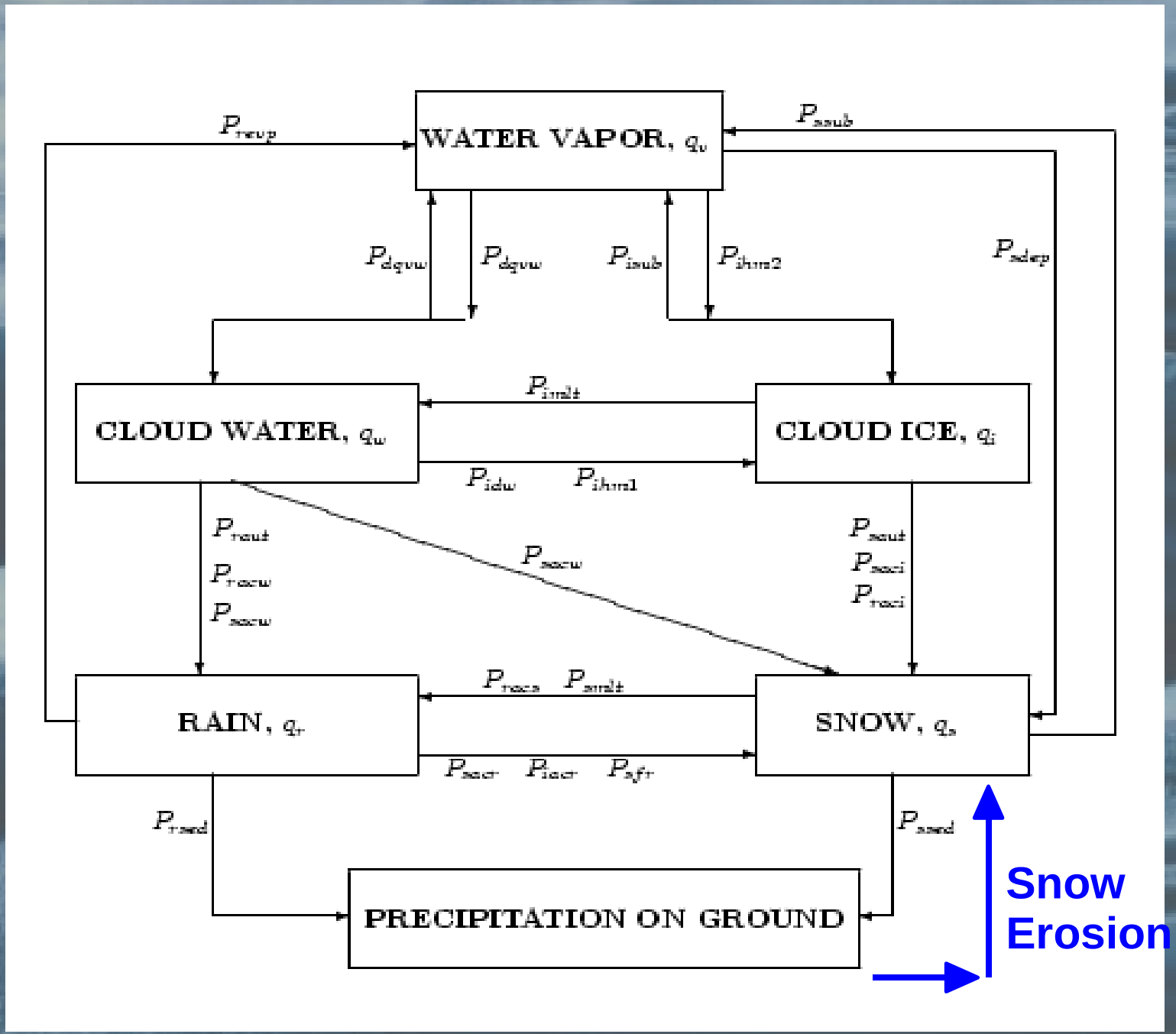

MAR
ALPES

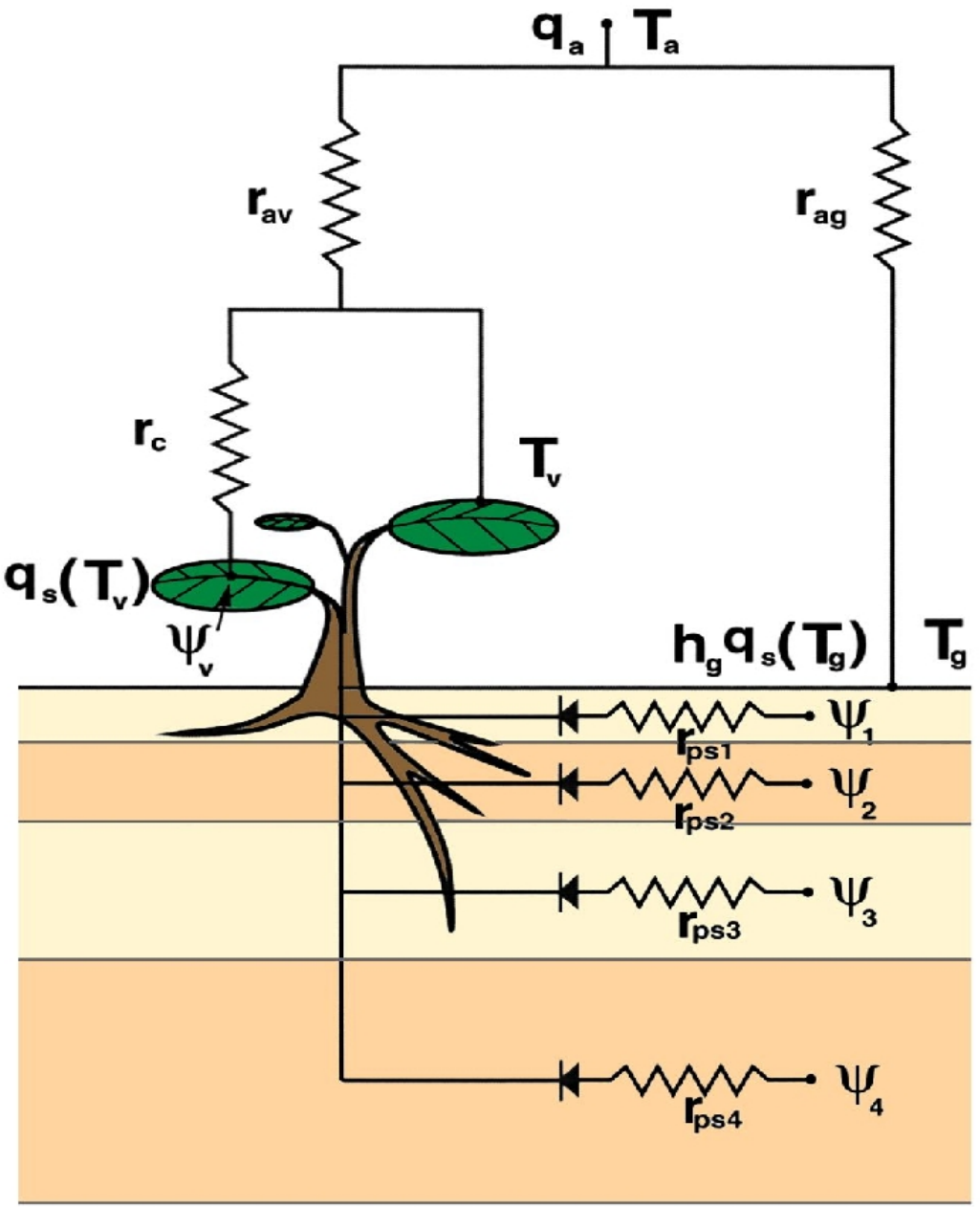
MAR (Modèle Atmosphérique Régional)

- Modèle à aire limitée
- Microphysique nuageuse pronostique
  (qw, qi, qs, qr)
  (pas de lessivage des aérosols)
- Paramétrisation de la convection
  (flux de masse)
- Transport des aérosols: advection, diffusion turbulente, interaction avec la surface (dépôt)
- Couplé à un modèle de neige de classe CROCUS

