

Les simulations du LMDZ a trois
resolutions differentes, pour le
climat actuel et pour le futur

Compte-rendu de l'avancement au LMD

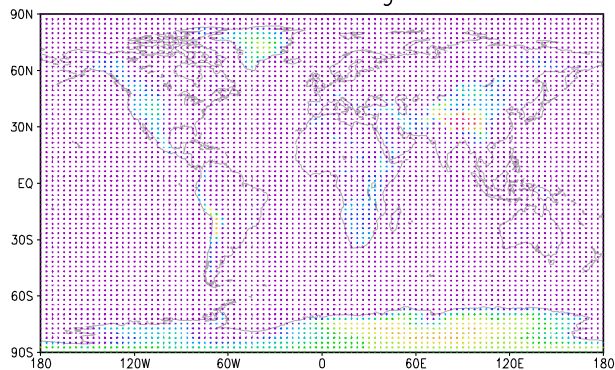
Laurent Li

Le 7 juillet 2010

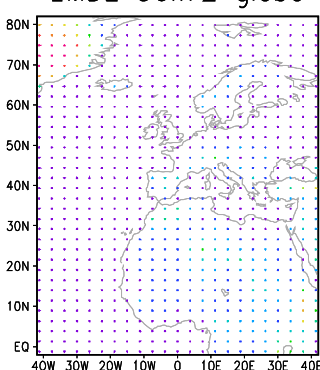
- Model used: LMDZ
- Three versions: Global / Europe / France
- Two-way nesting between Global/Europe
- One-way nesting from Europe to France

LMDZ grid schemes for the whole earth (left), for Europe (middle) and for France (right) in three versions

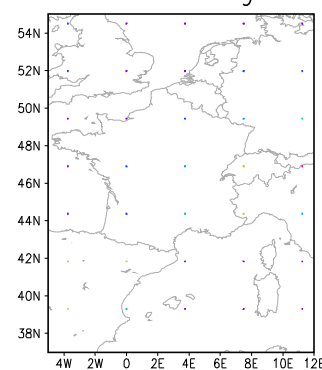
LMDZ 96x72 globe



LMDZ 96x72 globe

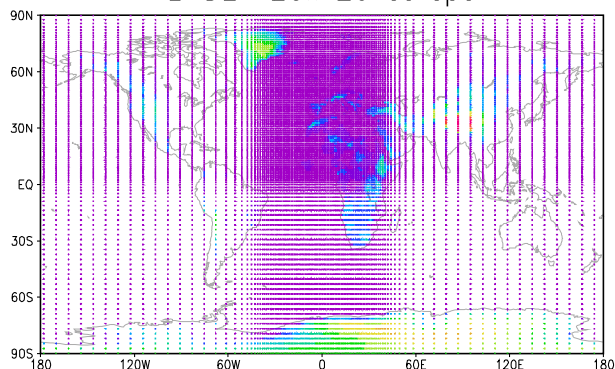


LMDZ 96x72 globe

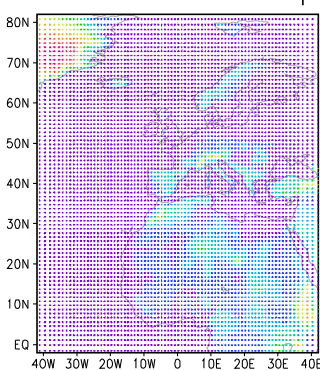


LMDZ Globe
(300 km)

