

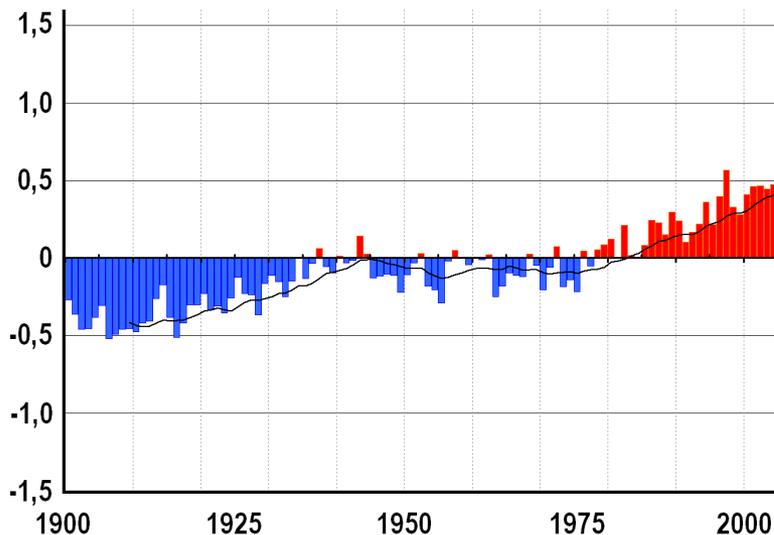
Les scénarios climatiques du futur: Quels sont les modèles existants ? Comment les interpréter ?

Michel Déqué
CNRM/GMGE

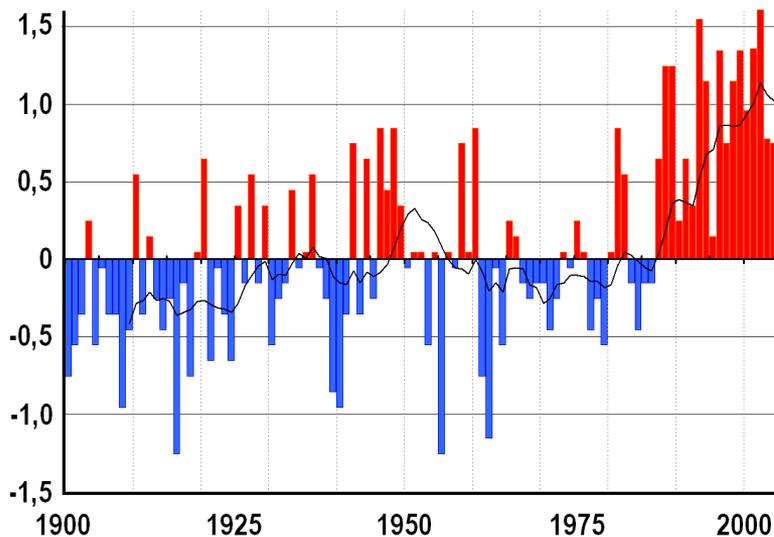
Plan

- ⇒ observations: le 20ème siècle
- ⇒ projection: fin du 21ème siècle
- ⇒ projection: les prochaines décennies
- ⇒ projection: incertitudes

Evolution de la température moyenne

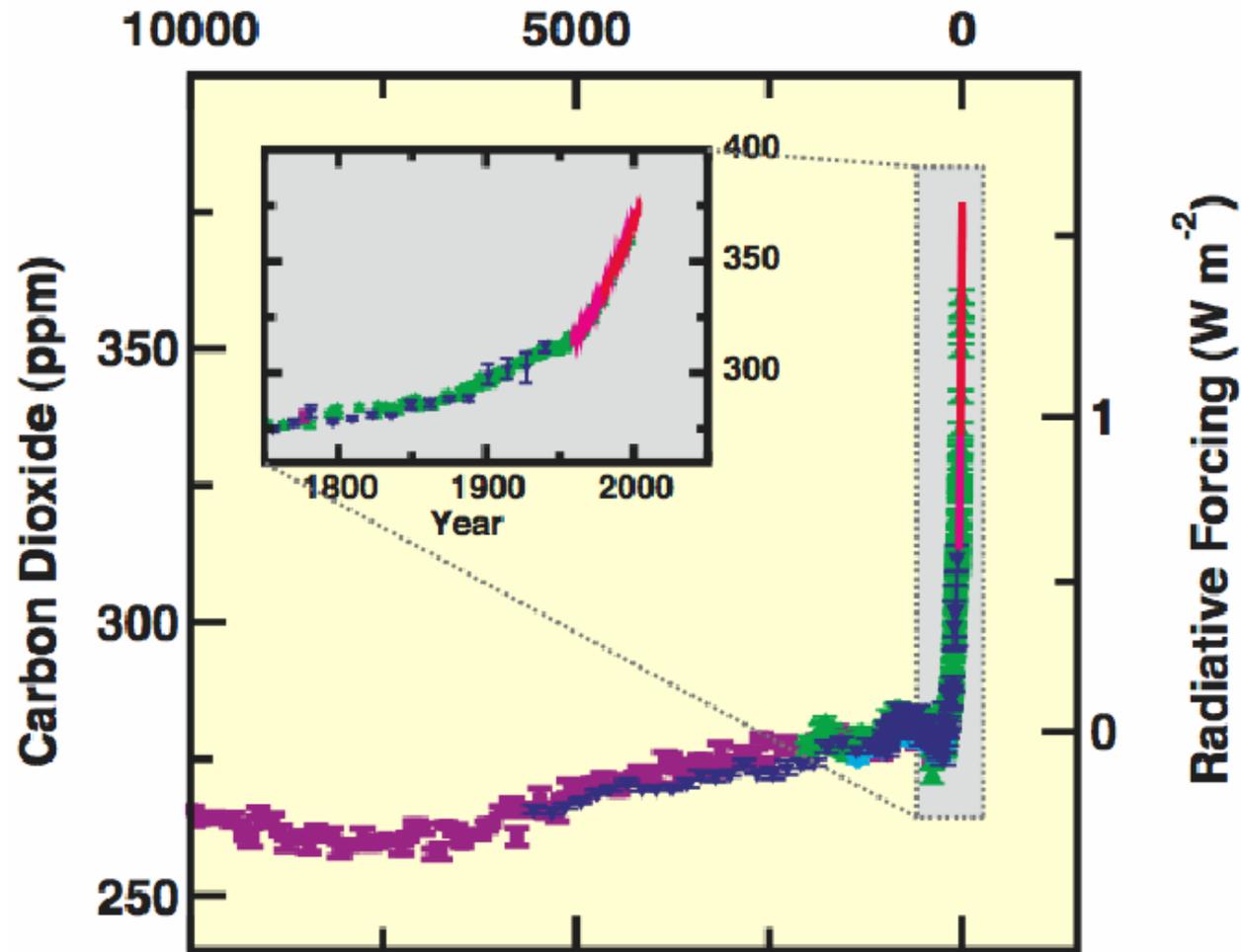


Sur la planète ...