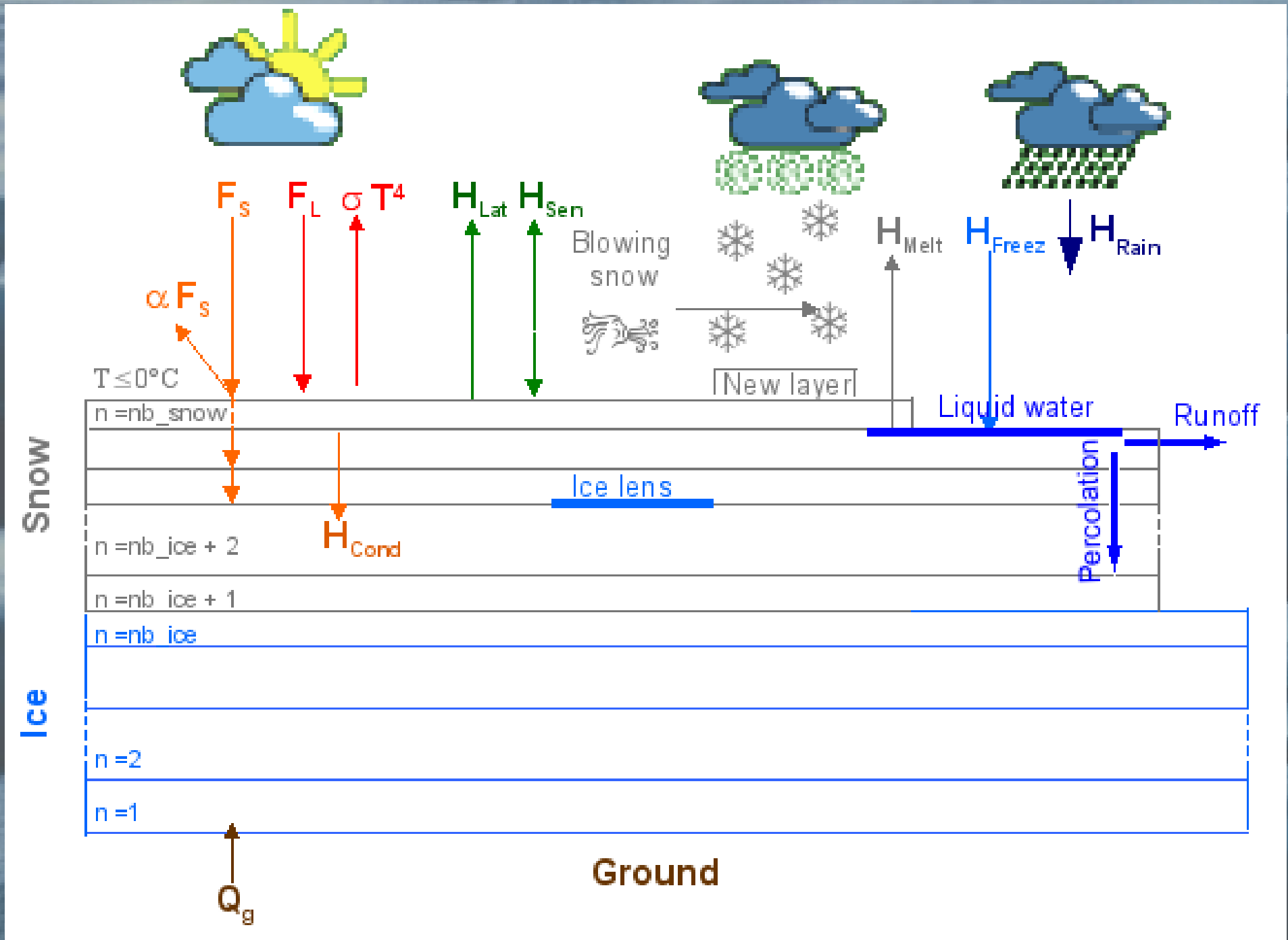
Cloud Microphysical Model



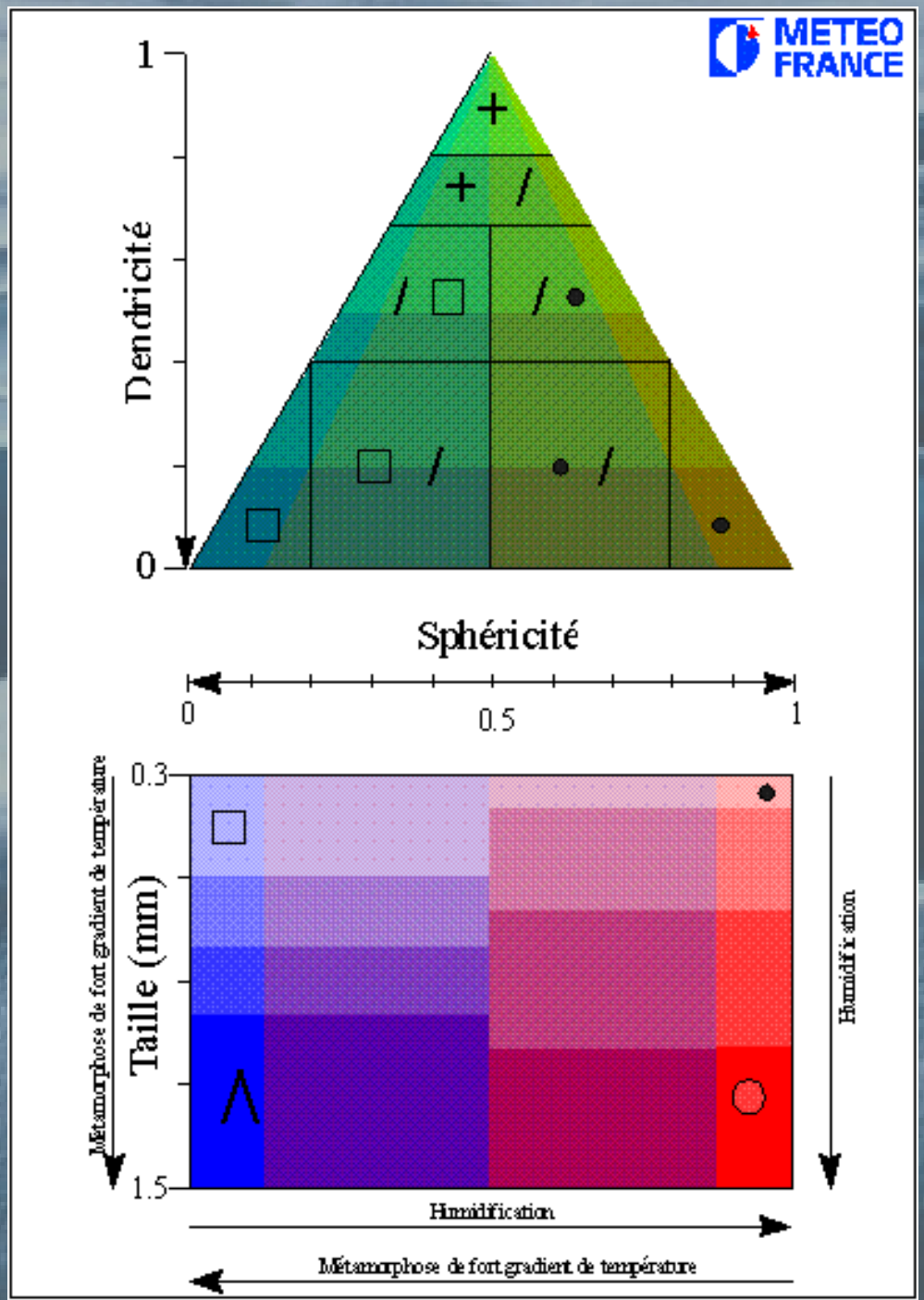
Modèle de Surface



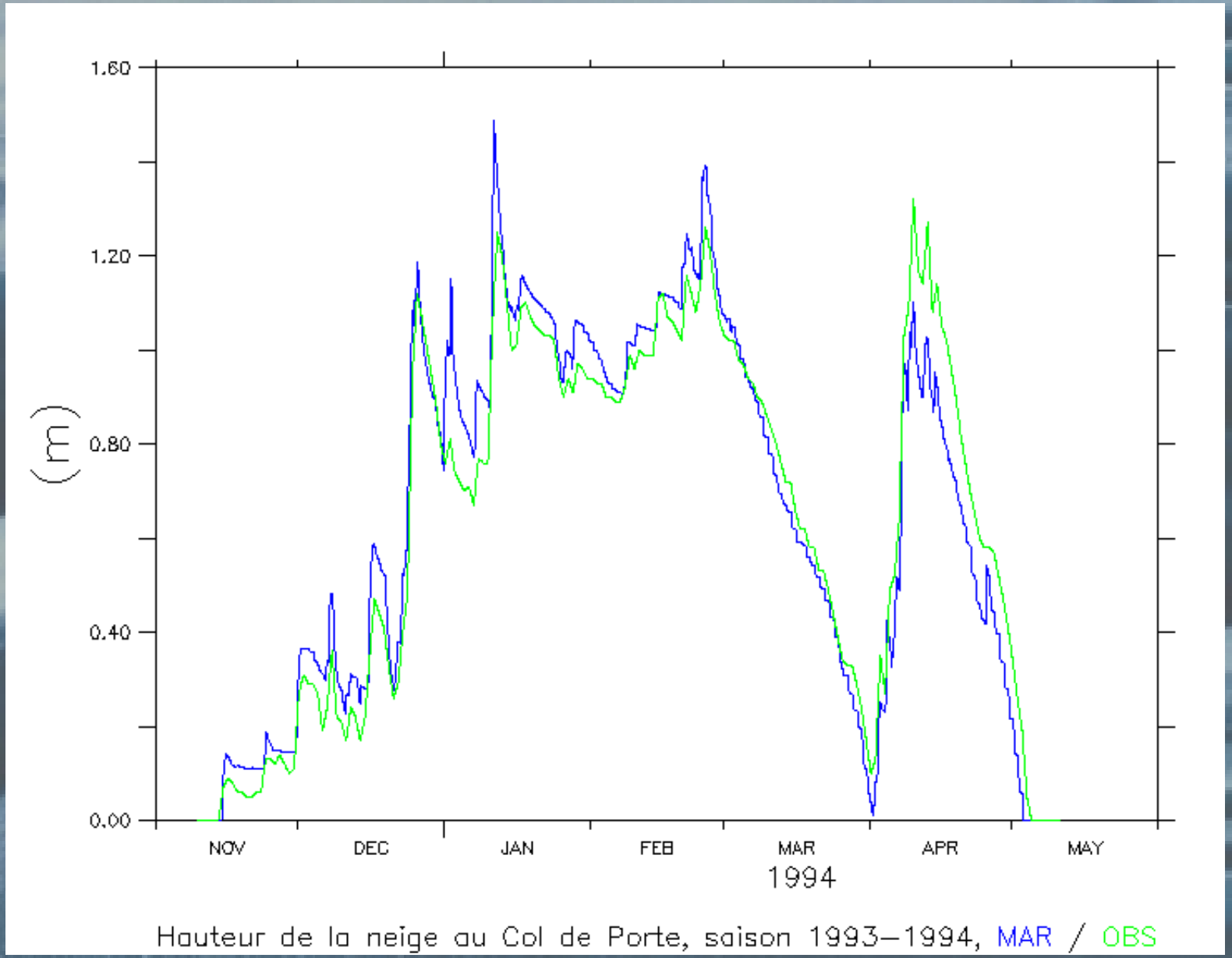
Modèle de Neige



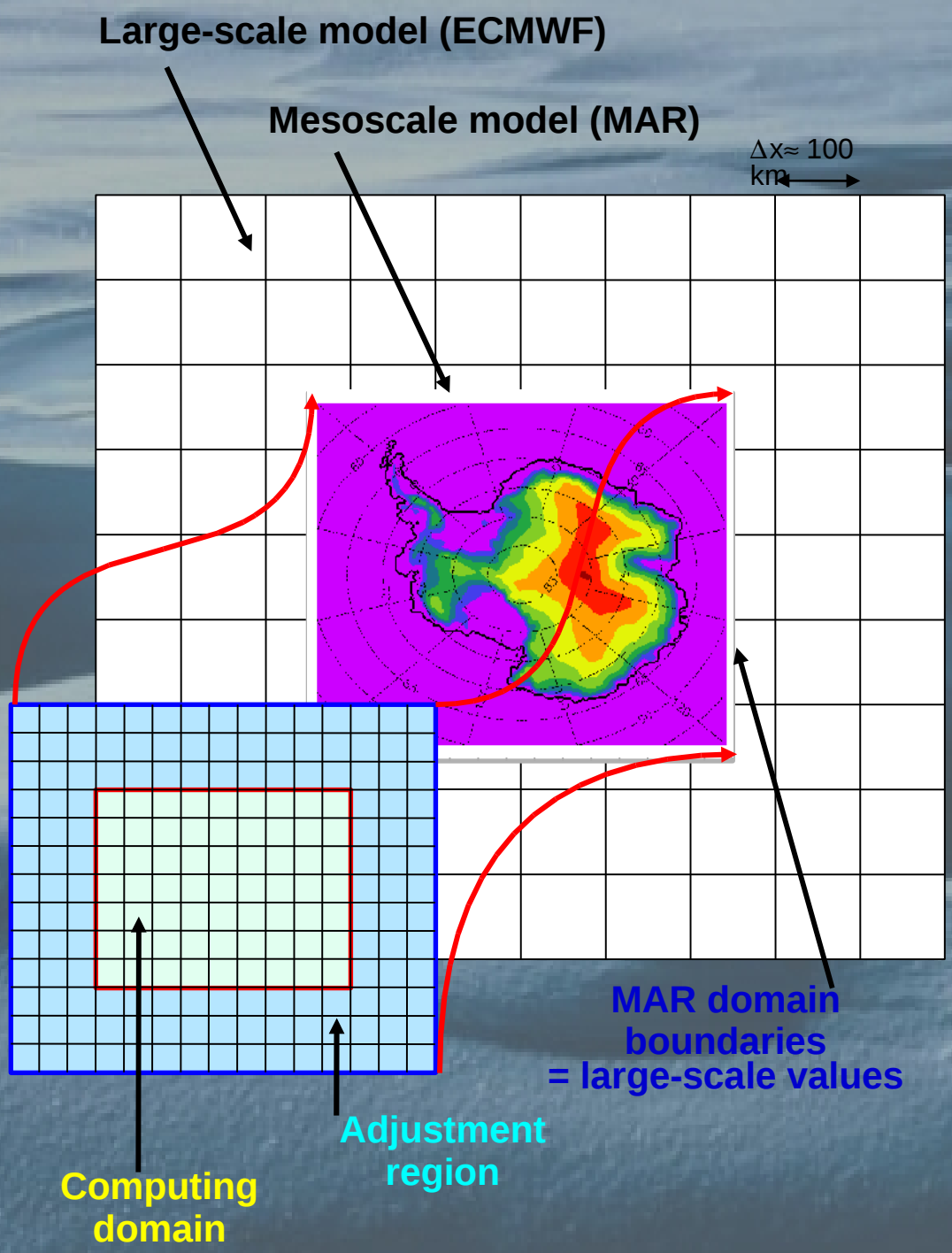
Modèle de Neige: Propriétés

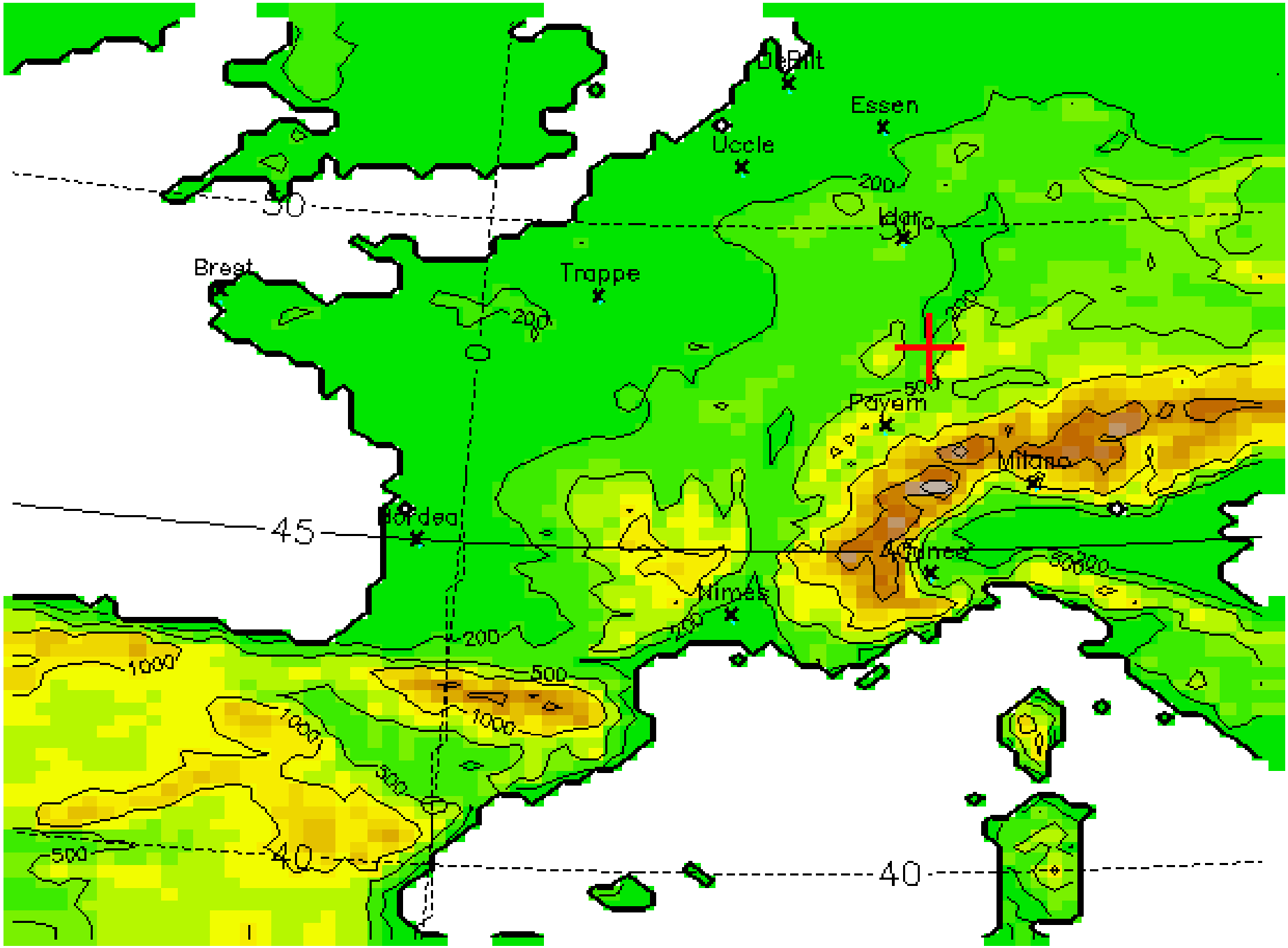


Validation (Col de Porte)



IMBRICATION : MAR dans ECMWF

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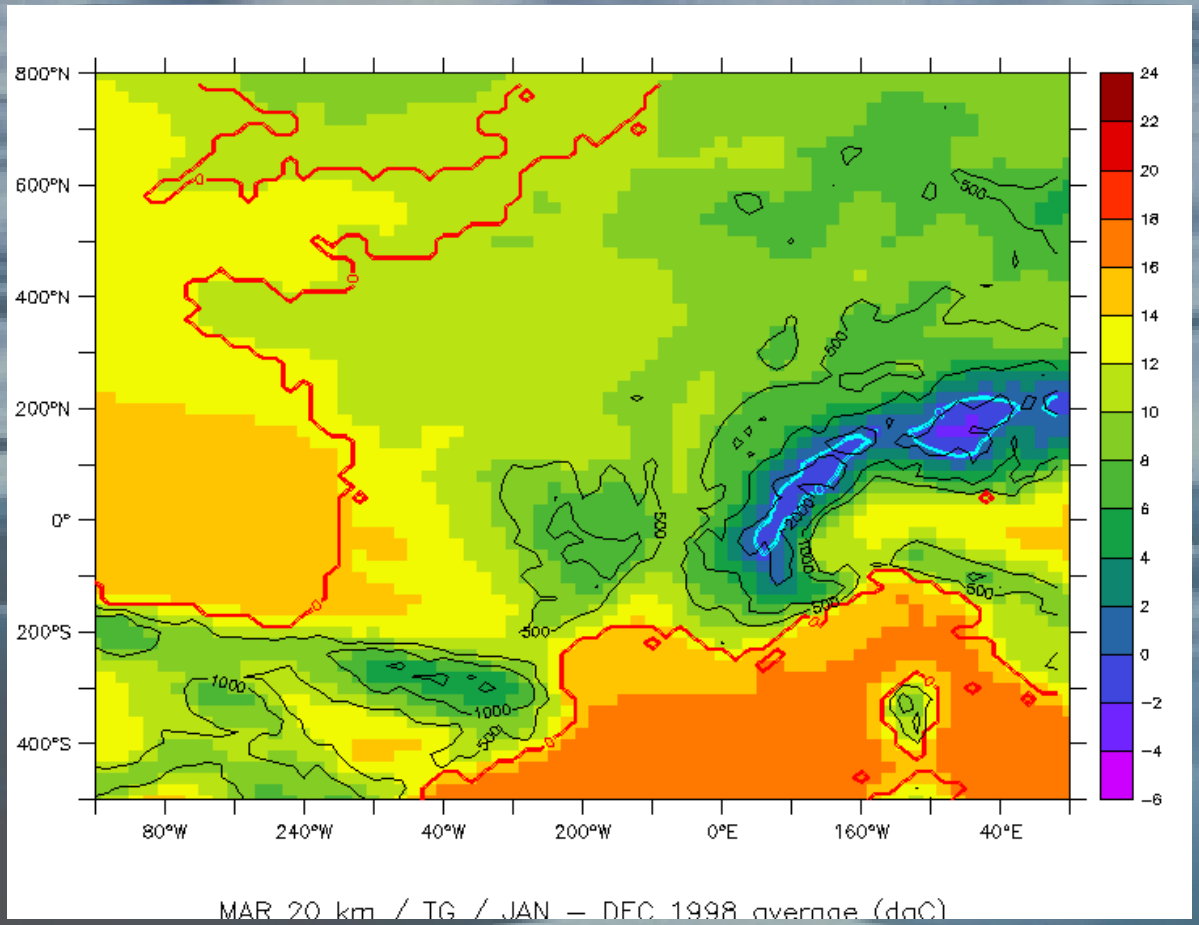
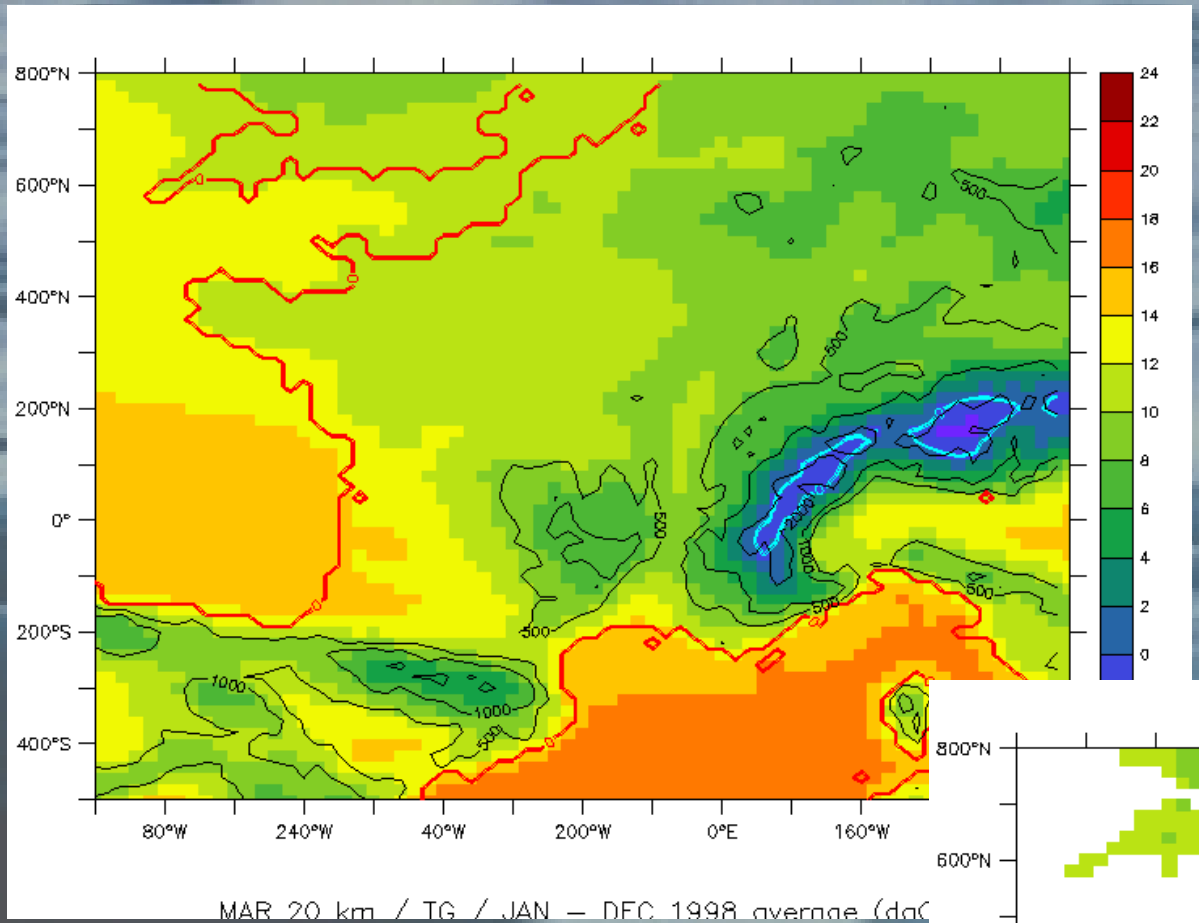