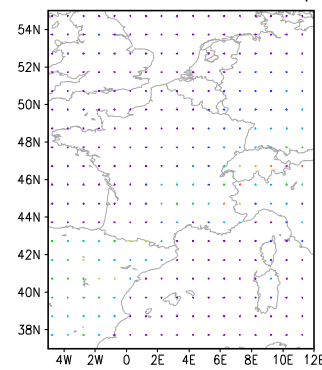
LMDZ 120x120 europe



LMDZ 120x120 europe

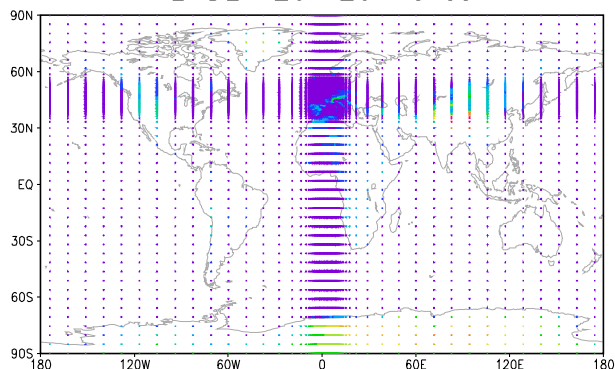


LMDZ 120x120 europe

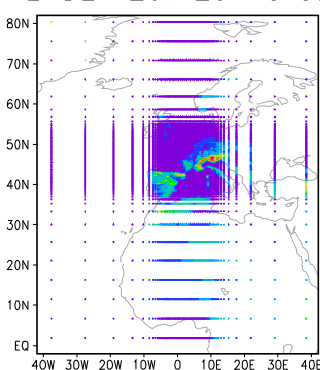


LMDZ Europe
(100 km)

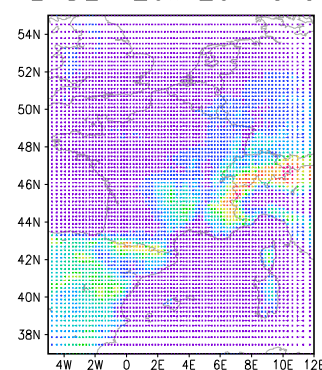
LMDZ 120x120 france



LMDZ 120x120 france



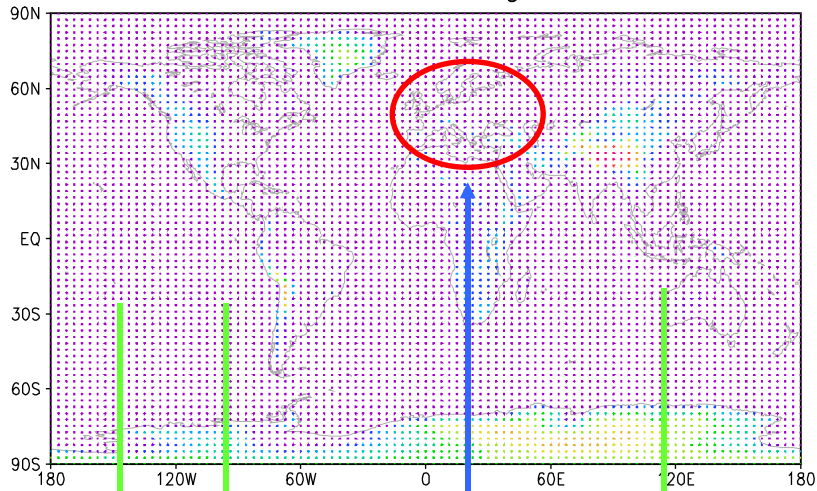
LMDZ 120x120 france



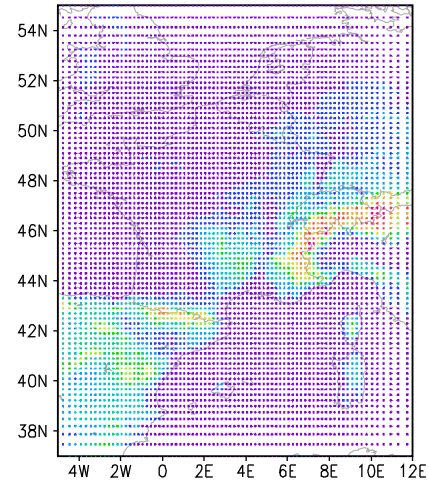
LMDZ France
(20 km)

