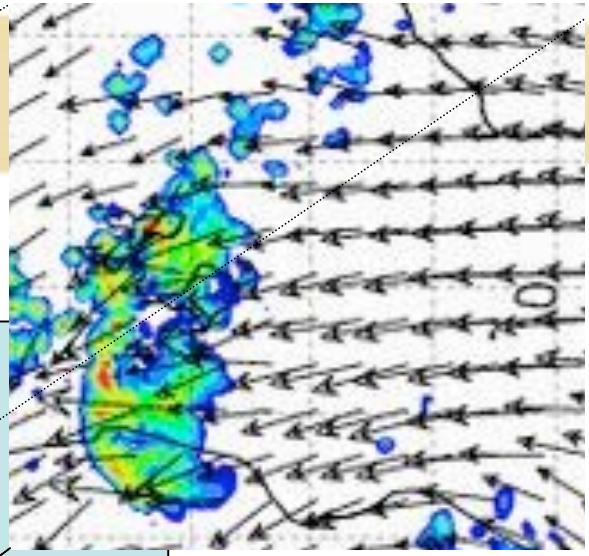
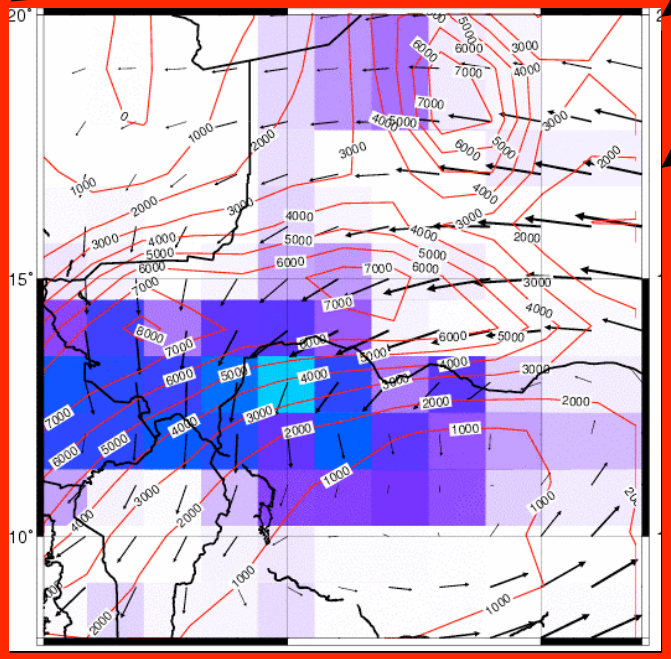
Validation 3D de paramétrisations physiques sur des cas documentés en comparaison aux observations et à des simulations CRM; exemple d'un cas Hapex-Sahel

J.F. Guérémy, I. Beau (CNRM/GMGEC/EAC),
D. Pollack (ENM/UFR)

METEO FRANCE
Toujours un temps d'avance

Méthodologie : simulations explicites de la convection (modèle Méso-NH) / simulations paramétrées (modèle Aladin-Climat) de cas documentés





Méso-NH : maille 5 km

Conditions initiales et latérales : ERA40 (comme Méso-NH) ; durée des simulations : 24 h

Aladin-Climat V5 utilisé avec différentes résolutions horizontales, de 300 km (GCM) à 10 km

METEO FRANCE
Toujours un temps d'avance

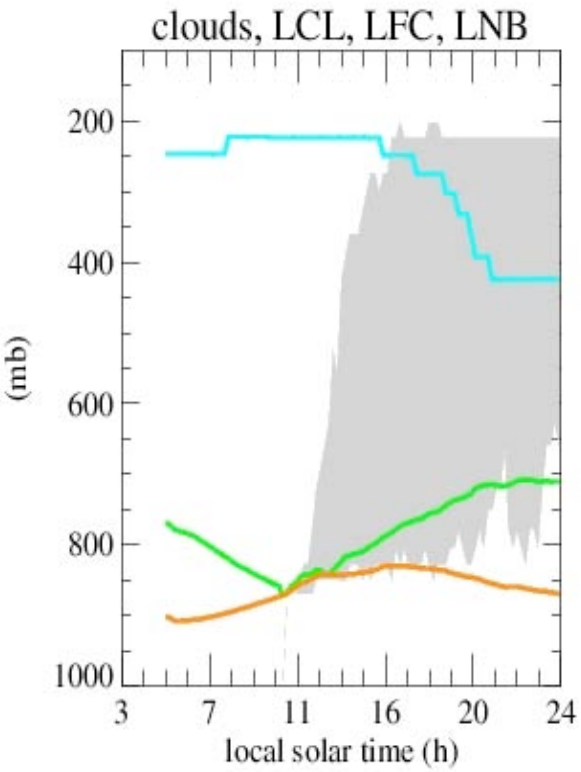
3 PHYSIQUES : STANDARD / PRO1/ PRO2

	STANDARD *IPCC / Diagnostique*	*PRO1* *Prognostique*	*PRO2* *Prognostique*
TURB	*DIAG. Ricard-Royer 1993* $\partial e / \partial t = 0$ cond stat *Bougeault*	*PROG. / CBR 2002* $\partial e / \partial t = P - D$ cond stat Bougeault-Bechtold	*PROG. / CBR 2002* $\partial e / \partial t = P - D$ cond stat Bougeault-Bechtold
Micro-Phys	*DIAG.* *Smith/Kessler 1990* q_liq / q_sol	*PROG.* *Lopez 2002* q_nuage / q_pluie	*PROG.* *Lopez 2002* q_nuage / q_pluie
Convection peu profonde	*Turbulence + Flux de Masse, Bougeault*	*Flux de Masse CAPE Bechtold 2001*	*Flux de Masse CAPE Guérémy 2005*
Convection profonde	*Flux de Masse Convergence d'humidité (CVGU), Bougeault 1985*	*Flux de masse CVGU, Bougeault-Geleyn-Gerard 2000*	*Flux de masse, CAPE Guérémy 2005*

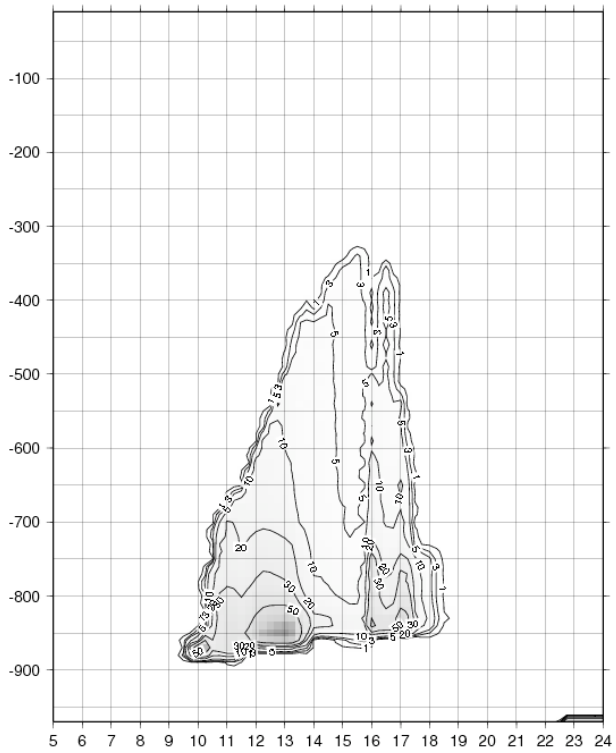
Cas ARM idealisé : cycle diurne de la convection continentale : de la CLA sèche à la convection profonde précipitante