MAR

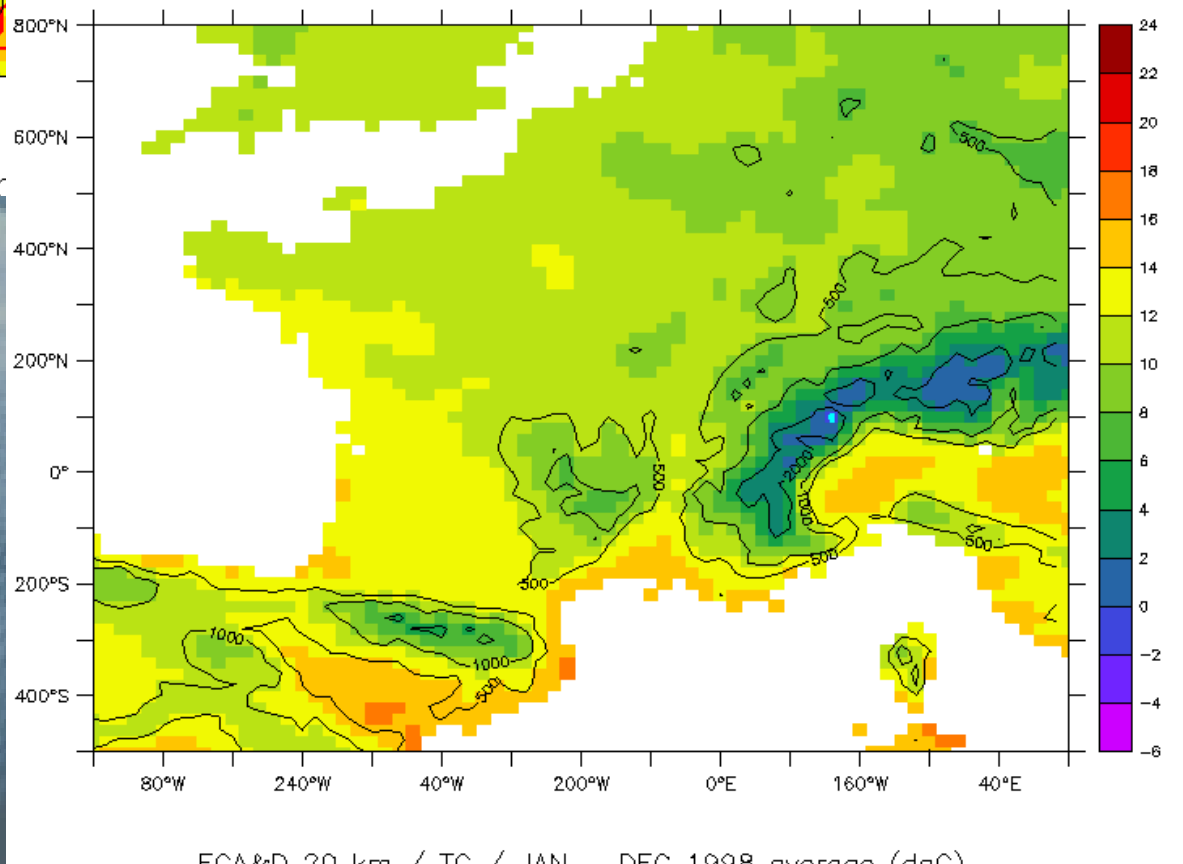
Température moyenne annuelle

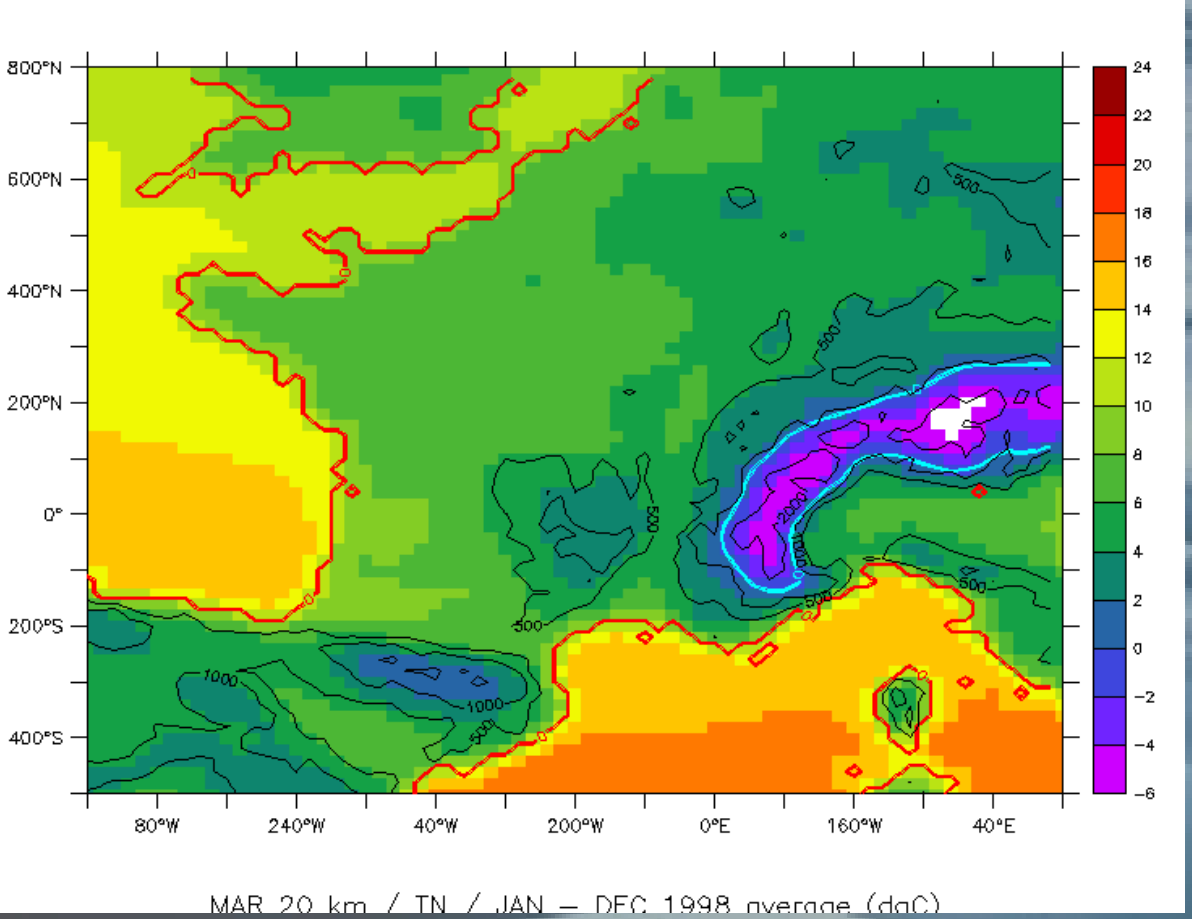


ECA&D

MAR

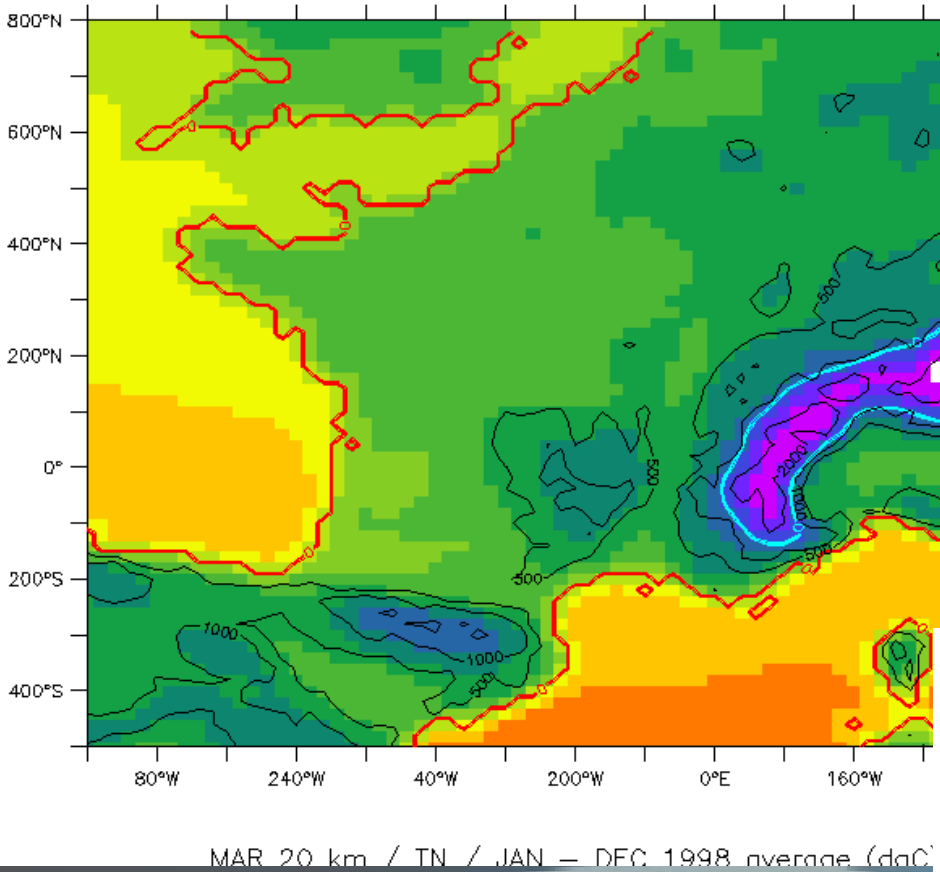
Température moyenne annuelle





MAR

Température MIN moyenne annuelle

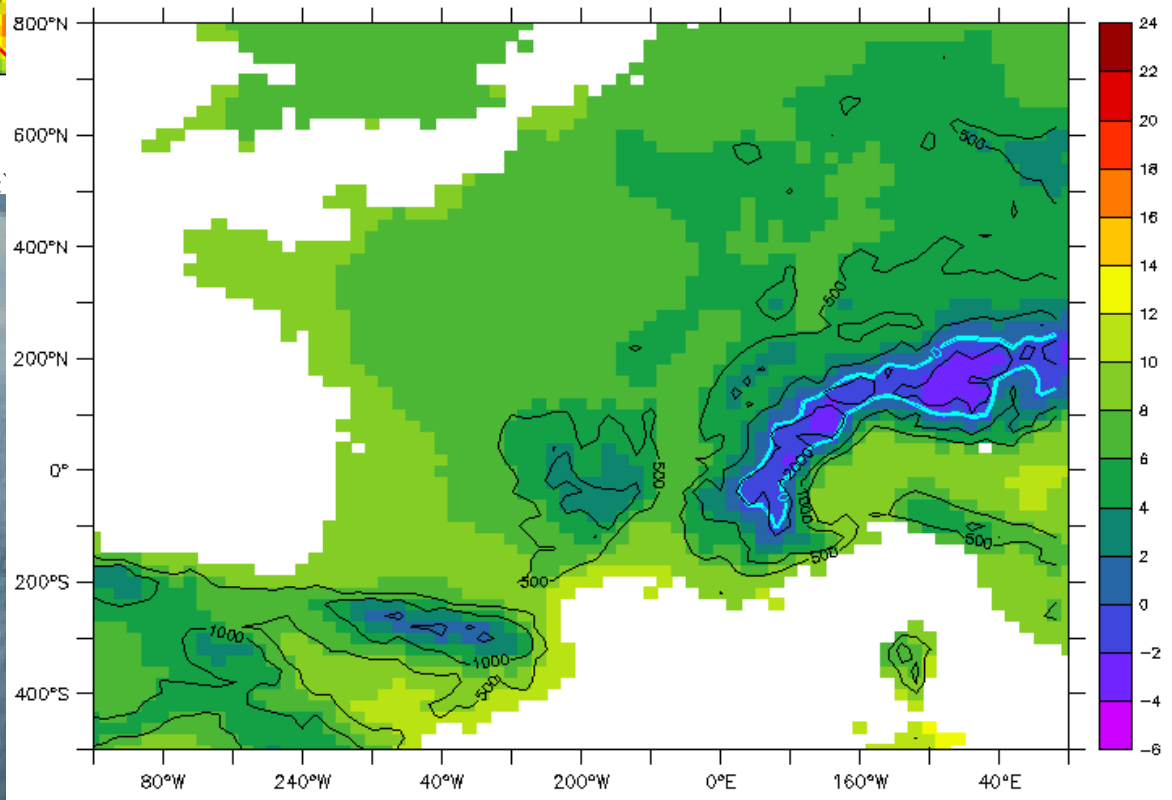


MAR 20 km / TN / JAN – DEC 1998 average (degC)

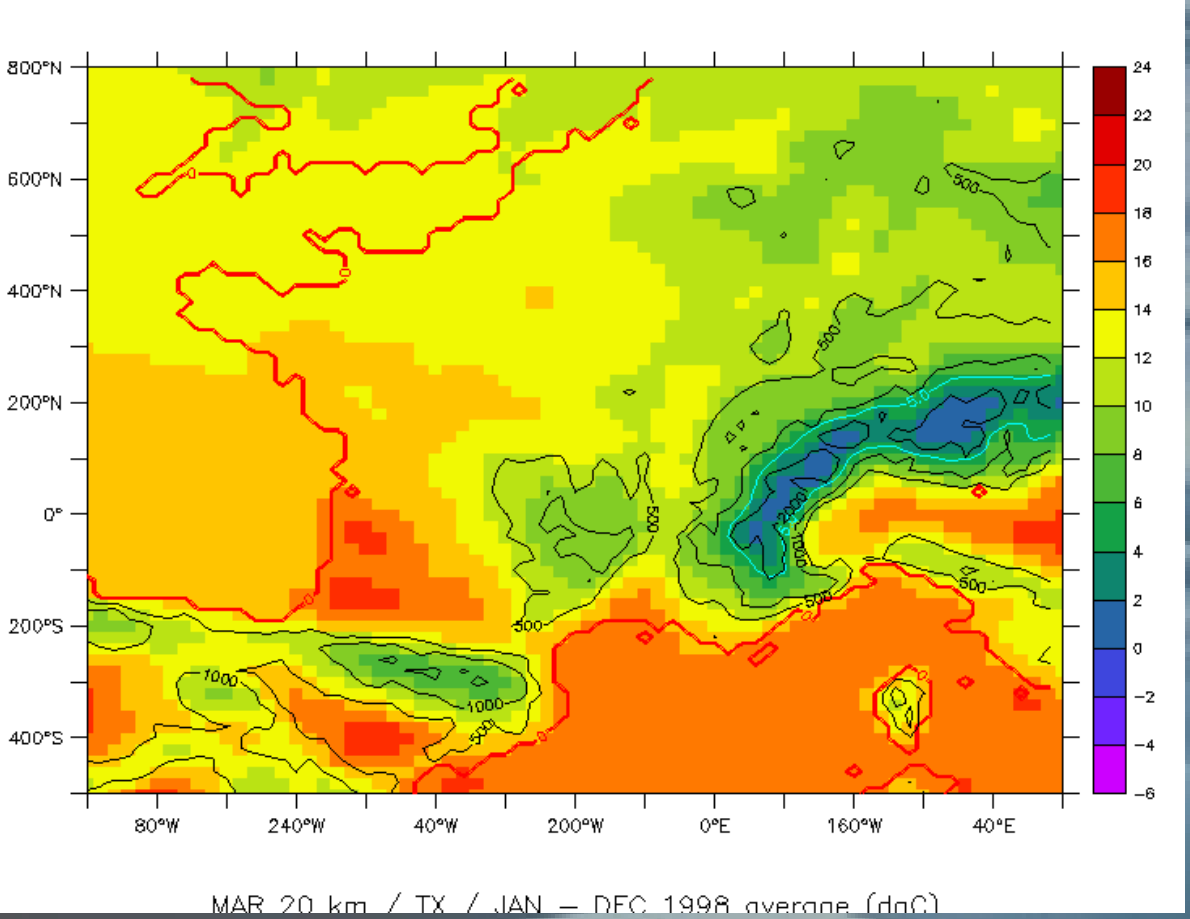
ECA&D

MAR

Température MIN moyenne annuelle

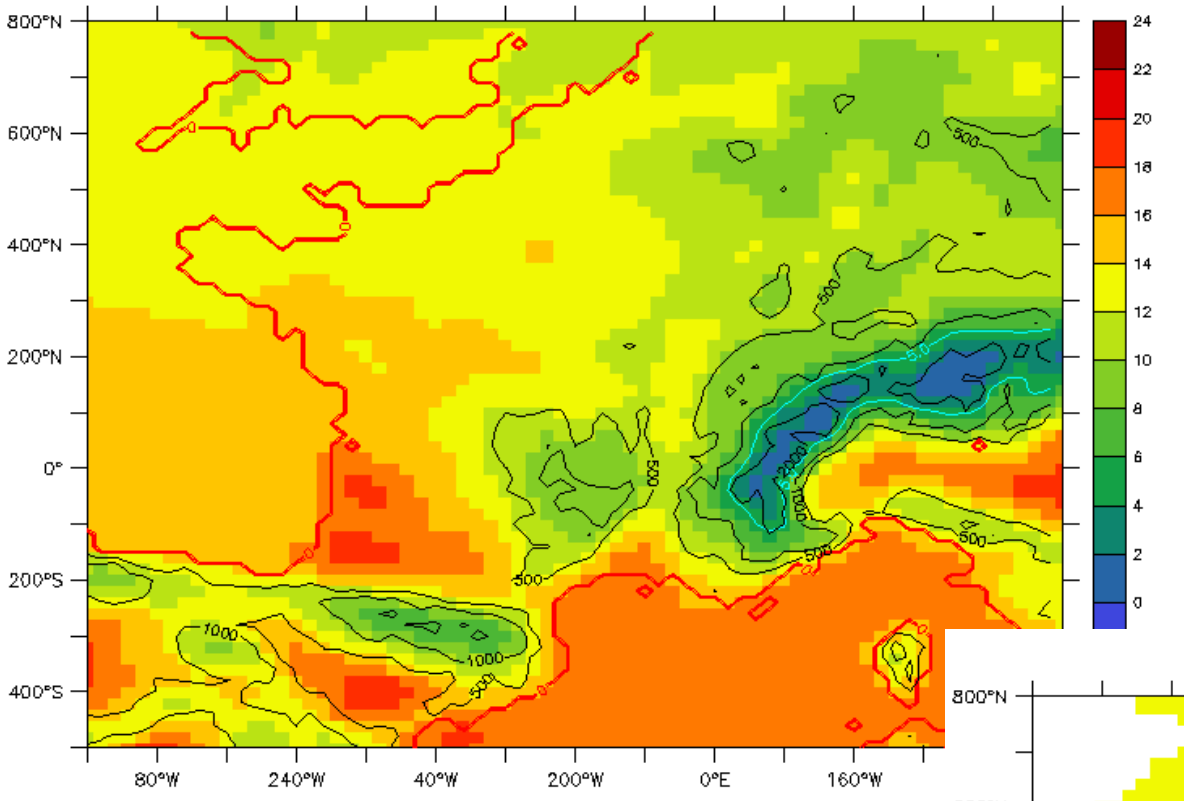


ECA&D 20 km / TN / JAN – DEC 1998 average (degC)



MAR

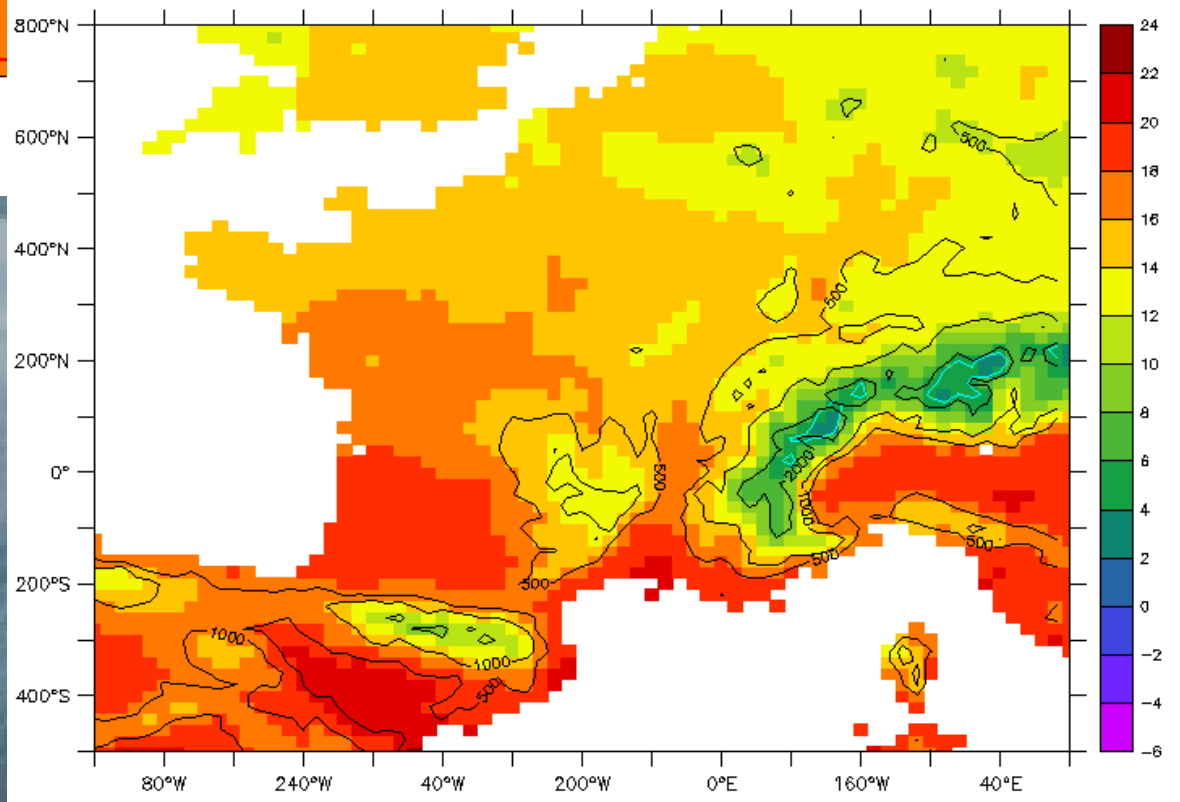
Température MAX moyenne annuelle



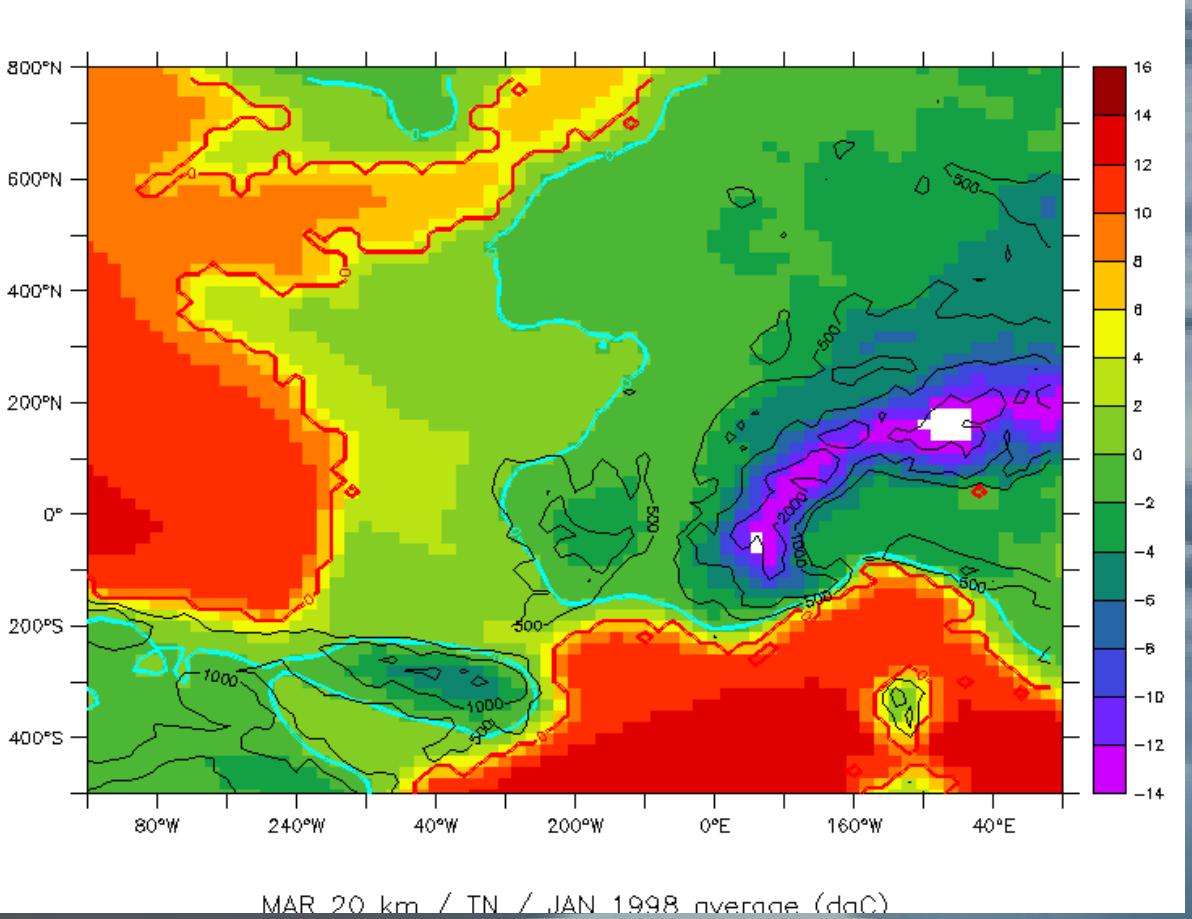
MAR 20 km / TX / JAN – DEC 1998 average (degC)

MAR

Température MAX moyenne annuelle

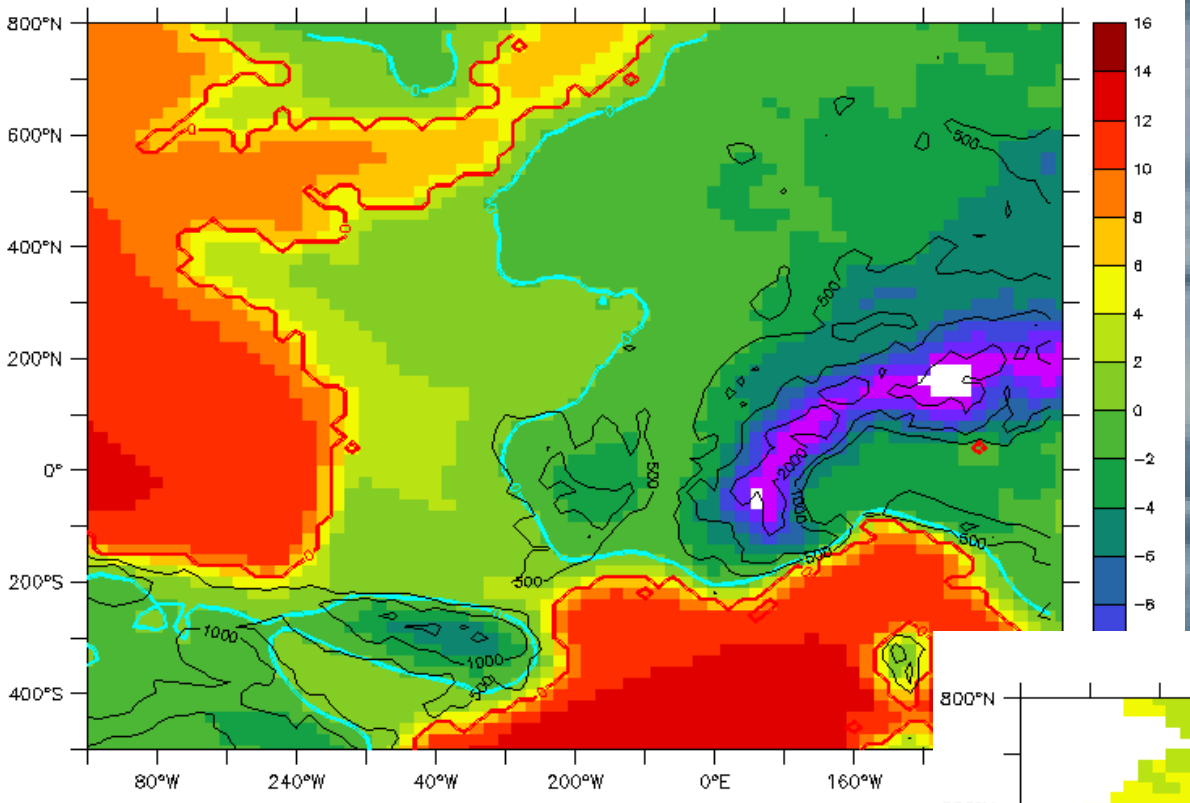


ECA&D 20 km / TX / JAN – DEC 1998 average (degC)