Two-way nesting between LMDZ-regional and LMDZ-global

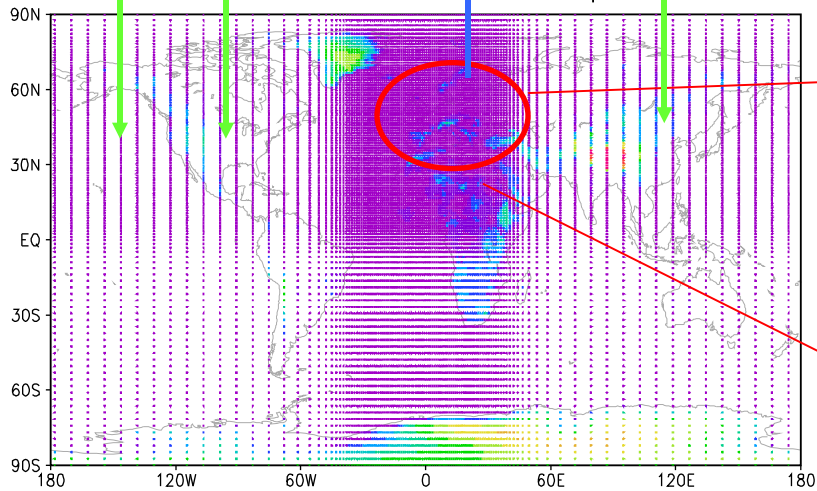
LMDZ 96x72 globe



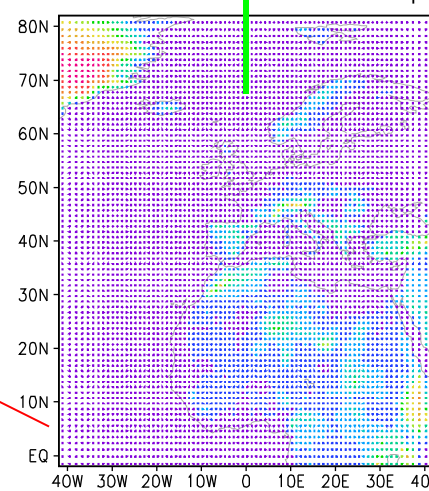
LMDZ 120x120 france



LMDZ 120x120 europe



LMDZ 120x120 europe



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- Present-day climat: observed SST, sea-ice and GHG for 1961/1990.
- Future projection: differential SST, sea-ice and GHG (2021/2050 – 1961/1990; 2071/2100 – 1961/1990) from IPSL-CM4 under scenario A1B.
- Simulation length: 30 x 1 year.
- Outputs: monthly, daily and 12xdaily
- **To be done**: two additional scenarios with CNRM-CM4 outputs

Available variables every 2 hours

Main variables:

t2m: 2-m air temperature
tsol: Surface temperature
q2m: 2-m specific humidity
rain: rainfall rate
snow: snowfall rate
evap: Evaporation rate
u10m: 10-m zonal wind
v10m: 10-m meridional wind
wind10m: 10-m wind speed
psol: Surface pressure

Surface energy budget:

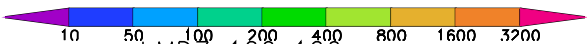
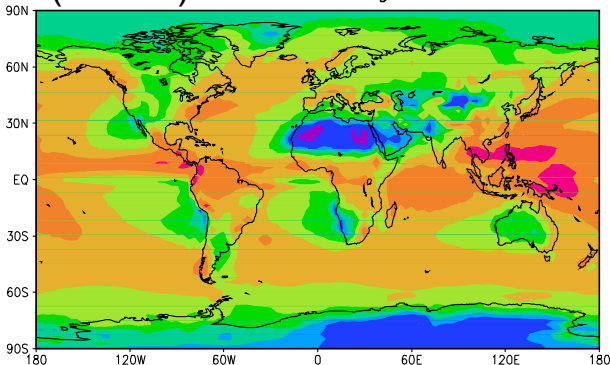
bils: Surface total heat flux" ;
flat: Latent heat flux" ;
sens: Sensible heat flux" ;
solldn: Surface downward IR radiation
sollup: Surface upward IR radiation
solstdn: Surface downward solar radiation
solsup: Surface upward solar radiation