Évolution temporelle de la nébulosité

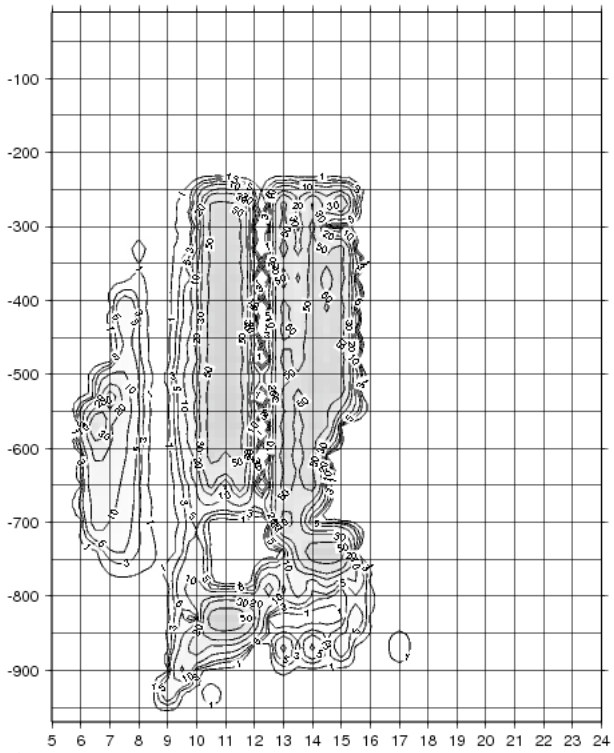
méso-NH CRM



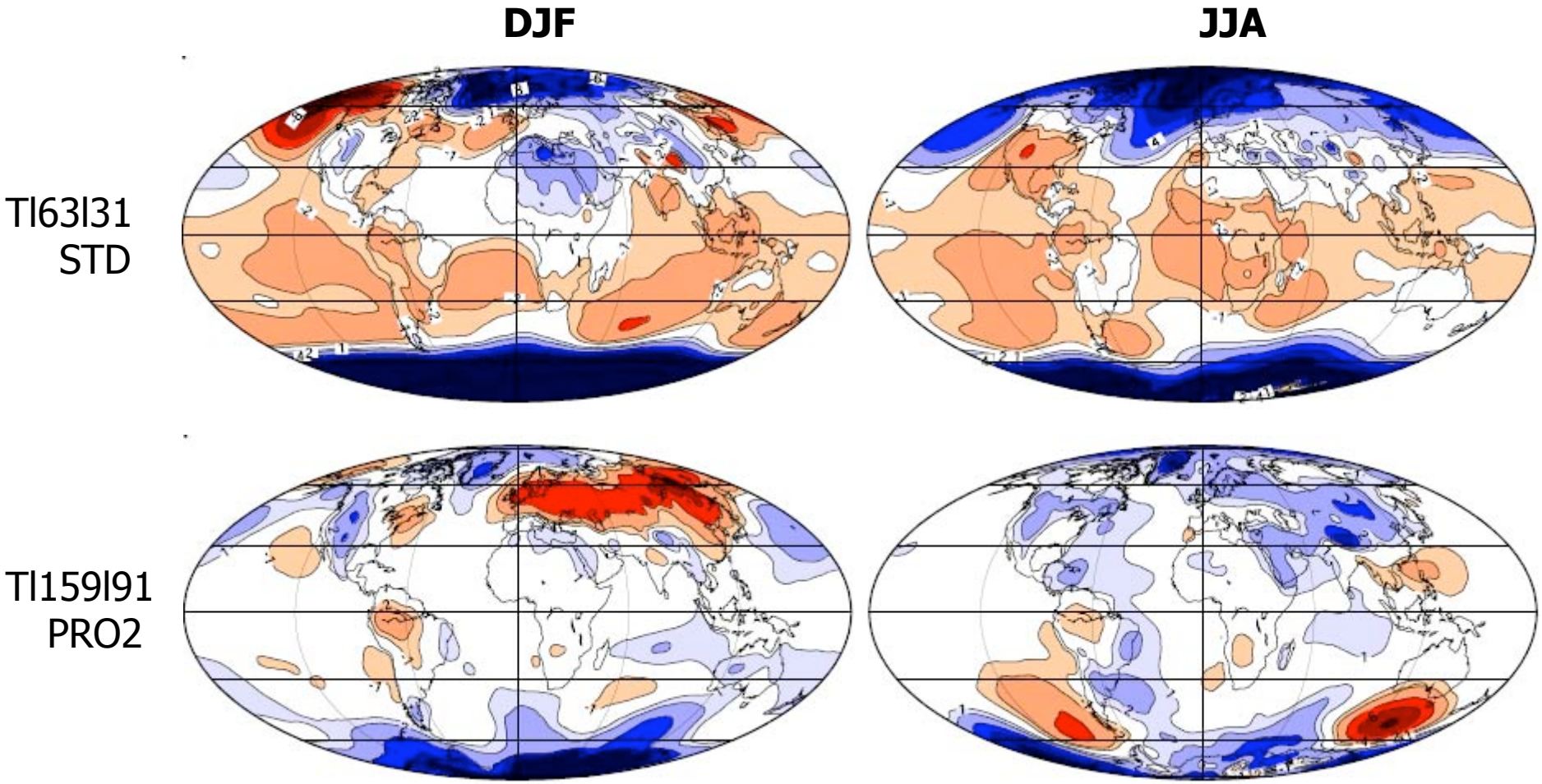
PRO2



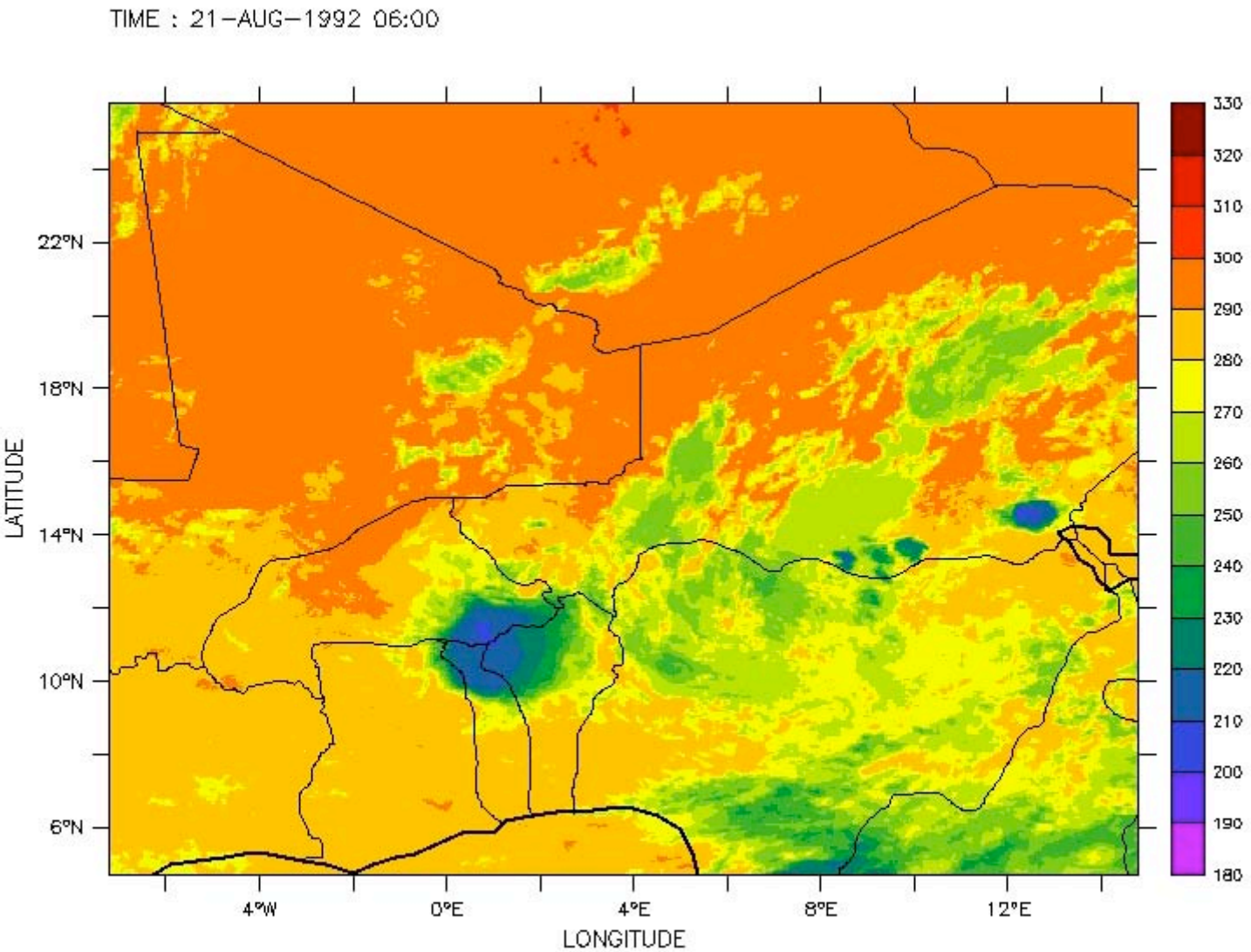
STD



Biais de la pression niveau mer (/ERA40) dans des simulations couplées pluriannuelles



HAPEX-SAHEL case 21/08/1992



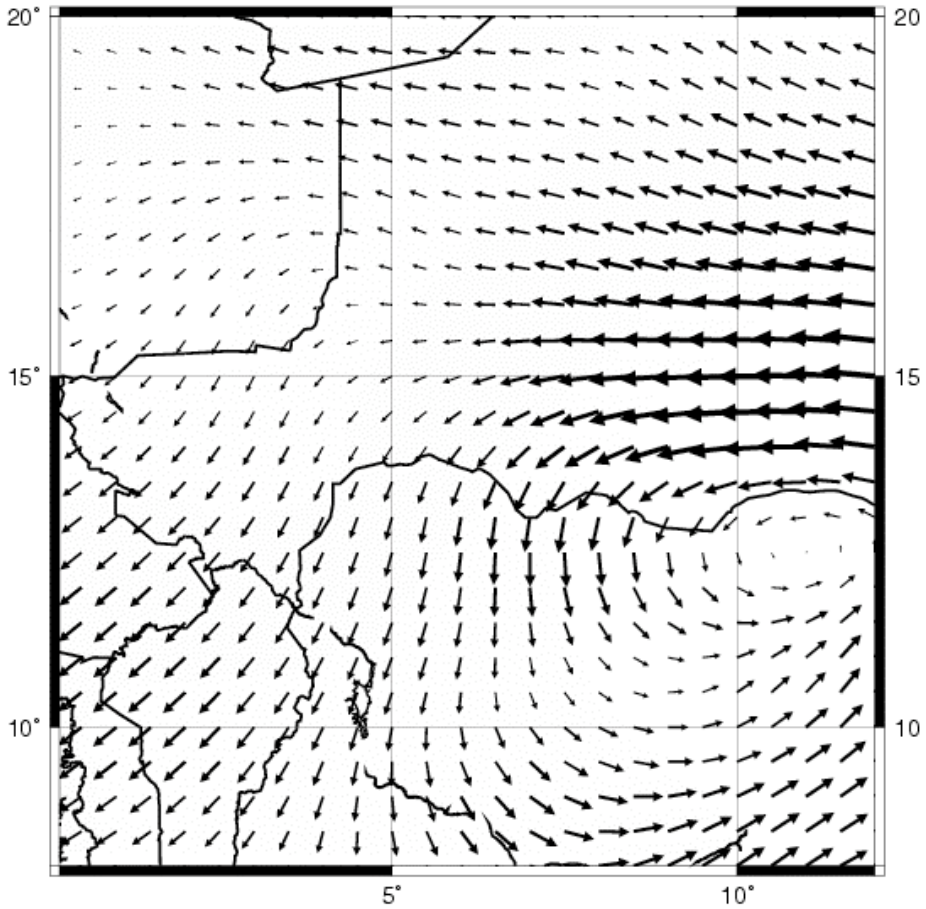
IR Brightness Temperature (K)

FRANCE
emps d'avance

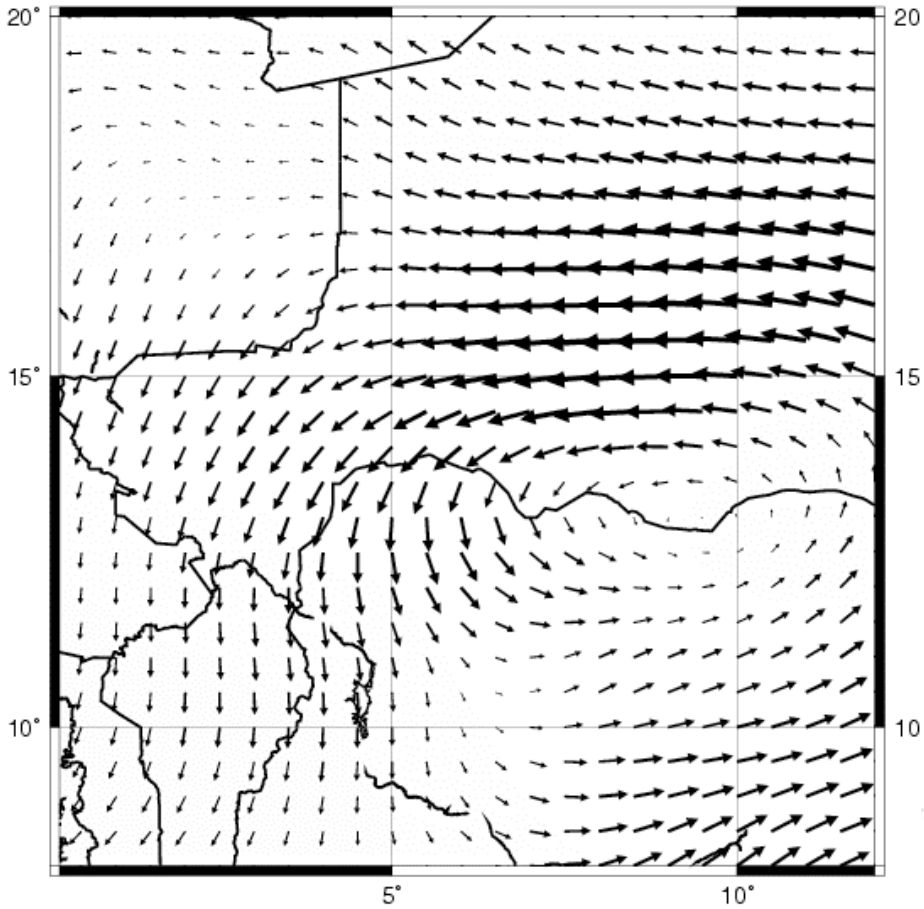
Vent à 700hPa (ERA40)