MAR

Température MIN moyenne janvier

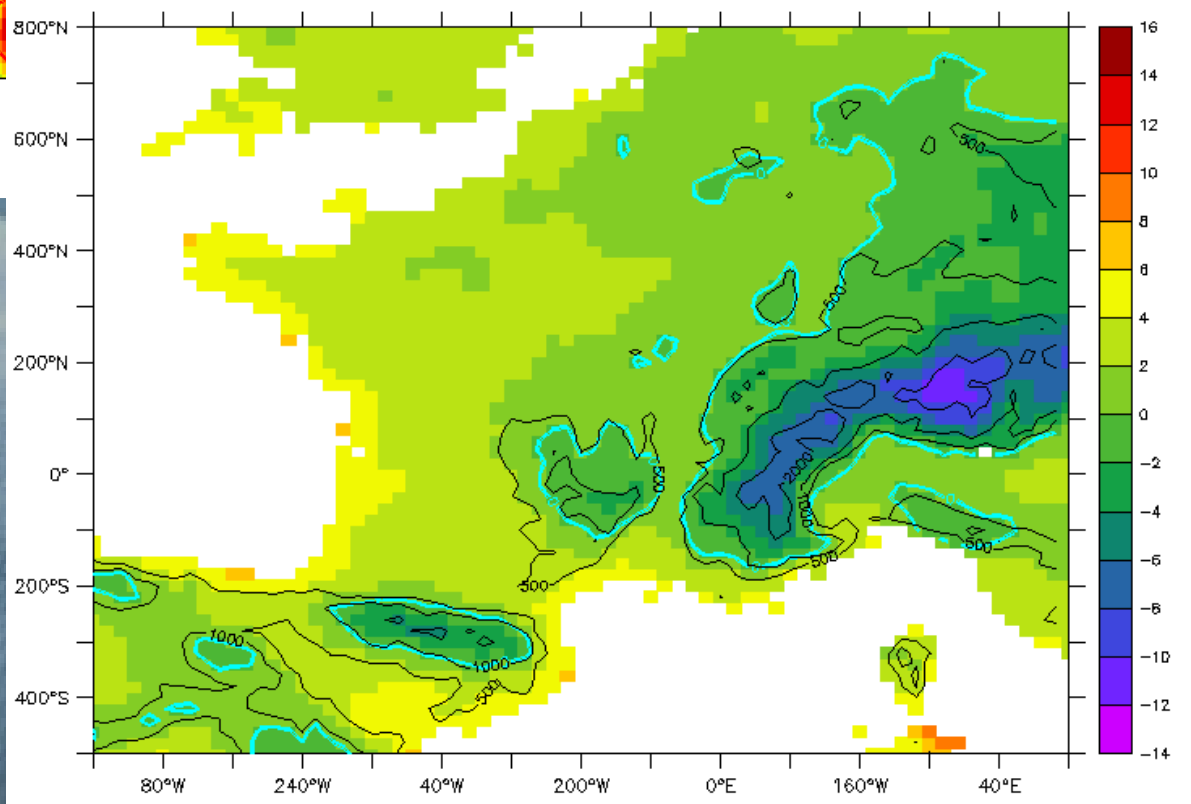


MAR 20 km / TN / JAN 1998 average (degC)

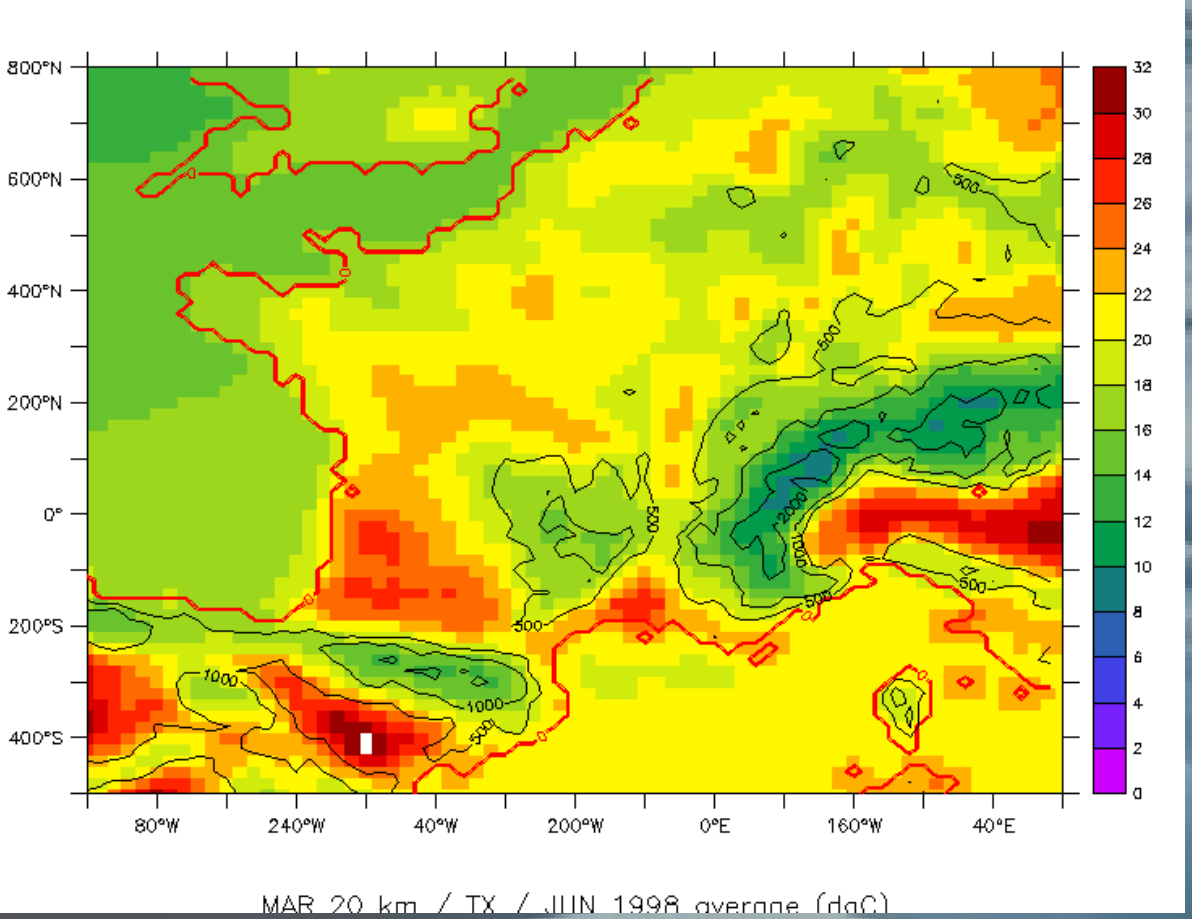
ECA&D

MAR

Température MIN moyenne janvier

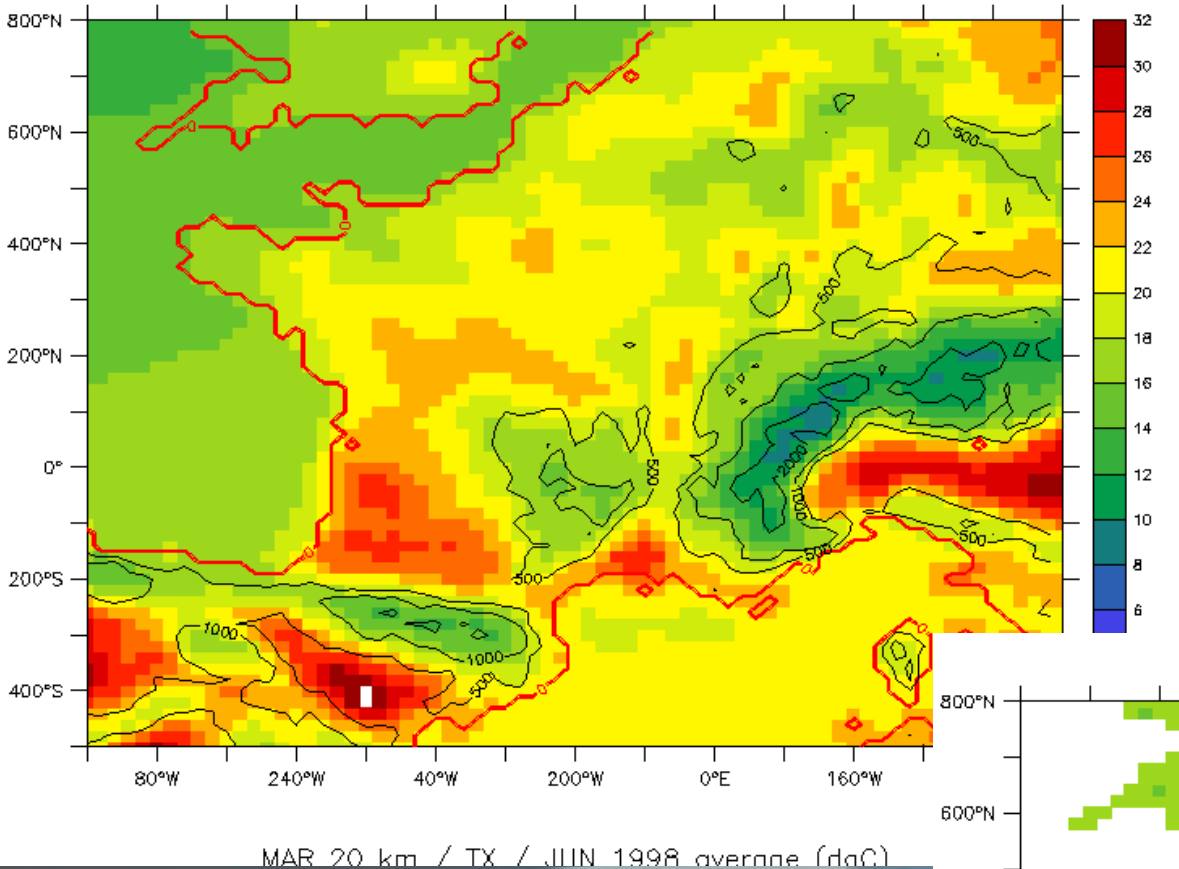


ECA&D 20 km / TN / JAN 1998 average (degC)



MAR

Température MAX moyenne juin

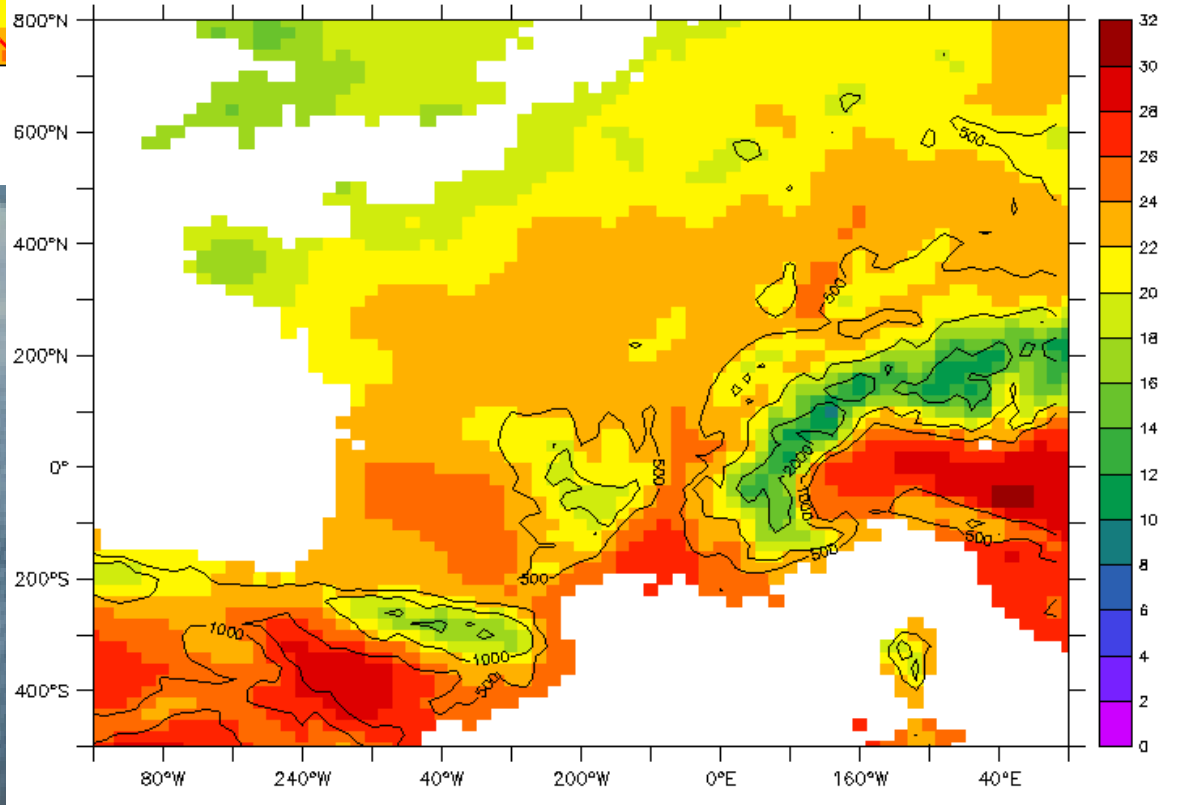


MAR 20 km / TX / JUIN 1998 average (degC)

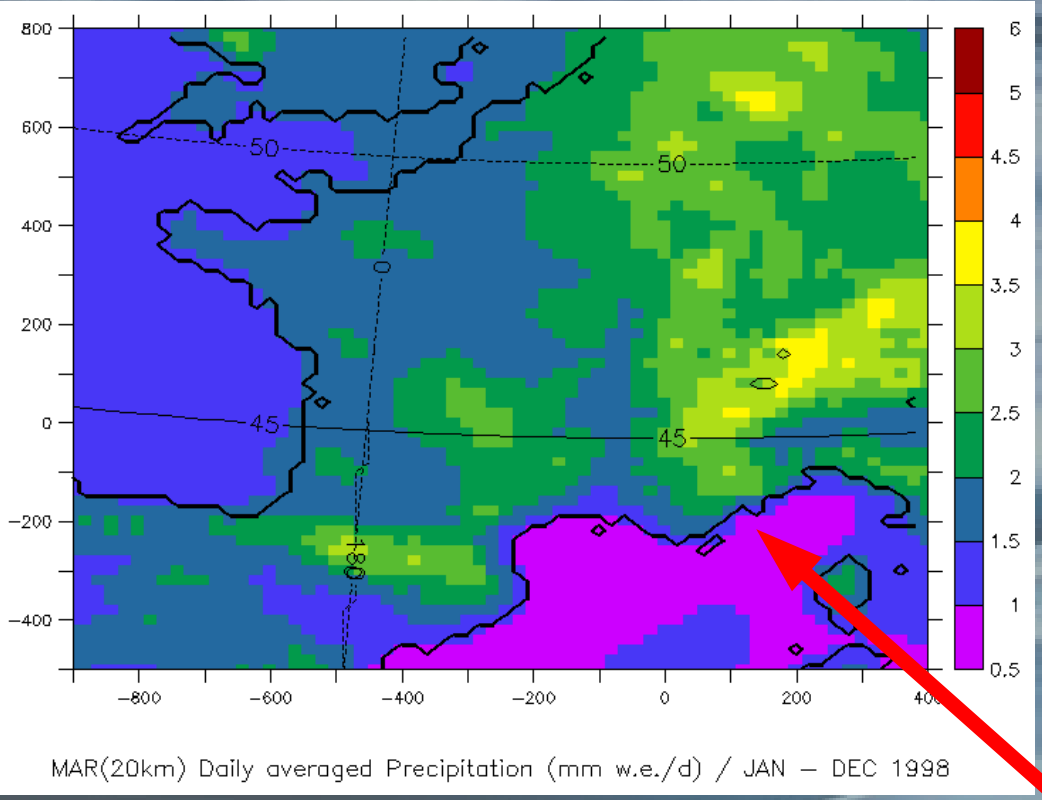
ECA&D

MAR

Température MAX moyenne juin

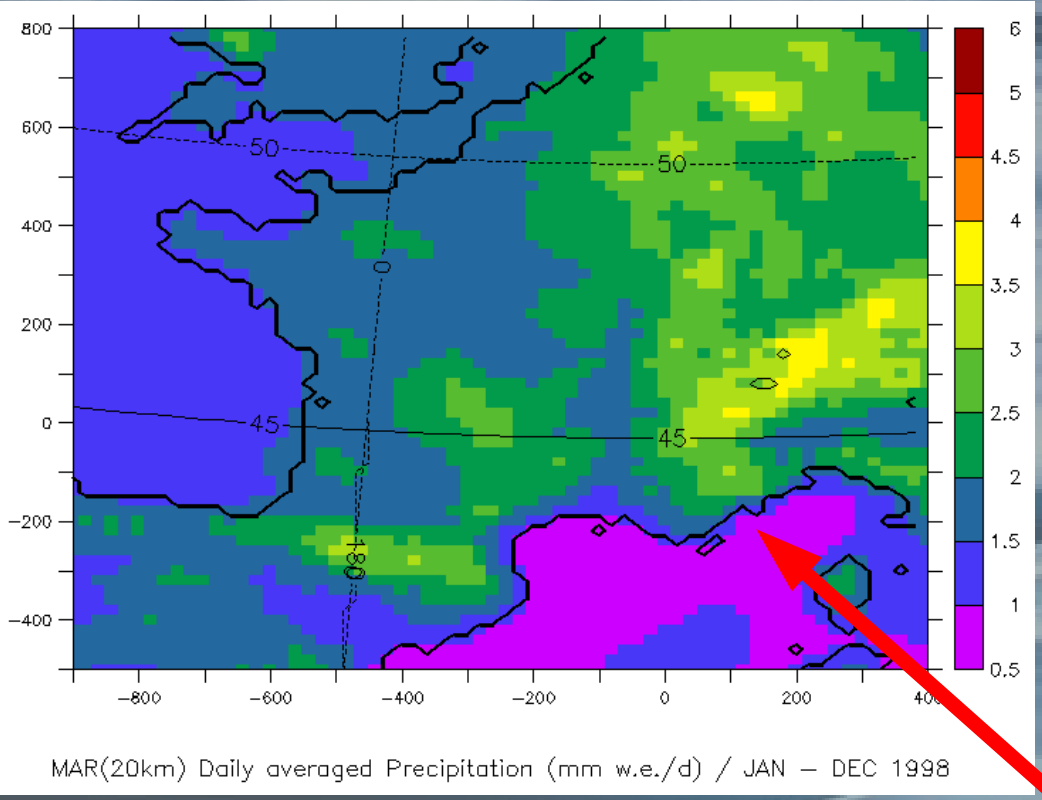


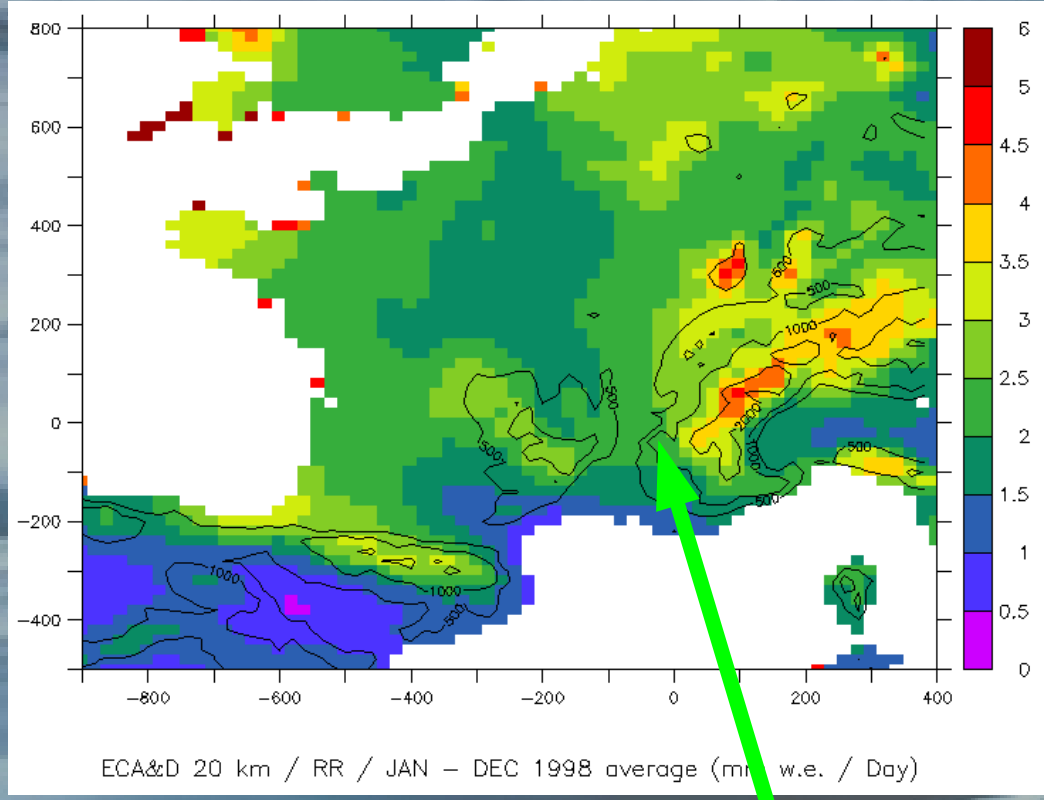
ECA&D 20 km / TX / JUIN 1998 average (degC)