Surface hydrology:

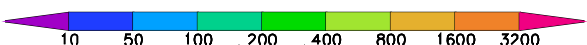
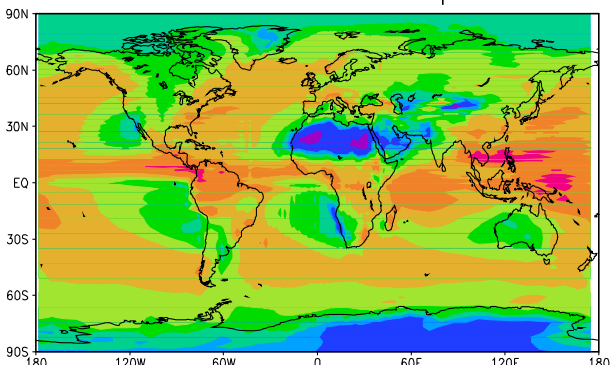
bqsb: Lower Soil Moisture
drainage: Deep drainage
evapot: Potential evaporation
gqsb: Upper Soil Moisture
runoff: Surface runoff
snowmass: Snow mass

Annual-mean precipitation (mm) in three LMDZ models: Globe (top), Europe (middle) and France

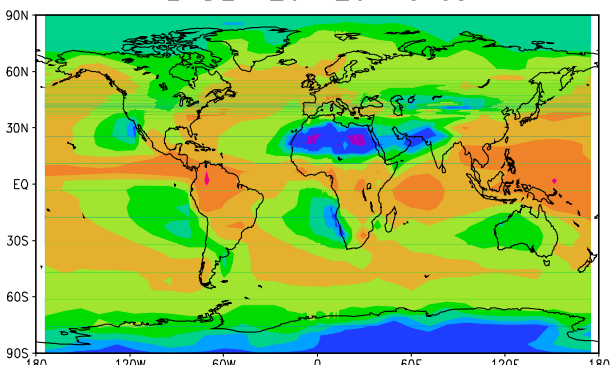
(bottom) LMDZ 96x72 globe



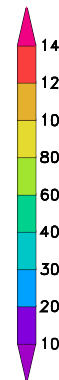
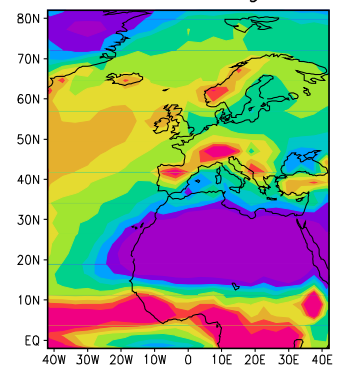
LMDZ 120x120 europe



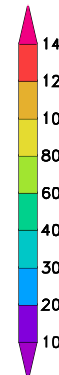
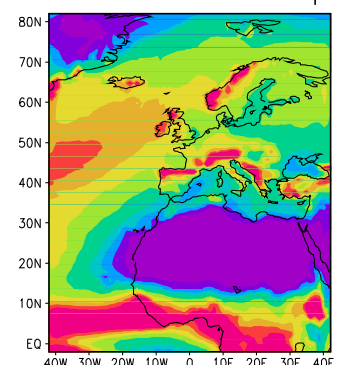
LMDZ 120x120 france



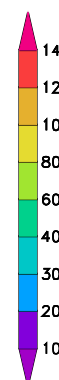
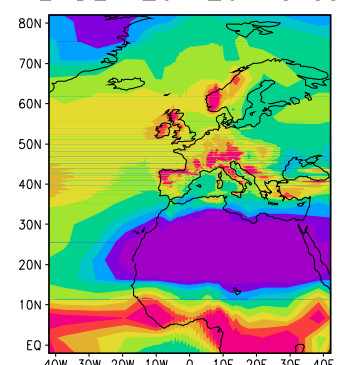
LMDZ 96x72 globe