Onde d'est africaine

12h

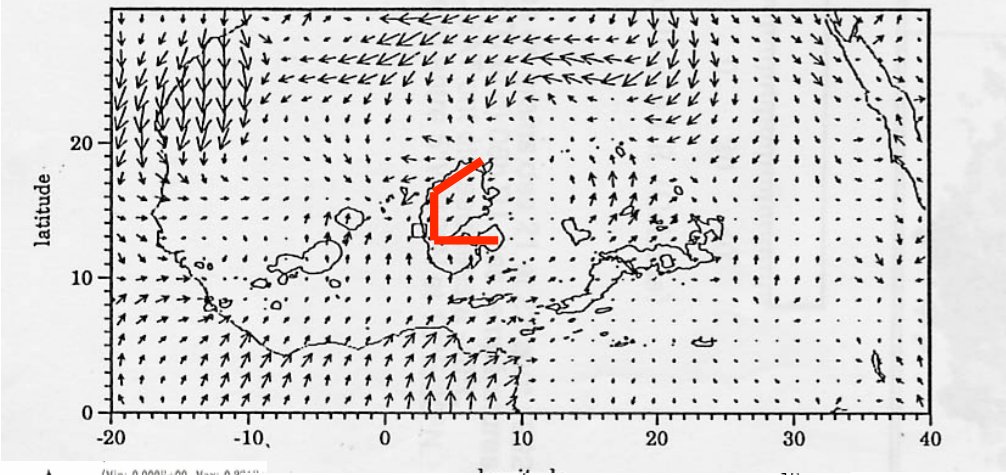


24h



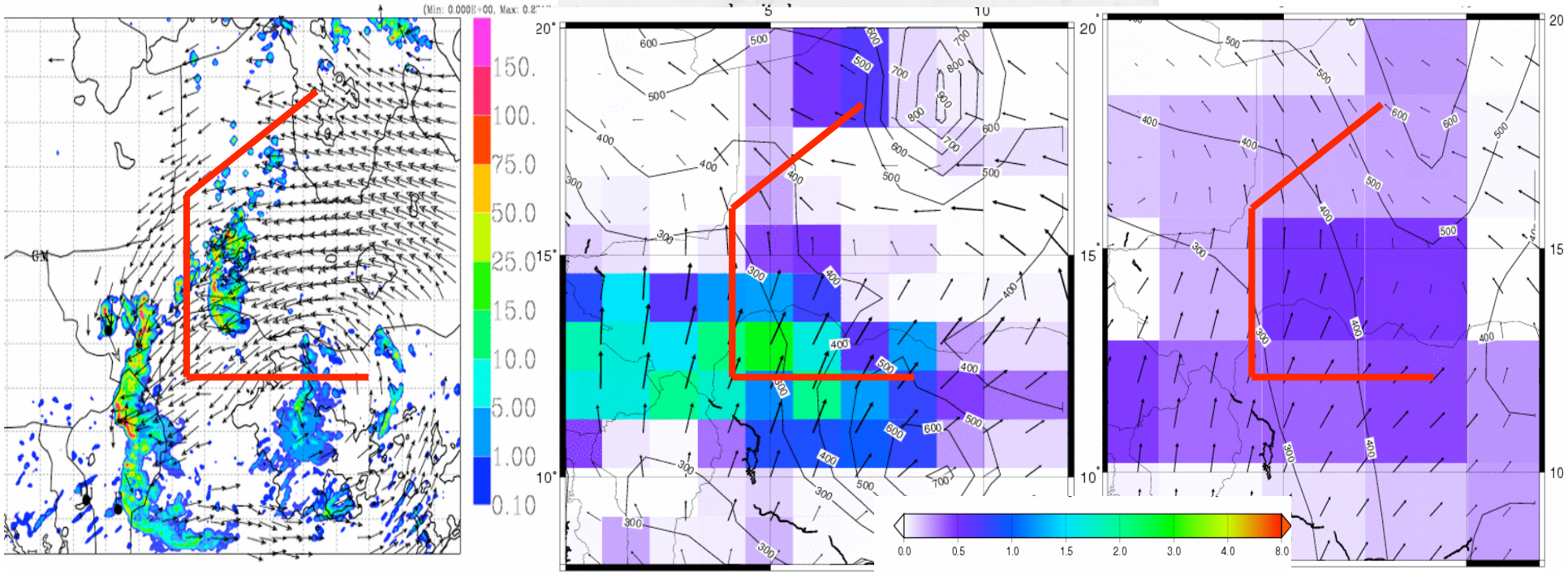
RESULTATS DES SIMULATIONS

ERA vent de surface + isotherme -40°C Meteosat **à 18h**



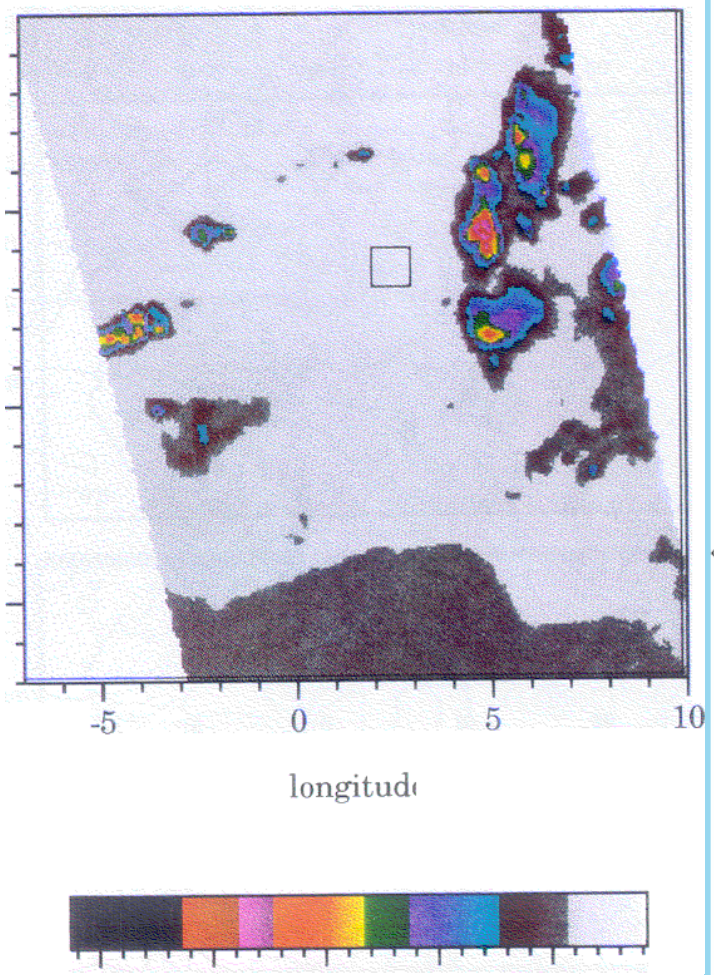
Méso-NH

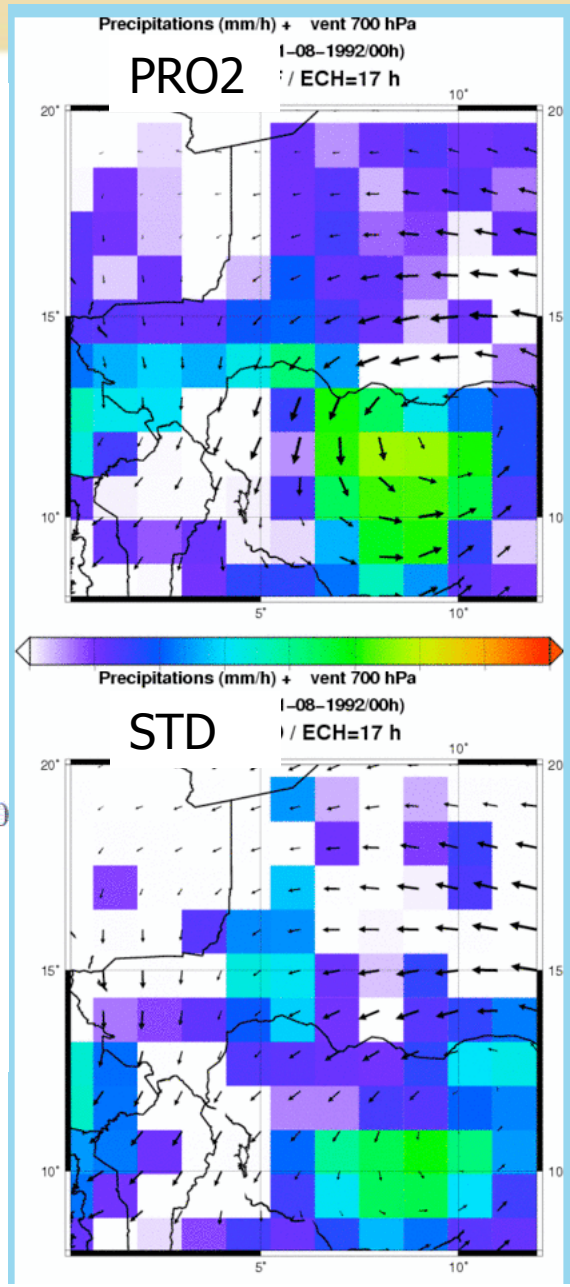
ALADIN pre**V5**
« Pro2 »
125 et 300 km

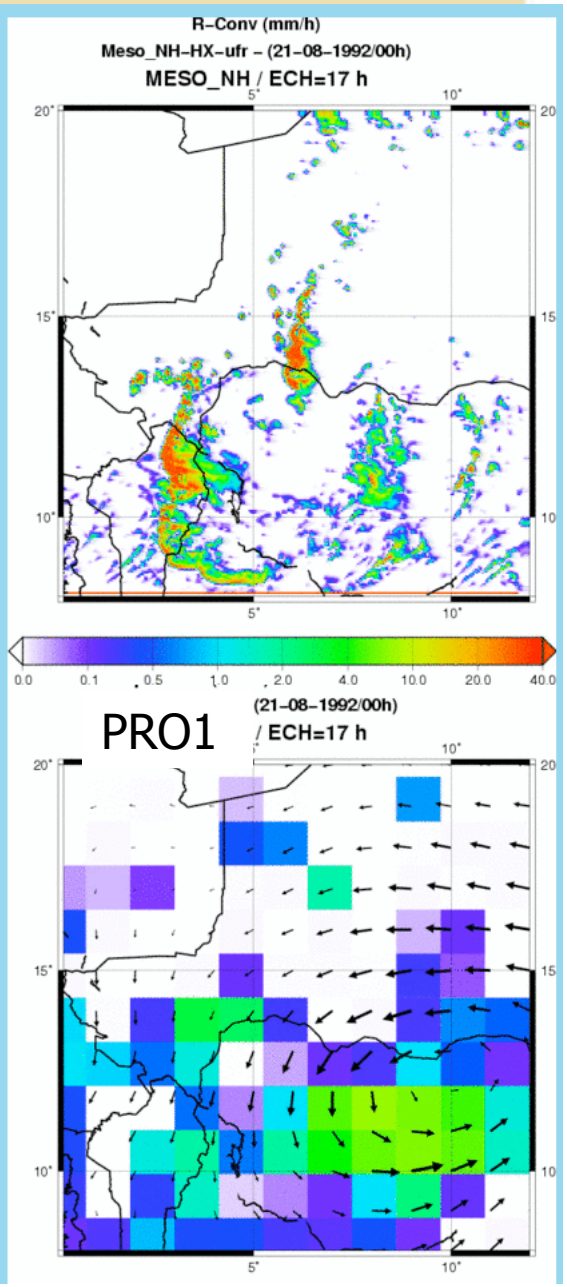


Résolution horizontale : 125km

