

Ecography

E7696

Lauzerali, C., Grenouillet, G. and Brosse, S. 2013.
Spatial range shape drives the grain size effects in species
distribution models. – *Ecography* 36: xxx–xxx.

Supplementary material

Appendix 1

Table A1: Pearson correlation coefficient (r) between the predicted area (log transformed) and the grain size.

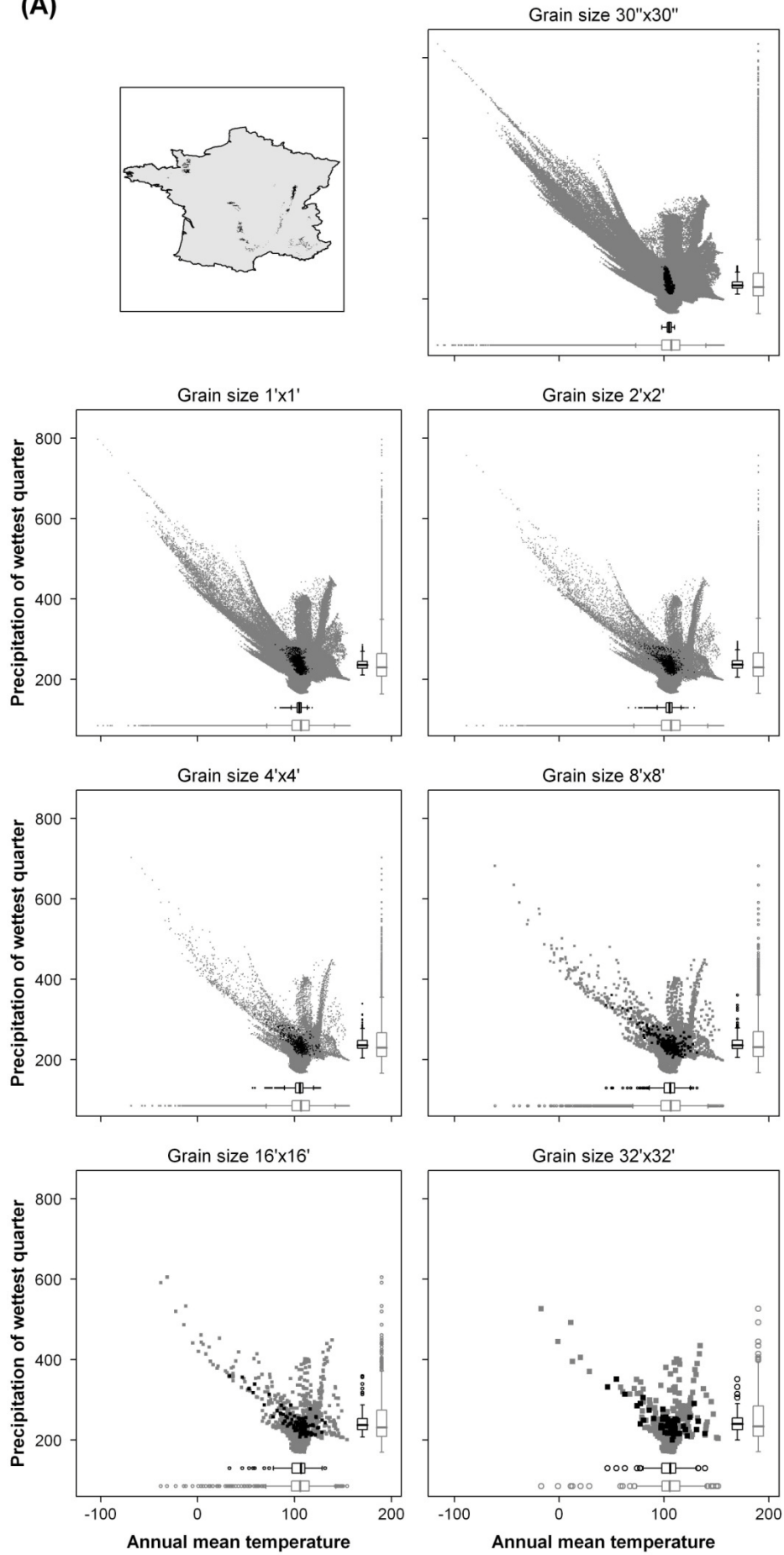
Range size	Threshold	Minimal r	Mean r	Maximal r	Percentage of models with p-value>0.05	Percentage of models with p-value >0.01		
Prevalence of 0.5	1%	TSS	0.8046	0.9503	0.9935	0	4	
		Kappa	0.321	0.7645	0.9655	40	75	
		Prevalence	0.7164	0.9383	0.9959	3	12	
	5%	TSS	0.9432	0.9838	0.9985	0	0	
		Kappa	0.9485	0.9839	0.998	0	0	
		Prevalence	0.9637	0.9915	0.999	0	0	
	15%	TSS	0.9726	0.9911	0.9991	0	0	
		Kappa	0.9714	0.9906	0.9993	0	0	
		Prevalence	0.9923	0.9978	0.9997	0	0	
	30%	TSS	0.9652	0.9883	0.9981	0	0	
		Kappa	0.9672	0.9868	0.9982	0	0	
		Prevalence	0.9851	0.9958	0.9996	0	0	
	60%	TSS	0.07008	0.8533	0.9953	22	34	
		Kappa	0.9048	0.9713	0.9919	0	0	
		Prevalence	0.7973	0.9865	0.9978	0	1	
	Initial prevalence	1%	TSS	0.9428	0.984	0.9987	0	0
			Kappa	0.9701	0.9915	0.9984	0	0
			Prevalence	0.9535	0.9866	0.9993	0	0
5%		TSS	0.945	0.9844	0.9989	0	0	
		Kappa	0.9673	0.988	0.9991	0	0	
		Prevalence	0.9792	0.9935	0.9995	0	0	
15%		TSS	0.9658	0.9884	0.9992	0	0	
		Kappa	0.9732	0.986	0.9974	0	0	
		Prevalence	0.9944	0.9982	0.9998	0	0	
30%		TSS	0.9705	0.9861	0.9982	0	0	
		Kappa	0.9734	0.985	0.9967	0	0	
		Prevalence	0.9854	0.9958	0.9998	0	0	
60%		TSS	0.9551	0.9788	0.9917	0	0	
		Kappa	0.9699	0.9865	0.9957	0	0	
		Prevalence	0.9759	0.9889	0.9982	0	0	

