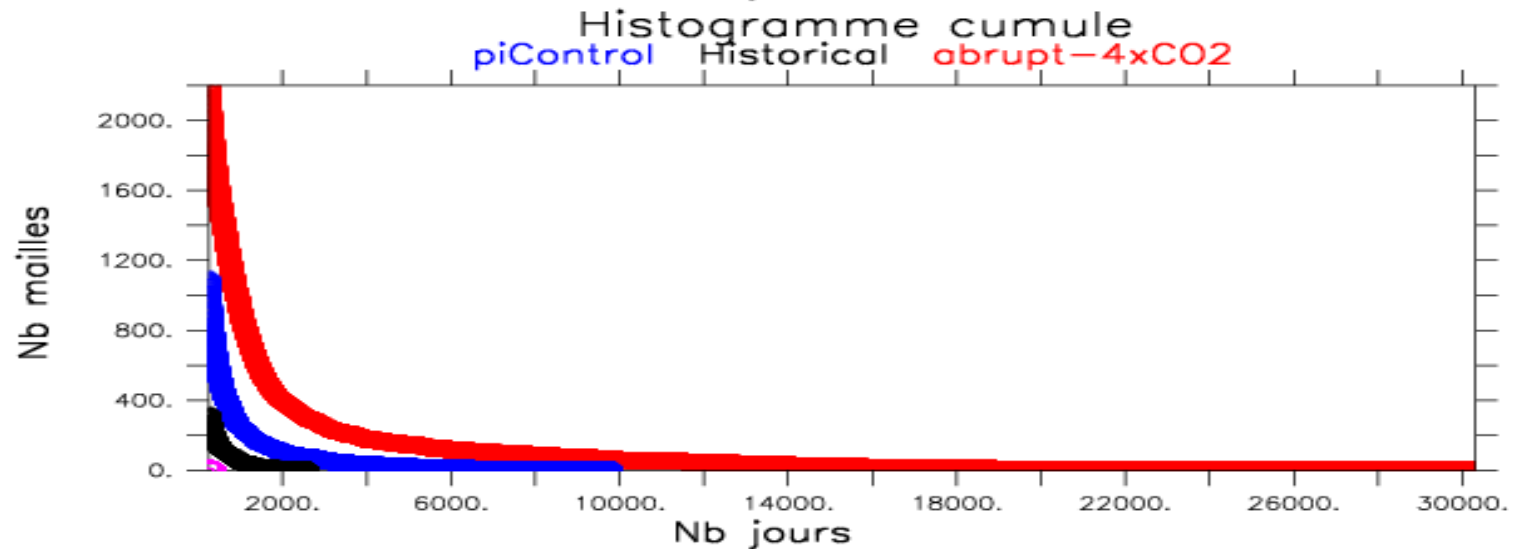
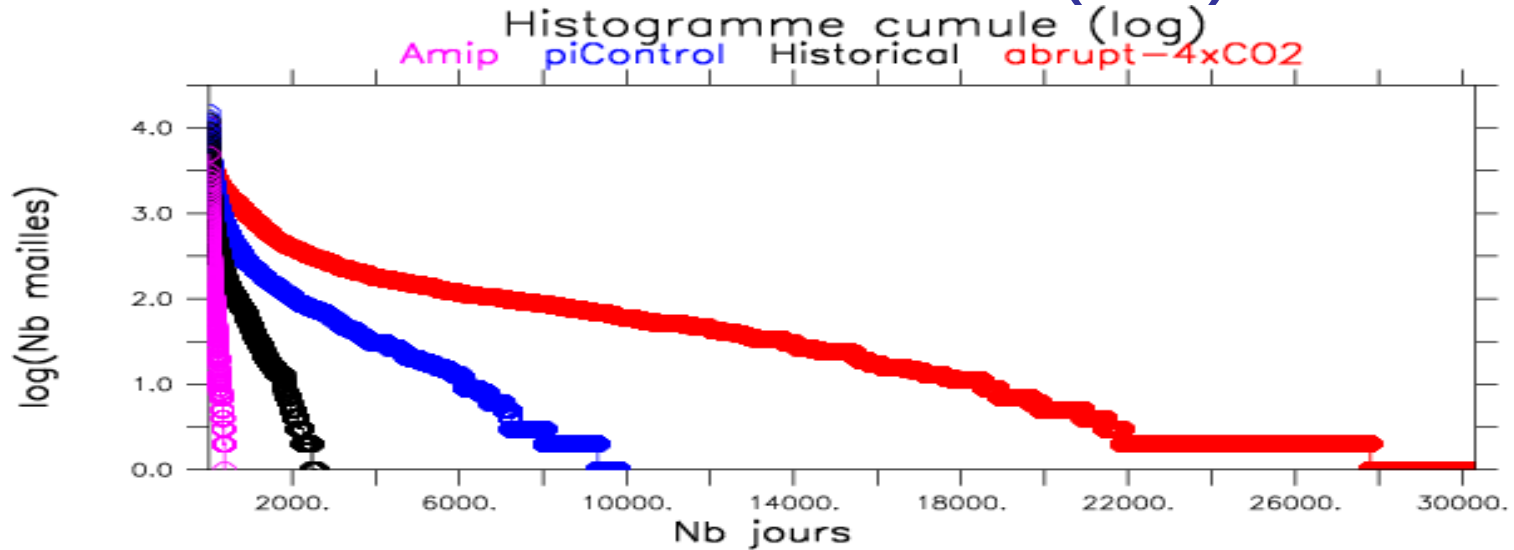


2. Statistique des instabilités dans les simulations CMIP6 (4/5)

Evolution BAD tasmax per year



2. Statistique des instabilités dans les simulations CMIP6 (5/5)



3. La méthode de correction

Les 3 étapes :

1/ DAJ corrigée :

1.1/ si 1 jour erroné : $DAJ_{cor}(j) = (DAJ(j-1) + DAJ(j+1))/2$

1.2/ si 2 jours erronés :

$$DAJ_{cor}(j) = (DAJ(j-1) + DAJ(j+2))/2$$

$$DAJ_{cor}(j+1) = (DAJ(j) + DAJ(j+2))/2$$

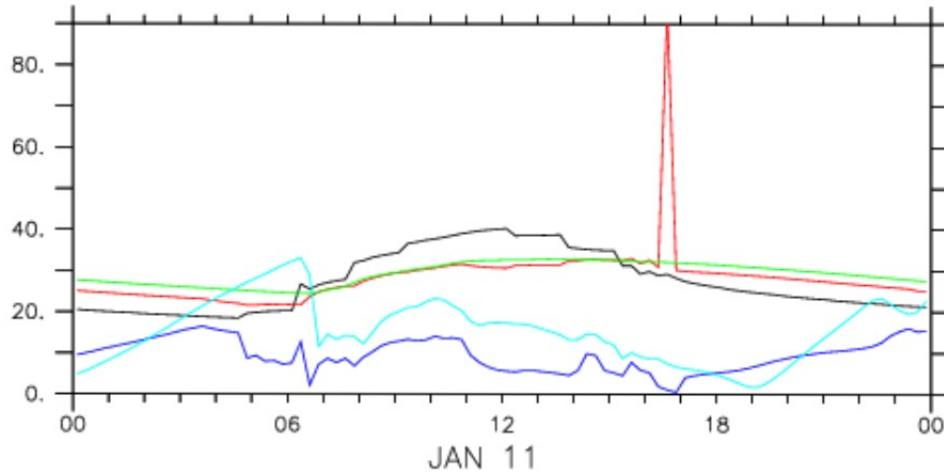
2/ tas corrigée : $t2m_{cor}(j) = t2m(j) + (DAJ_{cor}(j) - DAJ(j))/(N-1)$, N=96