MAR 20

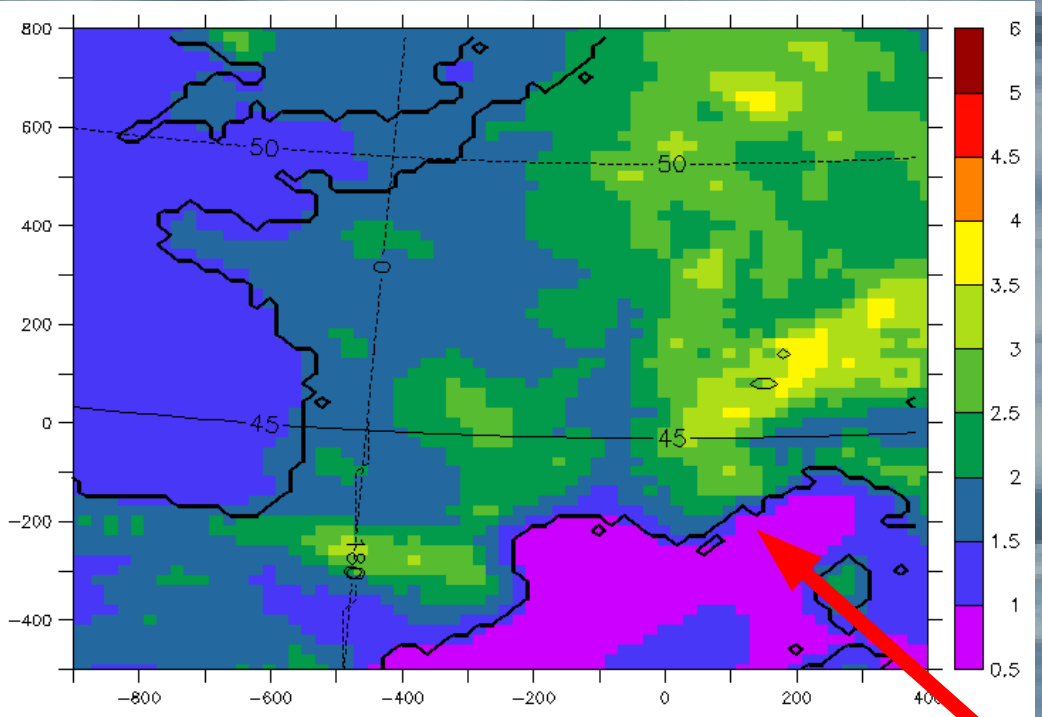
Précipitation: moyenne annuelle

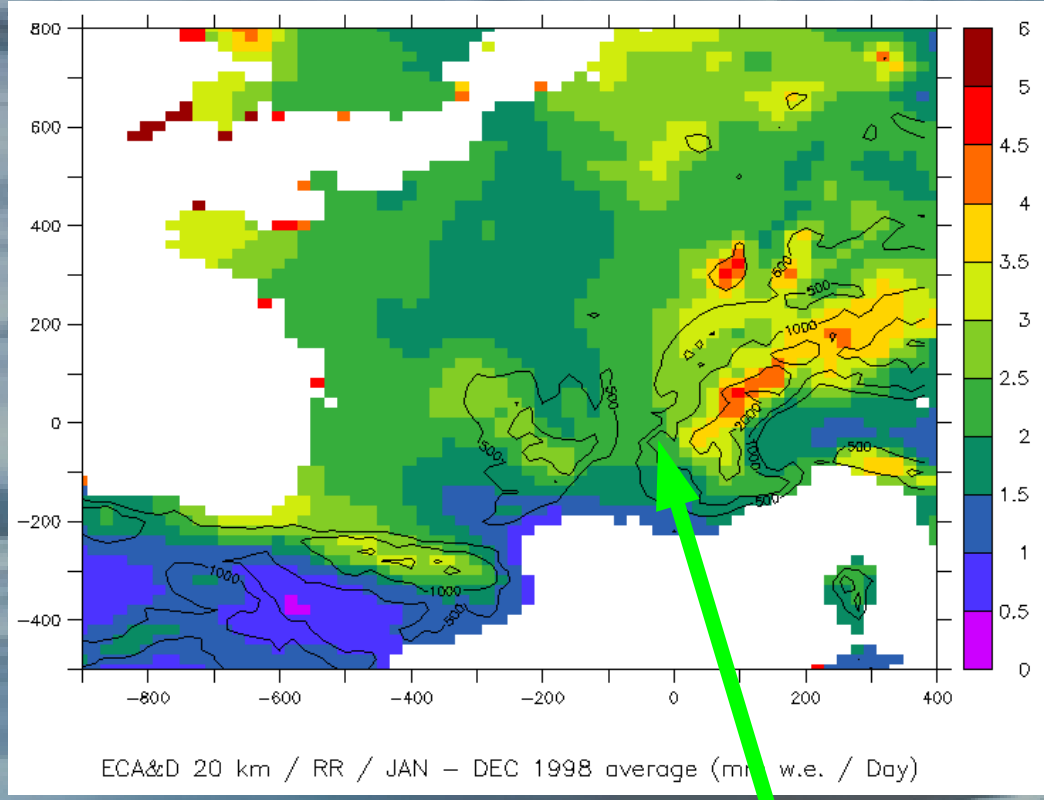


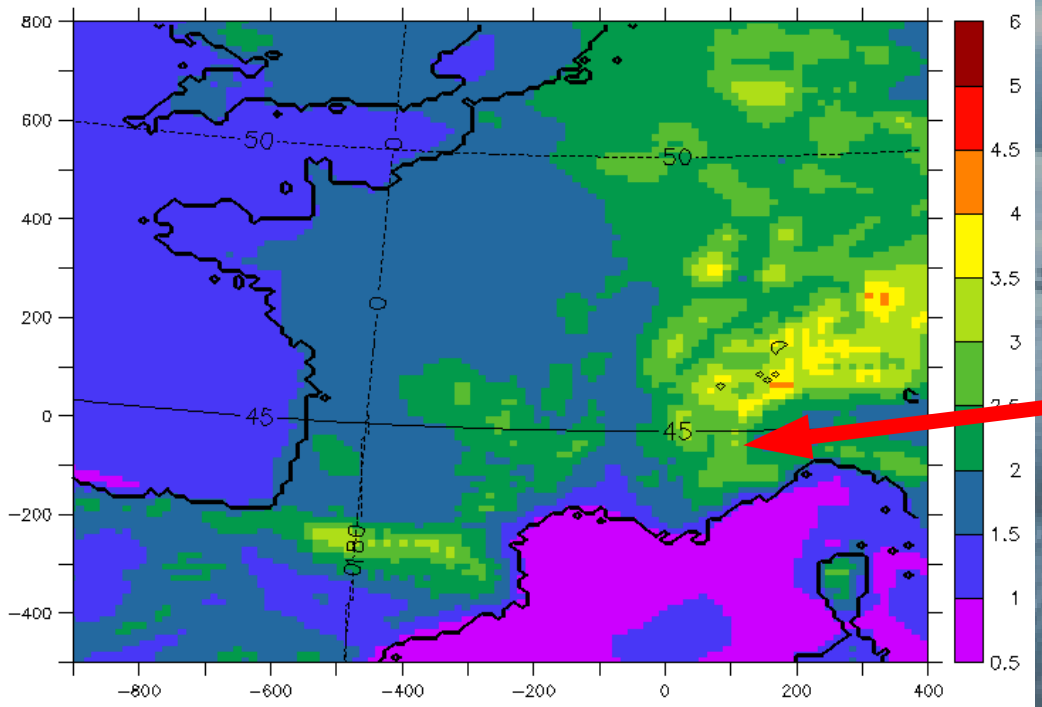


MAR 20 ECA&D

Précipitation: moyenne annuelle





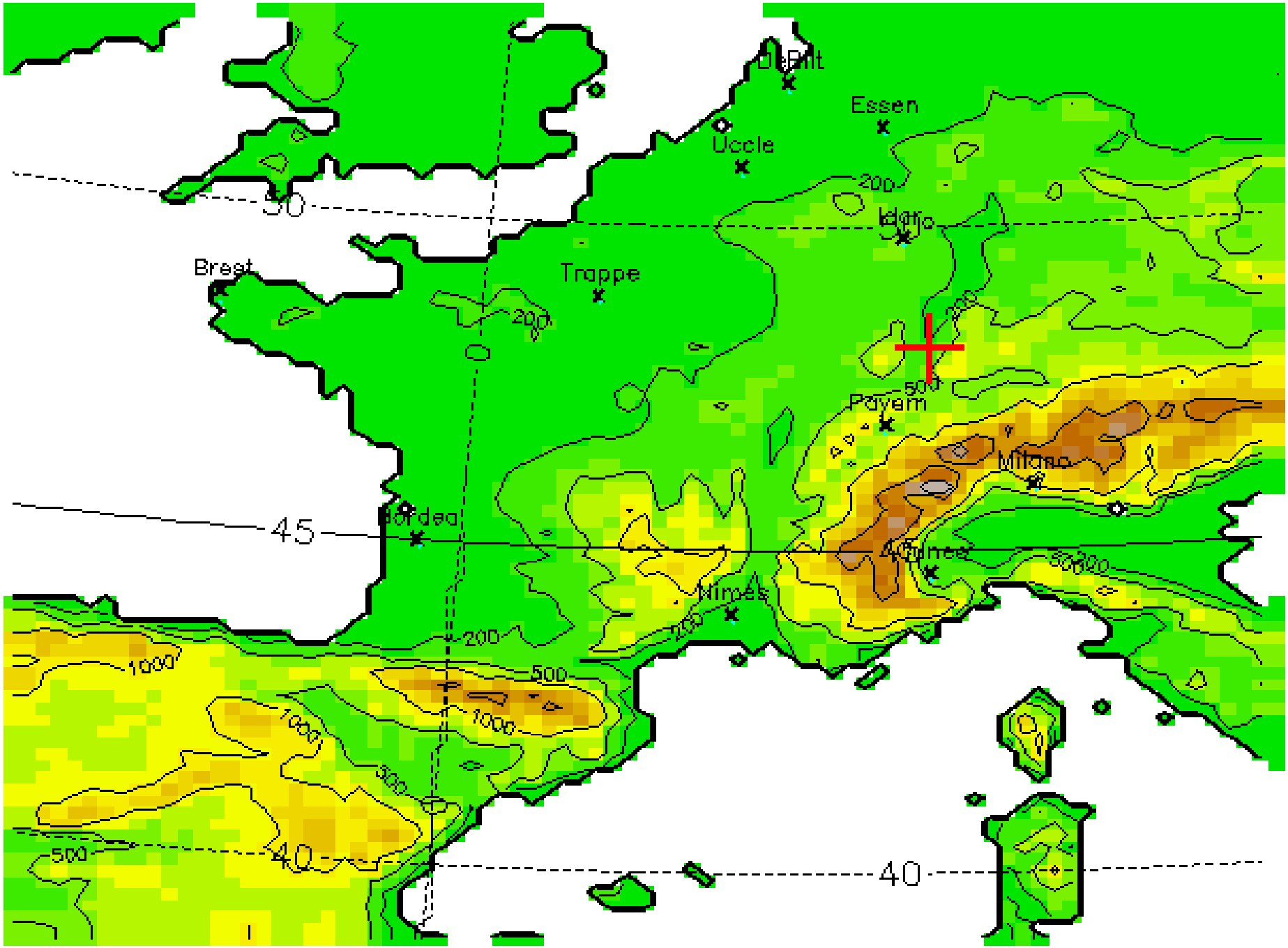


MAR 20

ECA&D

MAR 12

Précipitation: moyenne annuelle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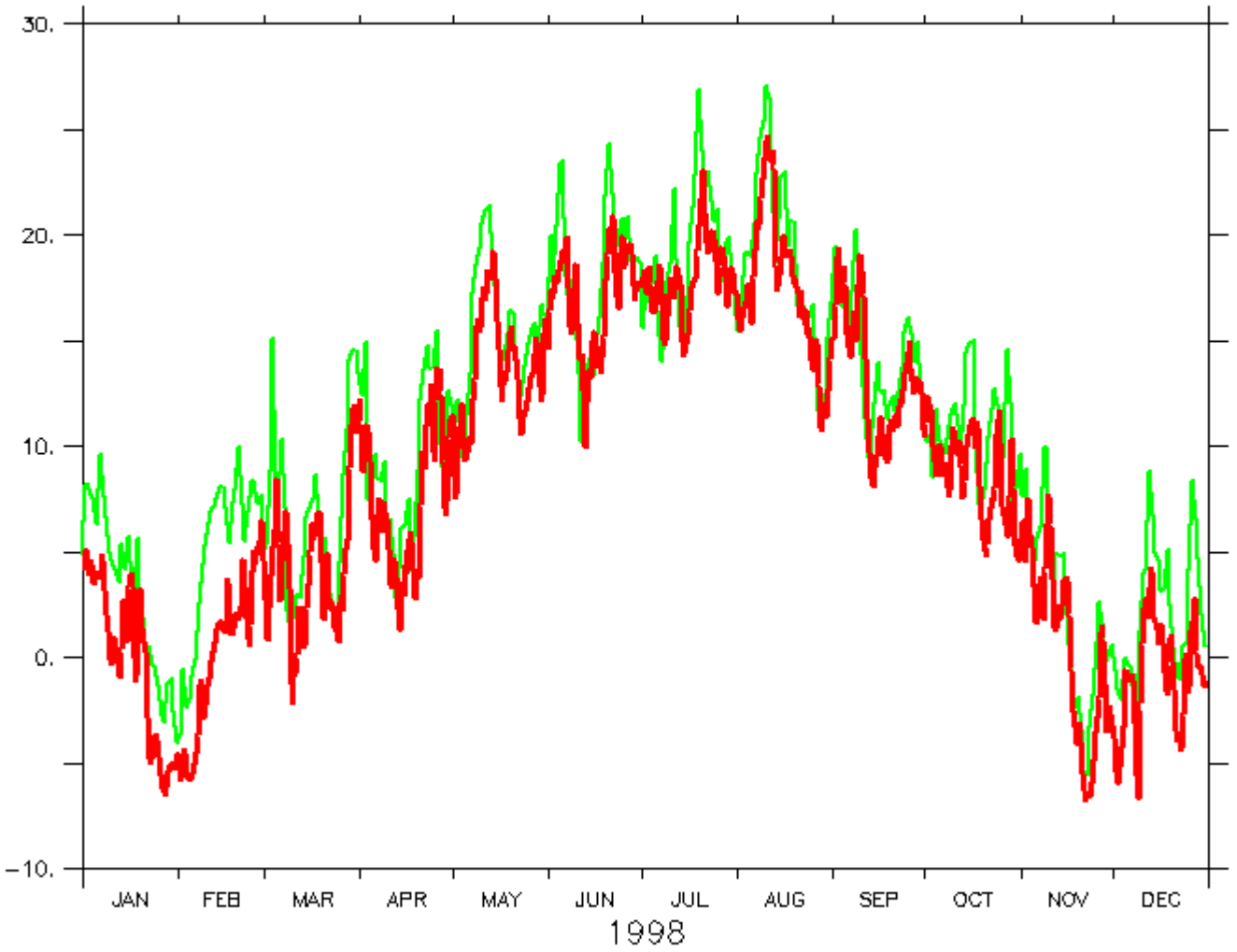
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OCT
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1998
MAR 20 km vs ECA&D OBS / (x,y) = (140,260)

Quelques remarques

Simulations à 20 km et 12 km de résolution

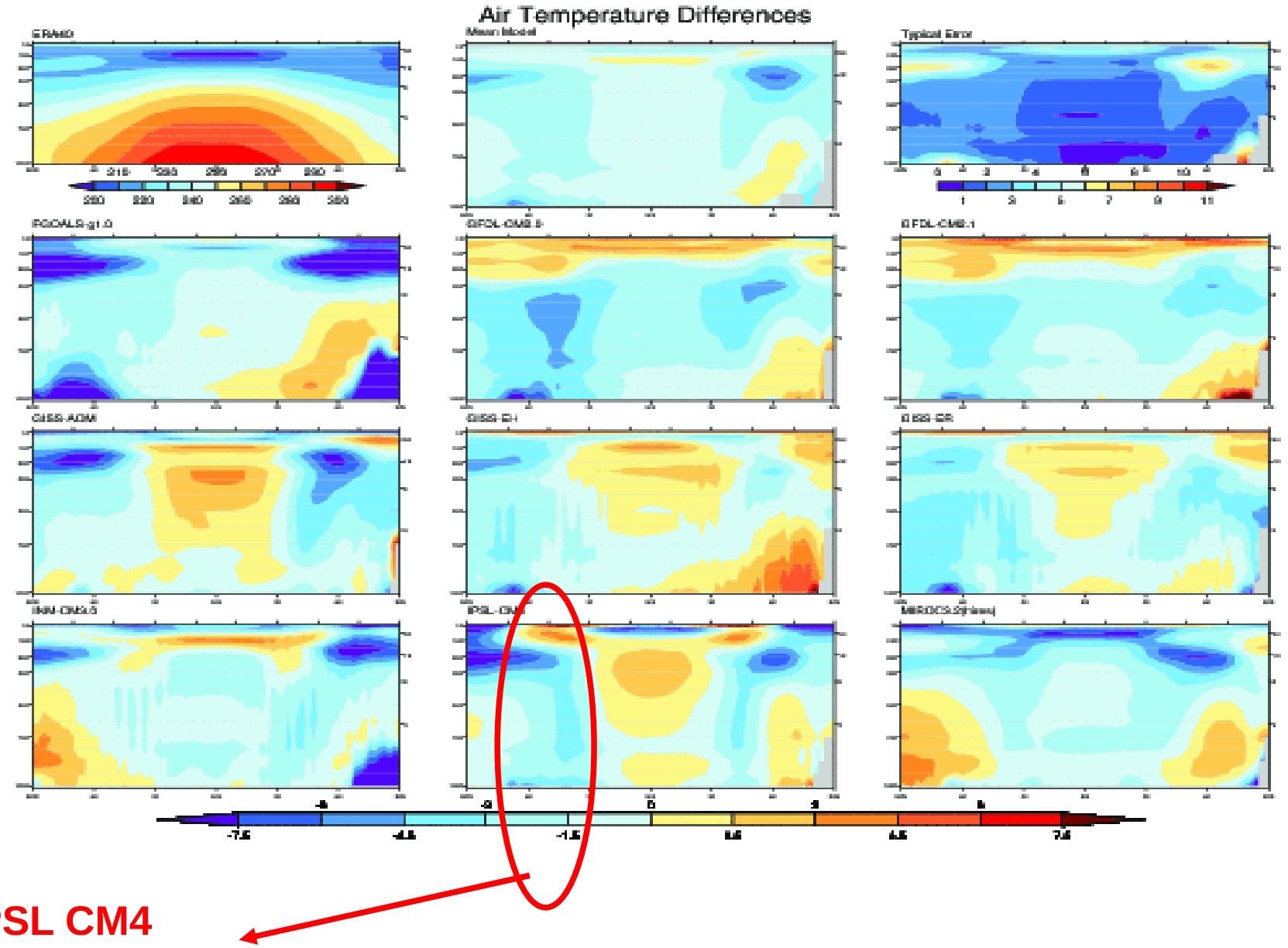
Bonne reproduction évènements (LBC !)

MAR sous-estime les températures et les précipitations en moyenne annuelle
Sous-estimation des précipitations l'hiver et surestimation l'été

Imbrication de MAR dans LMDz

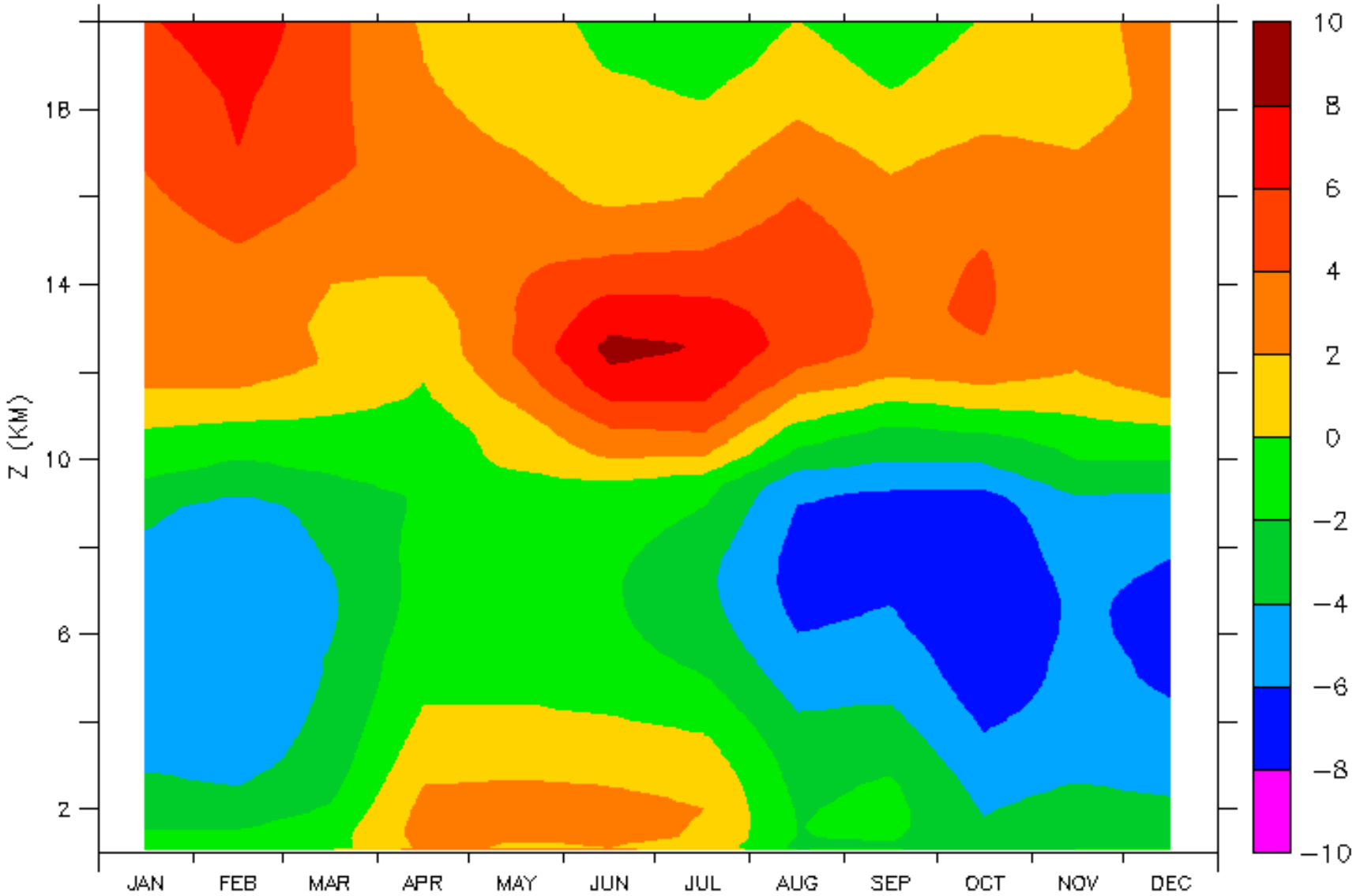
UN GCM n'est pas parfait.