Table A2: Pearson correlation coefficient (r) between the predicted area and the observed area.

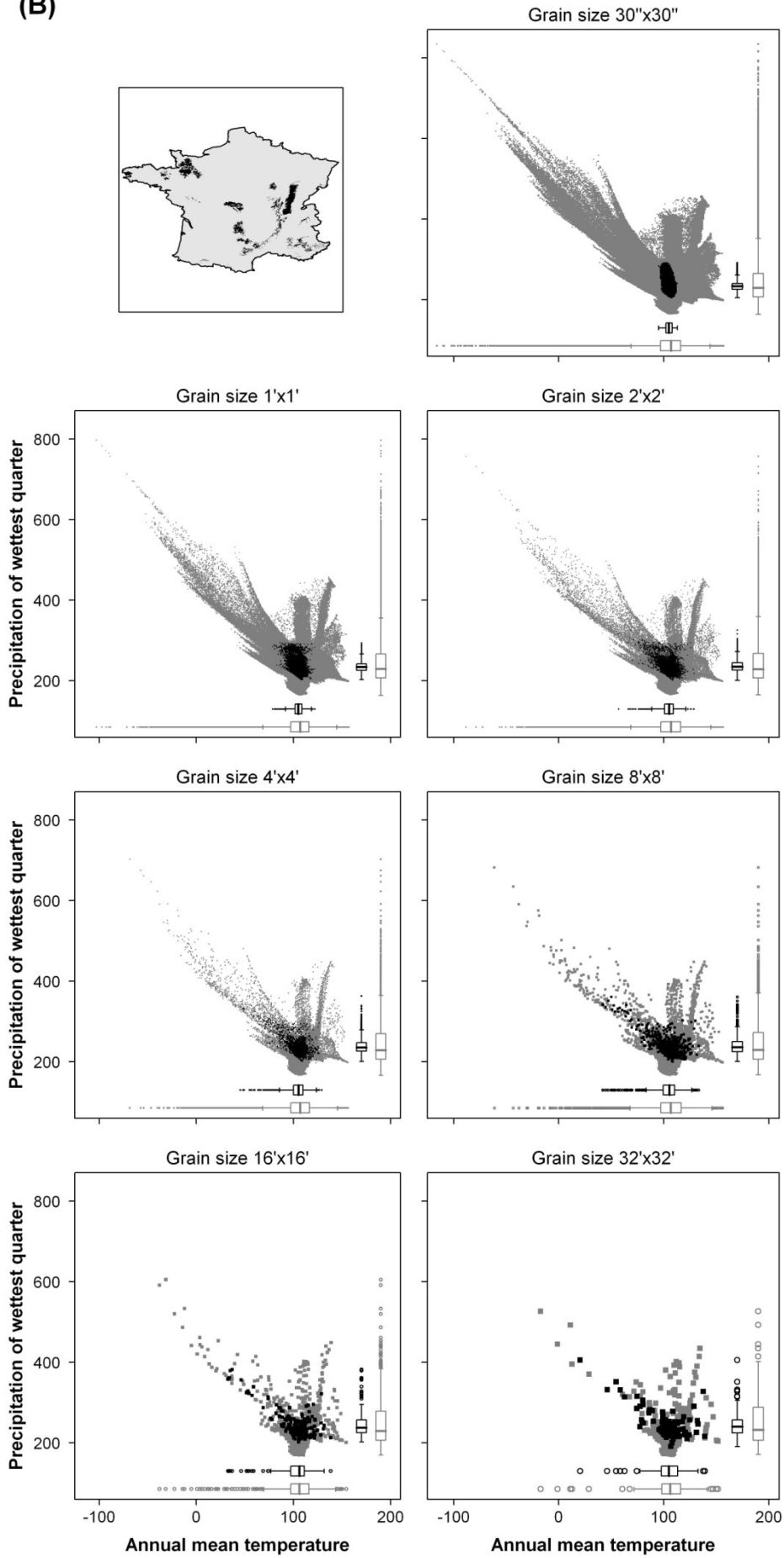
	Range size	Threshold	Minimal r	Mean r	Maximal r	Percentage of models with p-value>0.05	Percentage of models with p-value >0.01
Prevalence of 0.5	1%	TSS	0.6693	0.8652	0.9628	2	56
		Kappa	0.4883	0.85	0.9897	15	53
		Prevalence	0.7697	0.9013	0.9833	0	26
	5%	TSS	0.8346	0.9197	0.9814	0	8
		Kappa	0.8402	0.9278	0.9847	0	3
		Prevalence	0.8342	0.9148	0.9652	0	4
	15%	TSS	0.9114	0.9651	0.9926	0	0
		Kappa	0.9236	0.9674	0.9911	0	0
		Prevalence	0.9063	0.9461	0.9705	0	0
	30%	TSS	0.9168	0.9784	0.9983	0	0
		Kappa	0.9232	0.983	0.9983	0	0
		Prevalence	0.9518	0.9783	0.9928	0	0
60%	TSS	0.08257	0.805	0.9983	28	42	
	Kappa	0.9351	0.9926	0.9998	0	0	
	Prevalence	0.6912	0.9812	0.9992	1	2	
Initial prevalence	1%	TSS	0.7754	0.8522	0.9238	0	81
		Kappa	0.8434	0.9211	0.962	0	5
		Prevalence	0.7732	0.8672	0.9218	0	56
	5%	TSS	0.8046	0.9103	0.9624	0	13
		Kappa	0.9235	0.9661	0.9919	0	0
		Prevalence	0.8777	0.9145	0.9472	0	0
	15%	TSS	0.9208	0.9727	0.9947	0	0
		Kappa	0.9552	0.9816	0.9939	0	0
		Prevalence	0.9168	0.9434	0.965	0	0
	30%	TSS	0.9428	0.9877	0.9987	0	0
		Kappa	0.9754	0.9917	0.9989	0	0
		Prevalence	0.9656	0.9811	0.9945	0	0
60%	TSS	0.9923	0.9973	0.9998	0	0	
	Kappa	0.9853	0.9957	0.9997	0	0	
	Prevalence	0.9868	0.995	0.9996	0	0	

Figure A1: The distribution range of the species at each grain size in the two-dimensional niche space defined by the two environmental variables that are the most correlated with the two syntetic variables at the seven grain sizes (grey: absences; black: presences). Box-plots represent the environmental range (grey) and the occupied niche (black) for each variable. A-E: the five species, from the rarest (range size: 1% of the study area) to the most common (range size: 60% of the study area).