3/ $t2m_{max}$ corrigée :

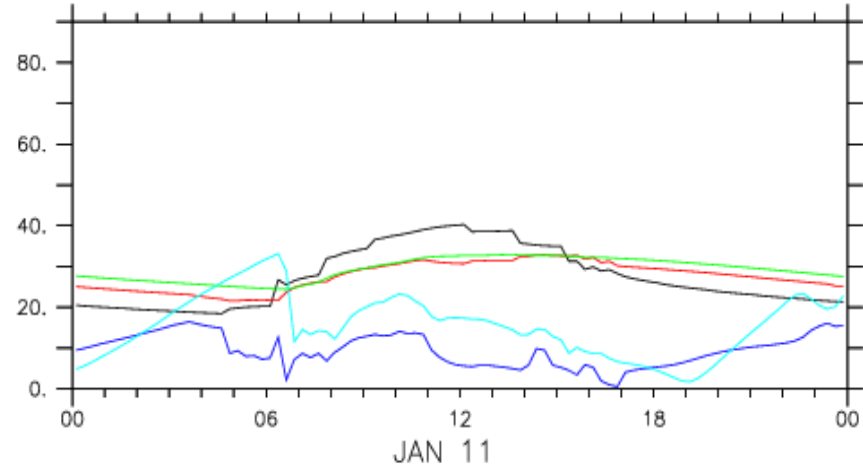
$$t2m_{max_{cor}}(j) = t2m_{cor}(j) + DAJ_{cor}(j)$$

