Yet another way to produce weights

Michel Déqué
Météo-France, Toulouse

METEO FRANCE
Toujours un temps d'avance

ENSEMBLES regional simulations

- Daily data used at DMI server:
- 25 km ERA40-driven simulations (RT3)
  CHMI CNRM **DMI** ETHZ ICTP KNMI
  METNO METOHC MPI **OURANOS** SMHI UCLM C4I
- Except CHMI they are (or will be in the case of SMHI and ICTP) in RT2B database for scenarios
- Verification based on ENSEMBLES daily observed gridded data

Study of probability distribution

- Daily temperature and precipitation, DJF and JJA
- 34 European capitals
  - ATHENS BELGRADE BERLIN BERN BRATISLAVA BRUSSELS BUCHAREST BUDAPEST COPENHAGEN DUBLIN HELSINKI LISBON LJUBLJANA LONDON LUXEMBOURG MADRID NICOSIE OSLO PARIS PRAGUE REYKJAVIK RIGA ROME SARAJEVO SKOPJE SOFIA STOCKHOLM TALLINN THE HAGUE TIRANA VIENNA VILNIUS WARSAW ZAGREB
- Pdf based on **weights** and Gaussian kernels (standard deviation 1K and 1 mm/day) for:
  1. Equal weights
  2. RT3 weights
  3. Optimal weights
  4. Random weights

RT3 weights

- Universal weight system: one weight per regional model
- Based on 6 different criteria applied to ERA40-driven runs
- Provisionnal (f6 missing, based on old DMI and old OURANOS)

CHMI	0.07	CNRM	0.09	DMI	0.01
ETHZ	0.04	ICTP	0.10	KNMI	0.30
METNO	0.03	METO	0.06	MPI	0.05
OURA	0.05	SMHI	0.06	UCLM	0.09
C4I	0.04				

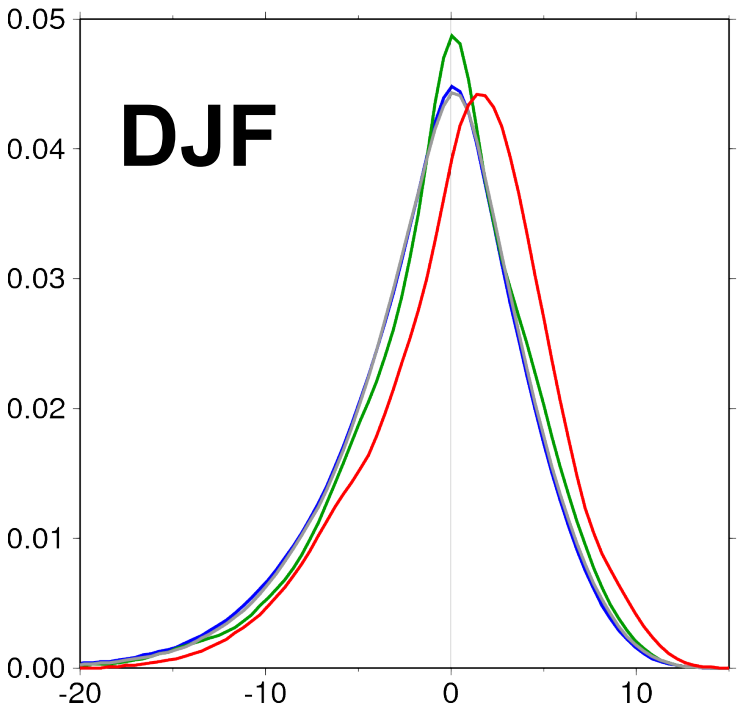
Optimal weights

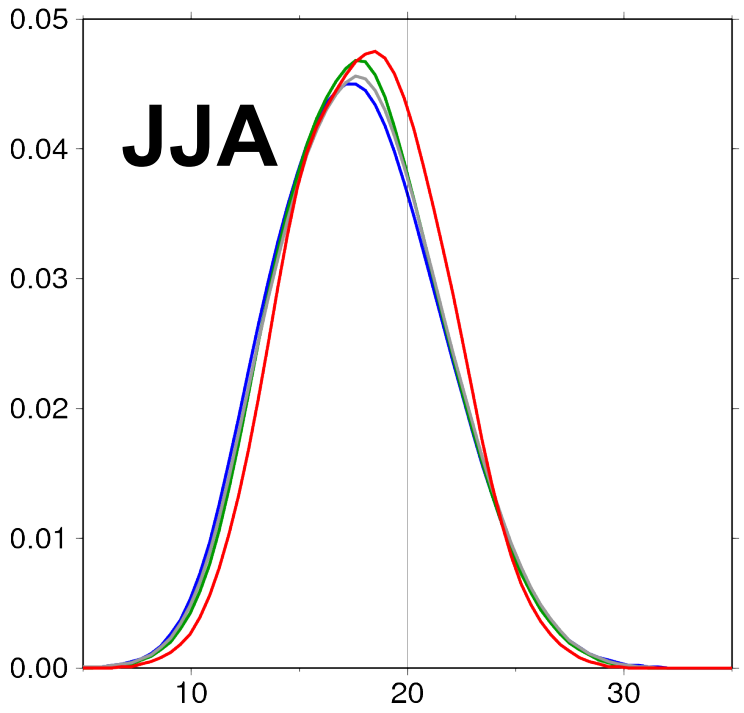
- Ranked Probability Score RPS
- Empirical cumulated density function CDF : Prob($X<x_i$)
- RPS=$<(CDFM_i-CDFO_i)^2>$ x_i=quantiles of observation
- $CDFM_i$=sum{ w(mod) $CDFM_i$(mod) }
- w(mod) : positive, sum=1, minimizing mean RPS over Europe