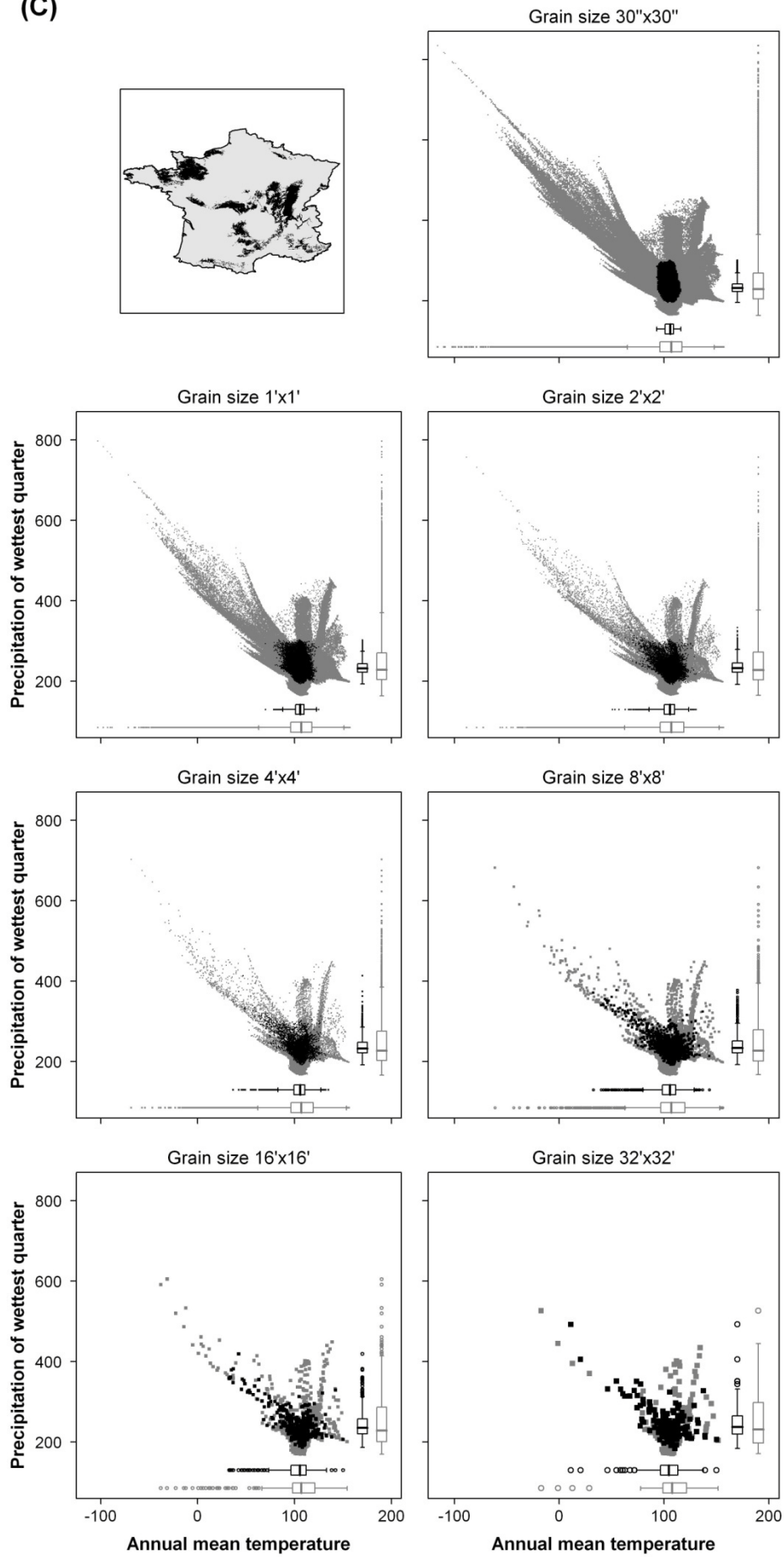
(A)