4. La validation (1/8)

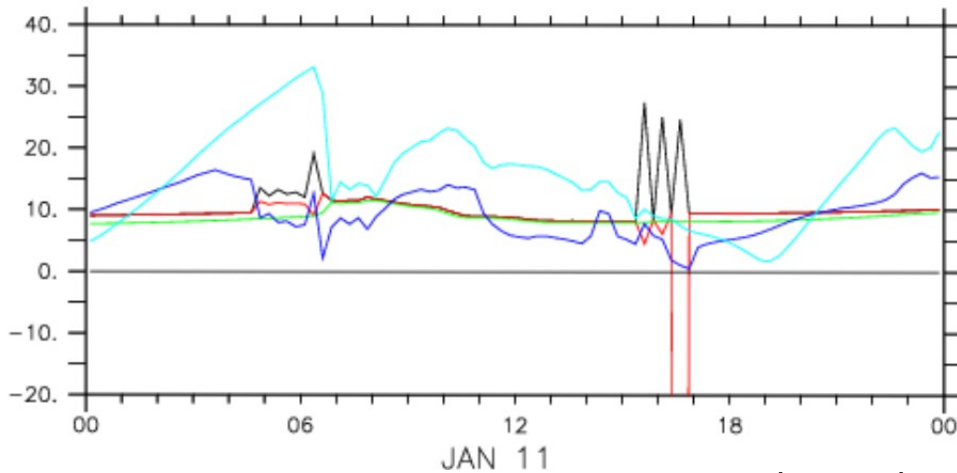
tsol, t2m, tair, 10*wind10m : 1979



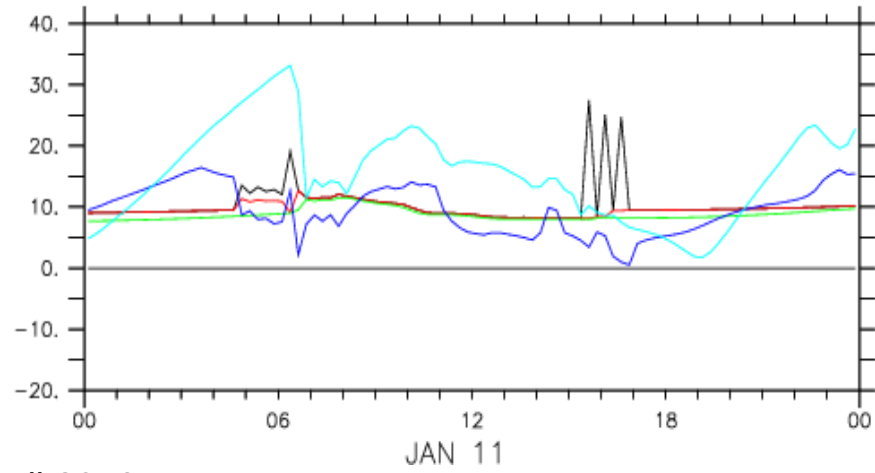
tsol, t2m, tair, 10*wind10m : 1979



qsurf, q2m, qair, 10*wind10m : 1979

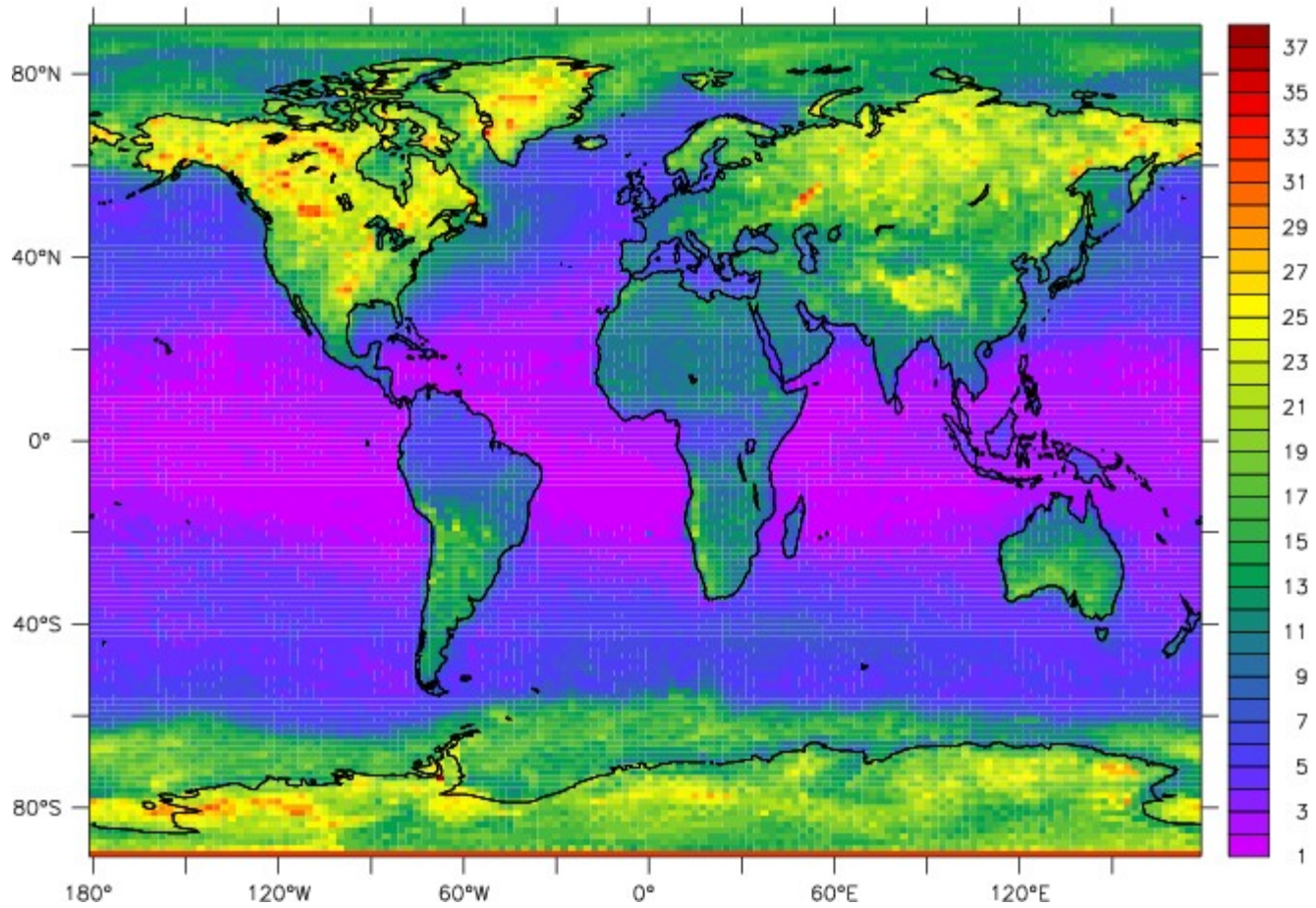


qsurf, q2m, qair, 10*wind10m : 1979



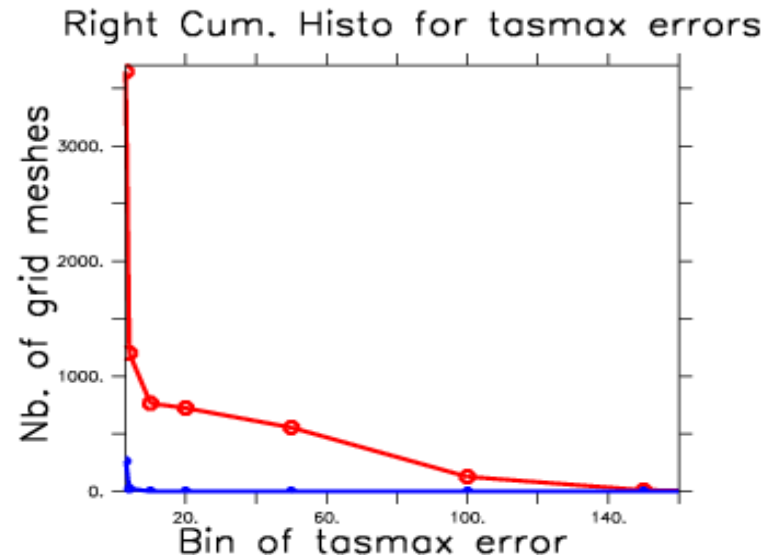
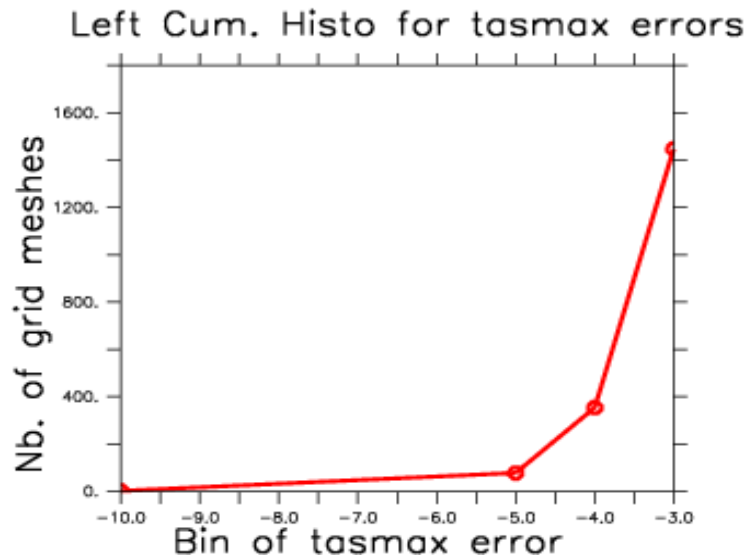
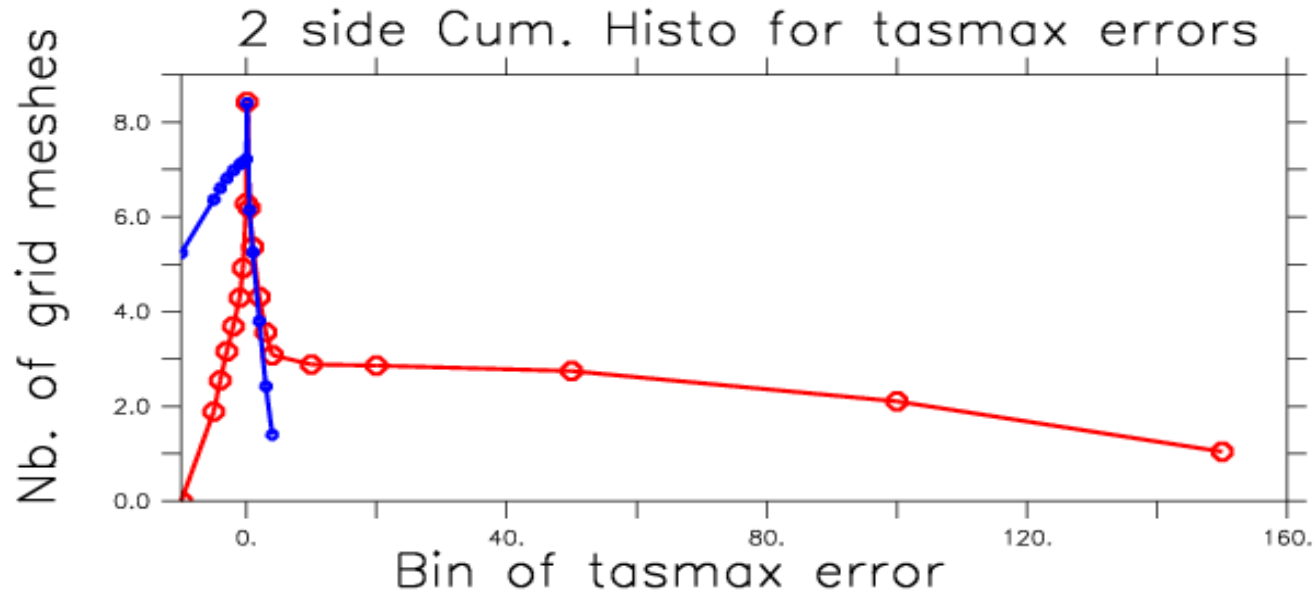
4. La validation (2/8)