Réflectivité micro-onde à 17h

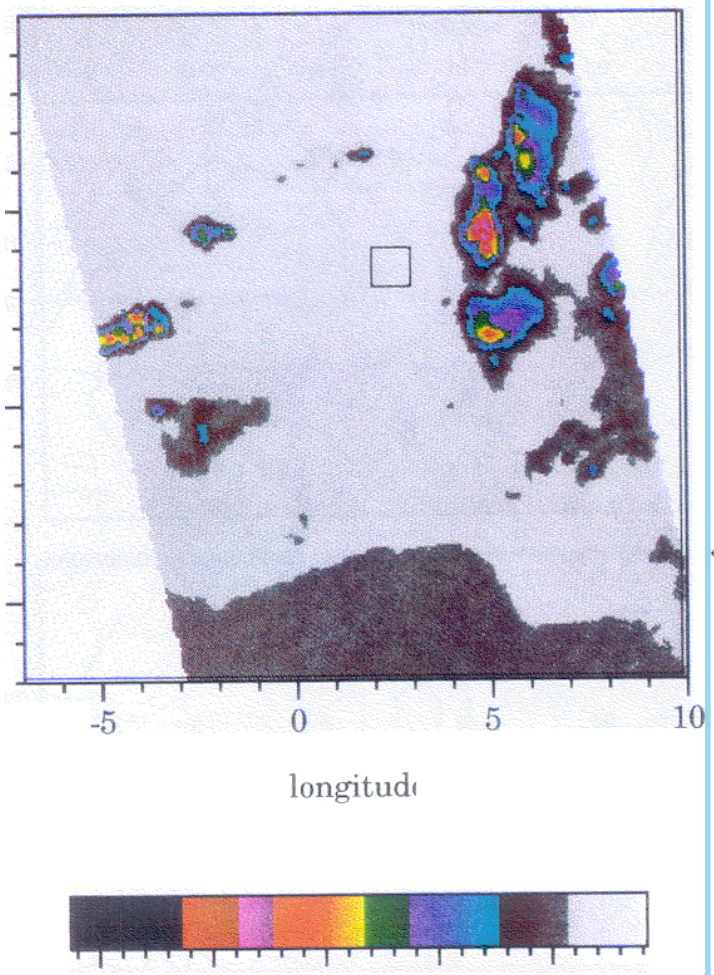


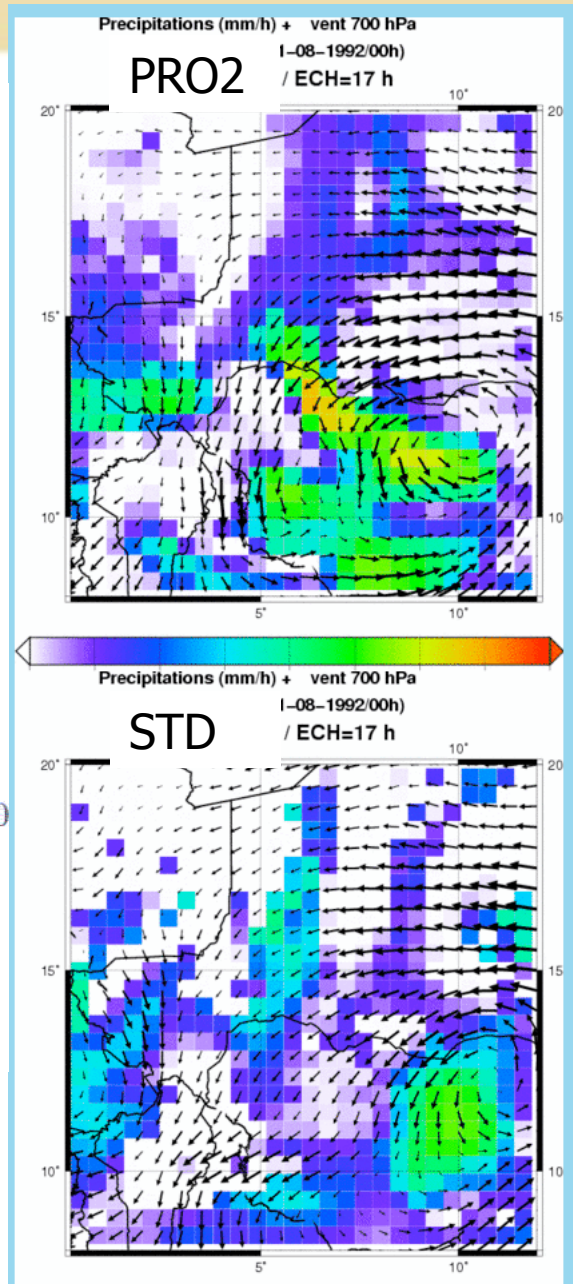


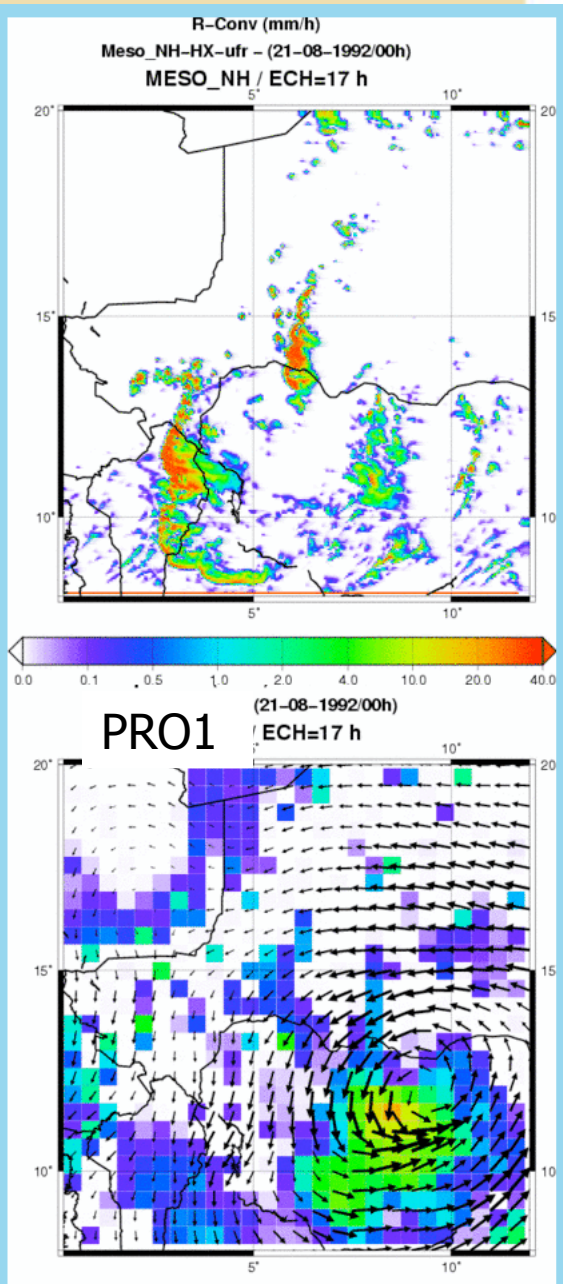


Résolution horizontale : 50km

Réflectivité micro-onde à 17h

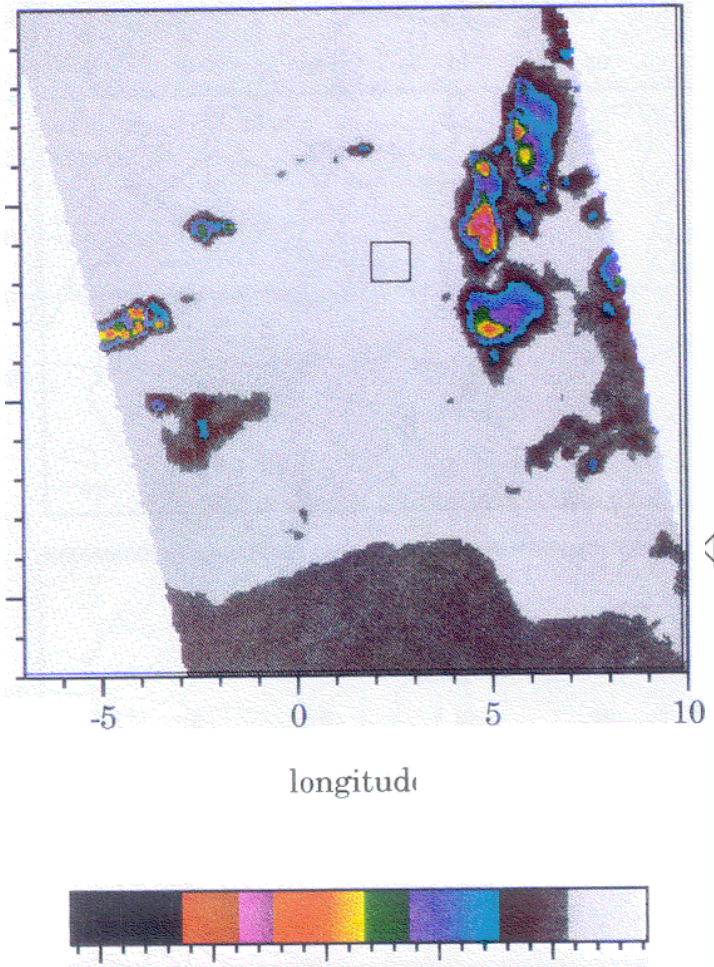


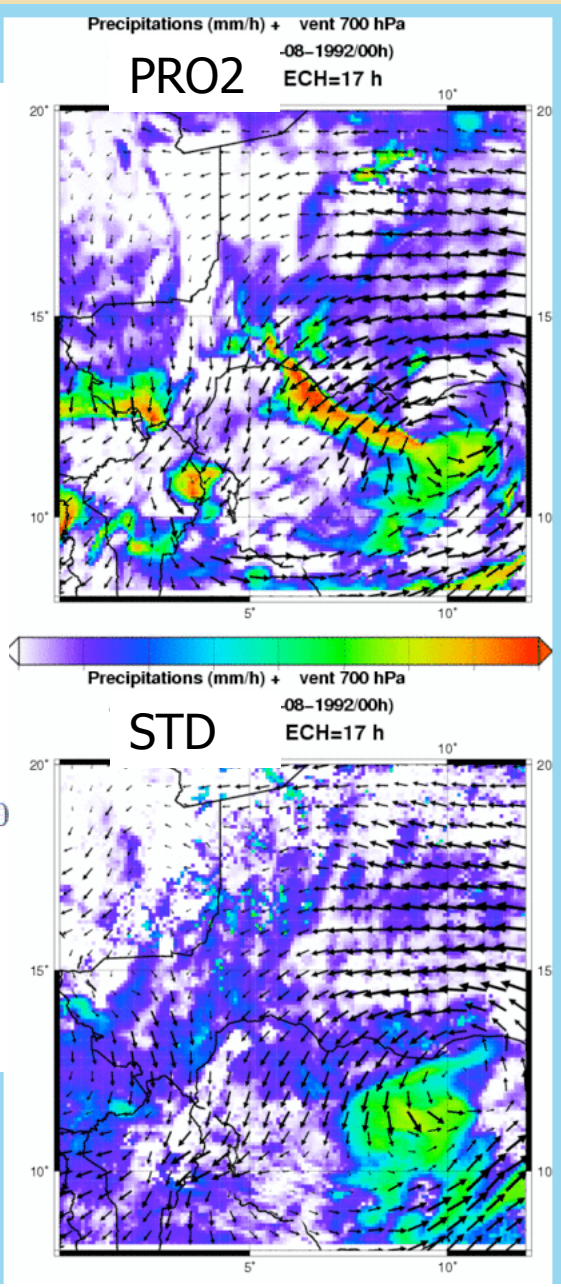


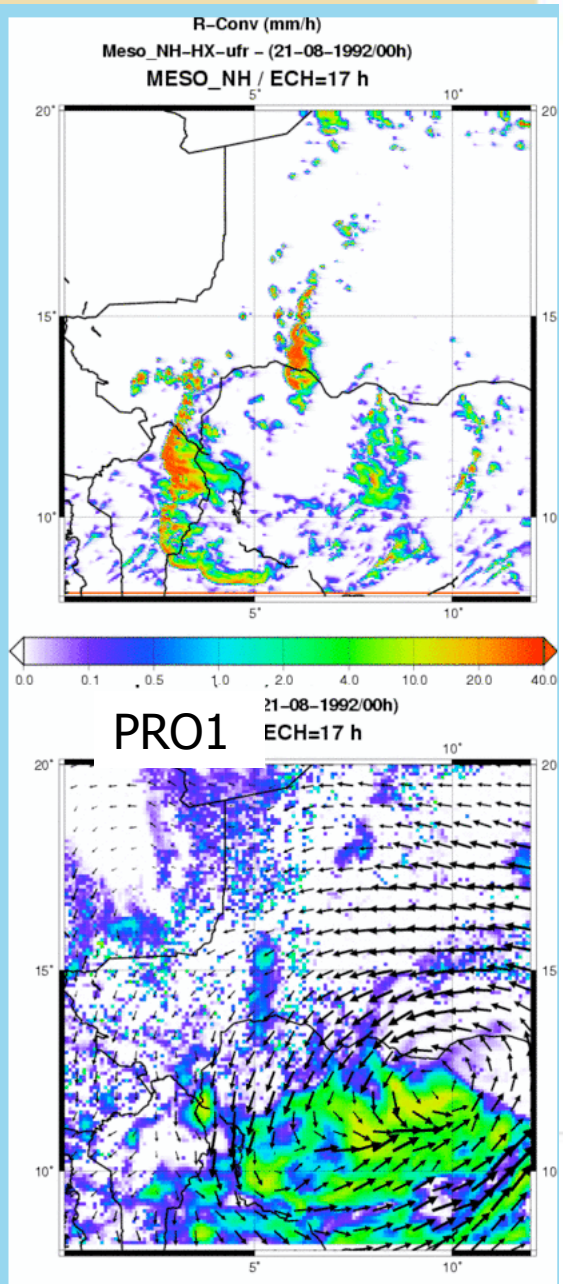


Résolution horizontale : 10km

Réflectivité micro-onde à 17h