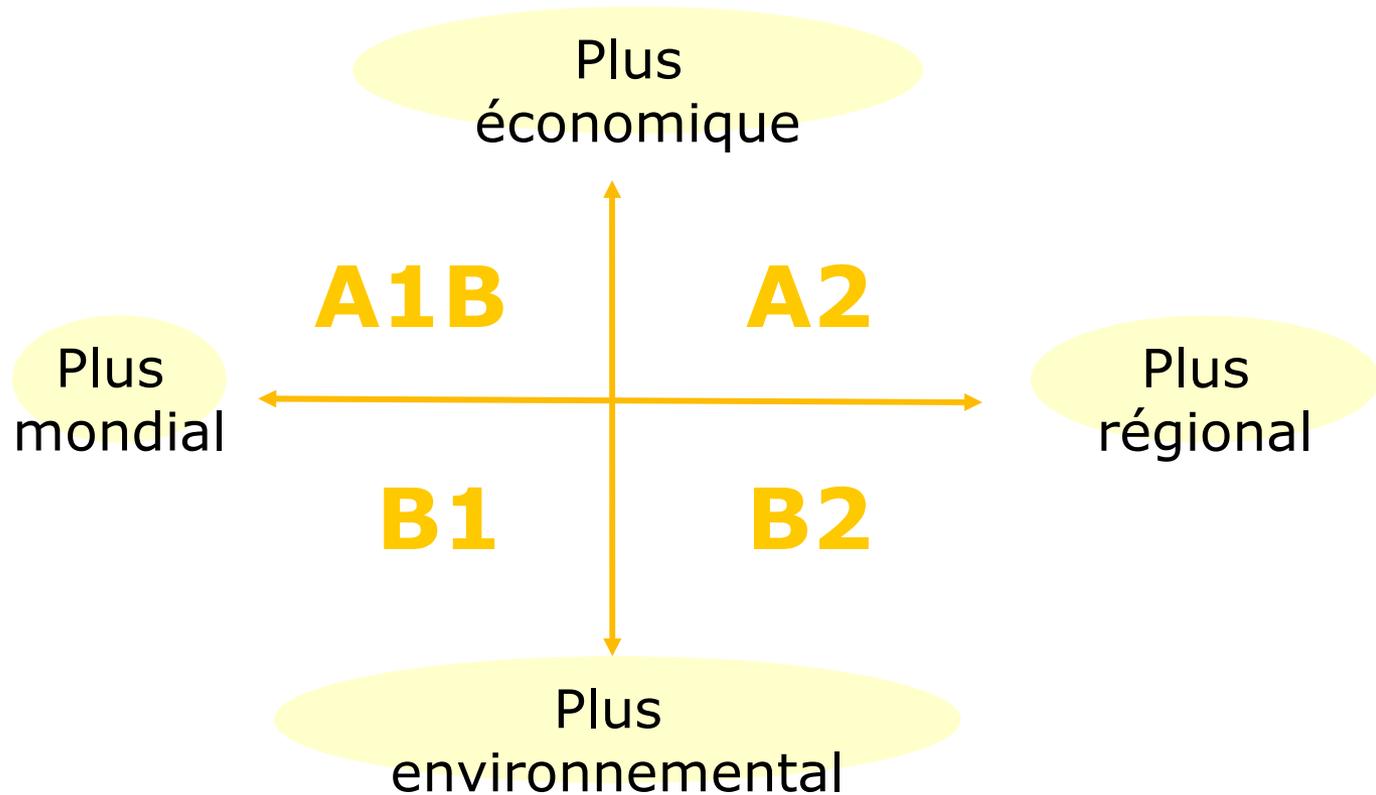


... et en France

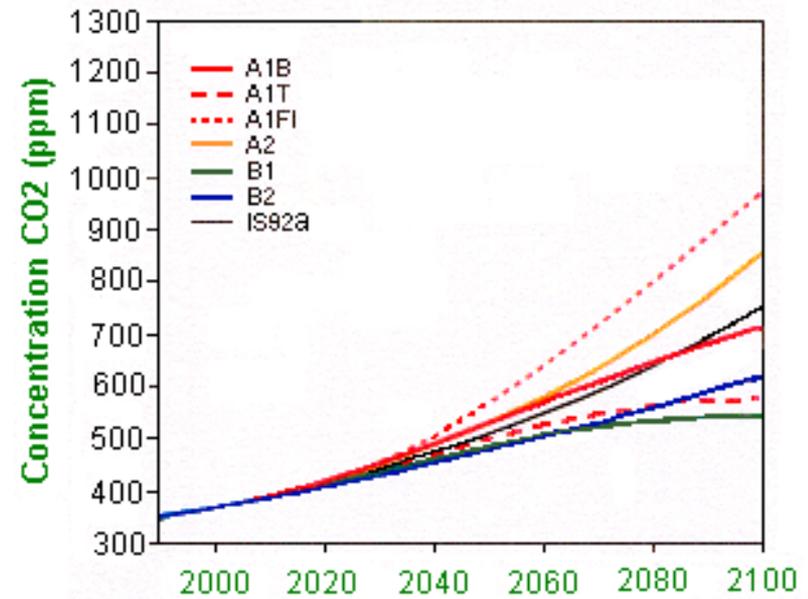
Concentration de CO₂ sur les 10 derniers milliers d'années (GIEC, 2007)