DAJmax : AmipA-Cor

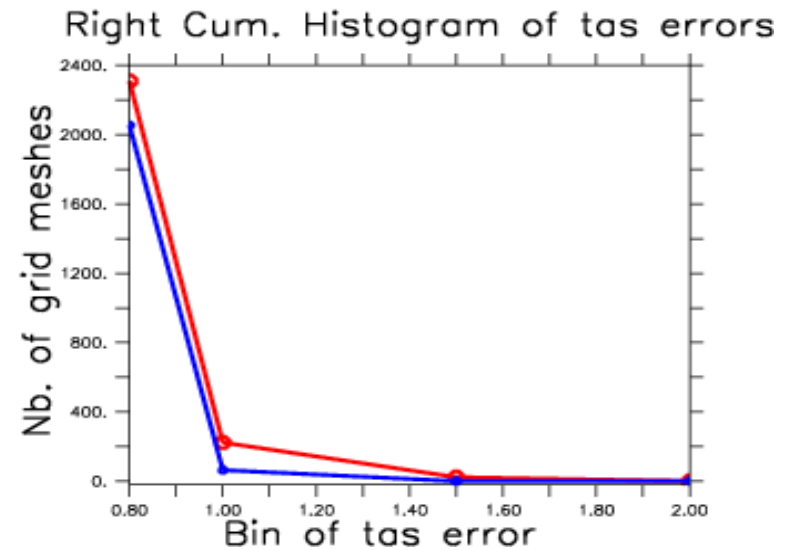
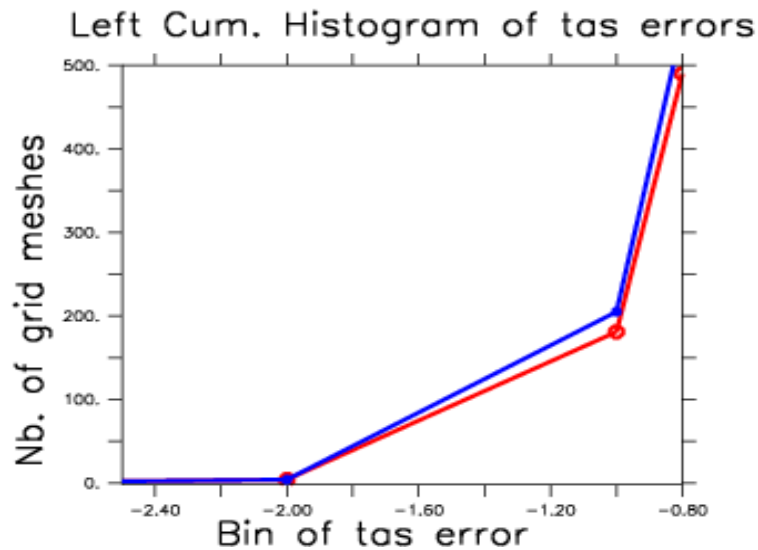
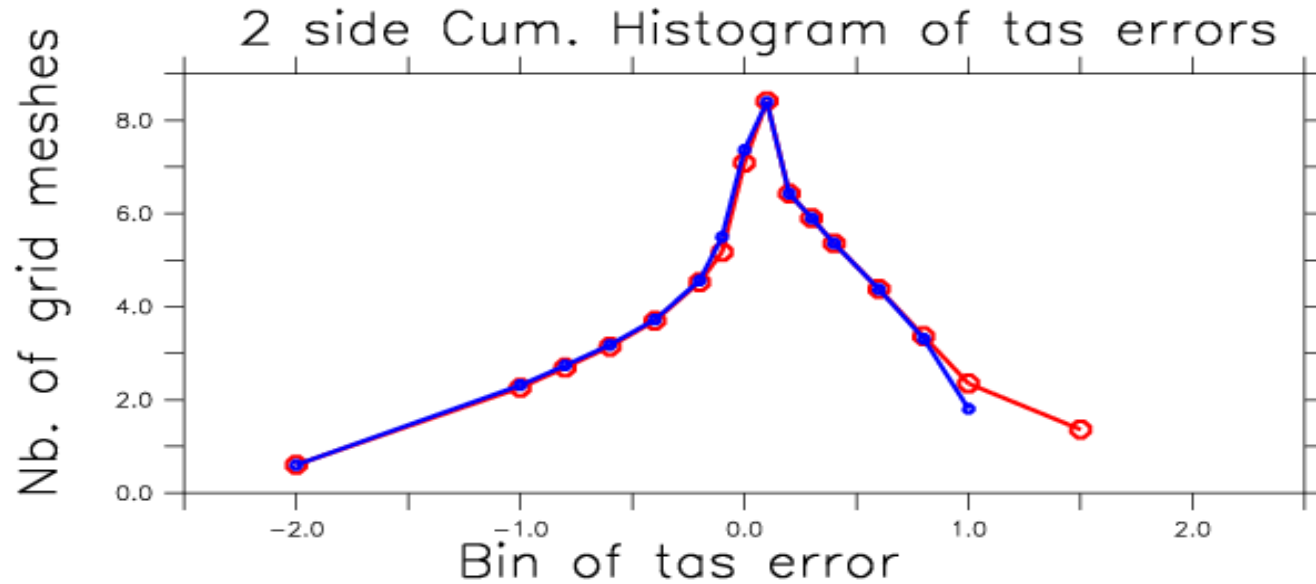