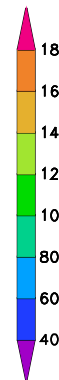
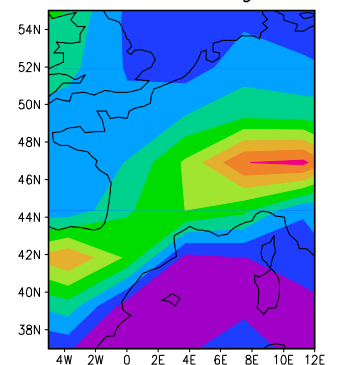
LMDZ 120x120 europe



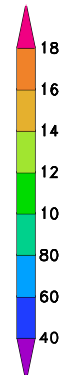
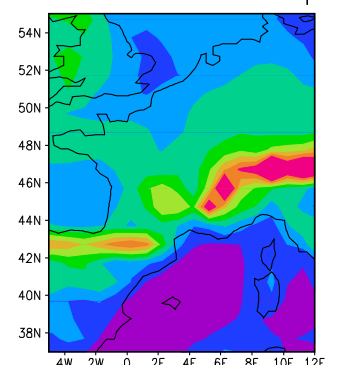
LMDZ 120x120 france



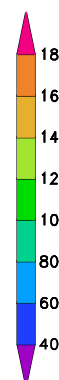
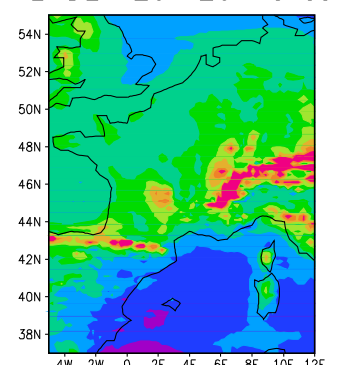
LMDZ 96x72 globe



LMDZ 120x120 europe

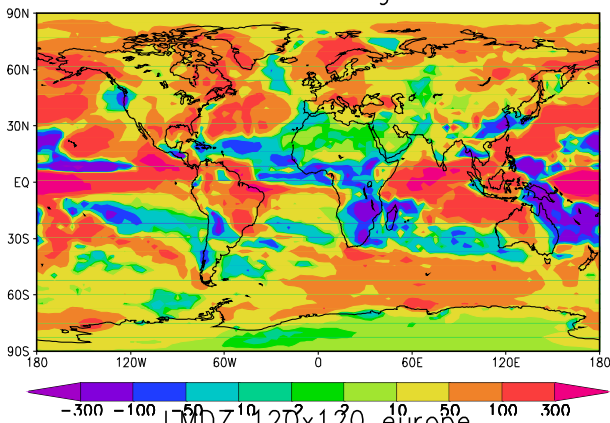


LMDZ 120x120 france

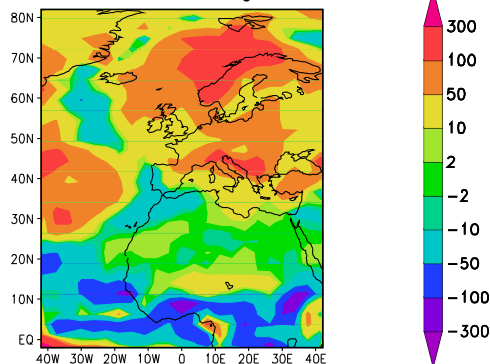


Annual-mean precipitation change (mm) in 3 LMDZ: Globe (top), Europe (middle) and France (bottom)