Les scénarios d'émissions: bases socio-économiques

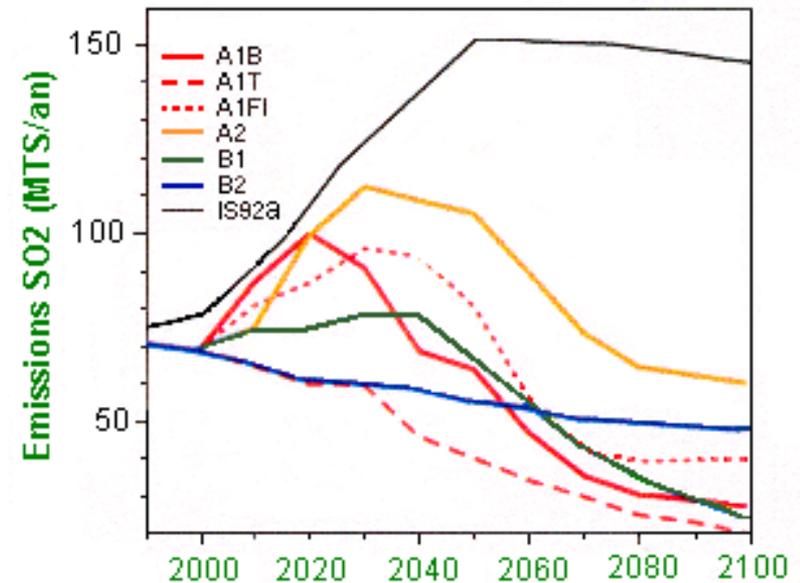


Concentration du
Gaz carbonique
(ppm)



Scénarios pour le XXI^{ème} siècle

Émissions de
sulfates
(MTS/an)



Les expériences multi-modèle

- GIEC AR4 (globe) 20 modèles
- PRUDENCE (Europe) 12 modèles
- IMFREX (France) 2 modèles
- CLIMATOR (France) 1 modèle + descentes d'échelle

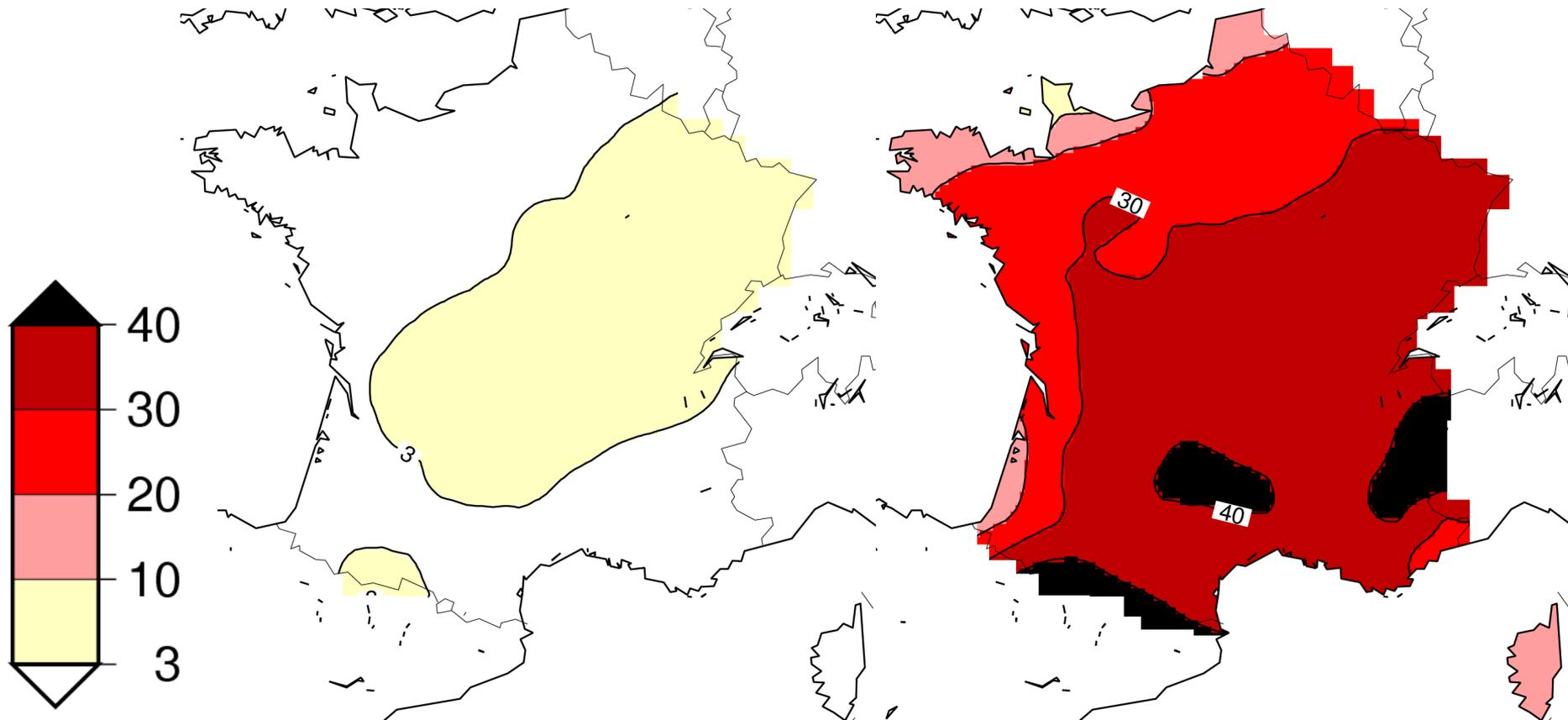


Projections A2: 2071-2100 par rapport 1961-1990

Nombre de jours de canicule en été

Référence
(1960-1989)