PedaLons le 1er Avril 2019

4. La validation (3/8)

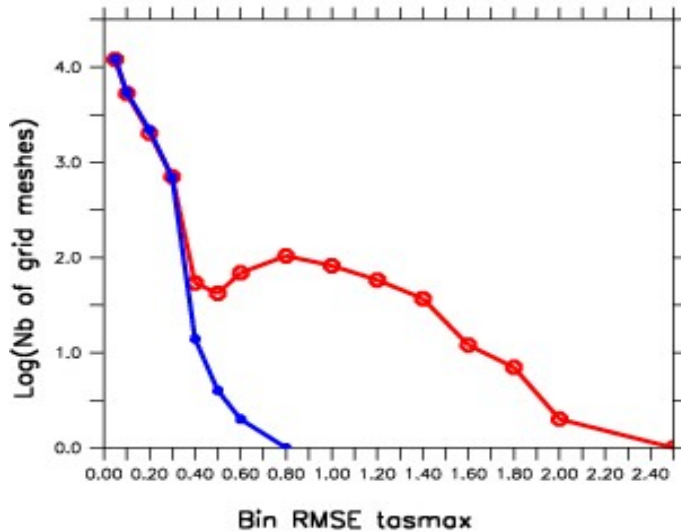


4. La validation (4/8)

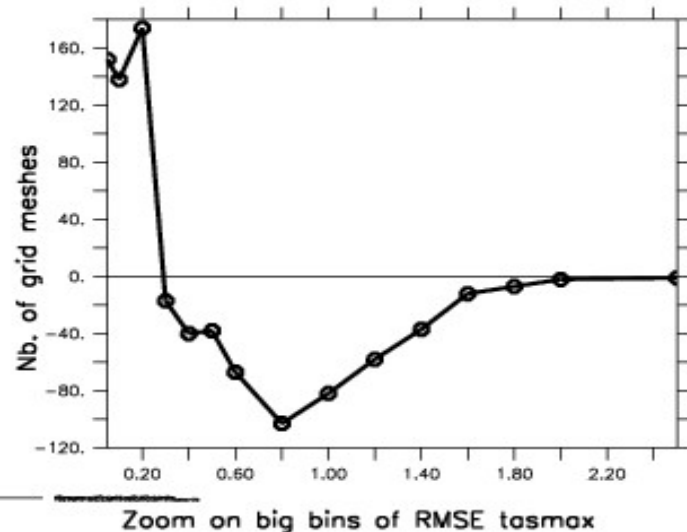


4. La validation (5/8)

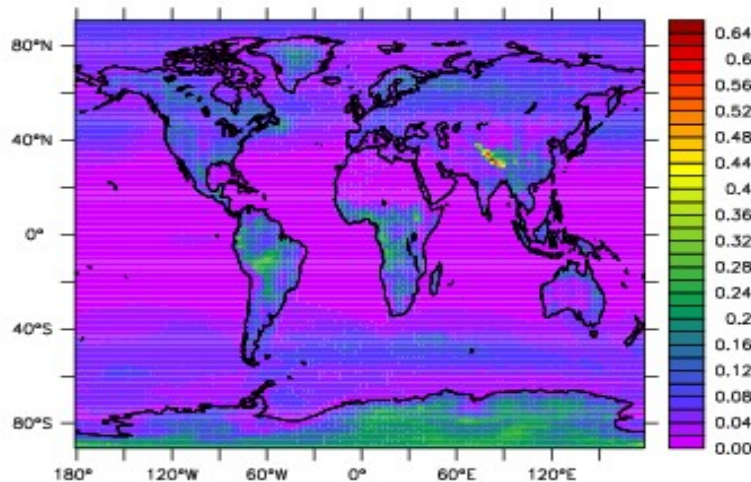
Histog.Log(RMSE tasmax)
CMIP6/LIM vs Cor/LIM



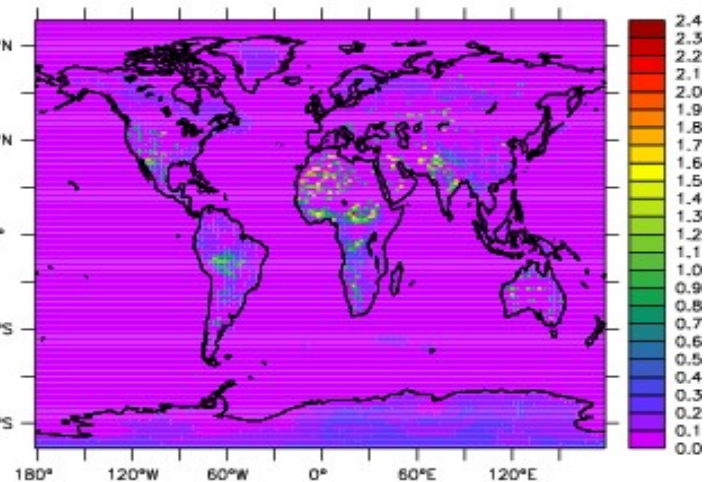
Histog. Difference for RMSE tasmax
(Cor/LIM - CMIP6/LIM)



RMSE tasmax : Cor/LIM

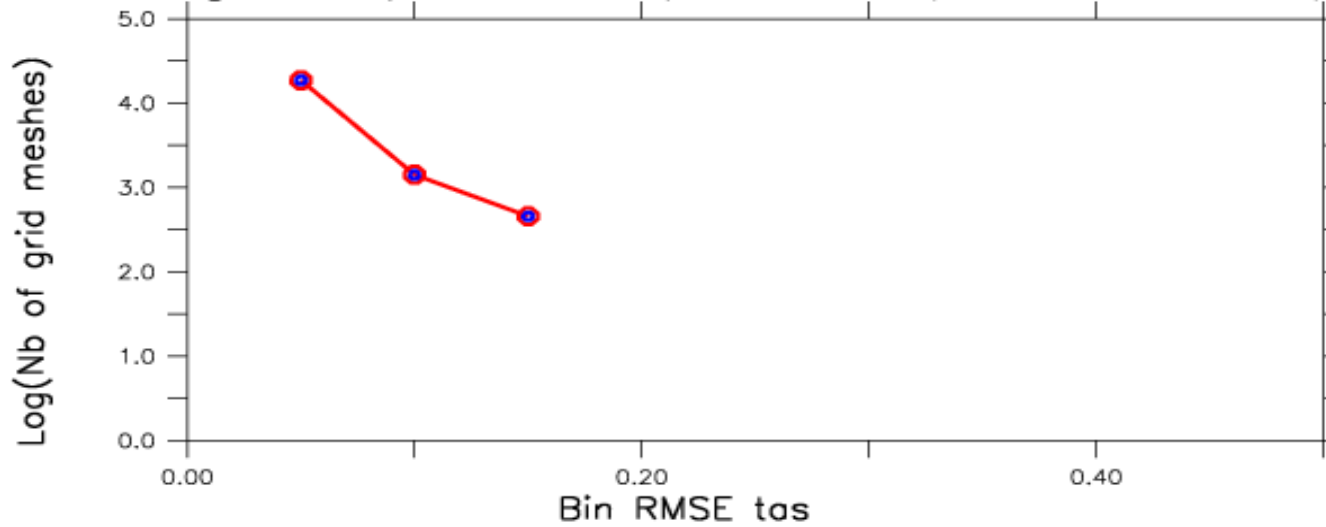


Diff. RMSE tasmax
(Cor/LIM - CMIP6/LIM)