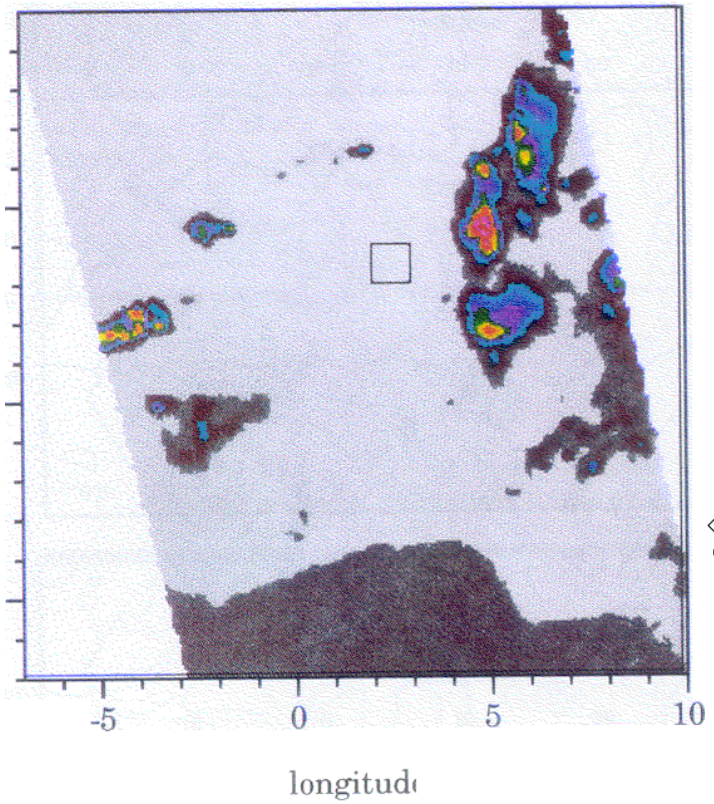


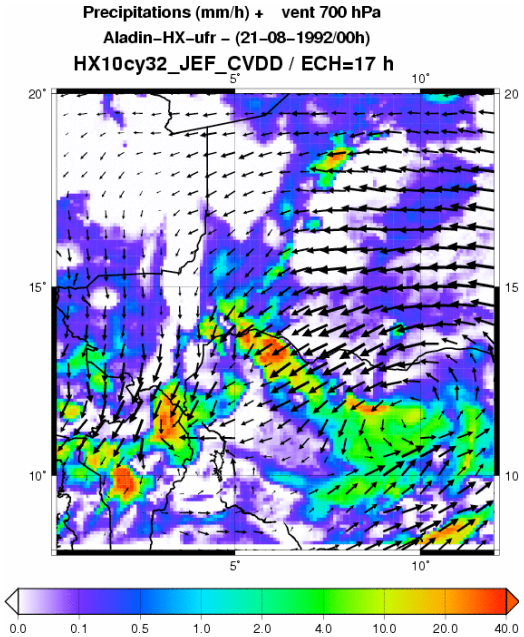


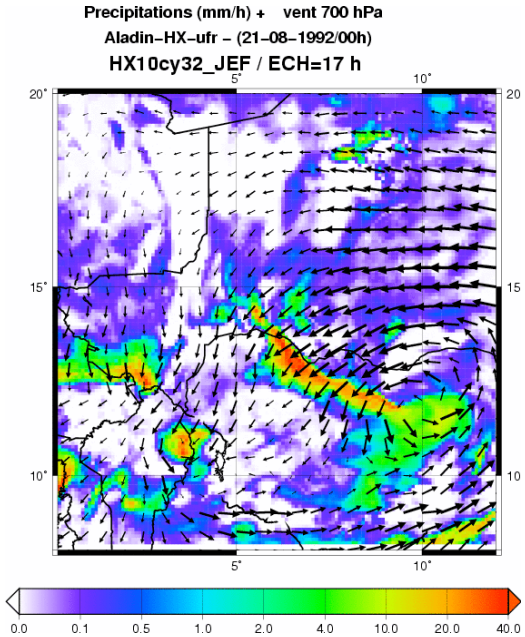


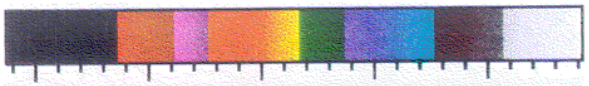
Courants descendants à 10km, PRO2

Réflectivité micro-onde à 17h



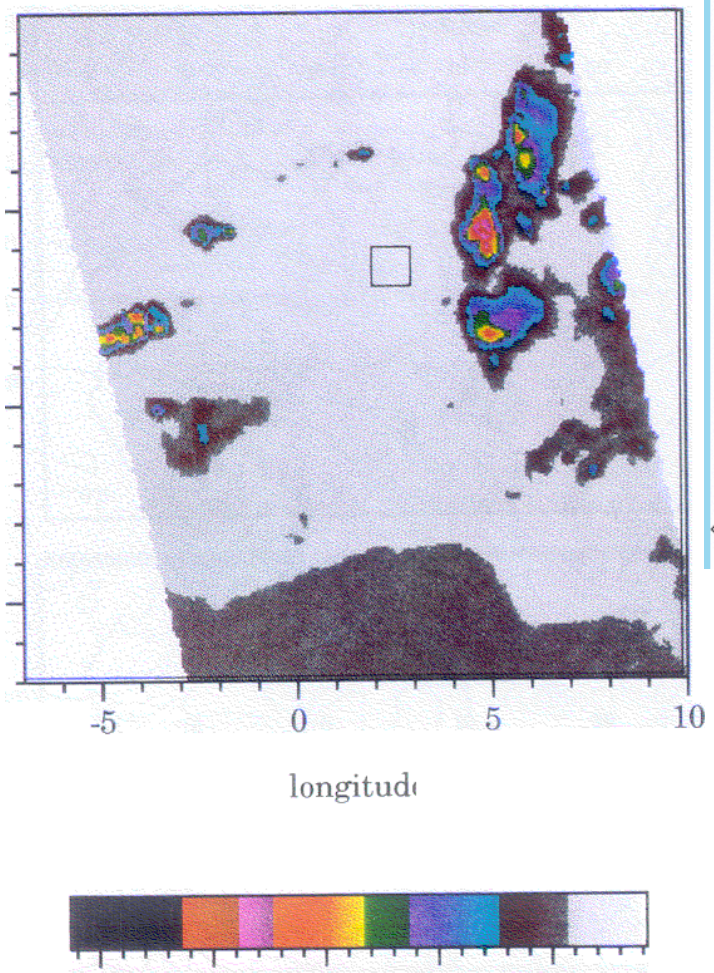


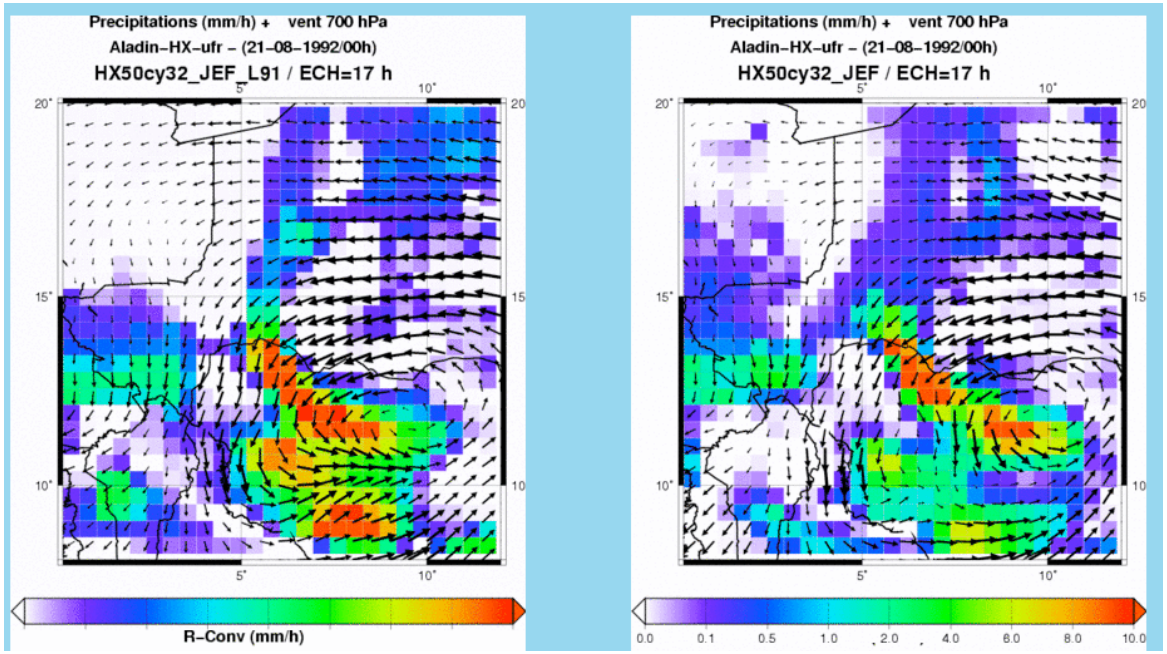




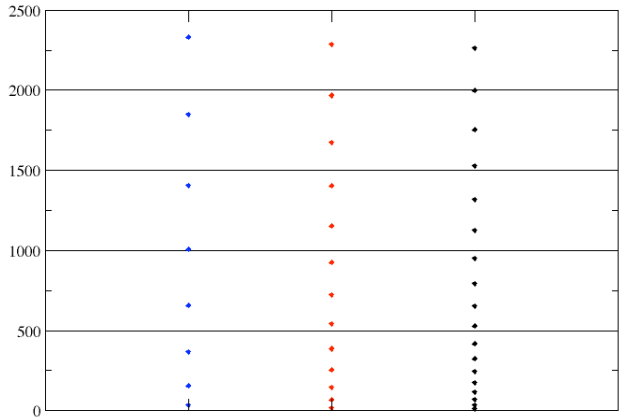
Résolution verticale (PRO2 à 50km) : 91 versus 31 niveaux