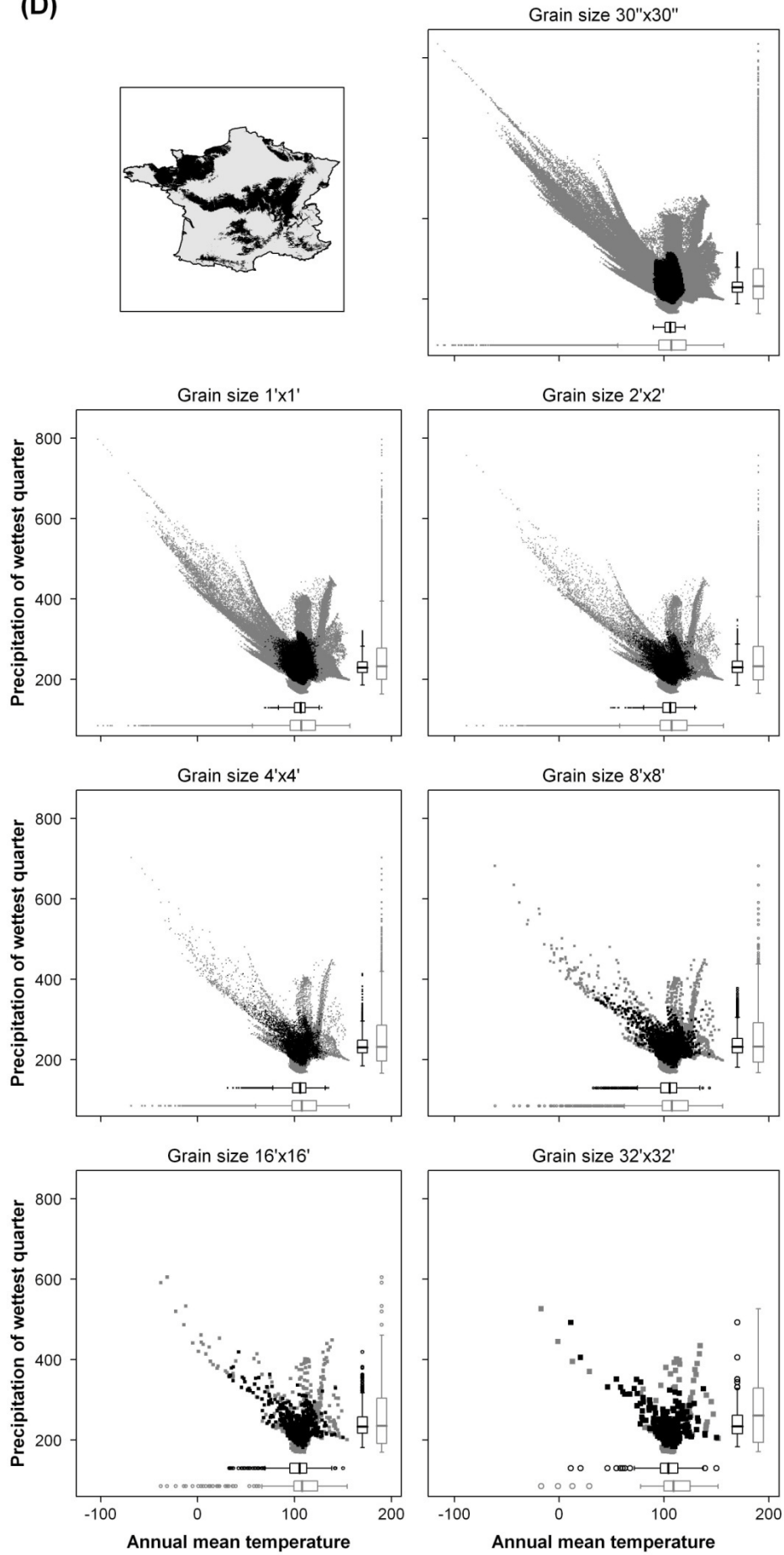
(B)



(C)



(D)



(E)