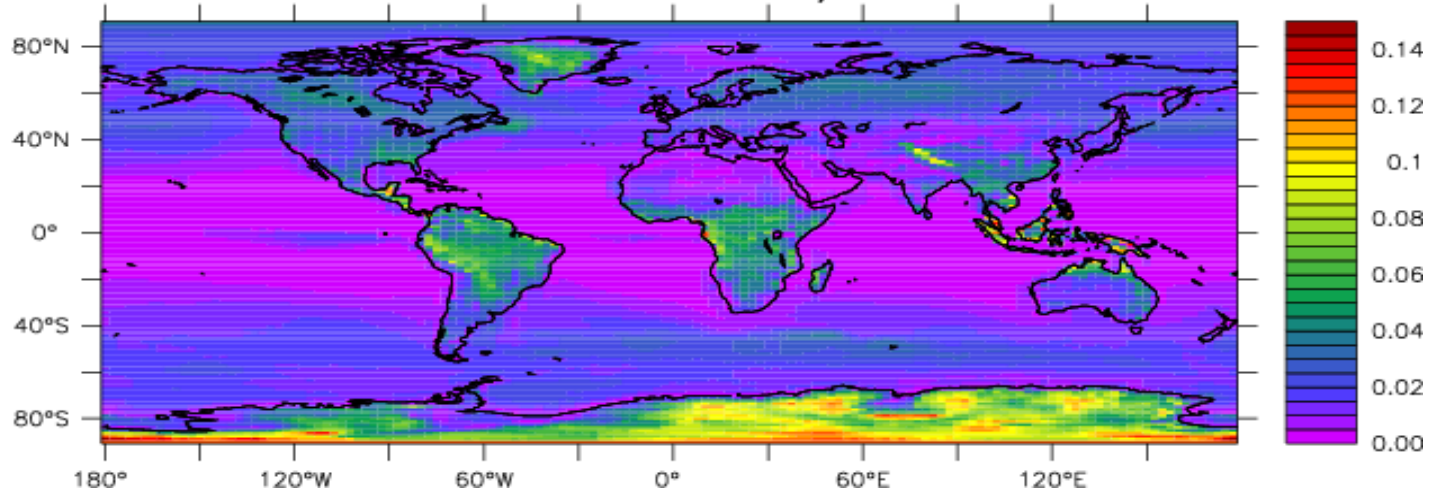


4. La validation (6/8)

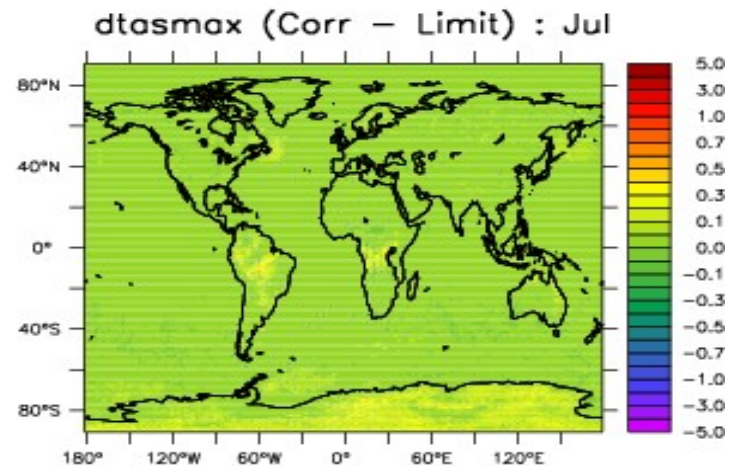
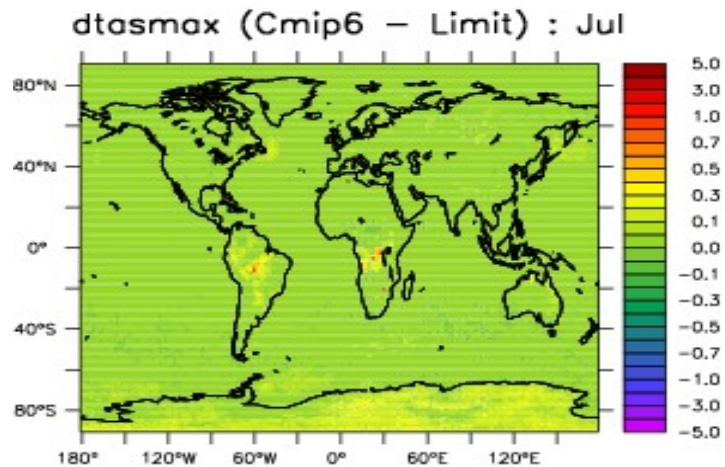
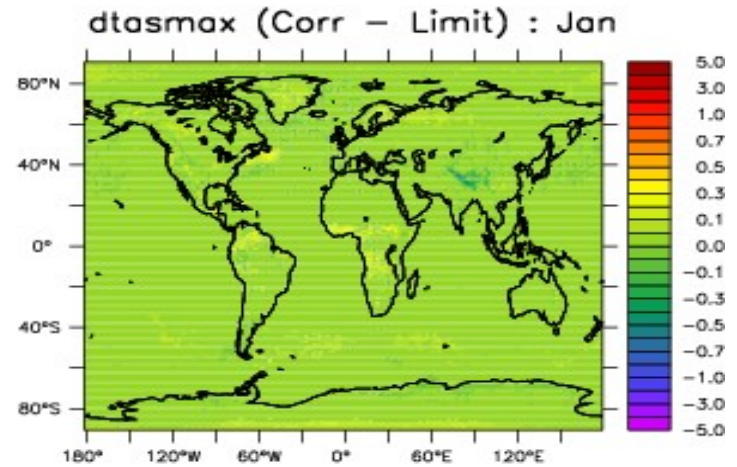
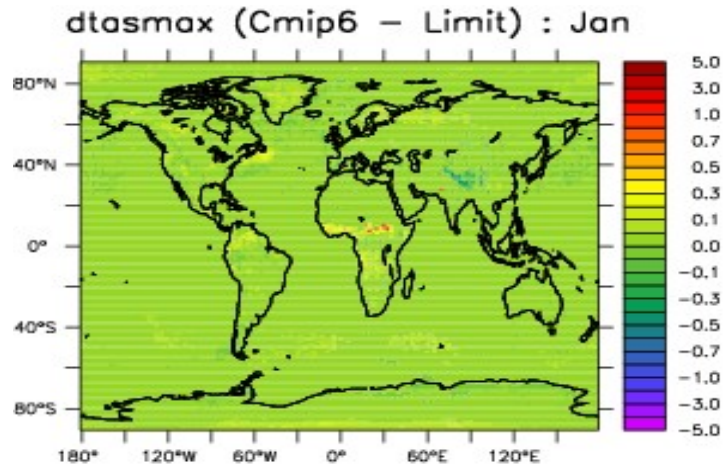
Histogram (RMSE tas) : CMIP6/LIMIT vs Cor/LIMIT



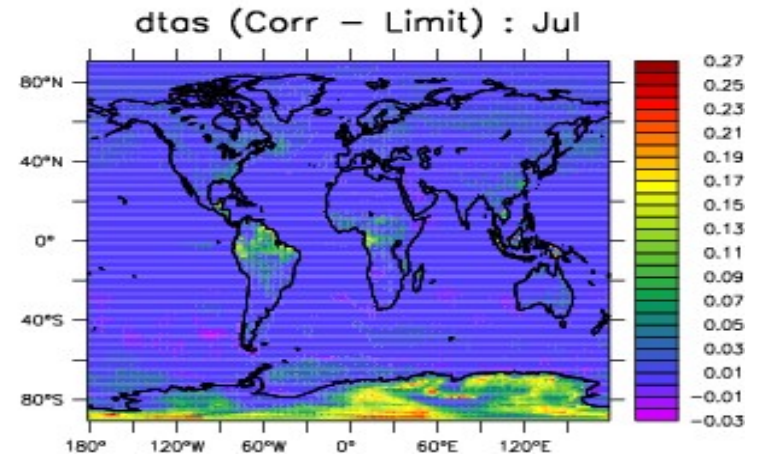
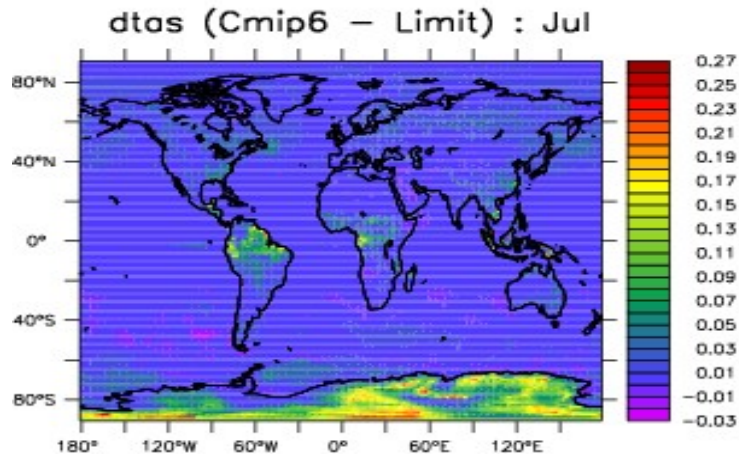
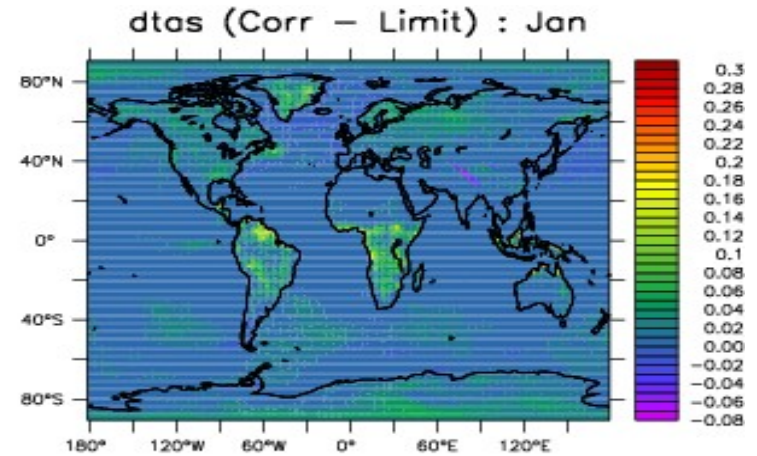
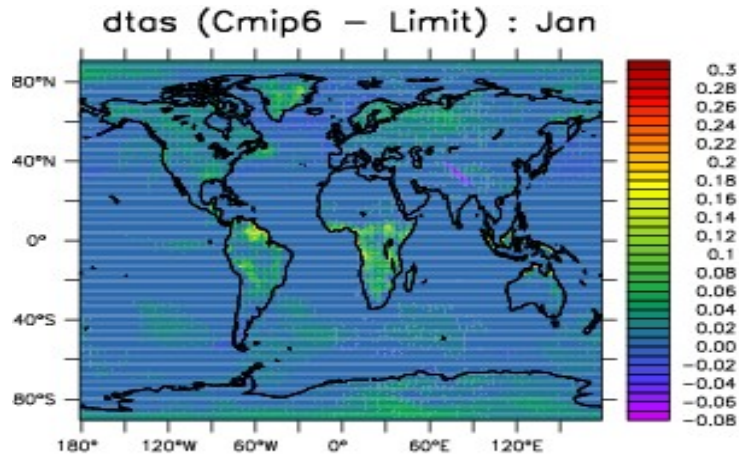
RMSE tas : Cor/LIMIT