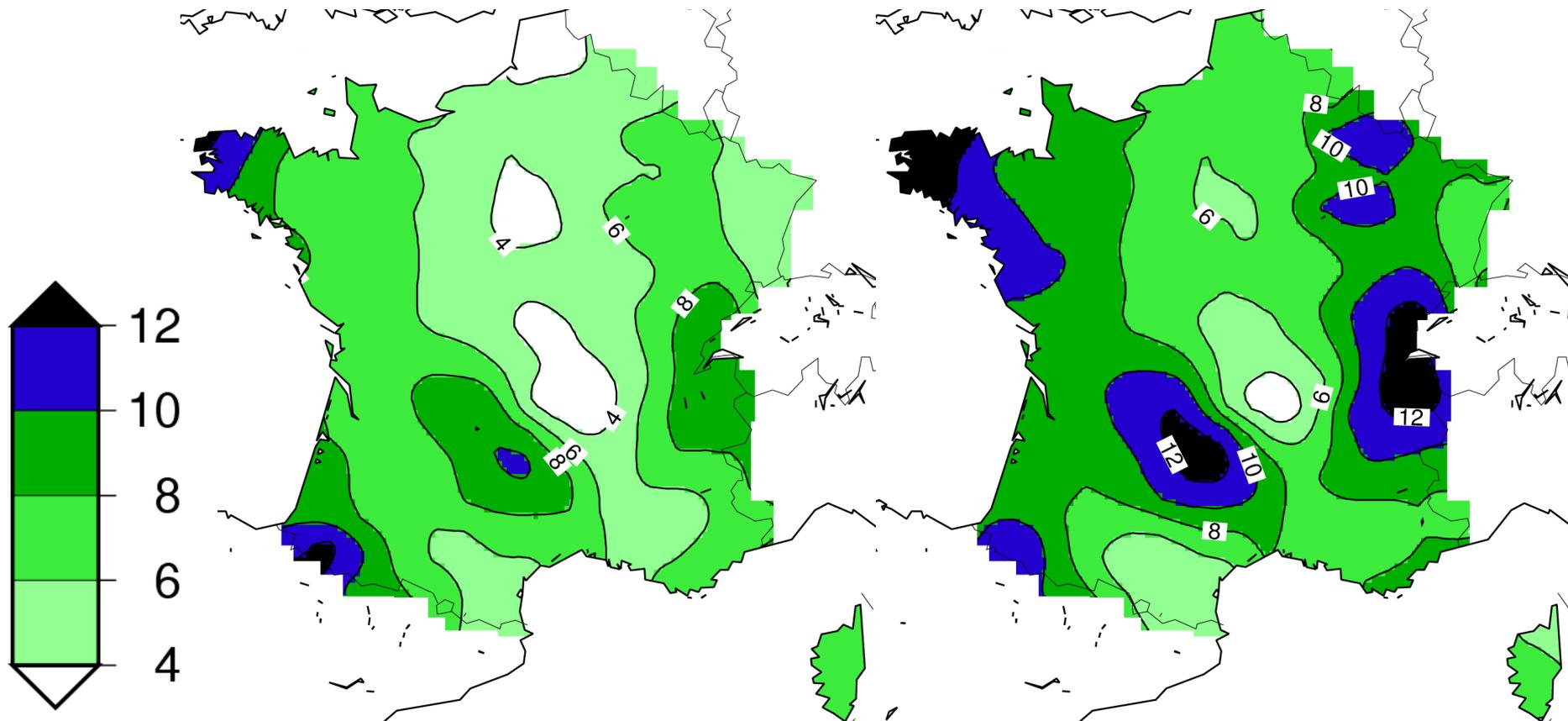
Scénario A2
(2070-2099)



Nombre de jours par hiver avec pluies > 10mm

Référence
(1960-1989)

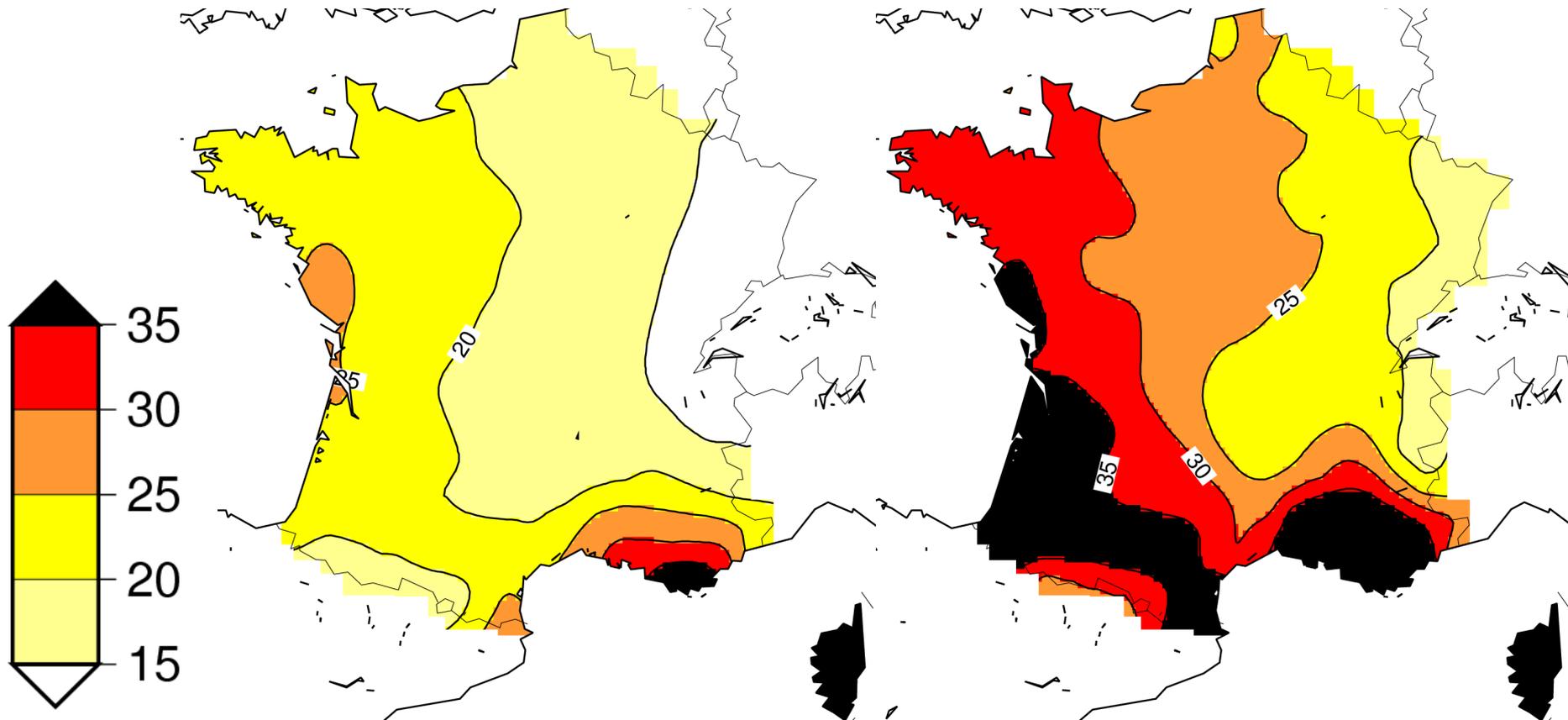
Scénario A2
(2070-2099)