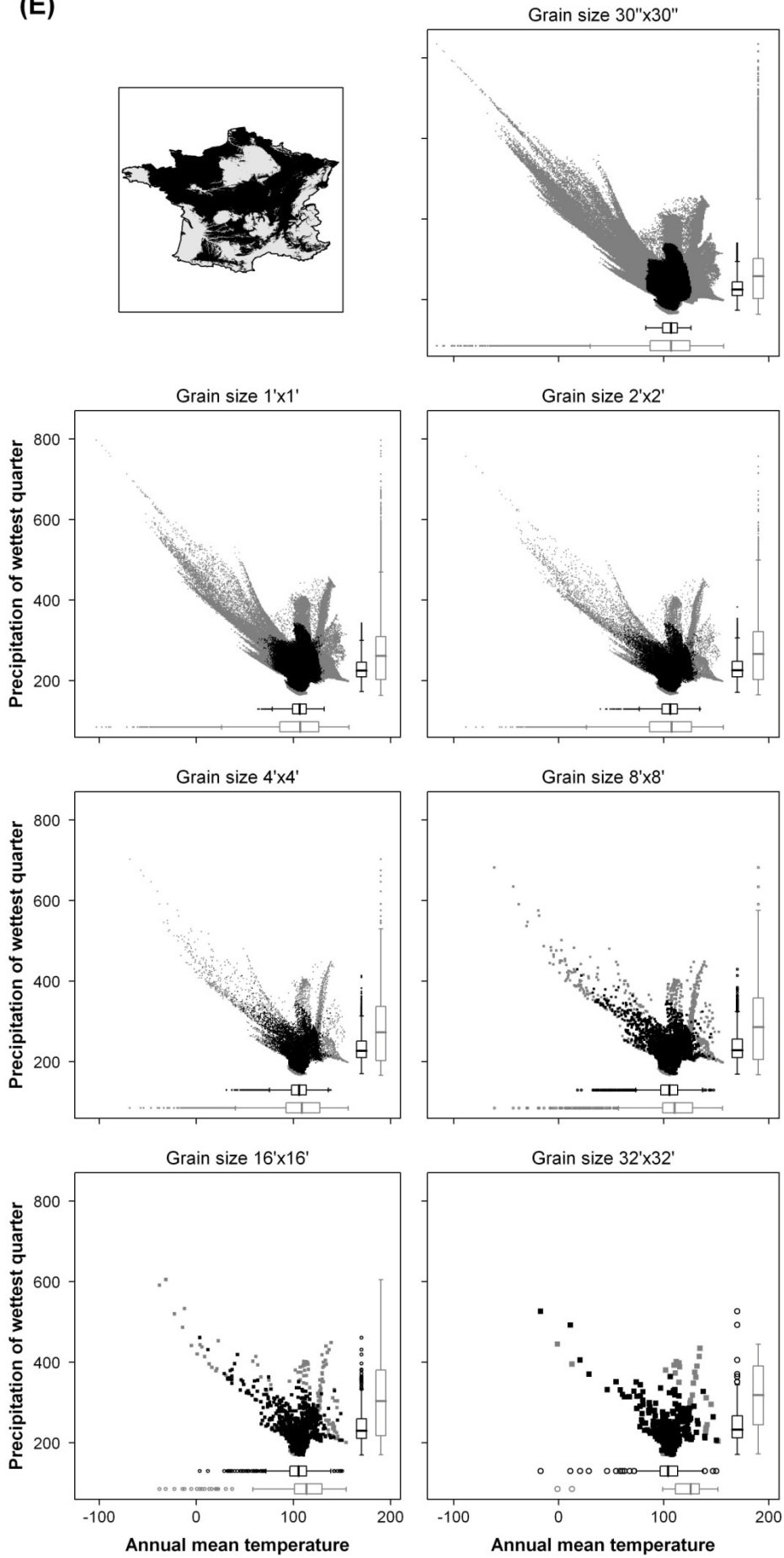


Figure A2: SDM predicted distribution areas through upscaling using a prevalence of 0.5 in the calibration dataset. A, B, C) Mean ratio between the predicted distribution areas at the 30'' x 30'' grain size and the six other grains sizes (log-scaled). D, E, F) Mean ratio between the observed and the SDM-derived distribution areas (log-scaled). In each case, the SDM-derived area was measured on the grain size at which the model was built and compared to the observed area measured on the same grain size. Cut-off thresholds are the maximisation of the TSS (A, D); the maximisation of the Kappa (B, E); the prevalence in the calibration dataset (C, F). Symbols represent virtual species range sizes expressed as proportion covered relative to the study area. Circles: 1%; squares: 5%; diamonds: 15%; up triangles: 30%; down triangles: 60%. Grey scale as in Figure 2.