Quel pourrait être l'apport
d'un modèle à aire limitée?

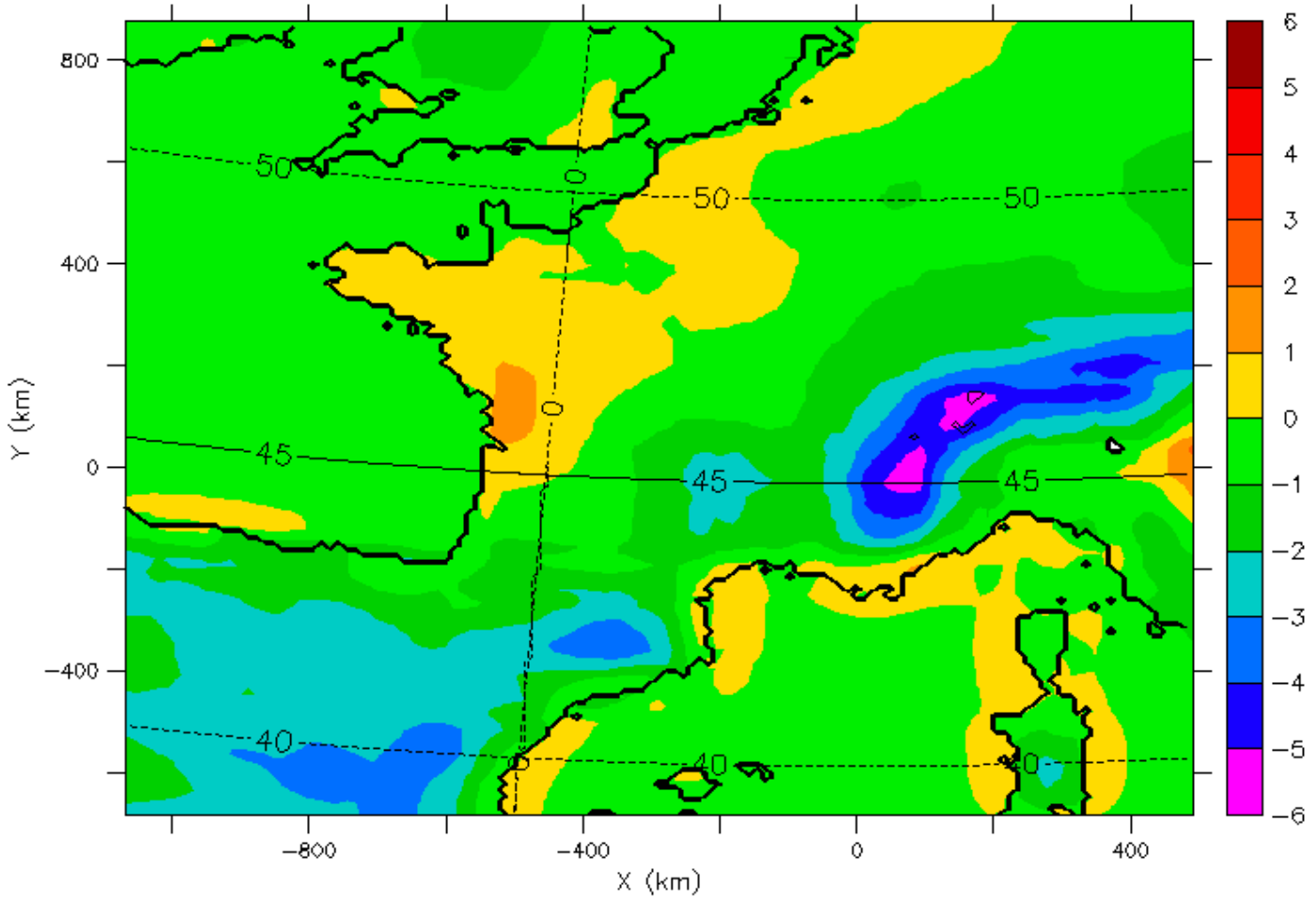


Solomon et al., 2007: Climate change 2007

LMDZ vs ERA Interim



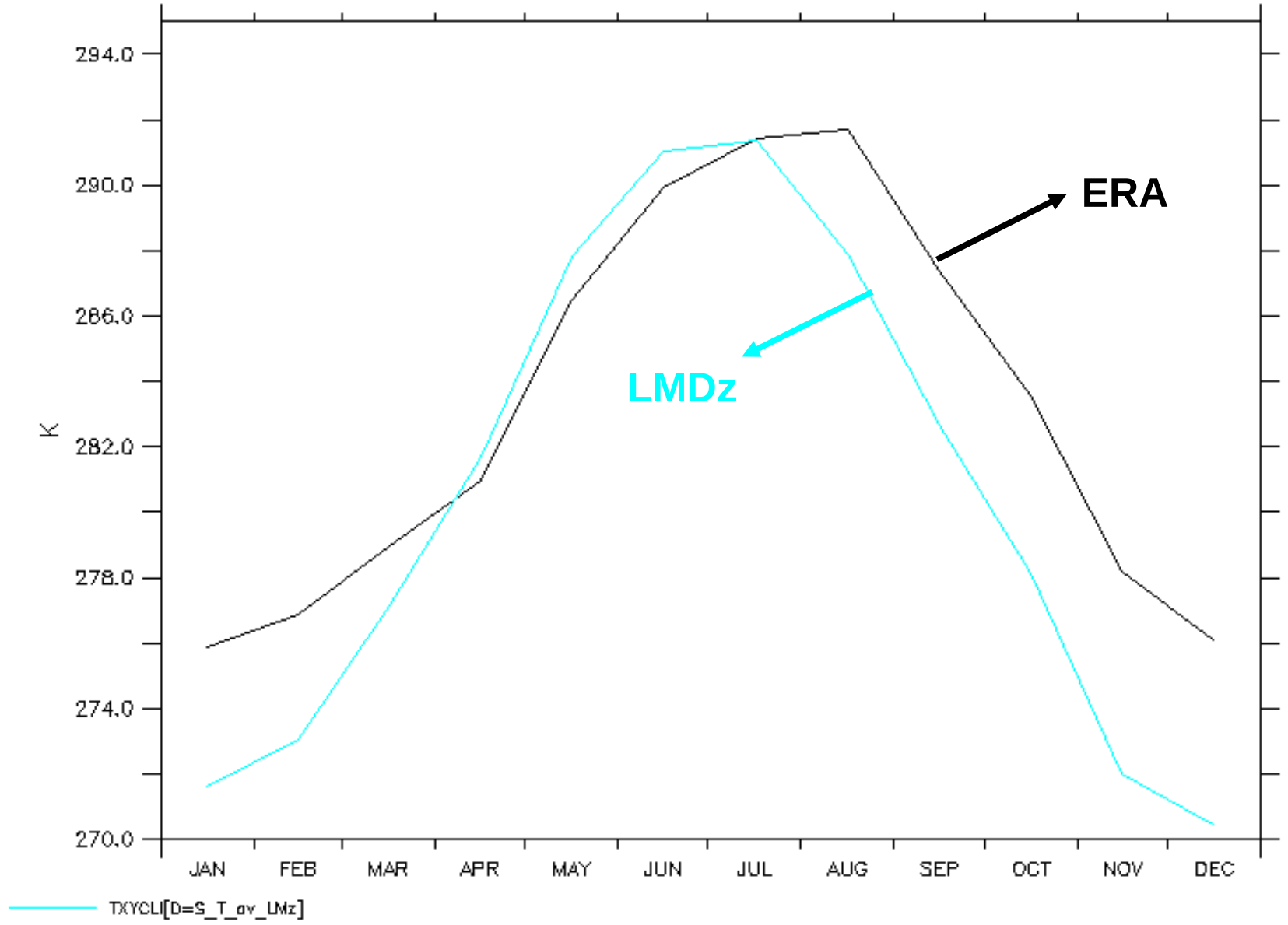
LMDZ vs ERA Interim



Surface Temperature Difference LMz − ERA (K)

LMDZ – ERA Interim

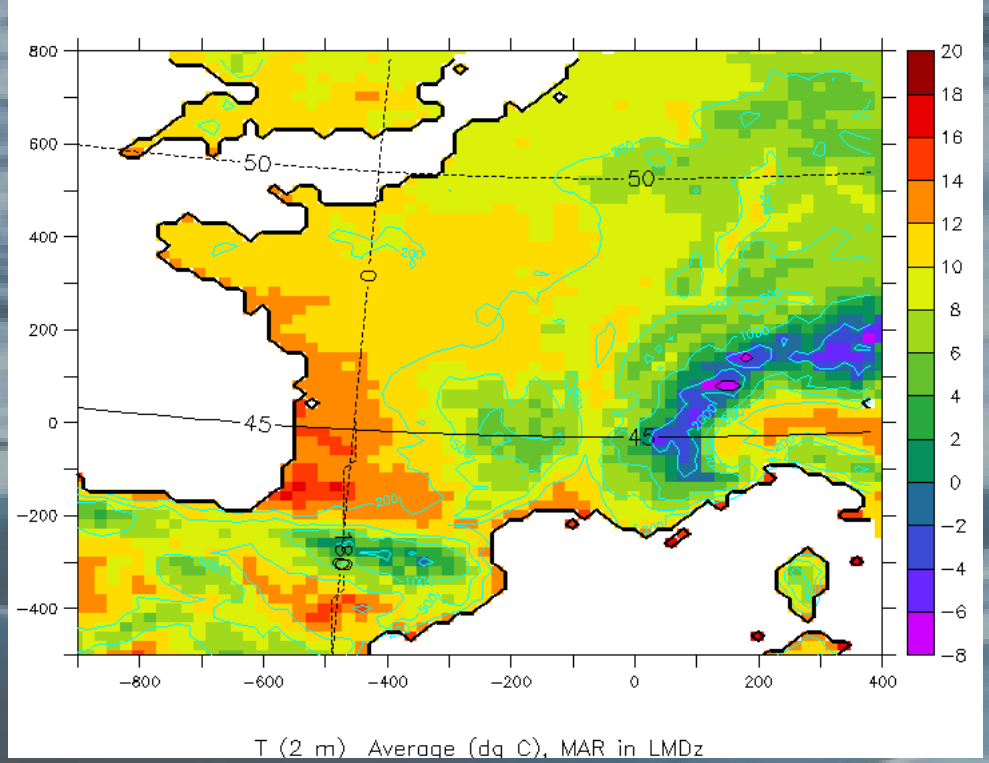
LMDZ vs ERA Interim

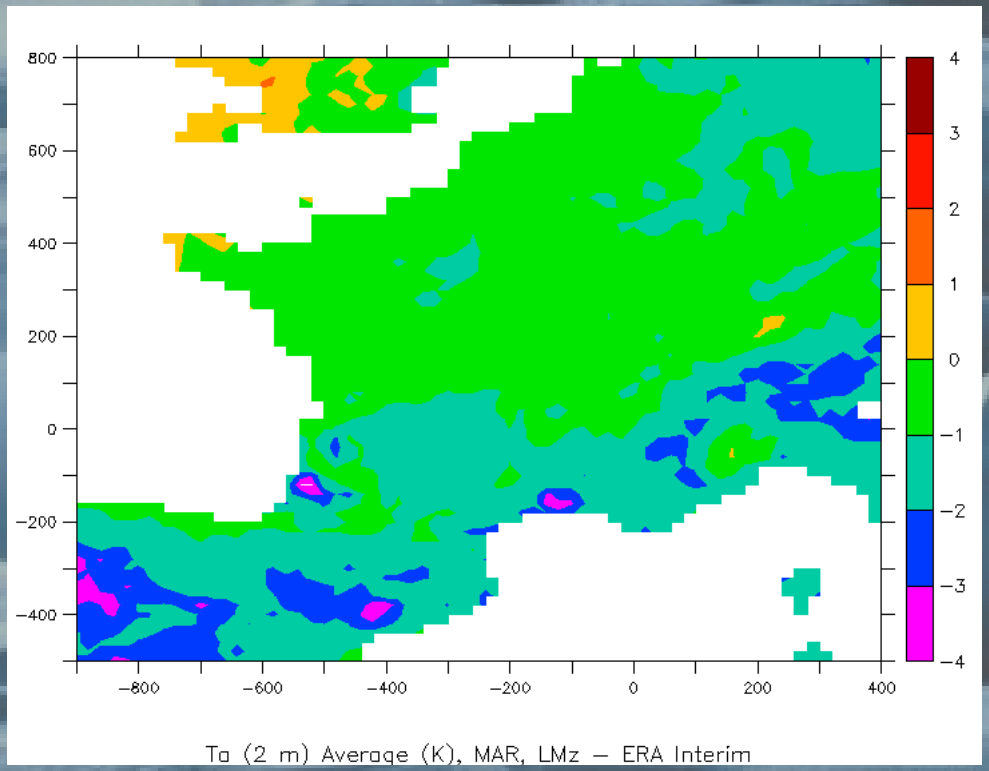


ALPS Surface Temperature Climatology (K)

ANNUAL MEAN 2 m Temperature

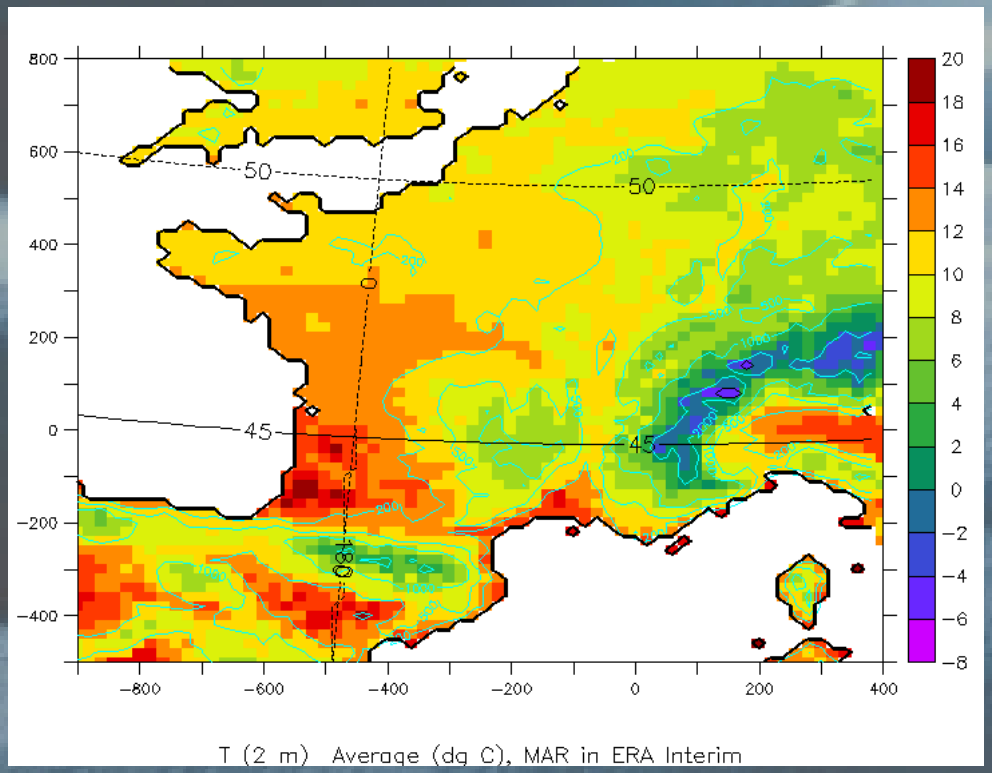
MAR in LMDz





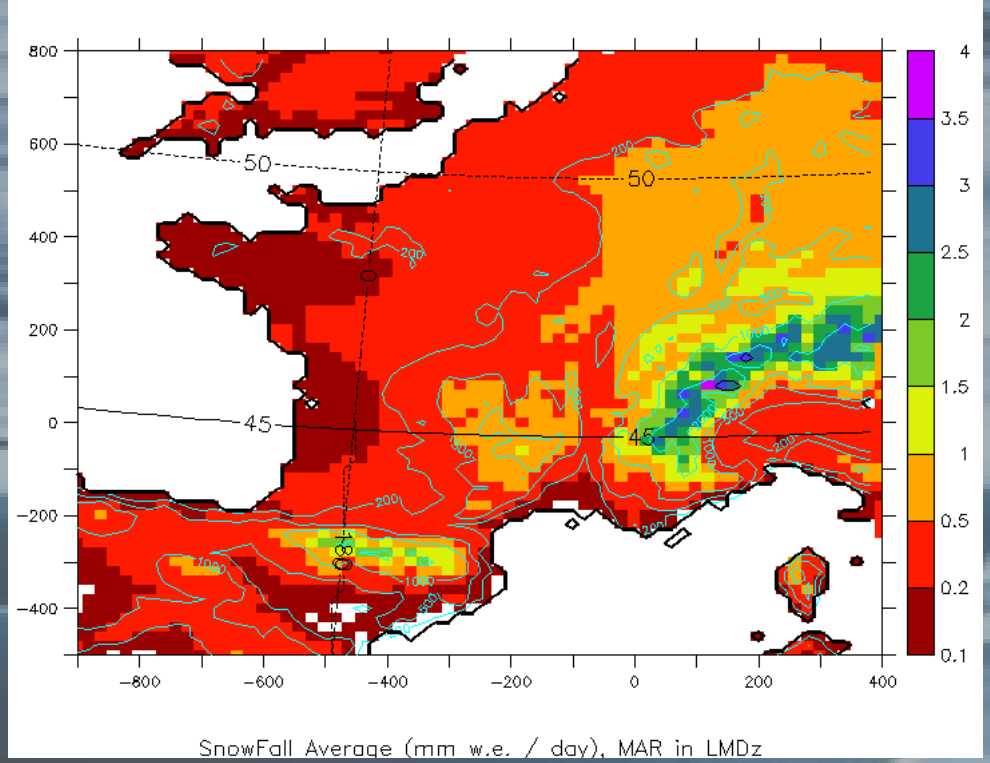
MAR nested in LMDz
MINUS
MAR nested in ERA-Interim