Réflectivité micro-onde à 17h





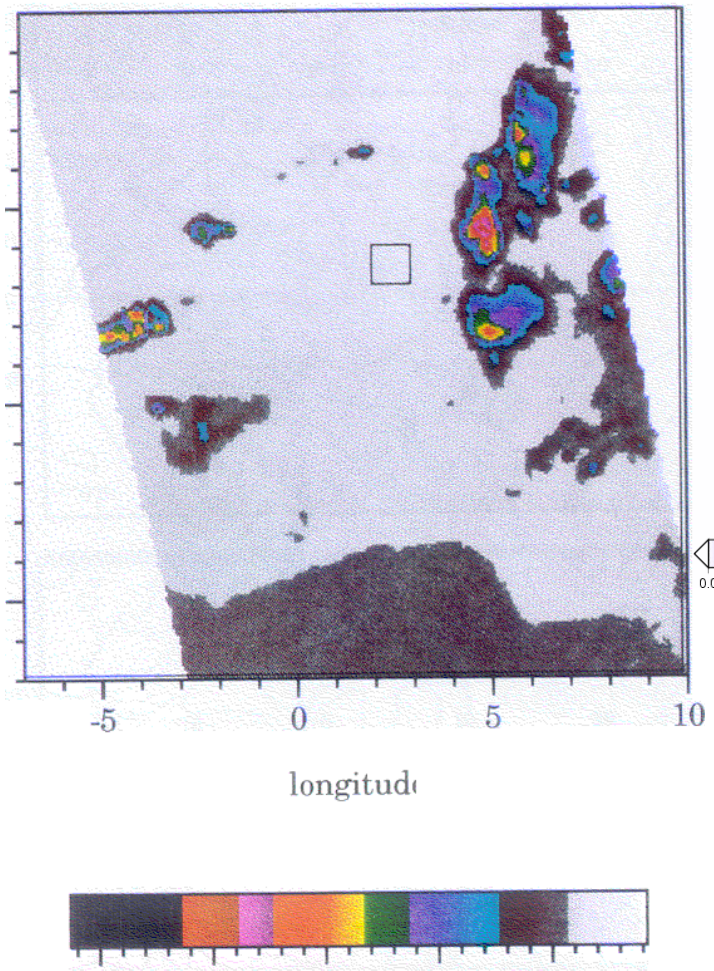
31 **60** **91**

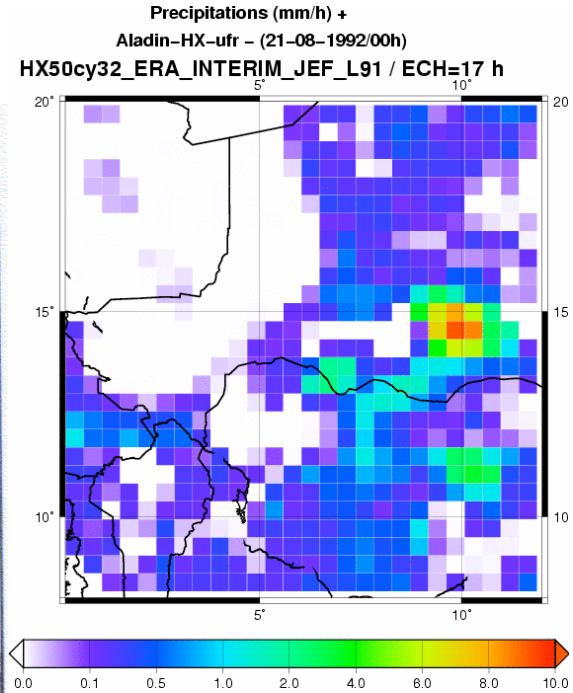


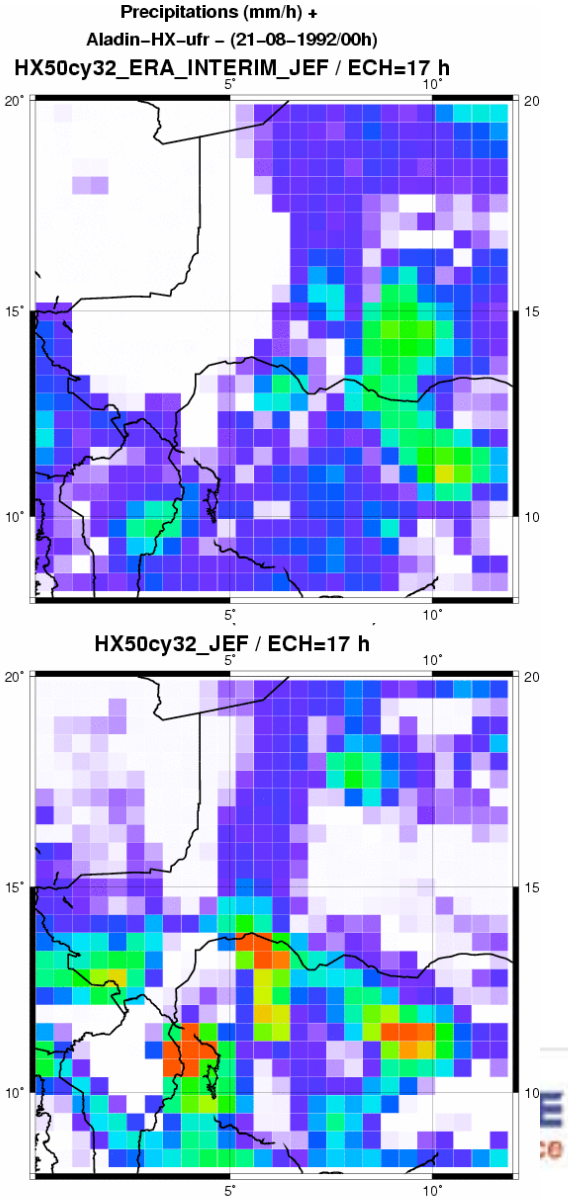
3, **5**, **8** niveaux sous 500m

Conditions latérales d'ERA-INTERIM

Réflectivité micro-onde à 17h



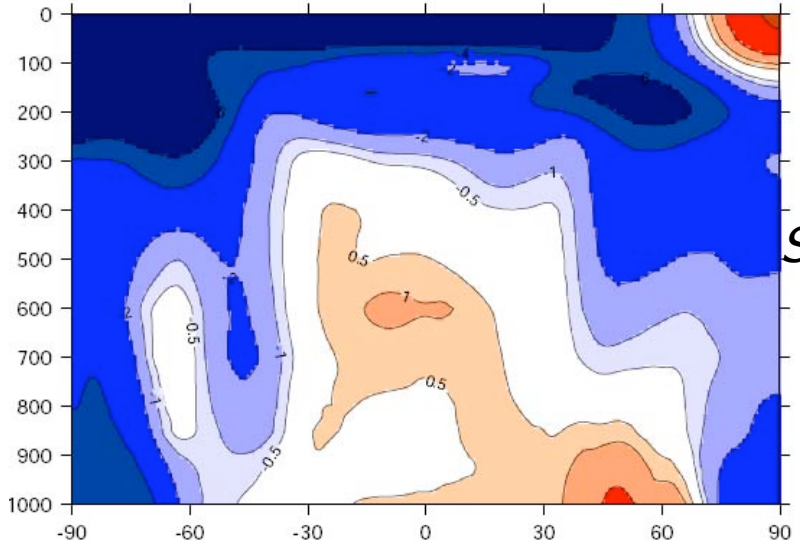




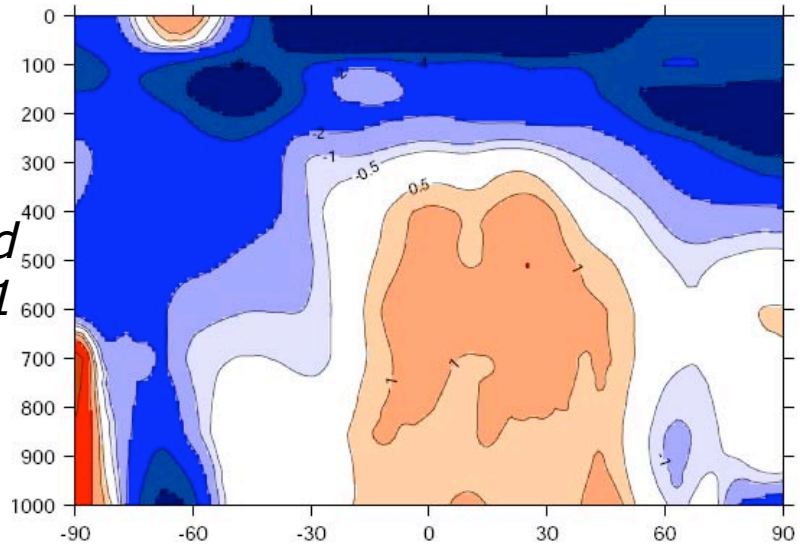
Simulations 3D forcées (23 ans)

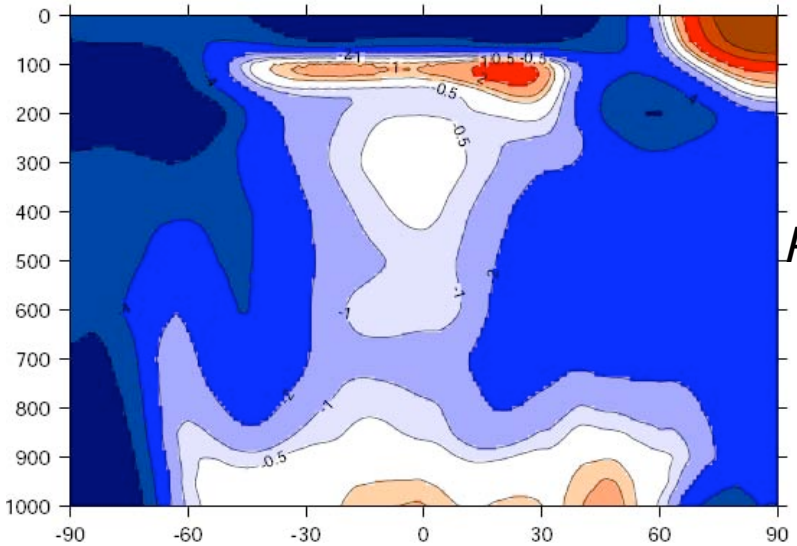
Biais de température (/ERA40)