Nombre maximal de jours secs consécutifs en été

Référence
(1960-1989)

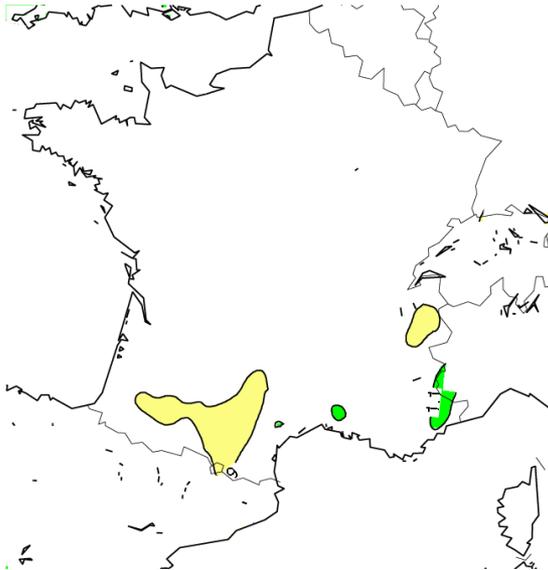
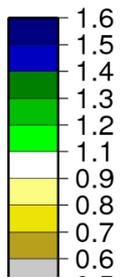
Scénario A2
(2070-2099)



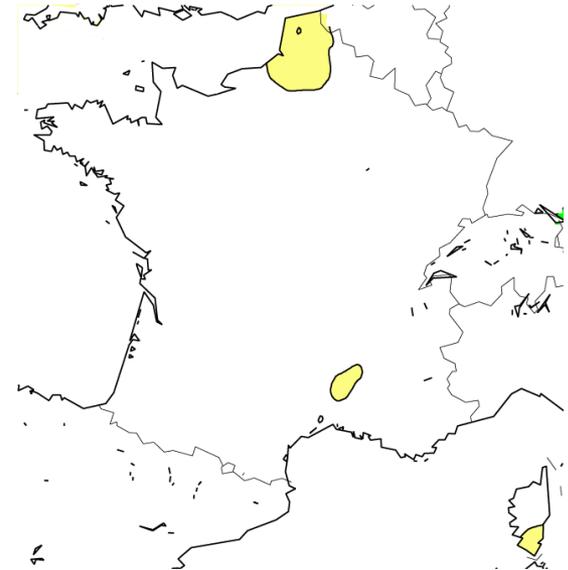
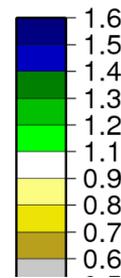
Projections 2021-2050 par rapport 1961-1990

Précipitations

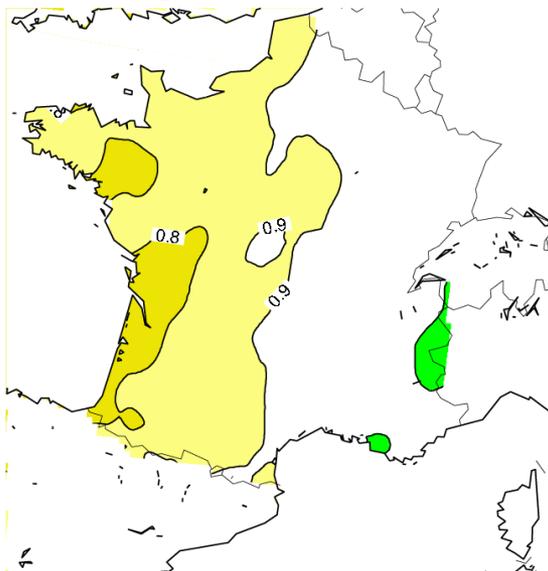
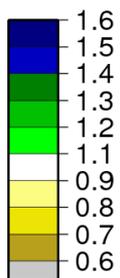
hiver



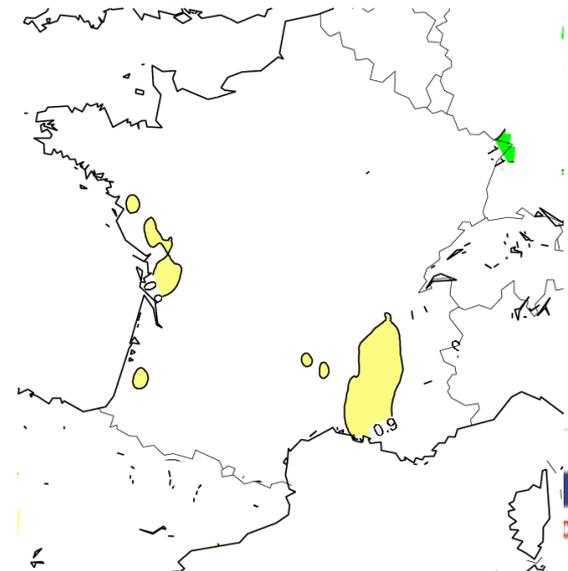
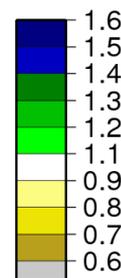
printemps



été

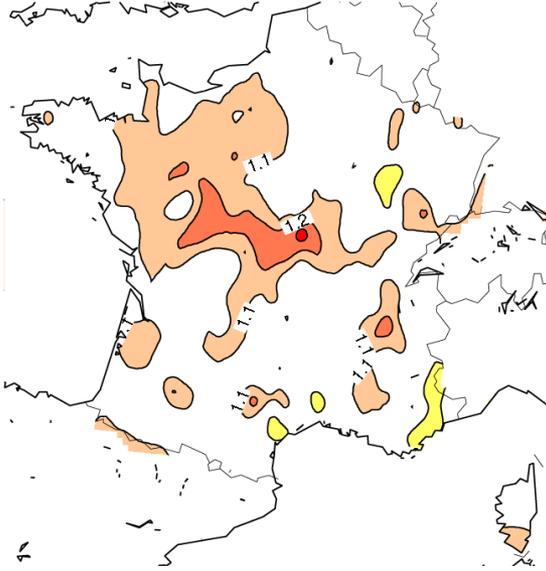
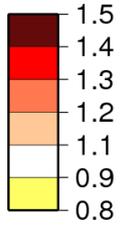