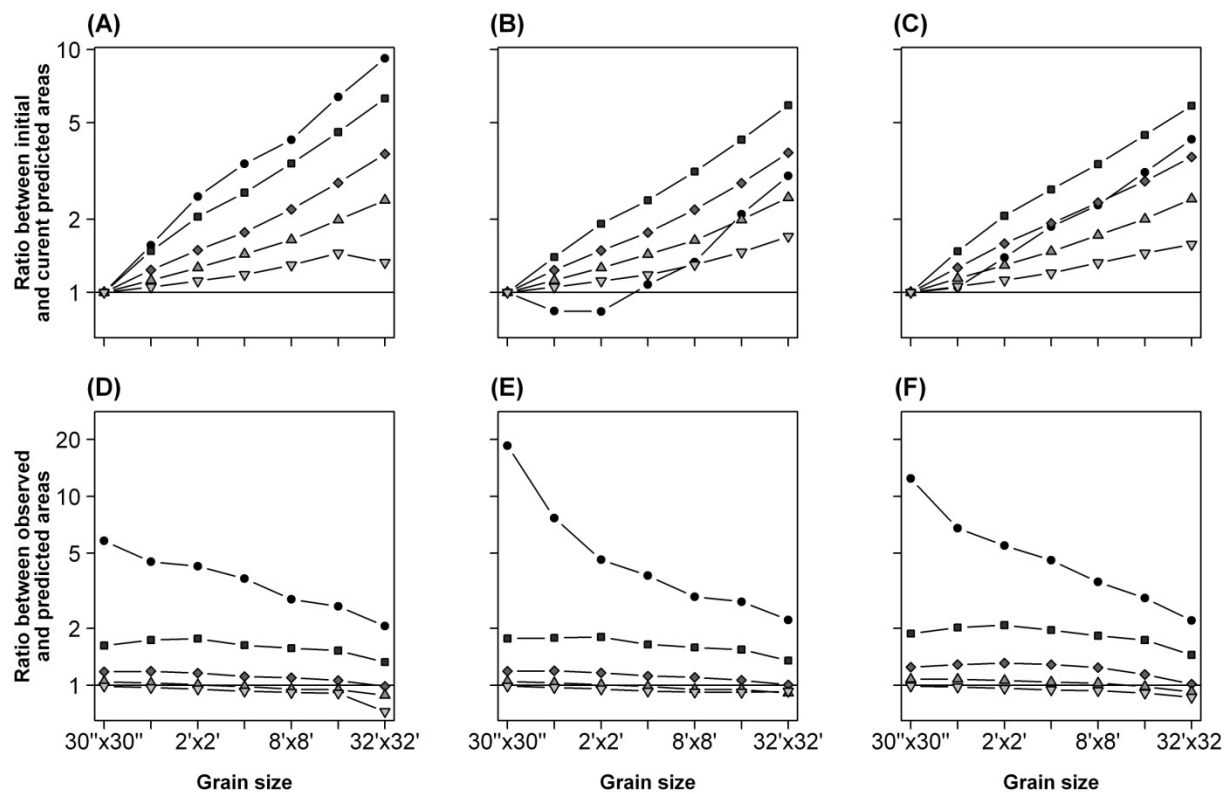


Figure A3: Effect of grain size on AUC (mean value over the 100 test sets) for the five virtual species. All the models were built using a prevalence of 0.5 in the calibration dataset. Symbols represent virtual species range sizes expressed as proportion covered relative to the study area. Circles: 1%; squares: 5%; diamonds: 15%; up triangles: 30%; down triangles: 60%. Grey scale as in Figure 2.

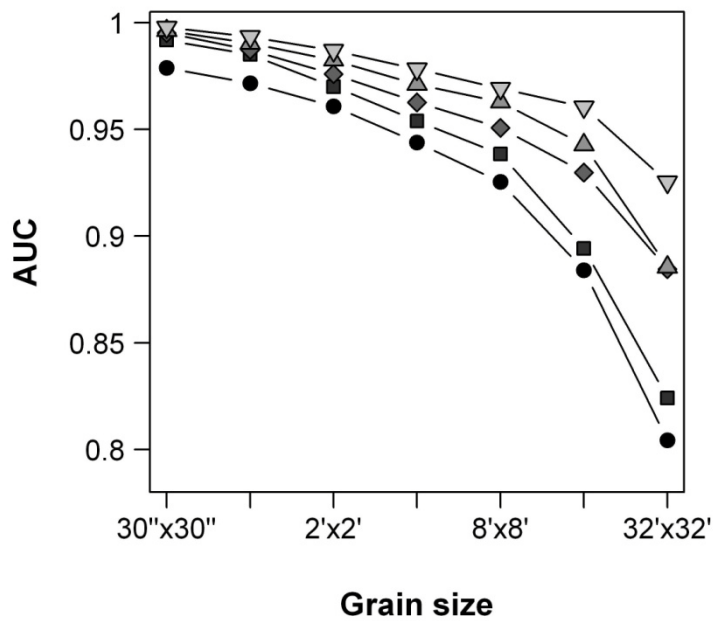


Figure A4: Effect of grain size on model accuracy using Kappa, TSS, sensitivity and specificity (mean value over the 100 test sets) for the five virtual species. All the models were built using a prevalence of 0.5 in the calibration dataset. Cut-off thresholds are the maximisation of the TSS (A); the maximisation of the Kappa (B) and the prevalence in the calibration dataset (C). Symbols represent virtual species range sizes expressed as proportion covered relative to the study area. Circles: 1%; squares: 5%; diamonds: 15%; up triangles: 30%; down triangles: 60%. Grey scale as in Figure 2.