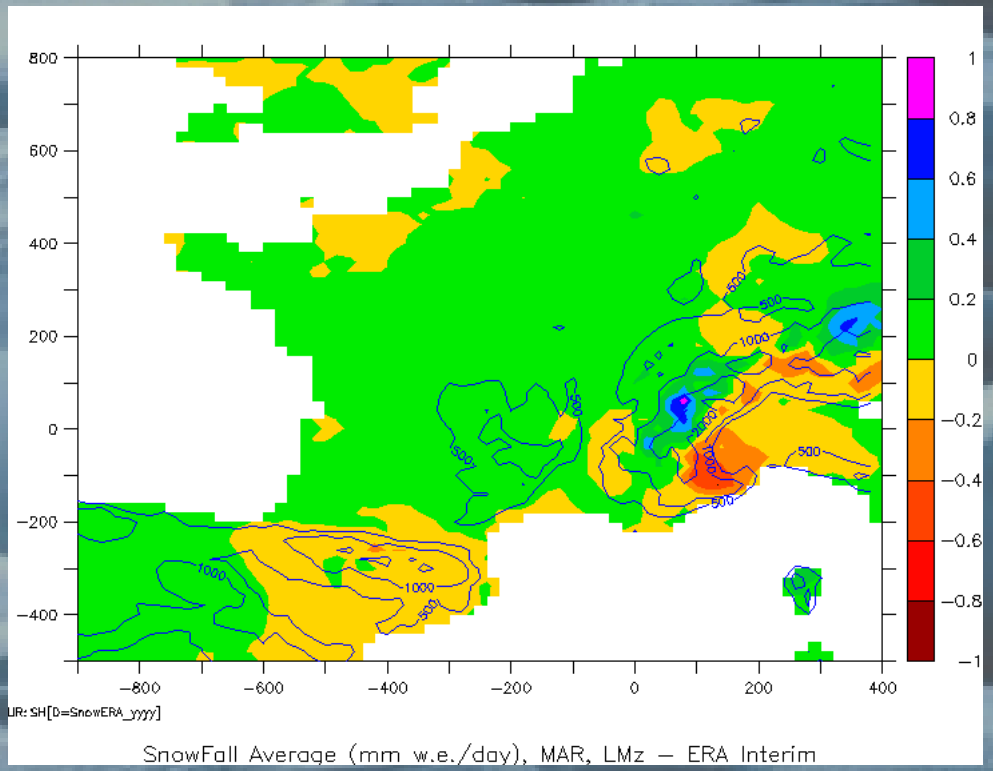
MAR in ERA Interim



Daily MEAN SnowFall

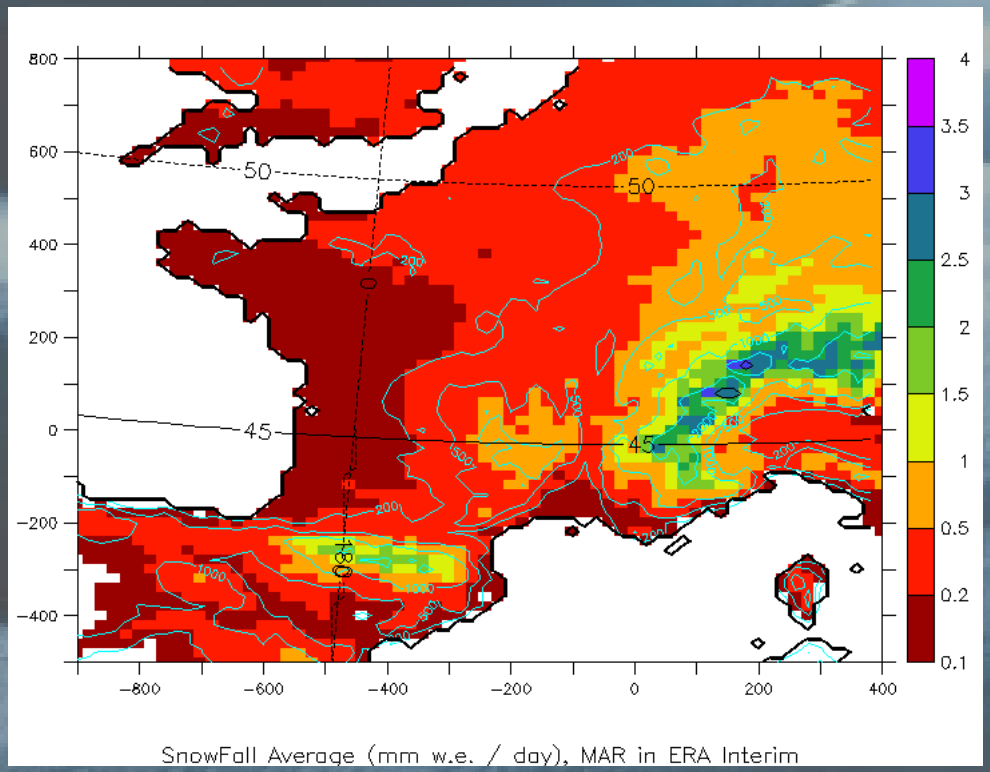
MAR in LMDz





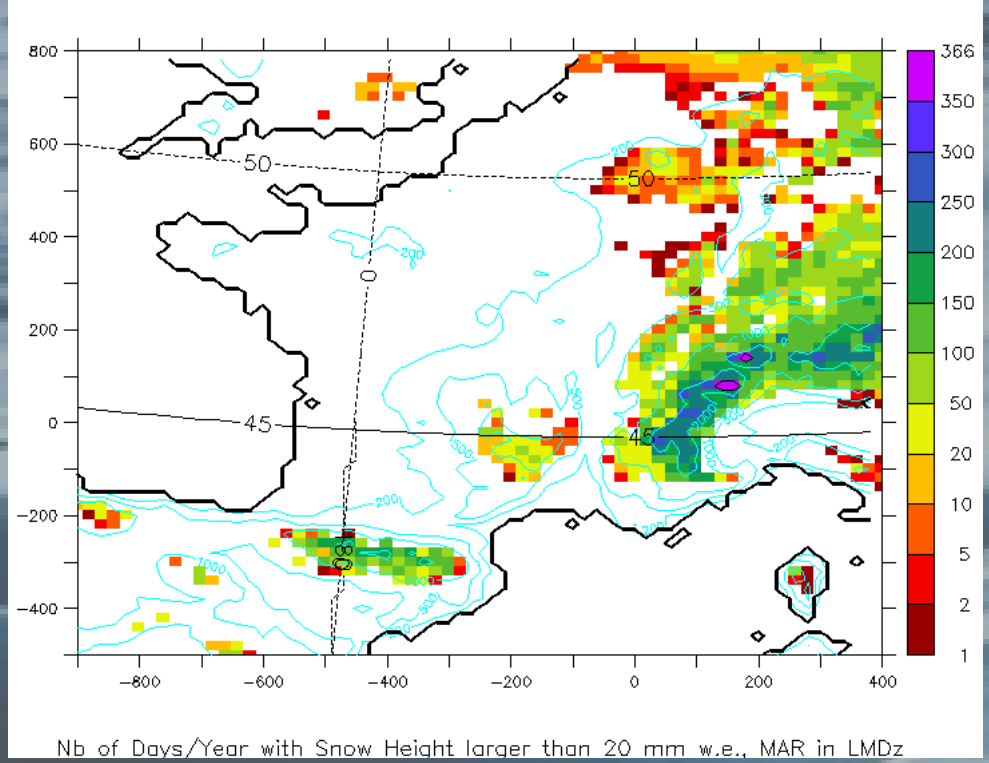
MAR nested in LMDz
MINUS
MAR nested in ERA-Interim

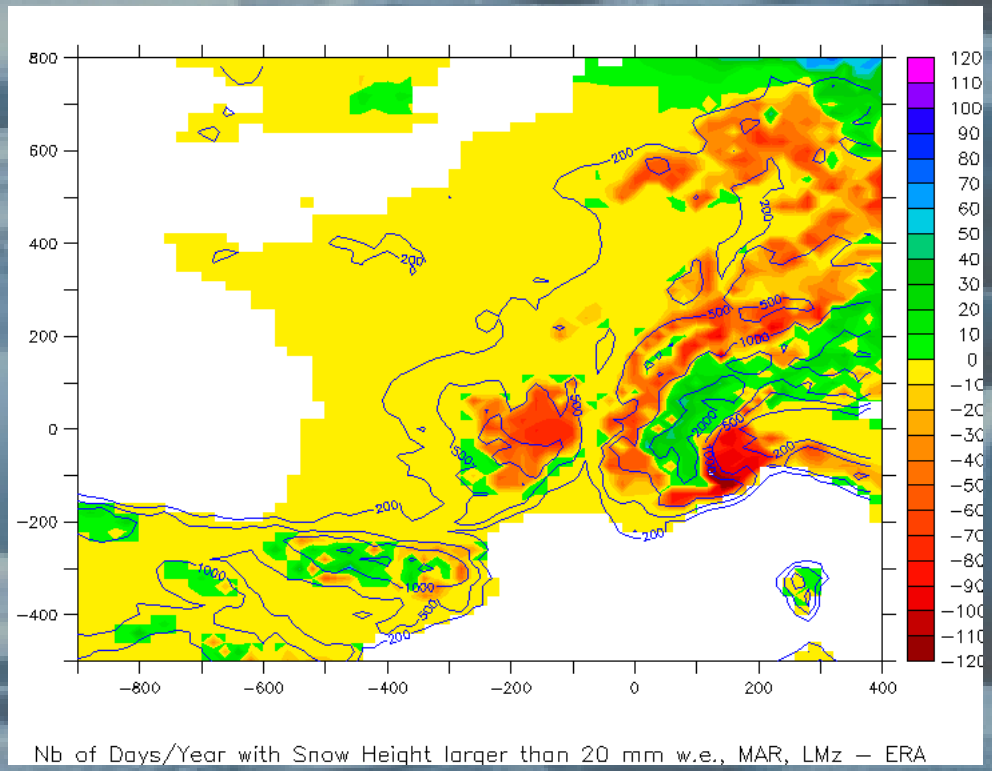
MAR in ERA Interim



MAR, nb of days when Mean Snow Height > 20 mm w.e.

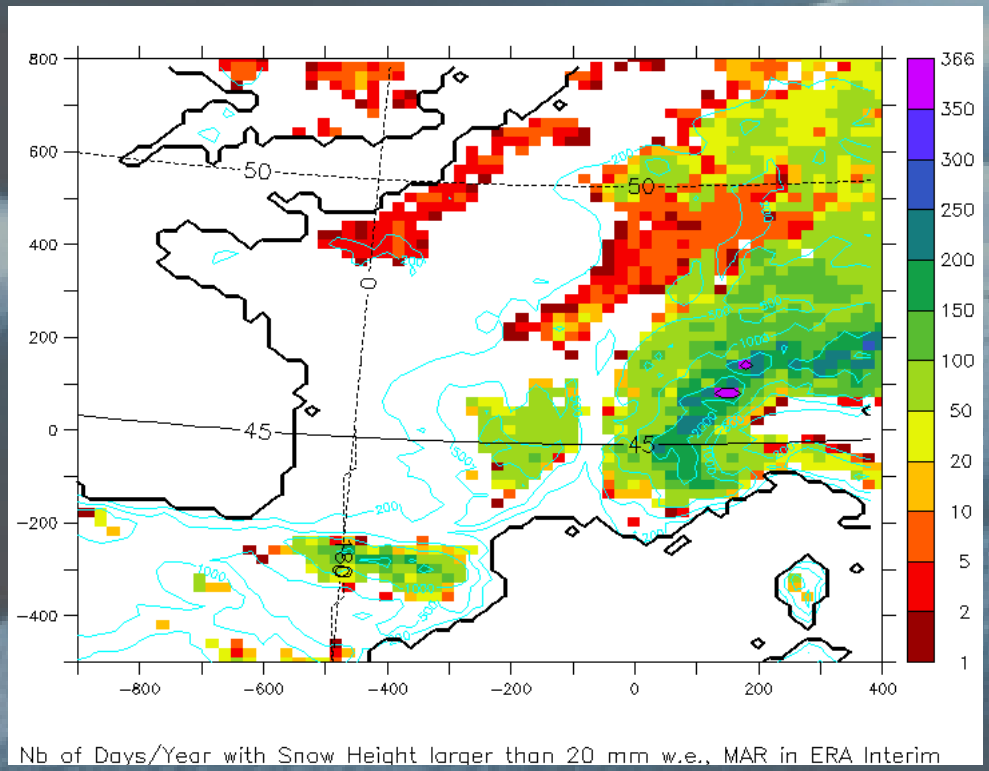
MAR in LMDz





MAR nested in LMDz
MINUS
MAR nested in ERA-Interim

MAR in ERA Interim



Quelques remarques supplémentaires:

LMDz un peu plus froid qu'ERA-Interim, spécialement au Sud et surtout en altitude.

L'excès de précipitation neigeuse augmente avec l'altitude, spécialement dans les Alpes du Nord

Circulations quelque peu différentes?

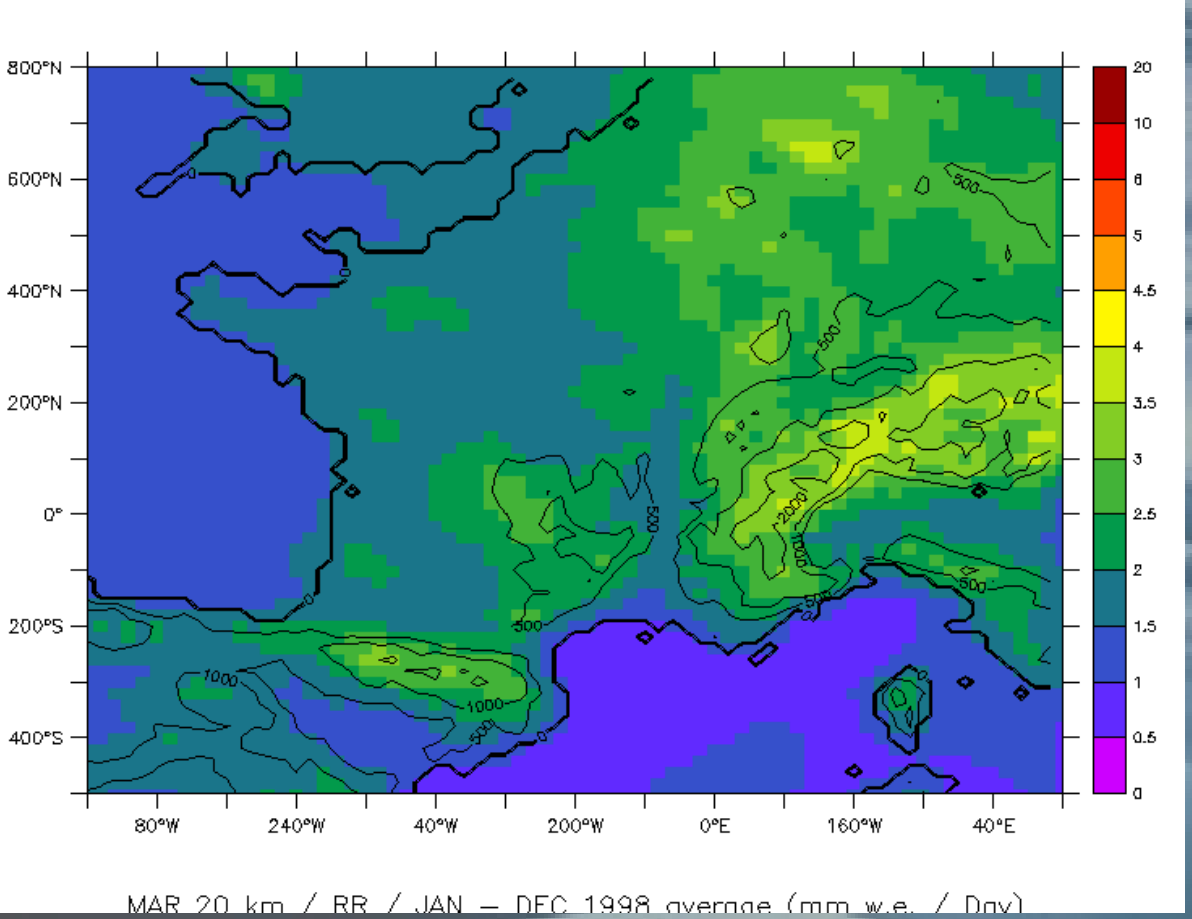
Importance du gradient vertical de température

En cours

- Couplage MAR – NEMO

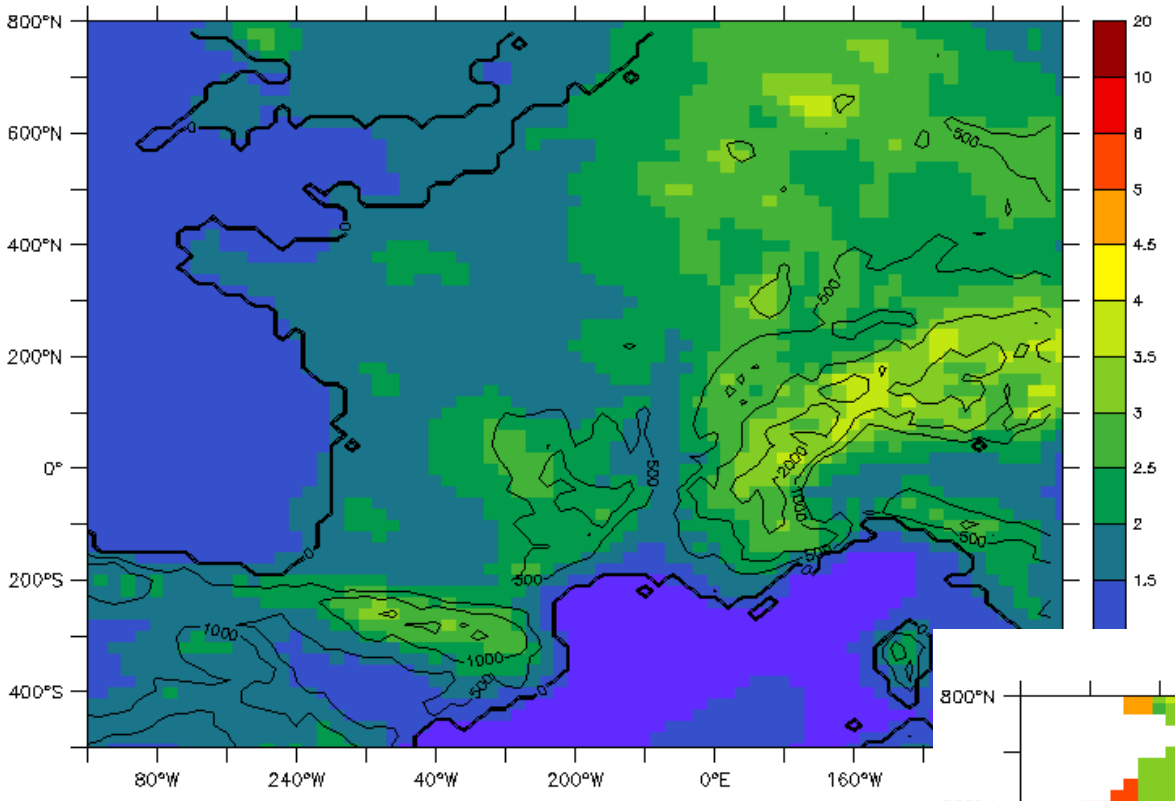
- Portage des paramétrisations physiques du MAR dans WRF:
  - SISVAT + érosion neige par le vent,
  - Microphysique nuageuse,
  - E-e Scu bi-phasique,
  - Convection,
  - Rad(ERA-40)

- Couplage WRF - NEMO

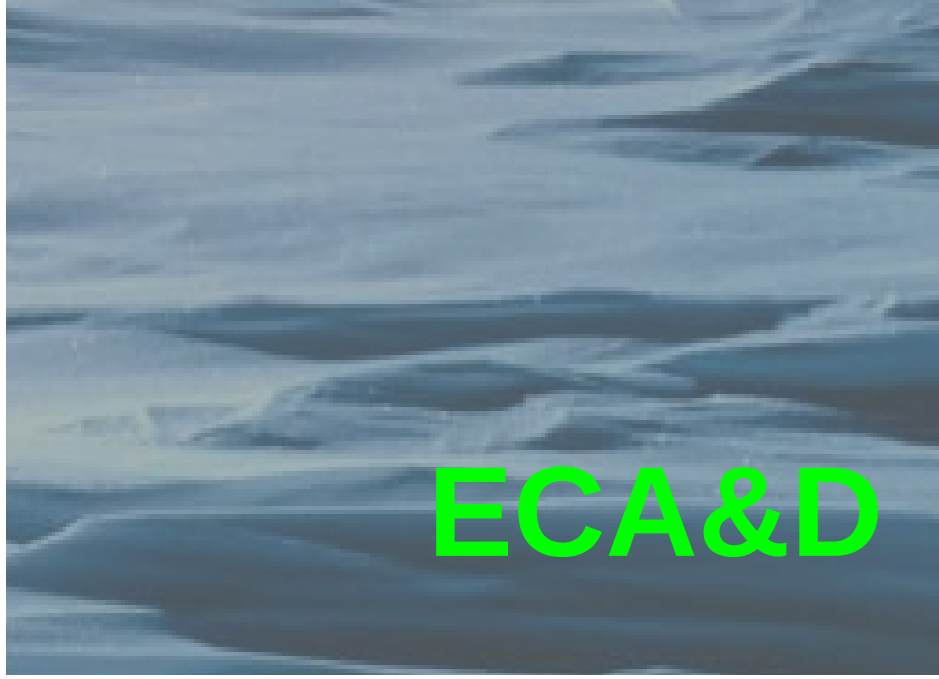


MAR

Précipitations moyenne annuelle

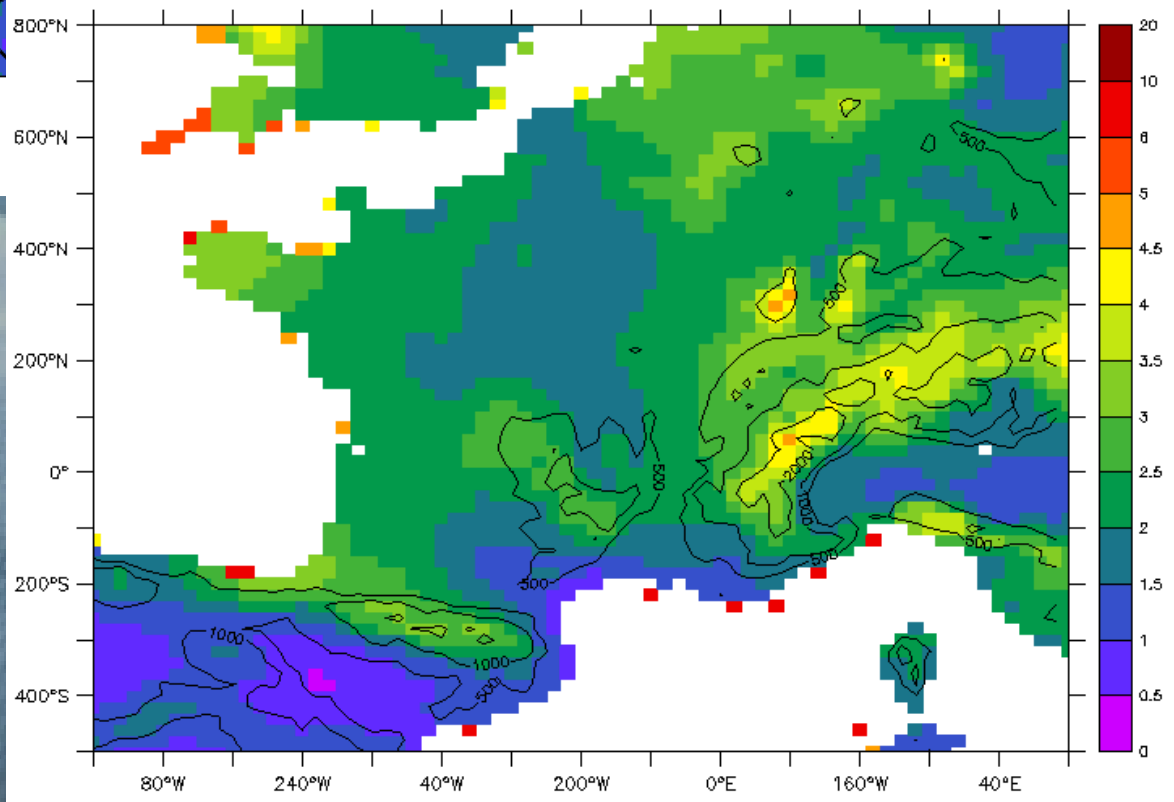


MAR 20 km / RR / JAN – DEC 1998 average (mm w.e.