automne

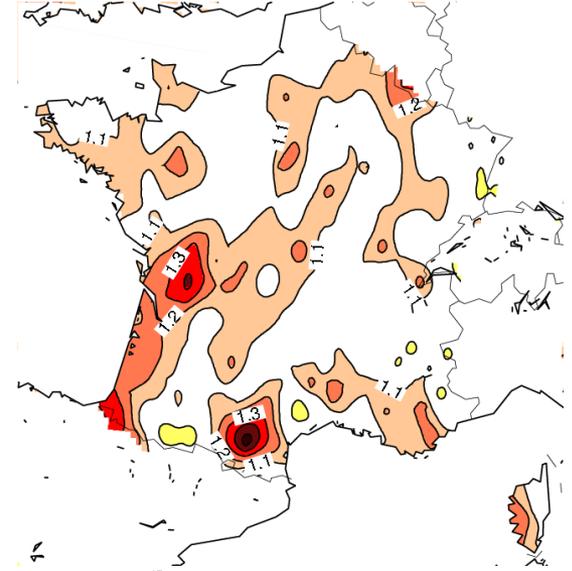
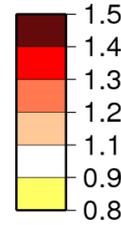


Pluies intenses

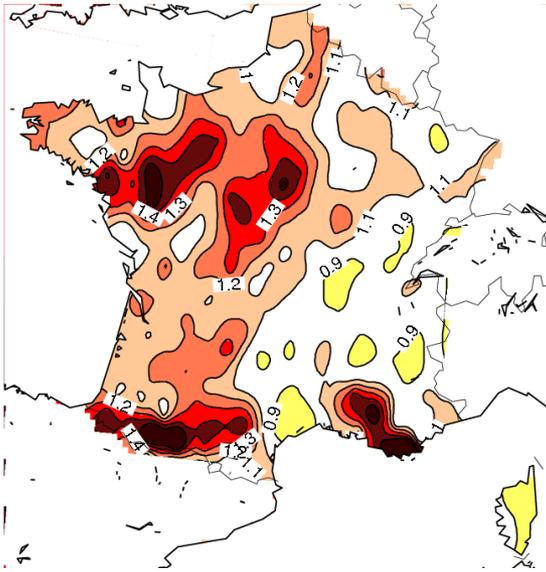
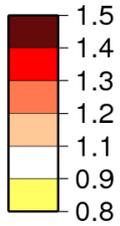
hiver



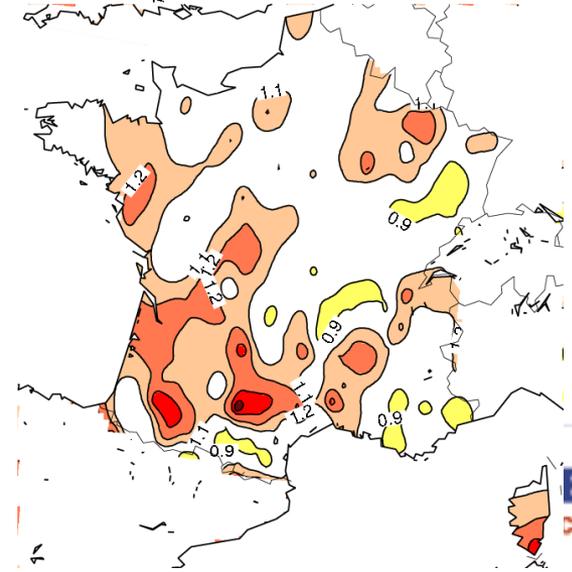
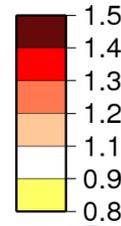
printemps



été

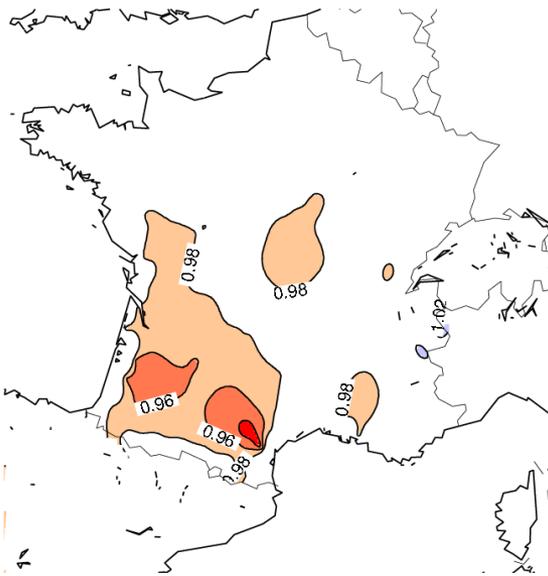
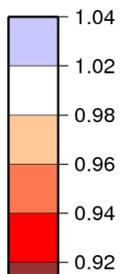


automne

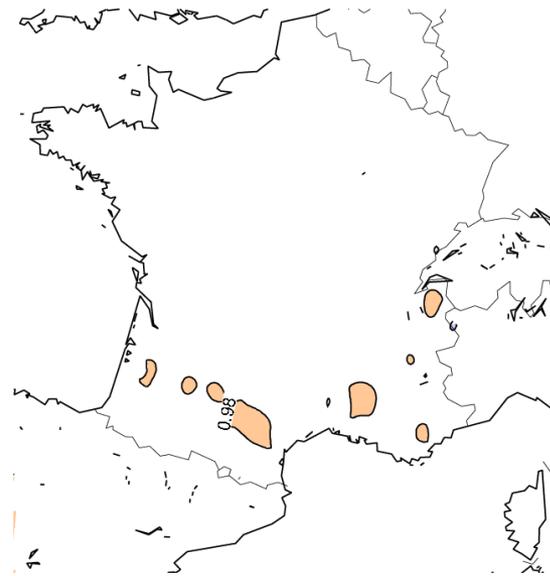


Réserve hydrique

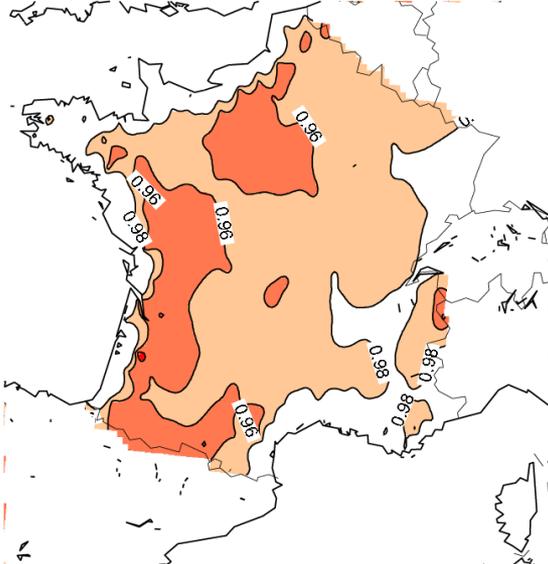
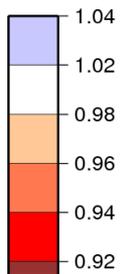
hiver