DJF **JJA**

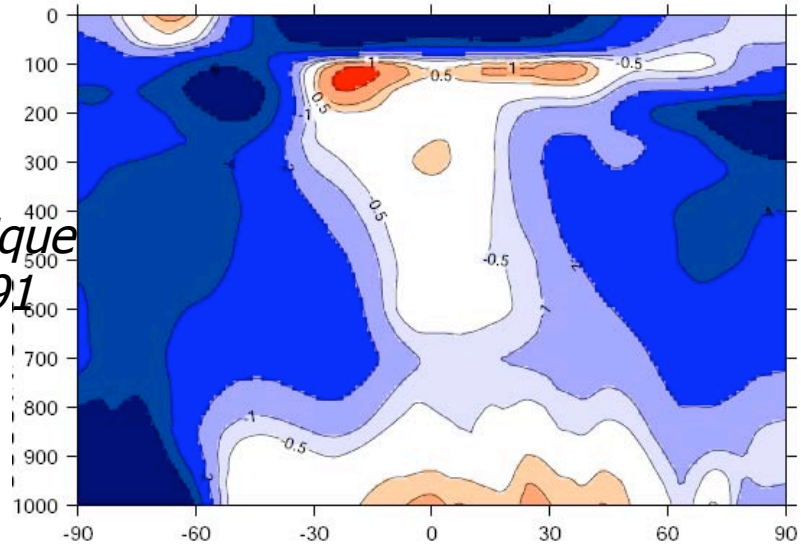


Standard
Tl63l31

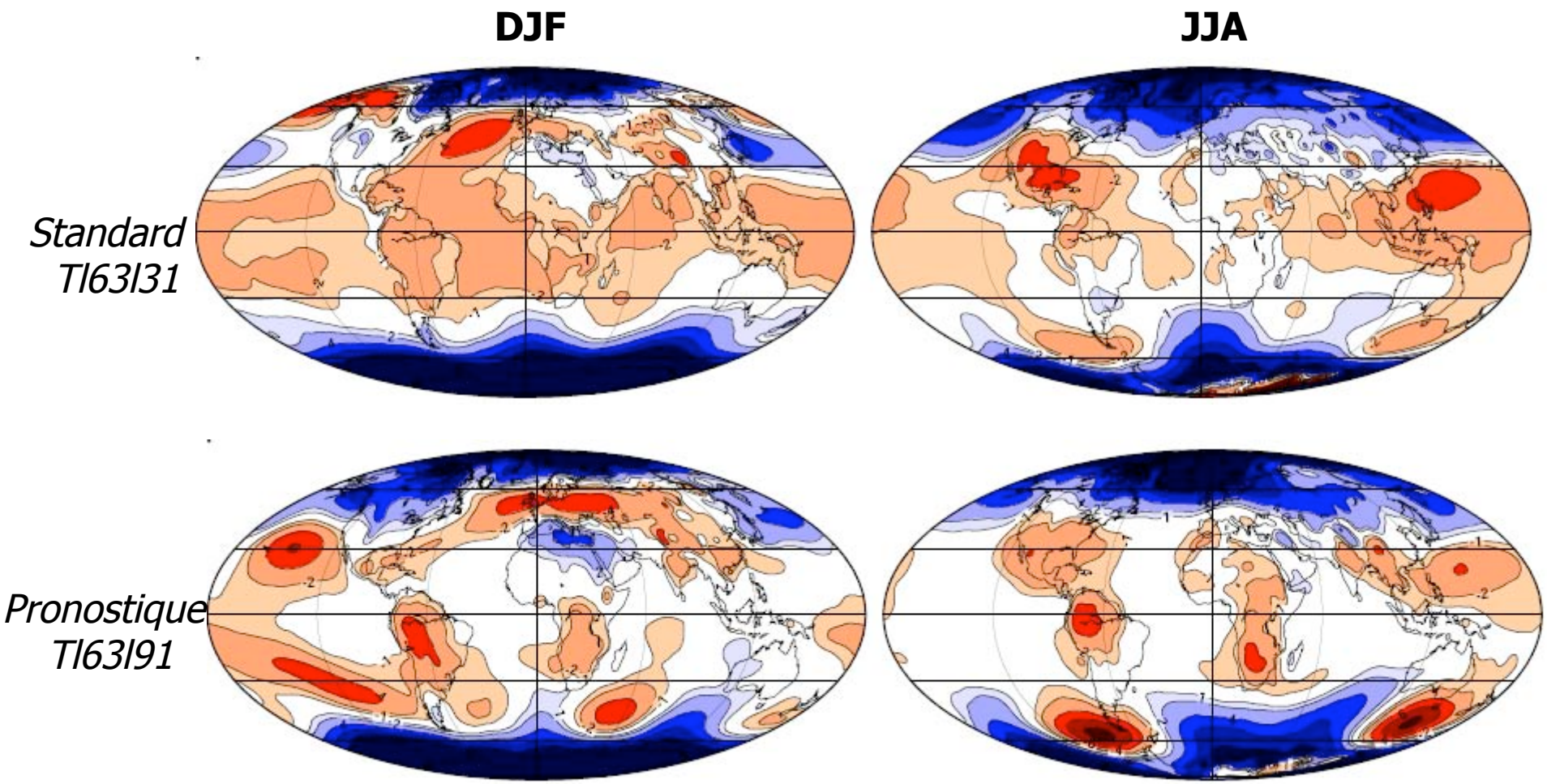




Pronostique
Tl63l91



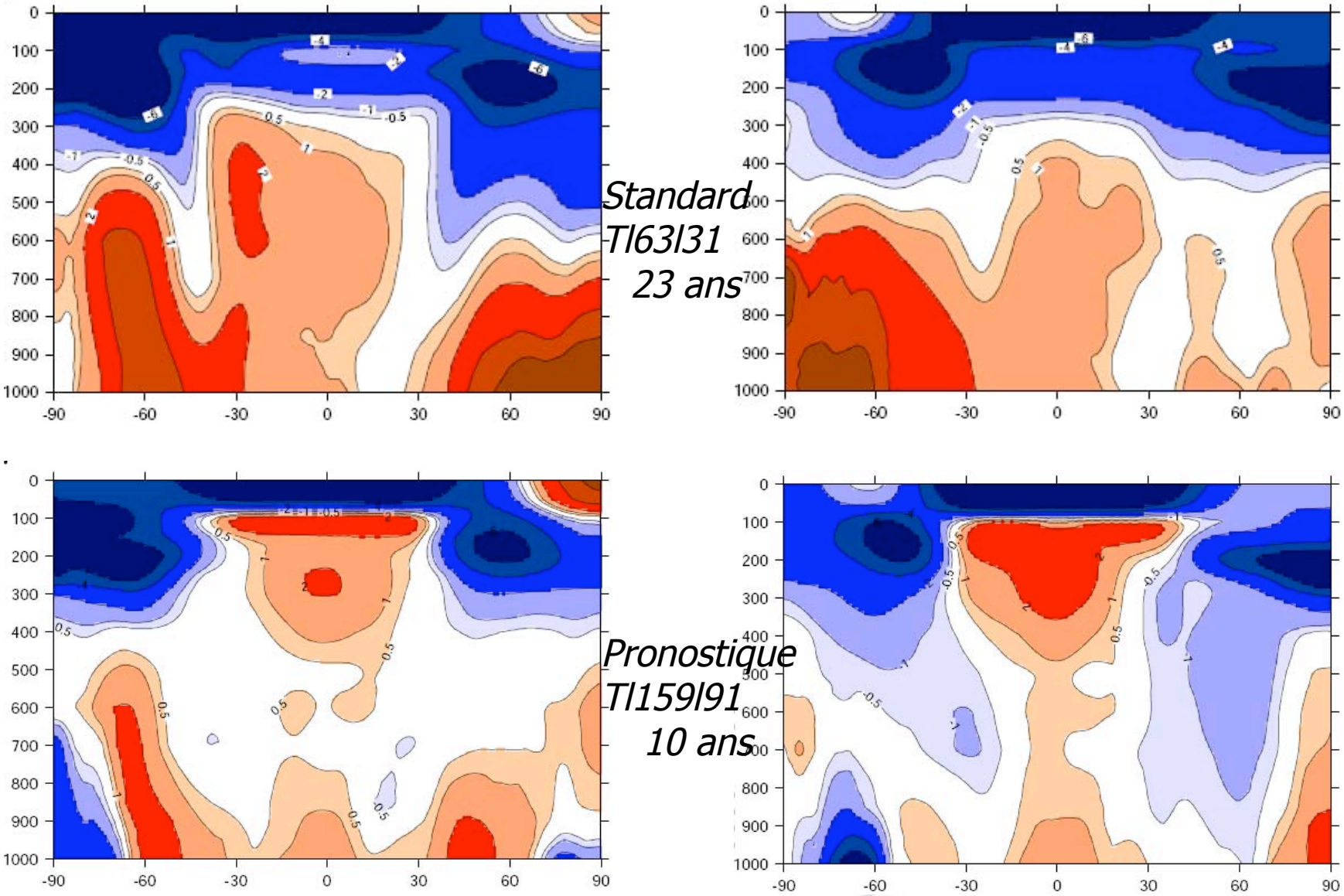
Biais de pression mer (/ERA40)



Simulations 3D couplées

Biais de température (/ERA40)

DJF **JJA**



Standard
Tl63l31
23 ans

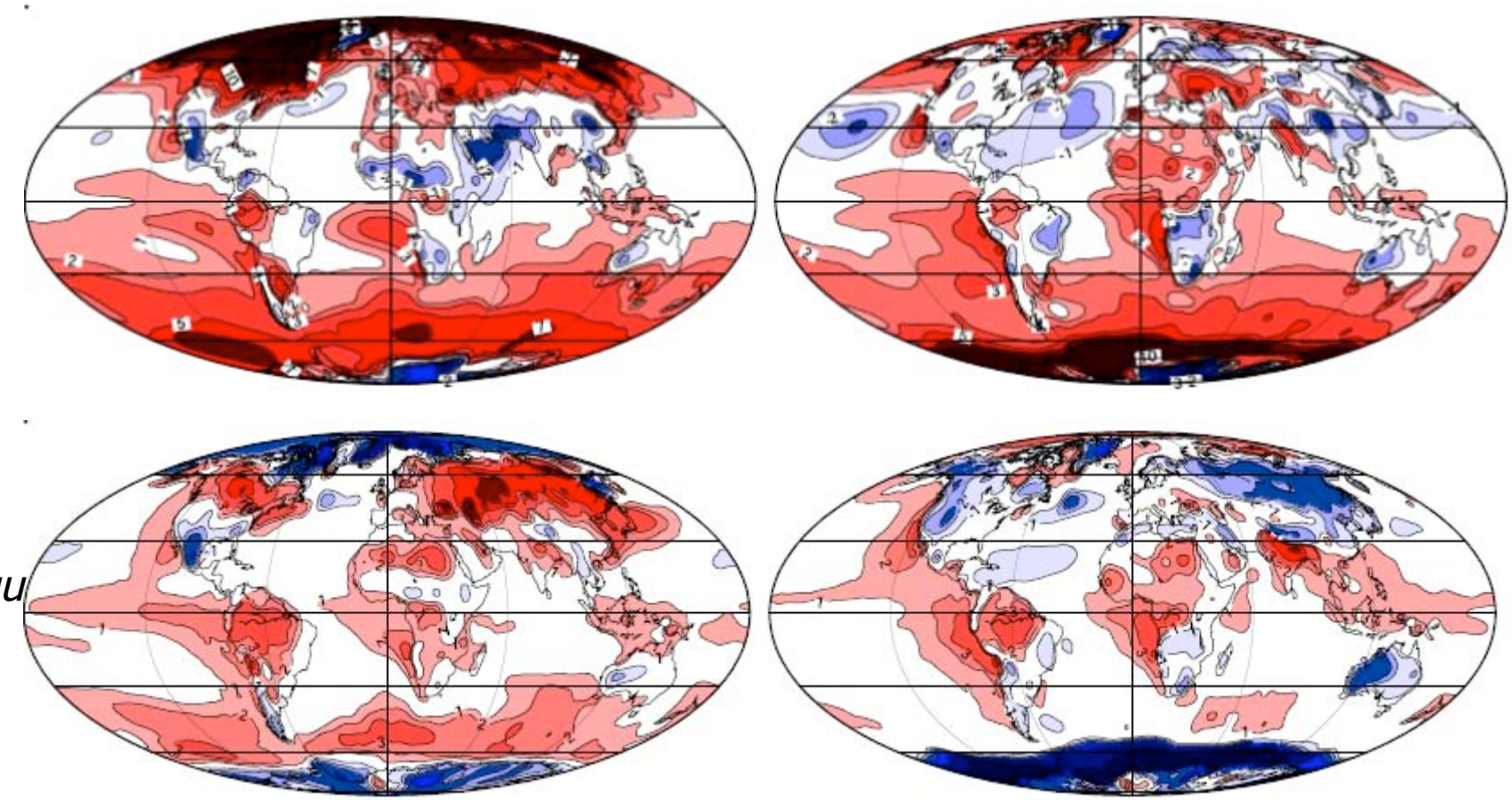
Pronostique
Tl159l91
10 ans

Biais de Température à 2m (/ERA40)