RPS over Europe

	Temp.DJF	Temp JJA	Prec. DJF	Prec JJA
Equal	0.012	0.008	0.027	0.012
RT3	0.013	0.006	0.028	0.009
0ptimal	0.004	0.005	0.008	0.002
Random 5%	0.010	0.007	0.023	0.008
Random 95%	0.015	0.010	0.031	0.018

Temperature PDF (Gauss kernels)



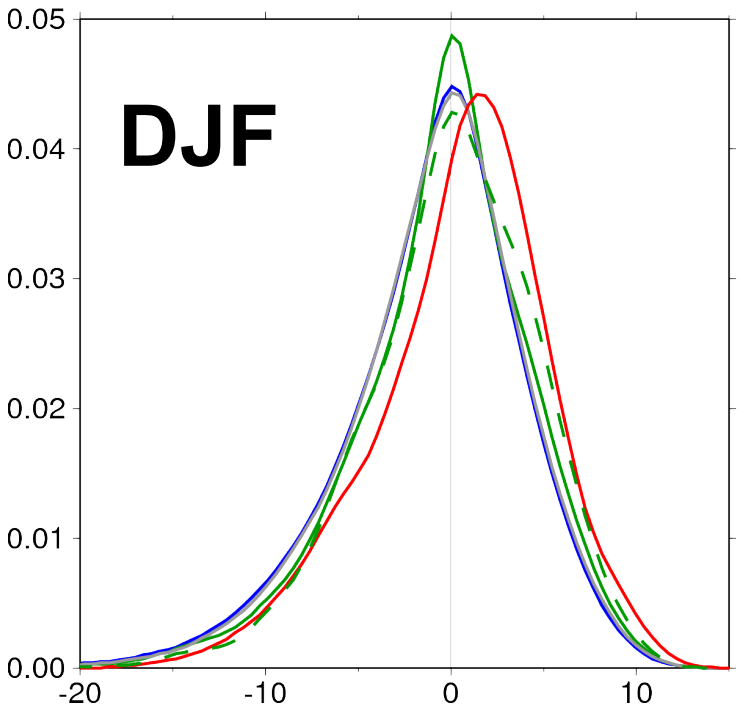


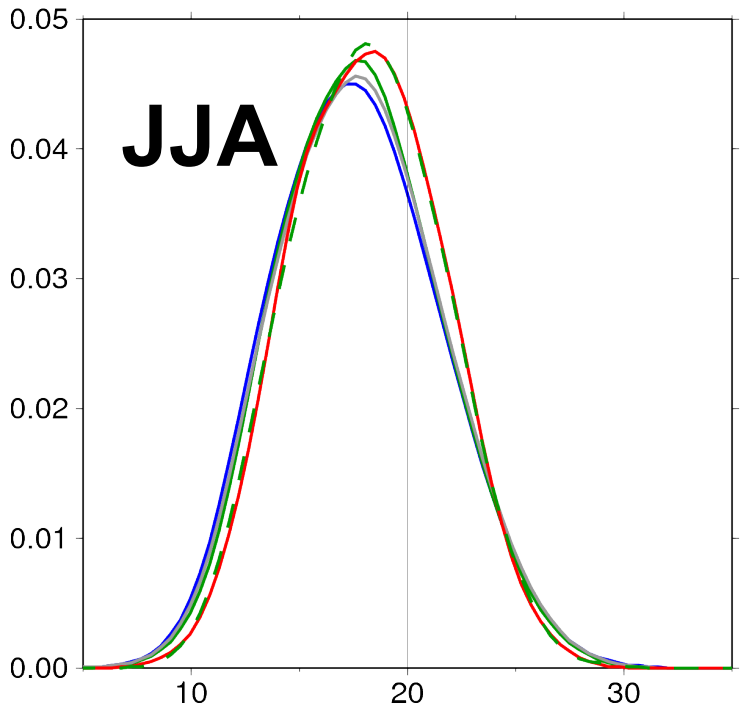
Observation
Equal weights
RT3 weights
Optimal weights