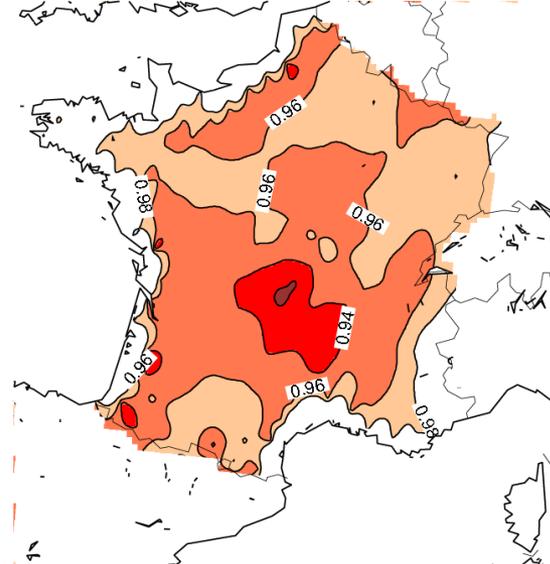
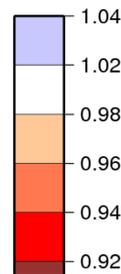
printemps



été

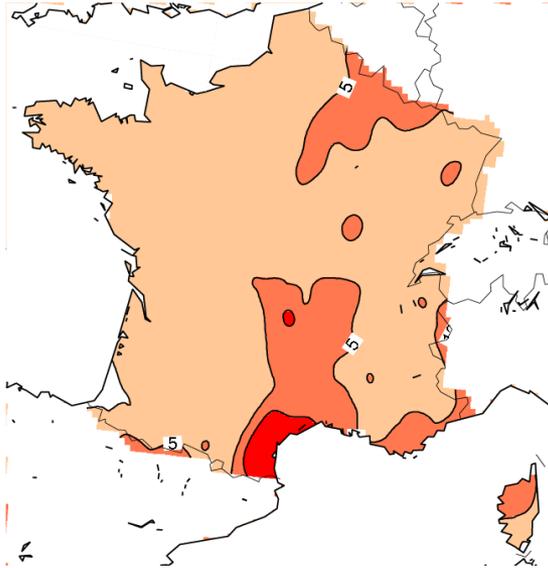
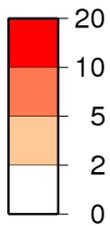


automne

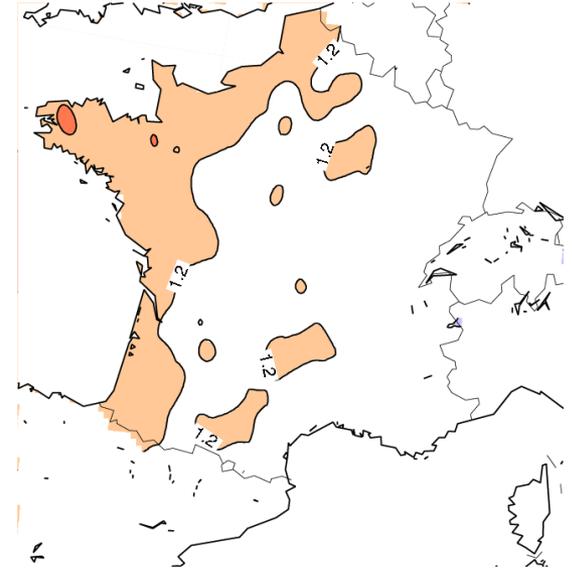
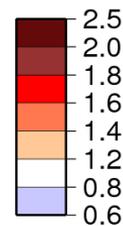