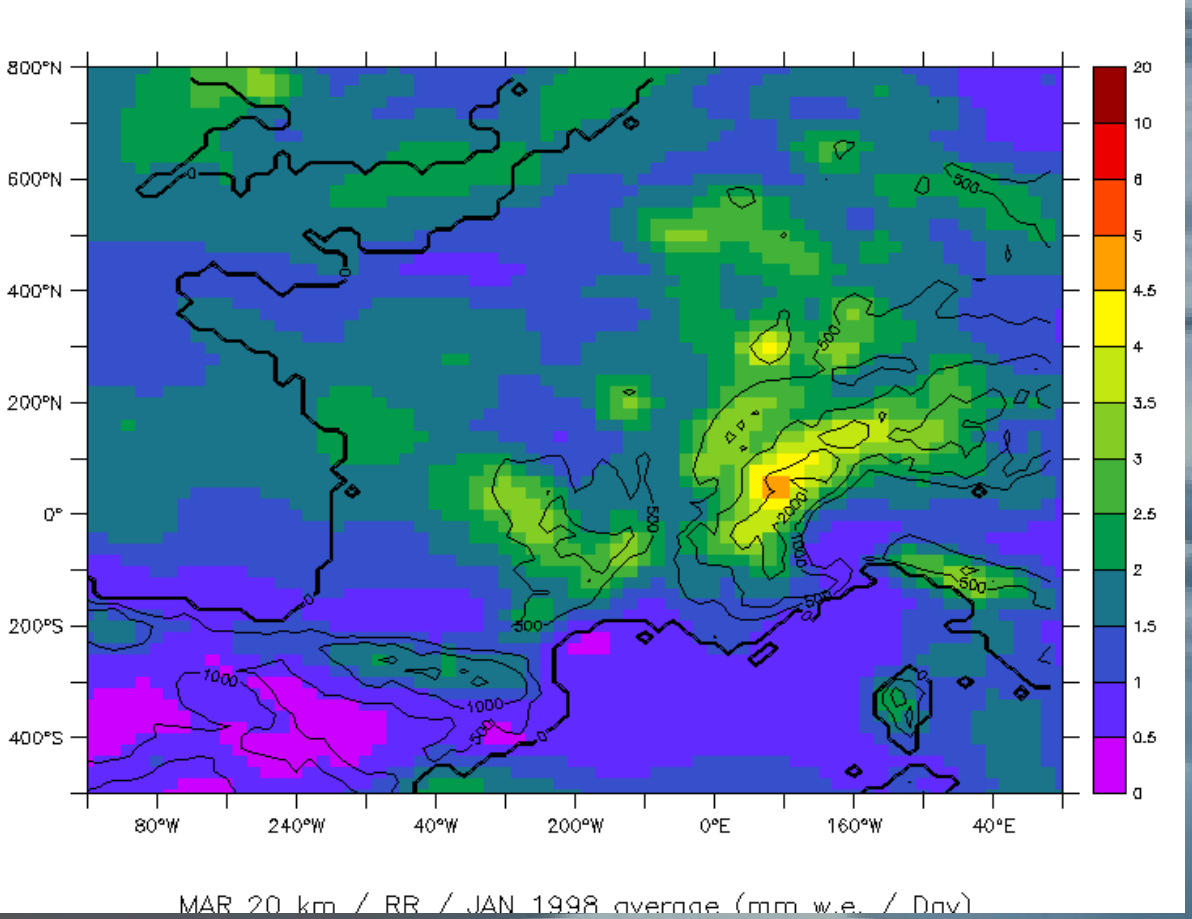


MAR

Précipitations moyenne annuelle

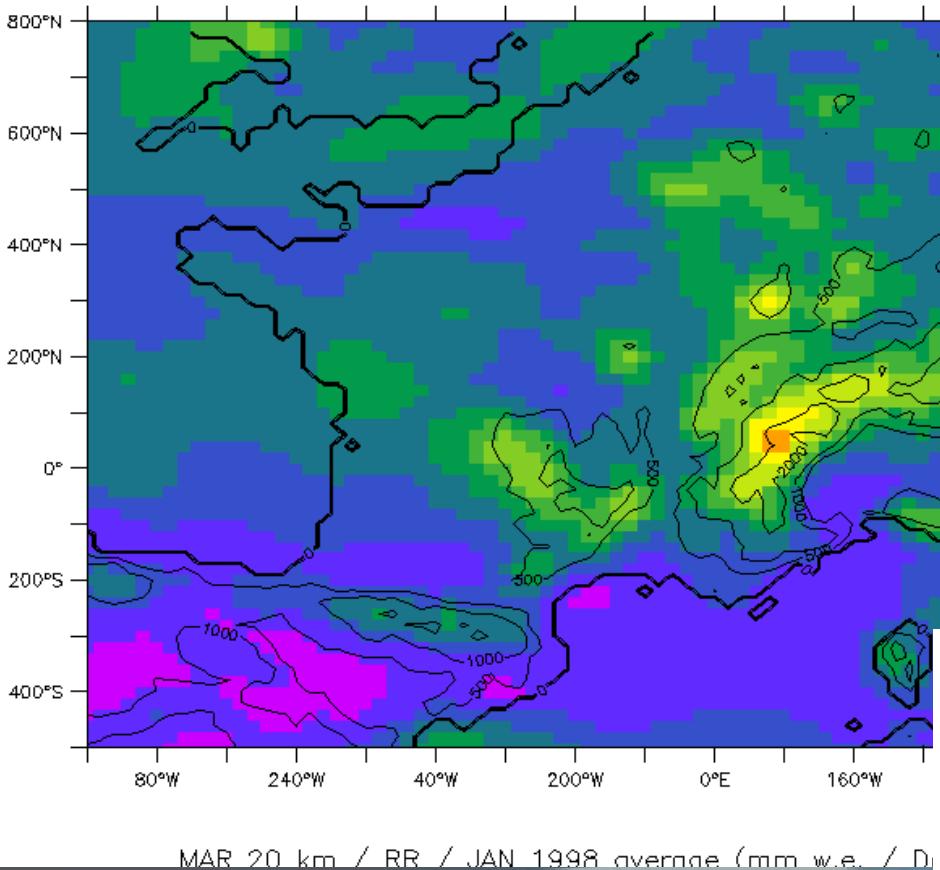


ECA&D 20 km / RR / JAN – DEC 1998 average (mm w.e. / Day)



MAR

Précipitations moyenne janvier

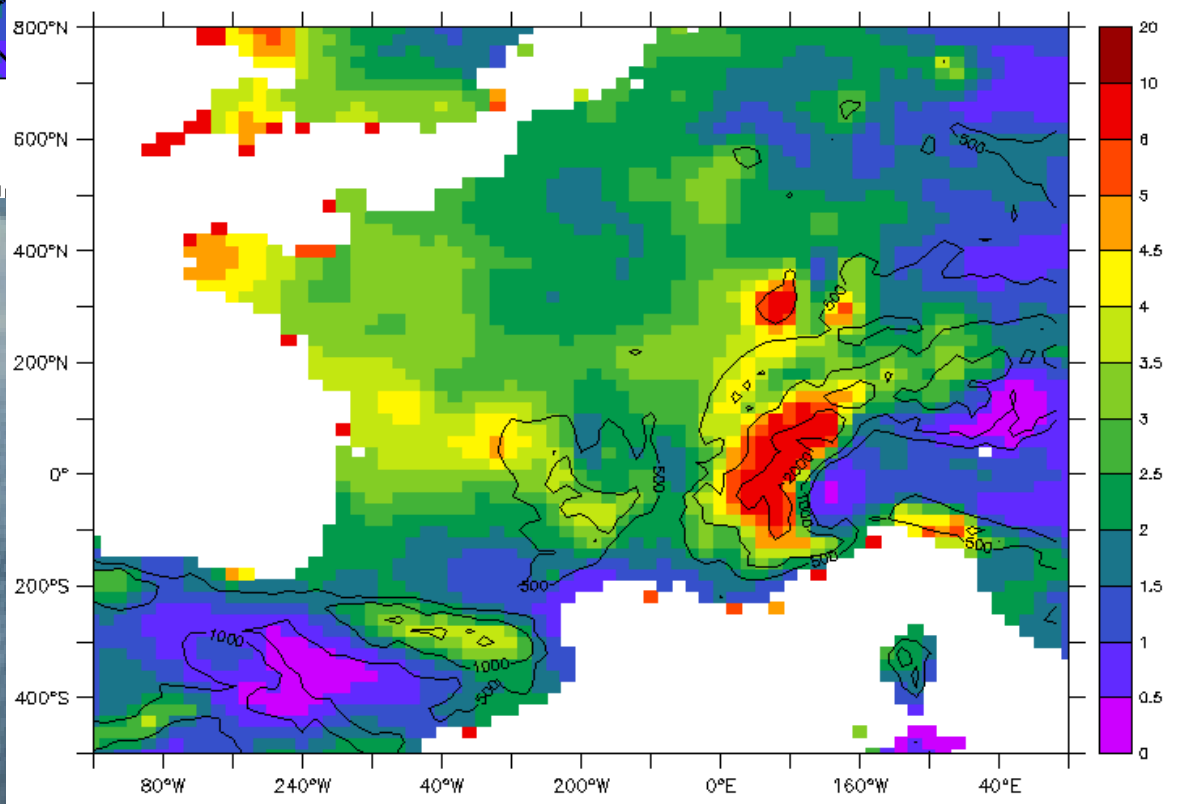


MAR 20 km / RR / JAN 1998 average (mm w.e. / D

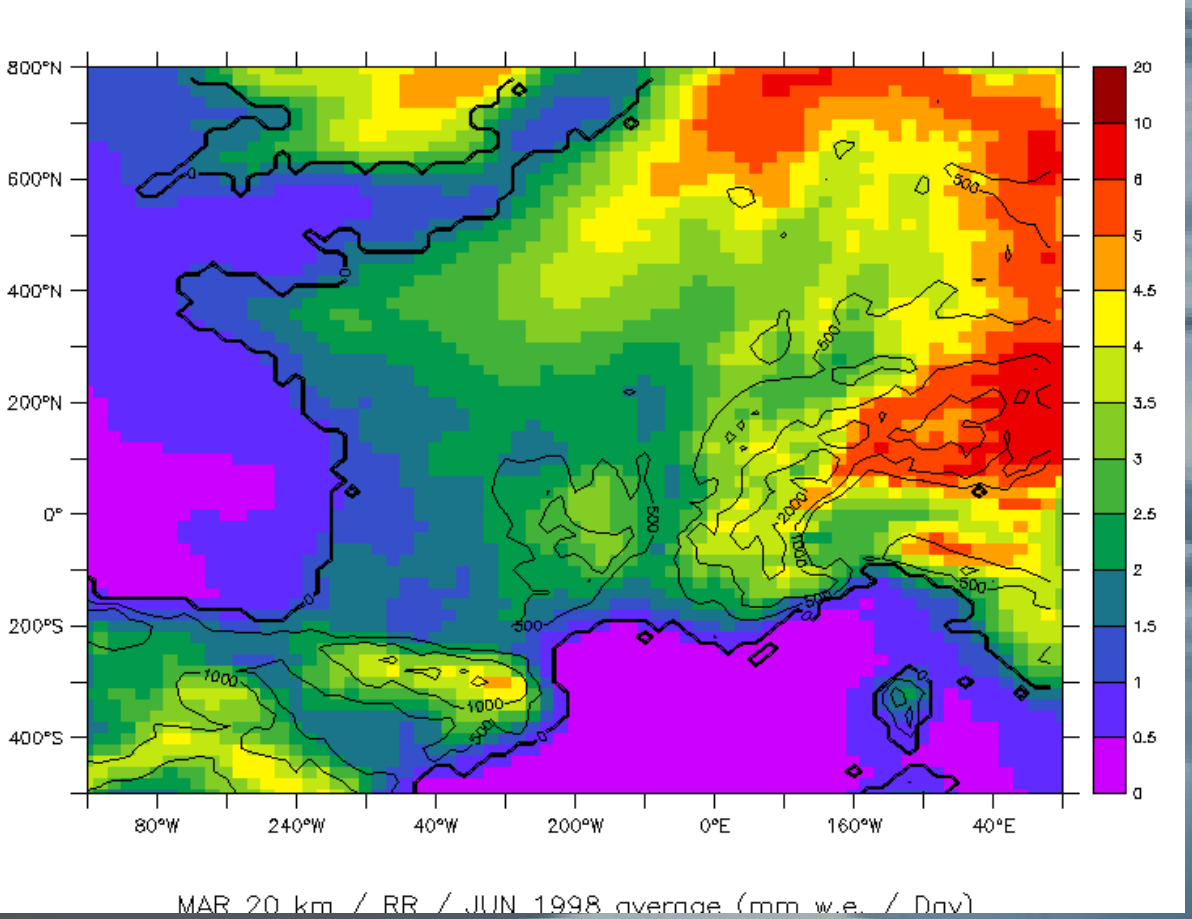
MAR

Précipitations moyenne janvier

ECA&D

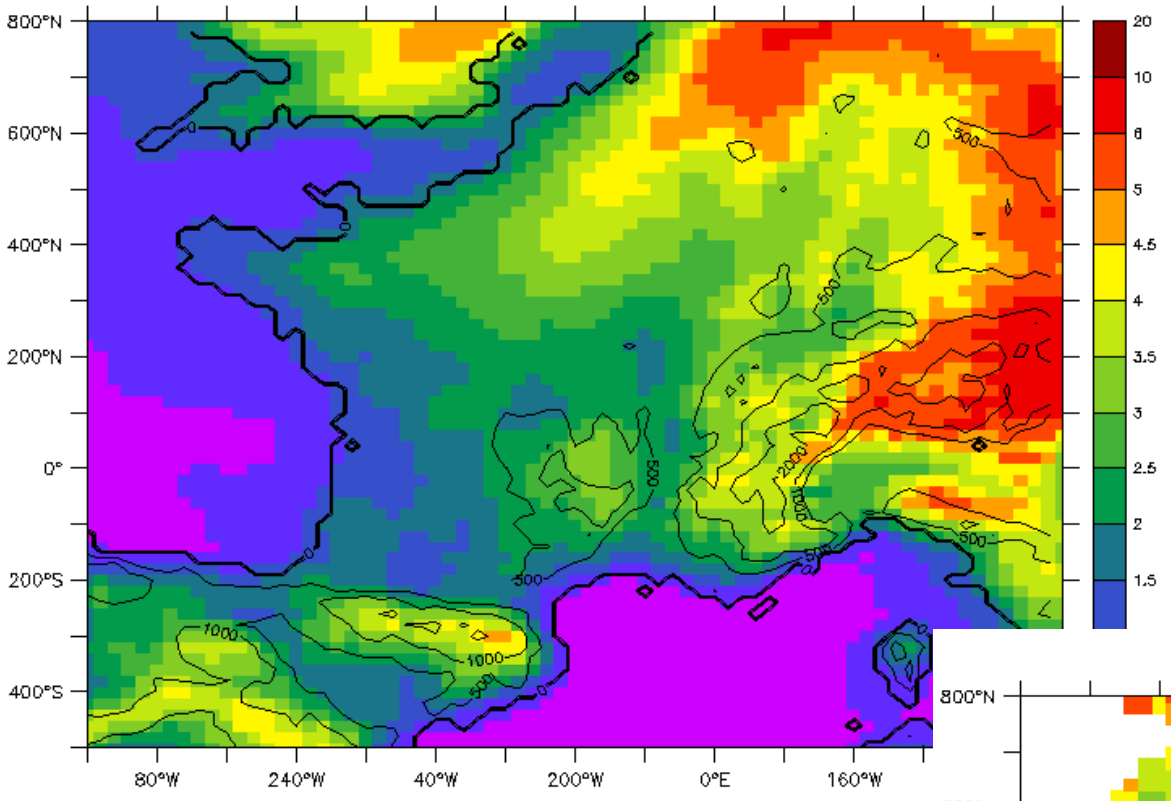


ECA&D 20 km / RR / JAN 1998 average (mm w.e. / Day)



MAR

Précipitations moyenne juin

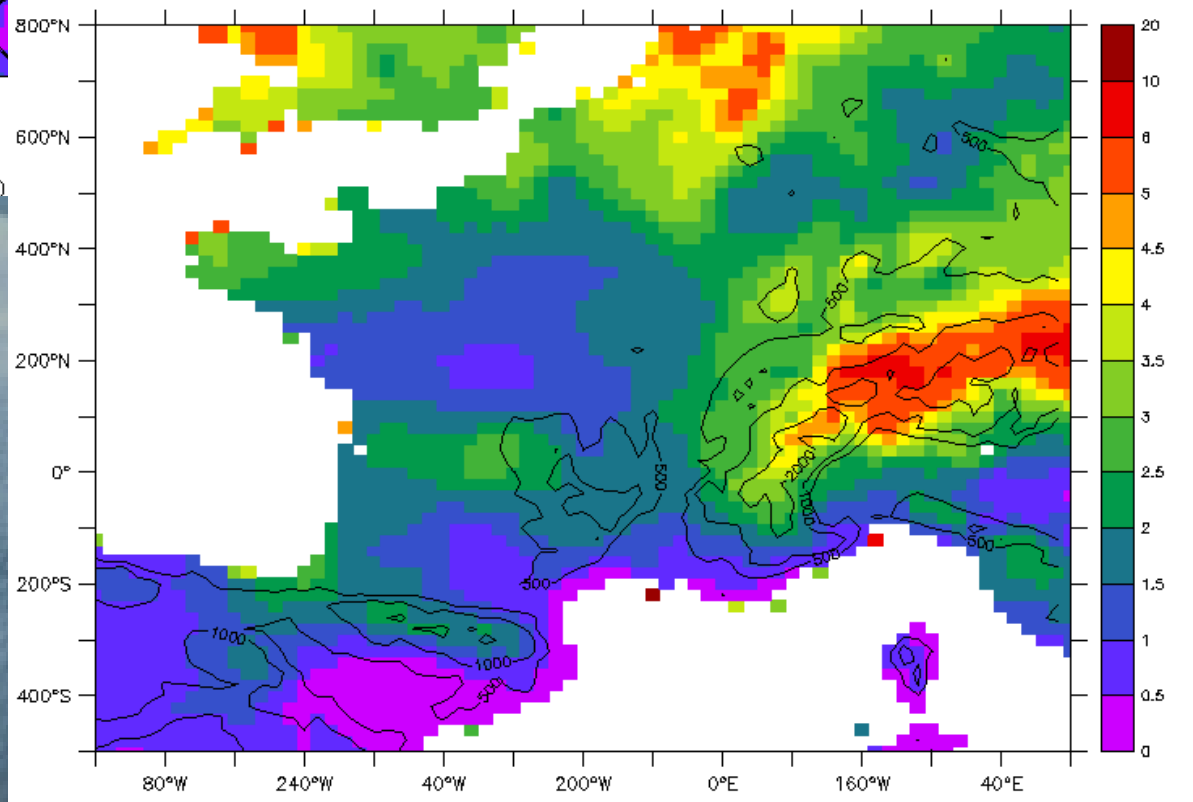


MAR 20 km / RR / JUN 1998 average (mm w.e. / D

ECA&D

MAR

Précipitations moyenne juin



ECA&D 20 km / RR / JUN 1998 average (mm w.e. / Day)