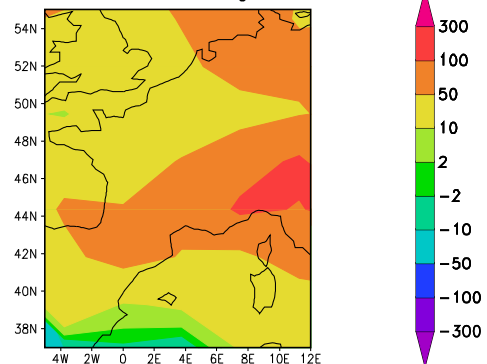
LMDZ 96x72 globe



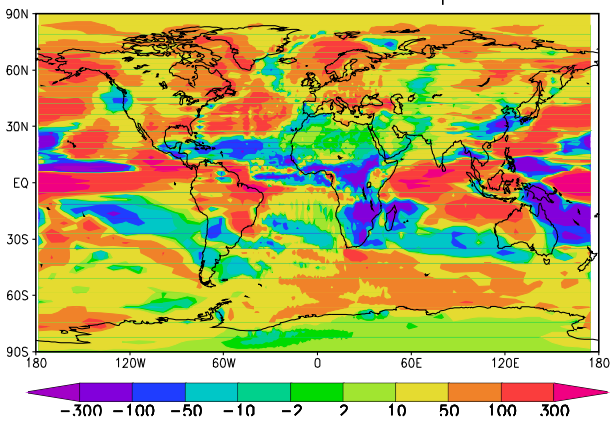
LMDZ 96x72 globe



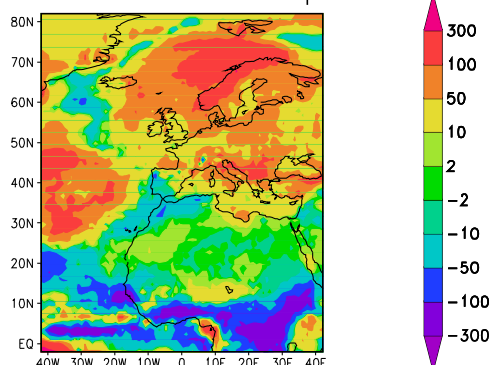
LMDZ 96x72 globe



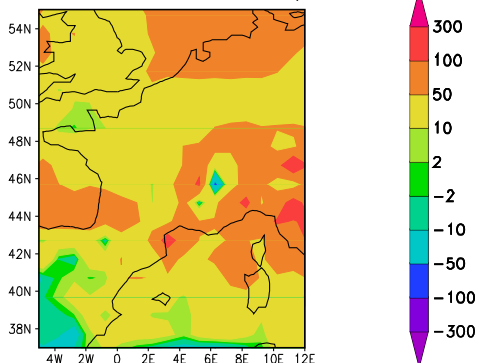
LMDZ 120x120 europe



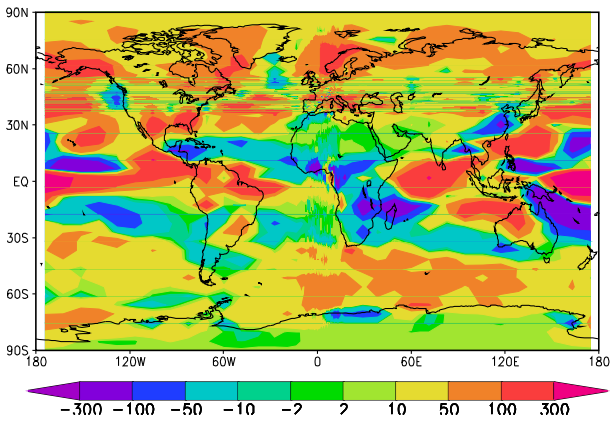
LMDZ 120x120 europe