Sécheresse estivale

jours de canicule

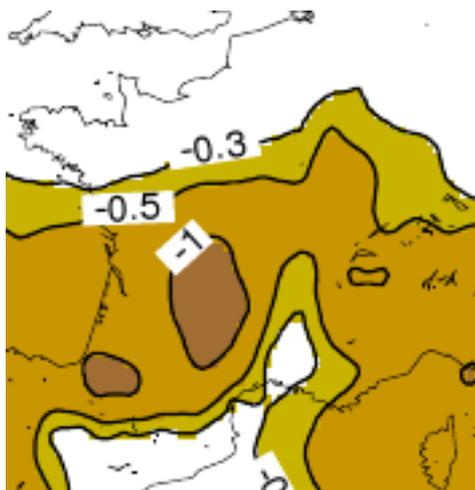
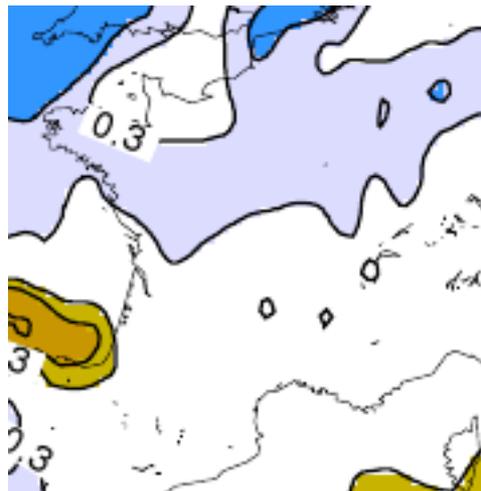
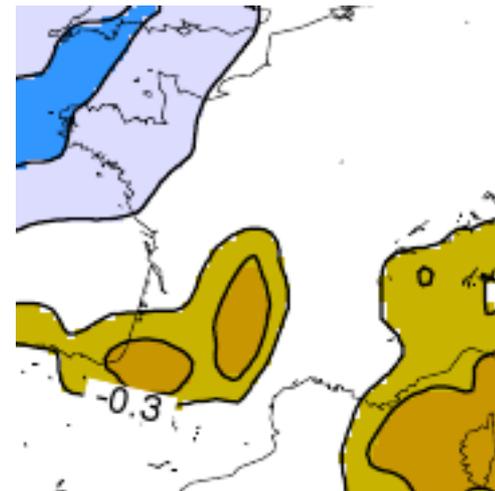
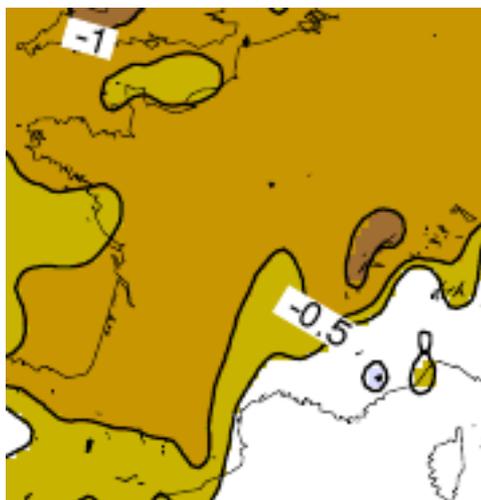
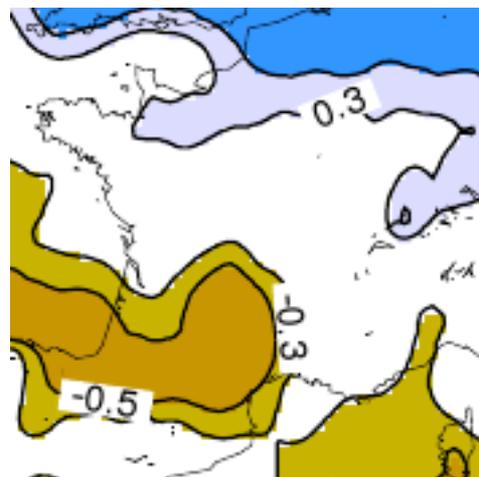
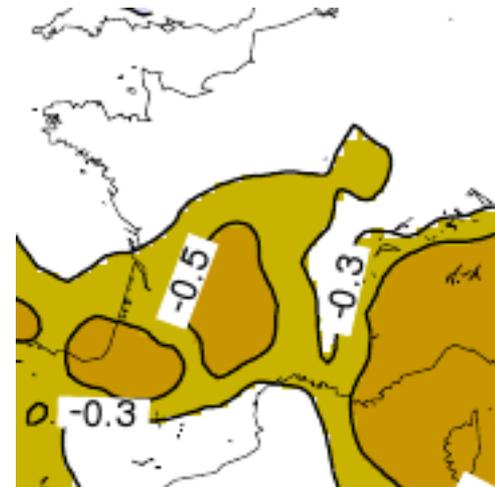


durée des sécheresses



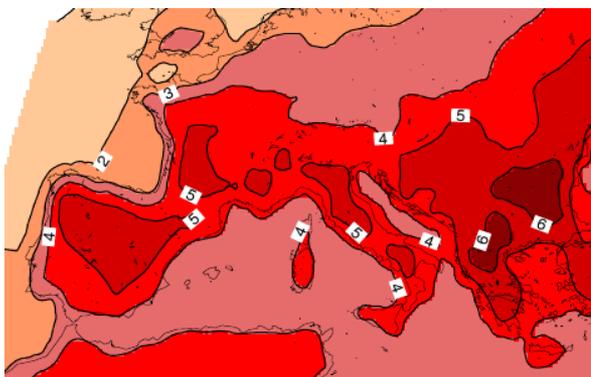
Incertitudes

Réponse précipitations ARPEGE DJF 2071-2100

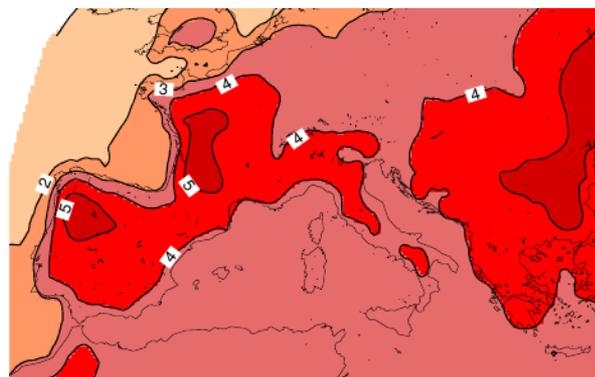
CNRM A1B**HadC A1B****CNRM A2****MPI A1B****IPSL A1B****CNRM B1**

Réponse température JJA 2071-2100

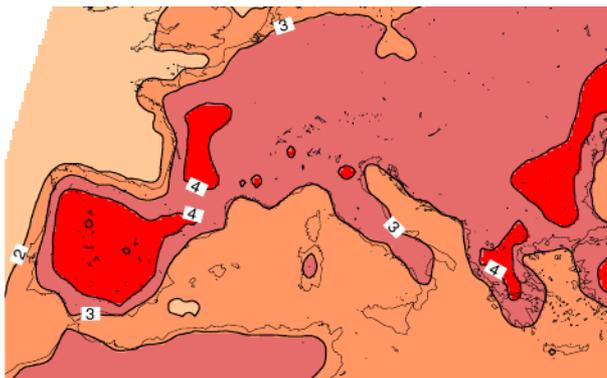
A1B ENSEMBLES



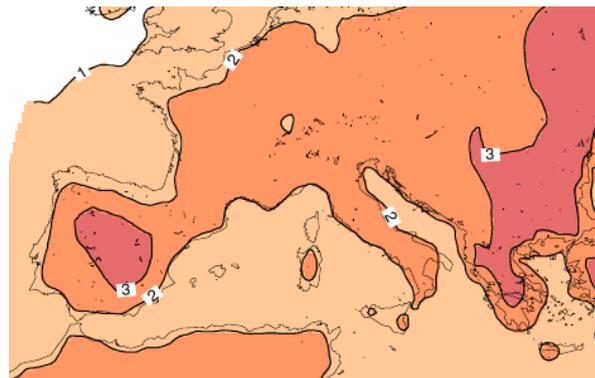
A1B RETIC



A1B STREAM2



Scénario stabilisé



Conclusions

- **Le passé: plus froid**
- **Le futur: plus chaud, plus sec (Sud/été), pluies plus extrêmes (> 20 mm/j)**
- **Surtout ne pas utiliser un seul scénario « représentatif » !**
- **Même avec un seul modèle les incertitudes sont larges**