DJF **JJA**

Standard Tl63l31

Pronostique Tl159l91

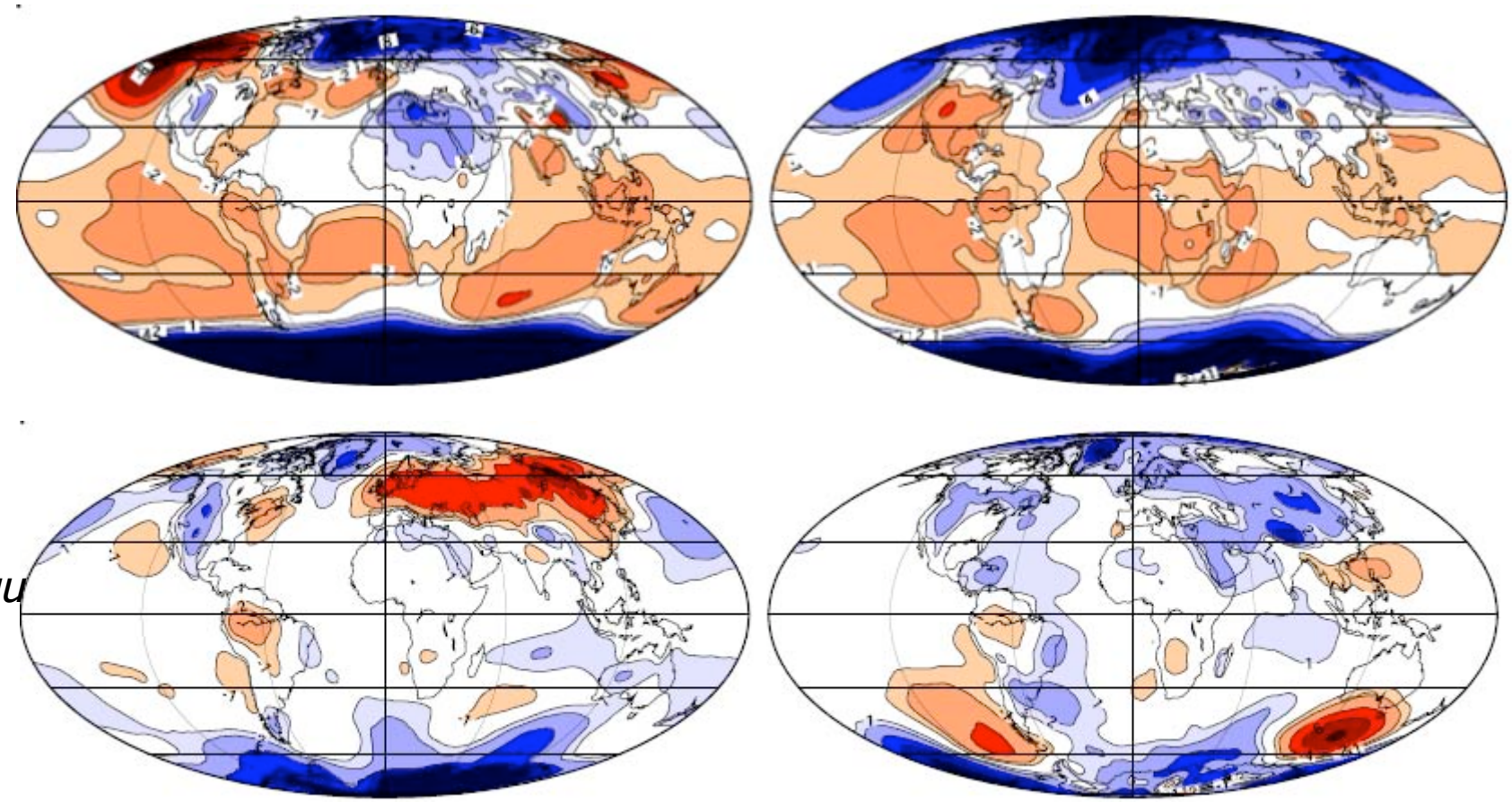


Biais de pression mer (/ERA40)

DJF **JJA**

Standard Tl63l31

Pronostique Tl159l91

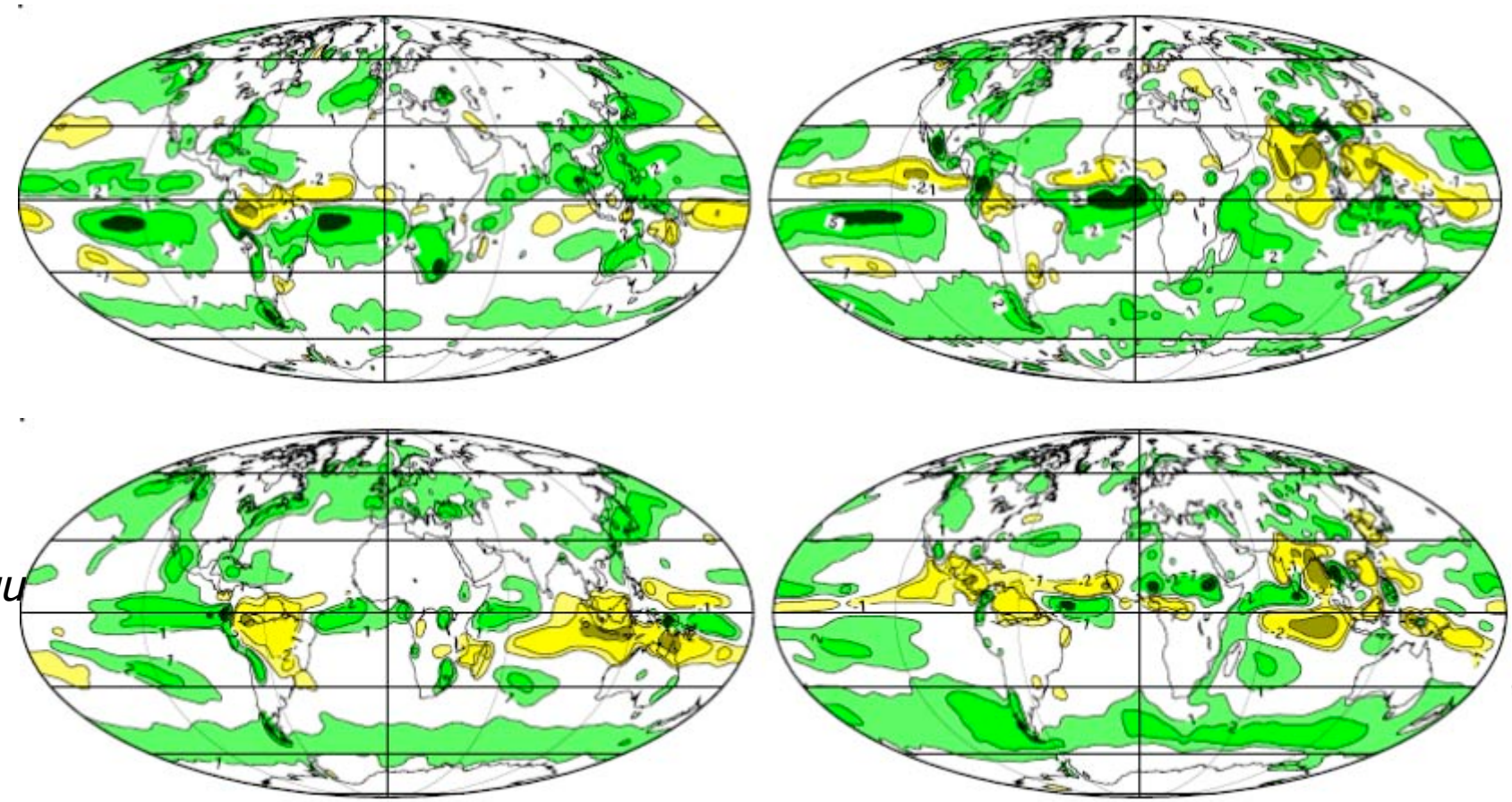


Biais précipitations (/ERA40)

DJF **JJA**

Standard Tl63l31

Pronostique Tl159l91

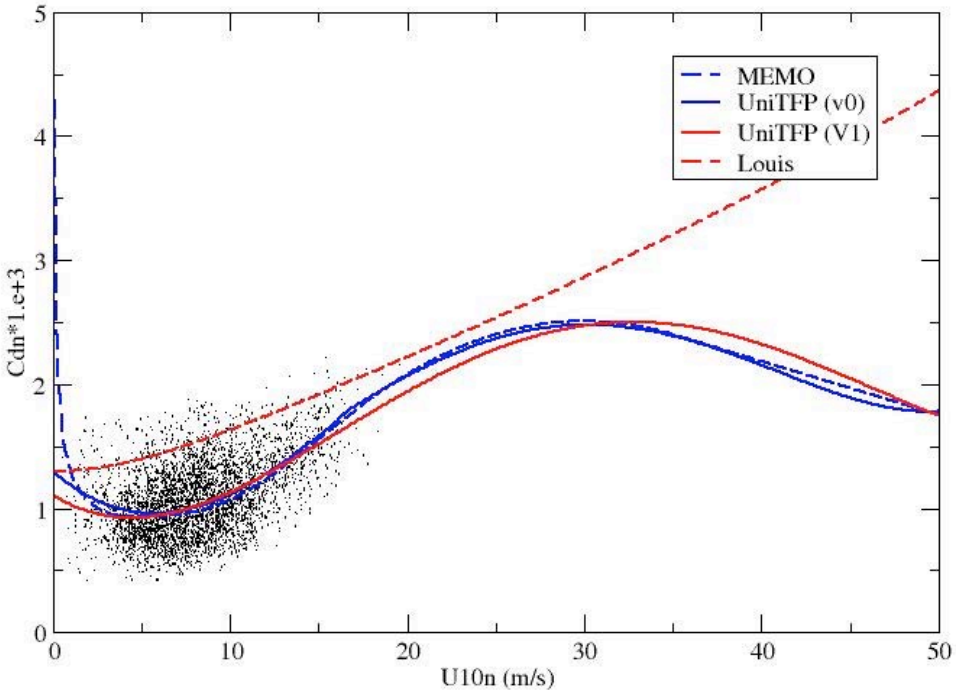
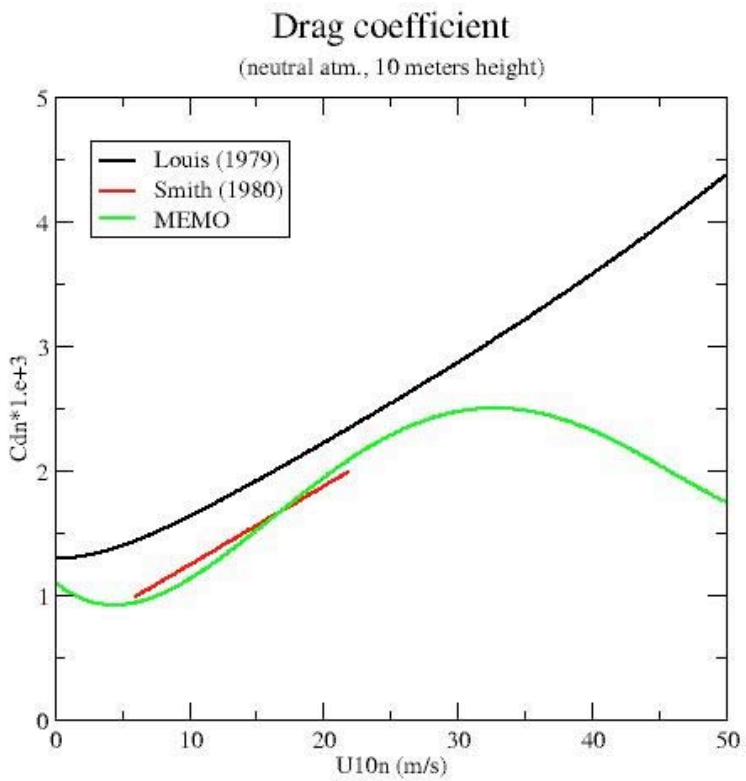


Conclusion et perspectives

- Meilleure localisation du système convectif par rapport à l'onde d'est et meilleure évolution temporelle de ces 2 éléments associés avec la physique PRO2.

- Tests avec un domaine plus grand pour analyser l'impact des conditions aux bords.

- Tests avec une version améliorée de la physique PRO1 (développée au GMAP/PROC).

- **Mise en oeuvre de cette méthodologie sur un cas AMMA *(dans le cadre DEPHY?)*; utilisation d'autres cas comme COPS (Forêt Noire) par exemple.**

coefficient d'échange du vent en condition de stabilité neutre en fonction du vent