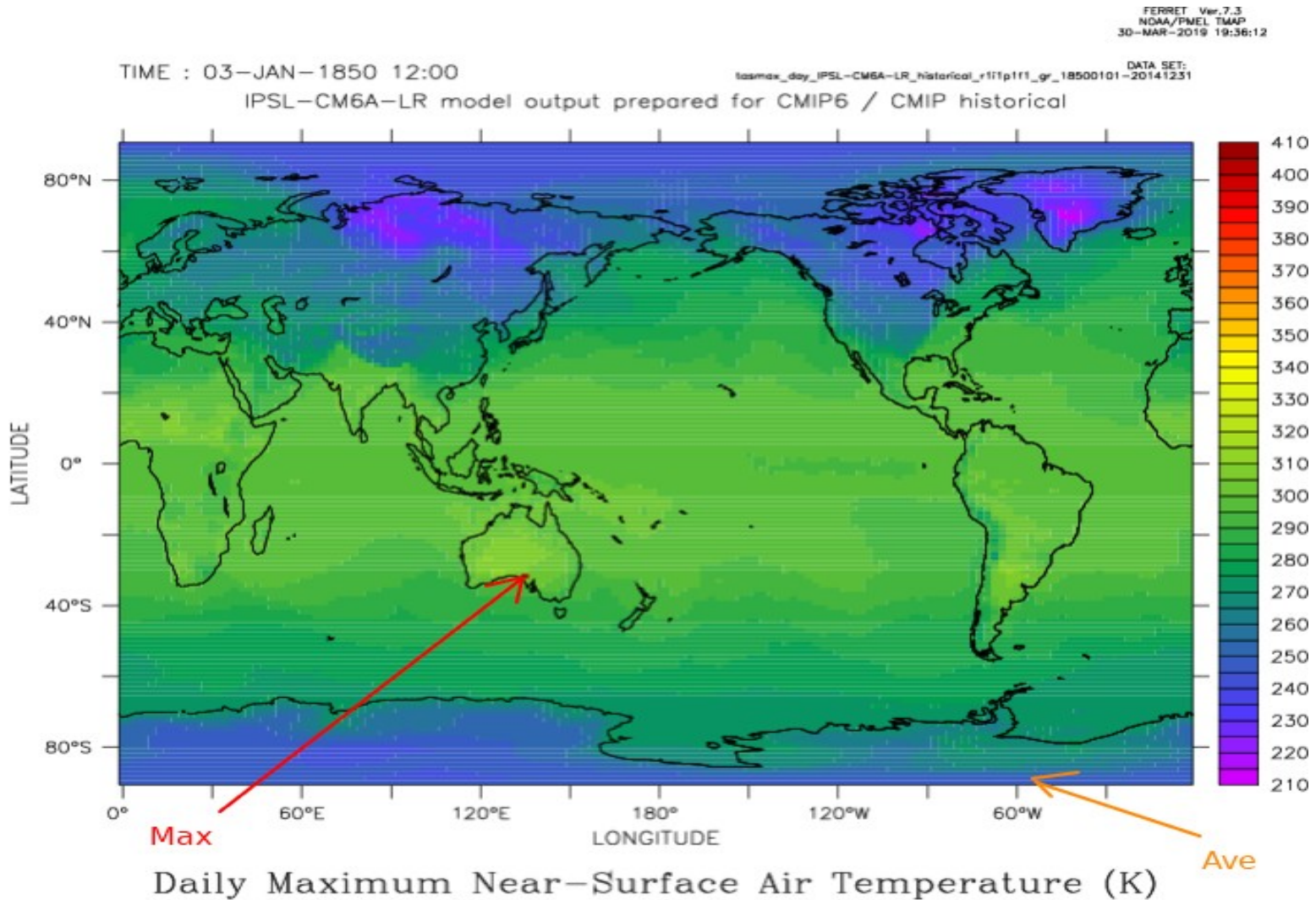
4. La validation : t2m_max moy. mois 1979 (7/8)