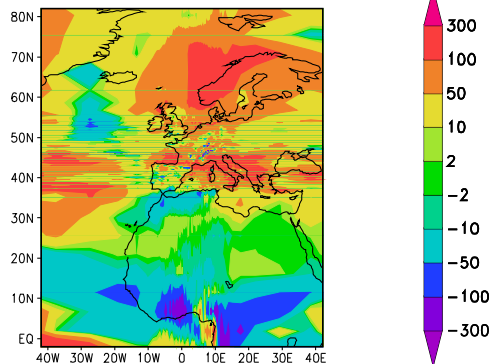
LMDZ 120x120 europe



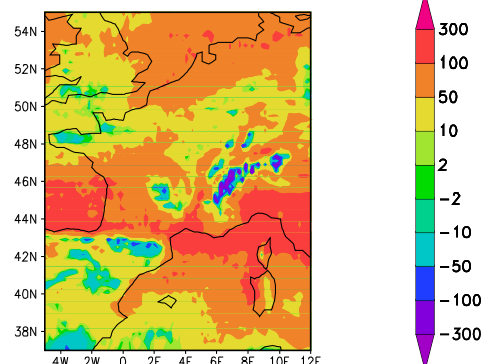
LMDZ 120x120 france



LMDZ 120x120 france

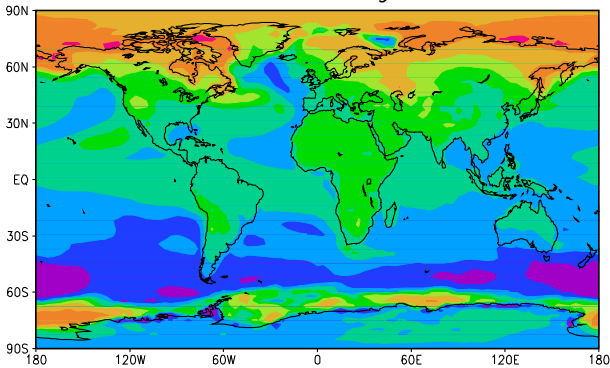


LMDZ 120x120 france

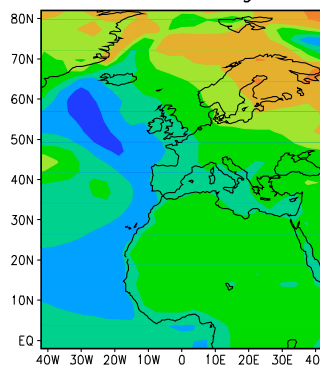


Annual-mean T2m change (°C) in 3 LMDZ: Globe (top), Europe (middle) and France (bottom)