Paris

METEO FRANCE
Toujours un temps d'avance

Temperature PDF (Gauss kernels)



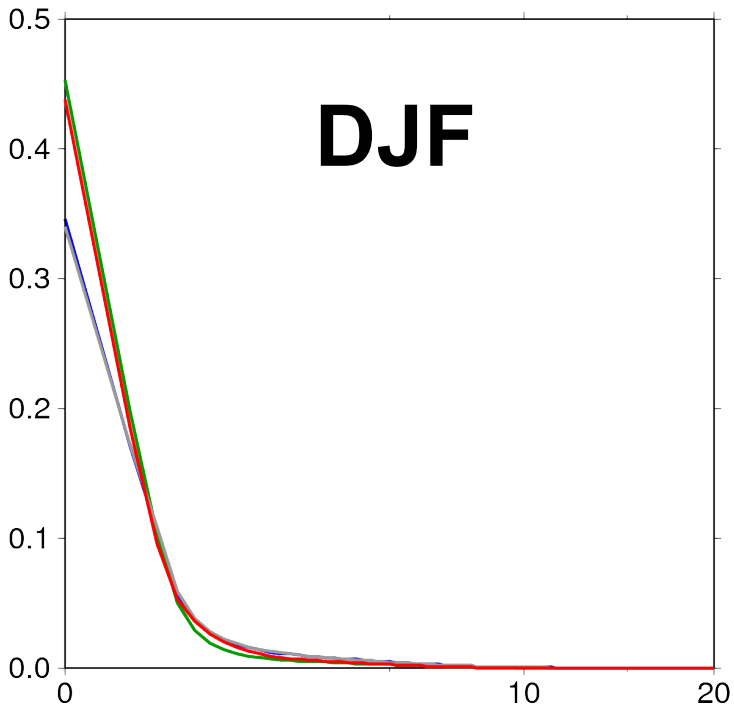


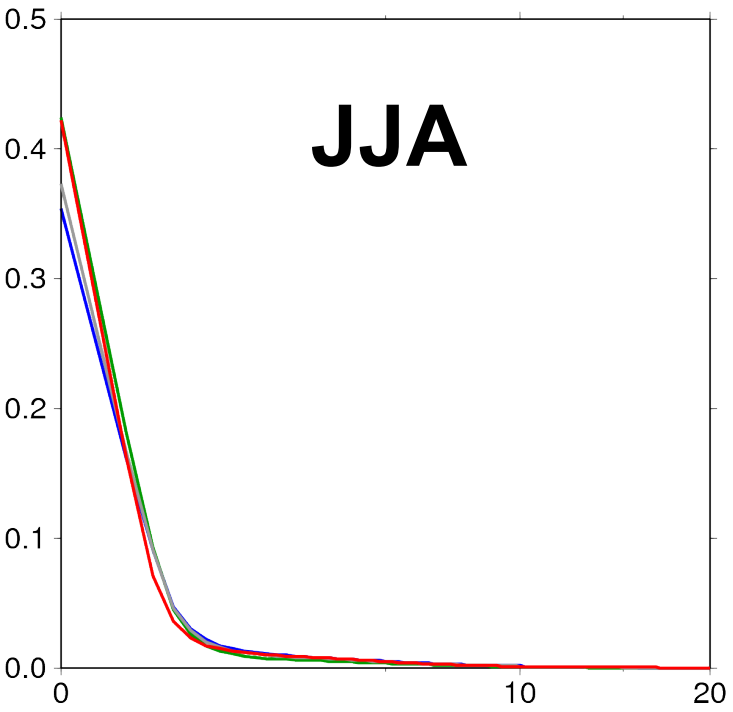
Observation
Equal weights
RT3 weights
Optimal weights

Paris

METEO FRANCE
Toujours un temps d'avance

Precipitation PDF (pseudo-Gauss kernels)





Observation
Equal weights
RT3 weights
Optimal weights

Paris

METEO FRANCE
Toujours un temps d'avance

Conclusion and Perspectives

- Conclusions
  1. It is possible to represent simply the uncertainty in the choice of a model in a sample
  2. This uncertainty merges easily with that of the natural variability:
     - pdf of daily values
     - pdf of seasonal means
     - pdf of 30-year means
  3. Weights can be optimized on a local as well as on a global (Europe) criterion; possible multi-parameter aggregation
- Perspectives
  1. Apply to RT2B results
  2. Do we have weight(GCMxRCM)=weight(GCM) x weight(RCM) ?
  3. Produce pdf of the climate response