4. La validation : t2m moy. mois 1979 (8/8)

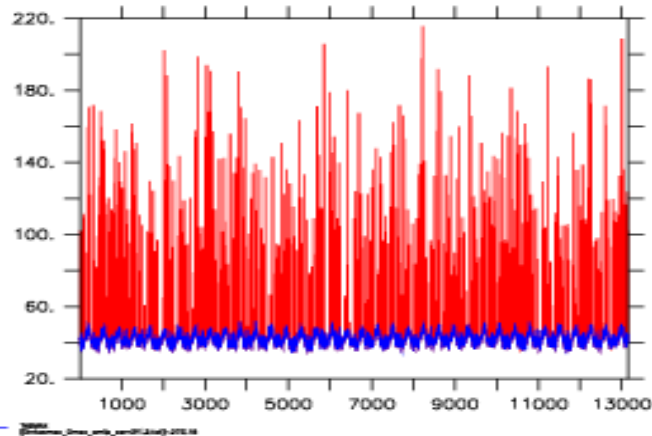


5. Les résultats CMIP6 avant/après correction

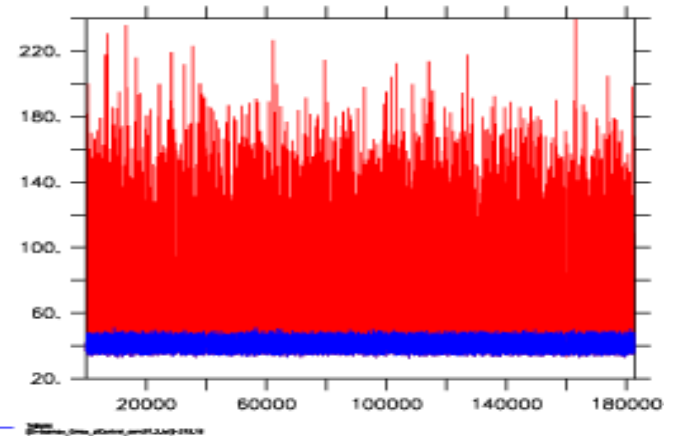


5. Les résultats CMIP6 avant/après correction (1/3)

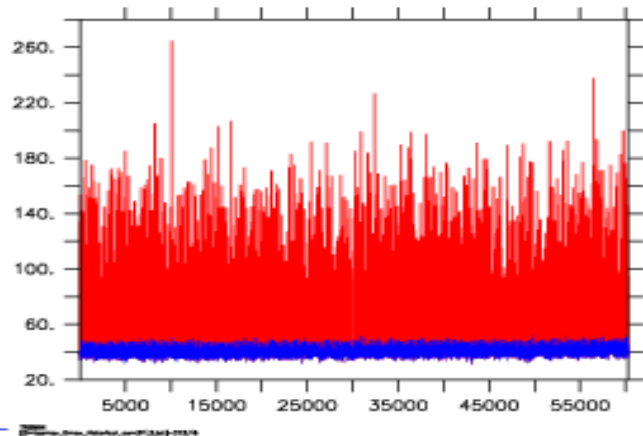
tasmax Max.Glob. amip



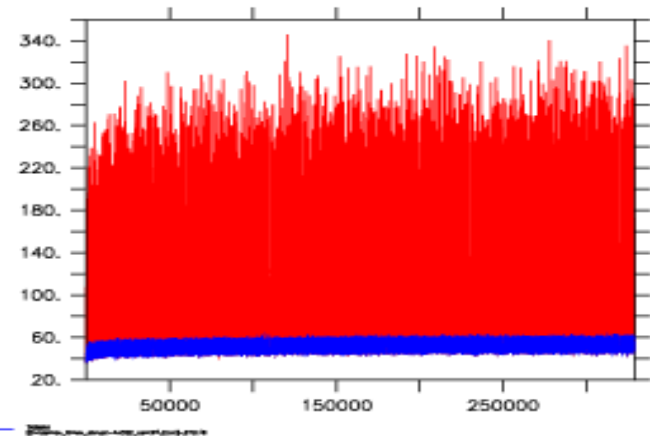
tasmax Max.Glob. piControl



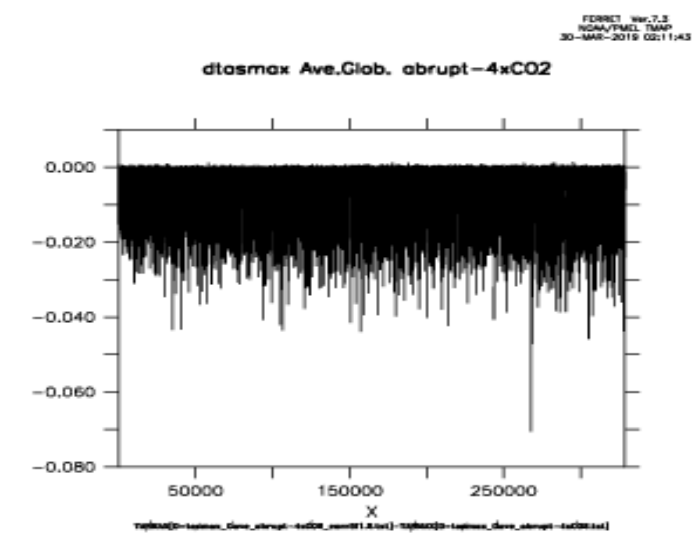
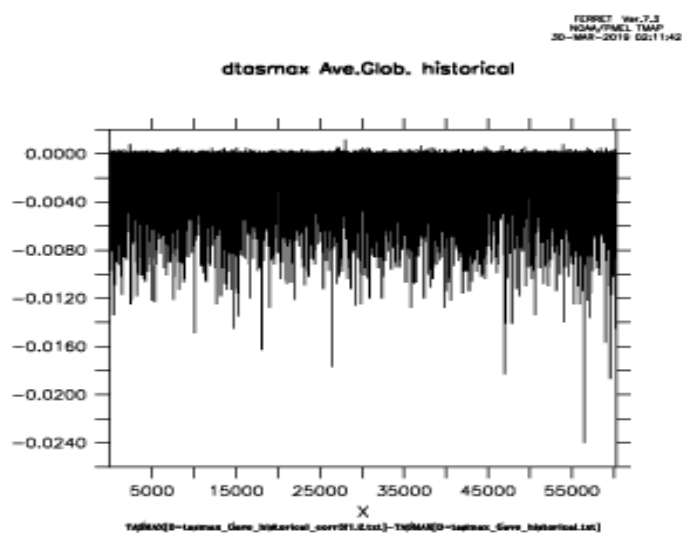
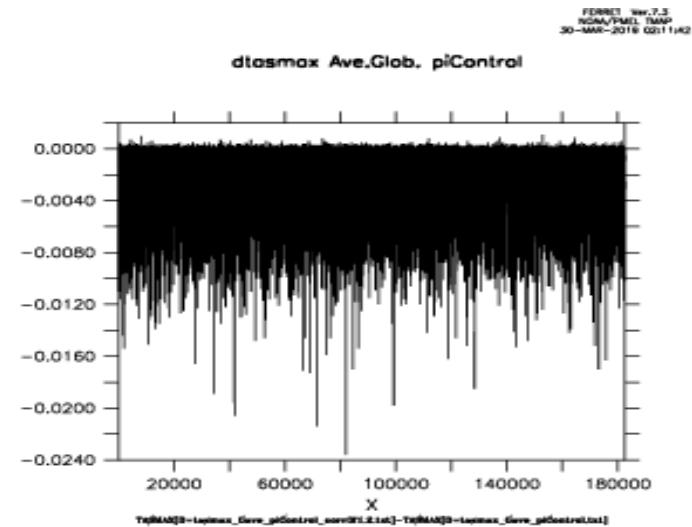
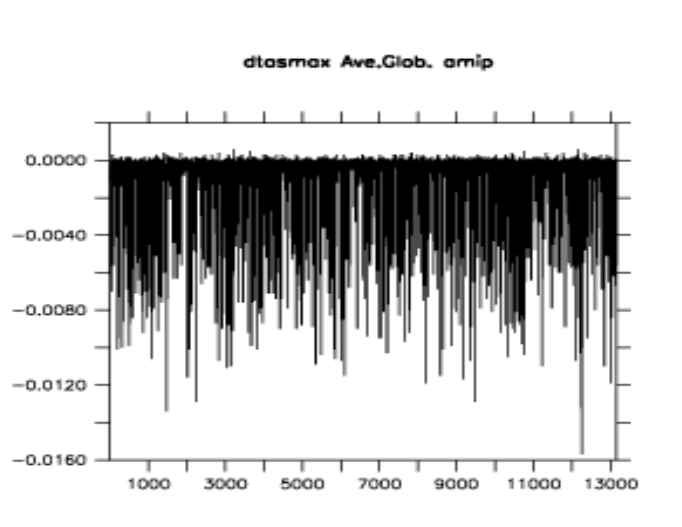
tasmax Max.Glob. historical



tasmax Max.Glob. abrupt-4xCO2



5. Les résultats CMIP6 avant/après correction (2/3)



5. Les résultats CMIP6 avant/après correction (3/3)