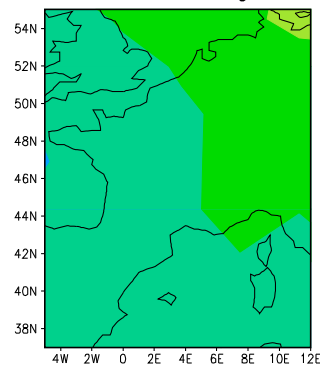
LMDZ 96x72 globe



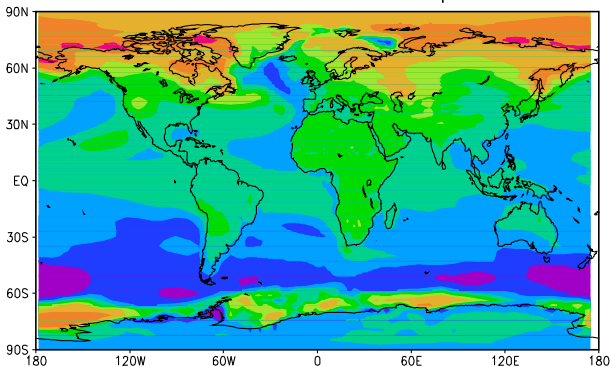
LMDZ 96x72 globe



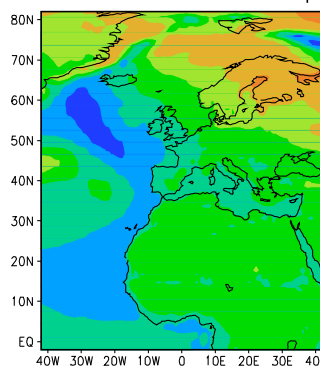
LMDZ 96x72 globe



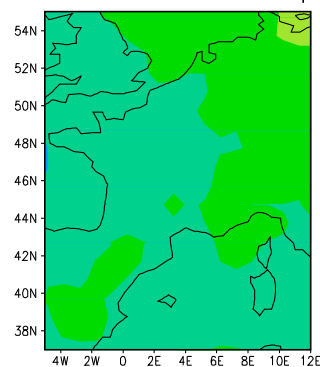
LMDZ 120x120 europe



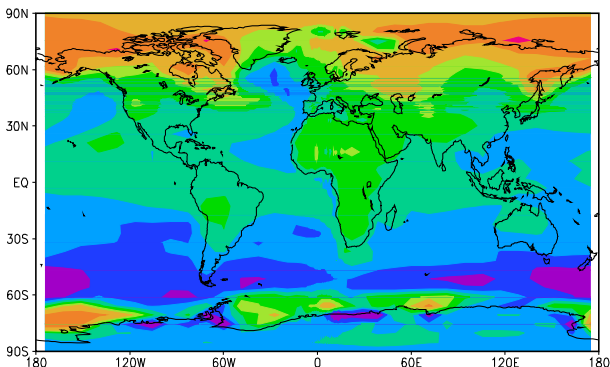
LMDZ 120x120 europe



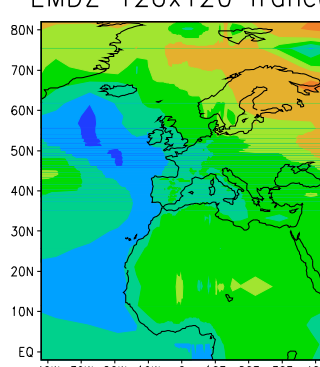
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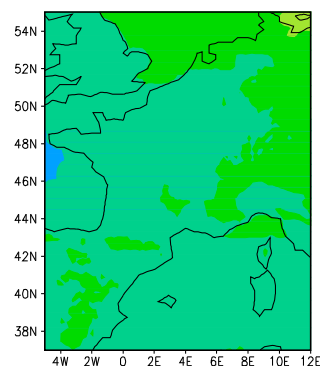
LMDZ 120x120 france



LMDZ 120x120 france



LMDZ 120x120 france



Pr (mm/jour), Tx(°C) et Tn (°C) pour un niveau de retour à 50 ans, à Marseille, observation et trois résolutions du LMDZ

Pr	Obs	300km	100km	20km
1961/1990	145	43	42	62
2021/2050	?	38	56	93

Tx	Obs	300km	100km	20km
1961/1990	38.9	32.2	34.7	35.6
2021/2050	?	36.0	36.9	37.5

Tn	Obs	300km	100km	20km
1961/1990	26.2	21.7	24.8	25.6
2021/2050	?	24.0	27.0	27.8

Pr: précipitations intenses

Tx: température maxi de jour

Tn: température de nuit chaude

Précipitations intenses, niveau de retour (mm/jour) à 50 ans

Marseille	Obs	300km	100km	20km
1961/1990	145	43	42	62
2021/2050		38	56	93

Paris	Obs	300km	100km	20km
1961/1990	84	31	40	37
2021/2050		26	39	48

Strasbourg	Obs	300km	100km	20km
1961/1990	65	40	49	41
2021/2050		32	61	44

Observations et Trois versions LMDZ.

Température maxi extrême, niveau de retour (C) à 50 ans

Marseille	Obs	300km	100km	20km
1961/1990	38.9	32.2	34.7	35.6
2021/2050		36.0	36.9	37.5

Paris	Obs	300km	100km	20km
1961/1990	38.7	36.6	37.8	36.9
2021/2050		39.1	40.0	39.5

Strasbourg	Obs	300km	100km	20km
1961/1990	38.3	34.7	34.8	35.2
2021/2050		36.7	37.5	37.5

Observations et Trois versions LMDZ.

Number of blocking days for 28 winters

	ATLANTIC	EUROPE	W PACIFIC	E PACIFIC
ERA40	811	1008	910	632
IPCM4	400	312	668	606
GLOBAL	738	501	763	671
MASTER	592	535	894	792
MASTER_1	806	587	947	916

Normalized number of blocking events in function of their duration