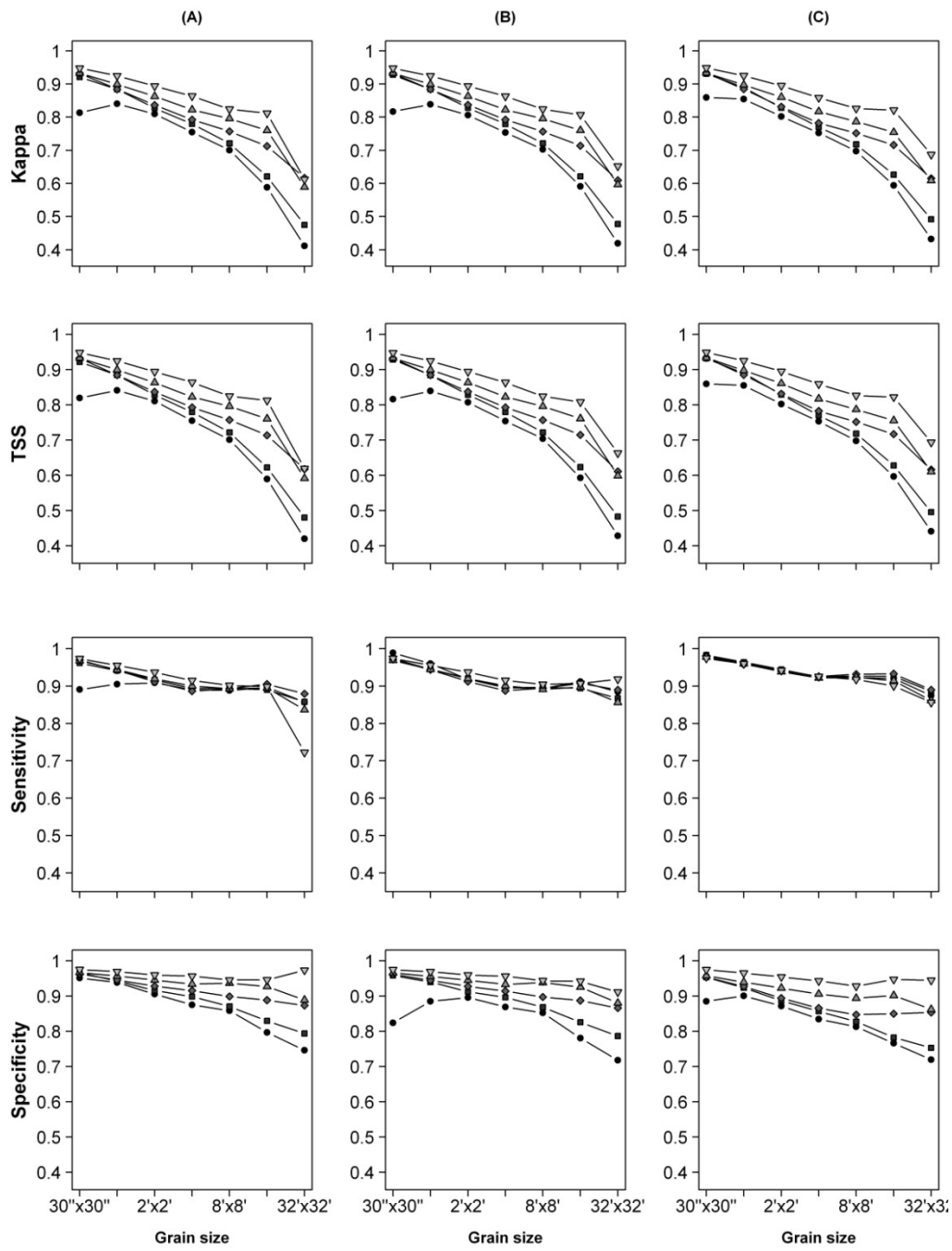
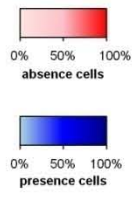


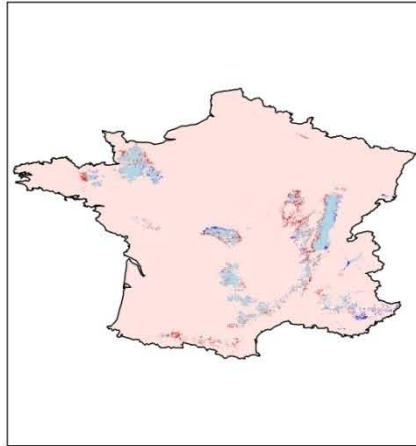
Figure A5: The predicted (at each grain size) distribution for four virtual species with **range size** of 5% (A); 15% (B), 30% (C) and 60% (D) **of the study area**. Models were built using **initial prevalence in the calibration dataset** and TSS maximisation as cut-off threshold. The 100 models based on the 100 different **calibration** datasets were used and we evaluated the percentage of mispredicting models in each cell. The darkest cells are the most often mispredicted.

(A)

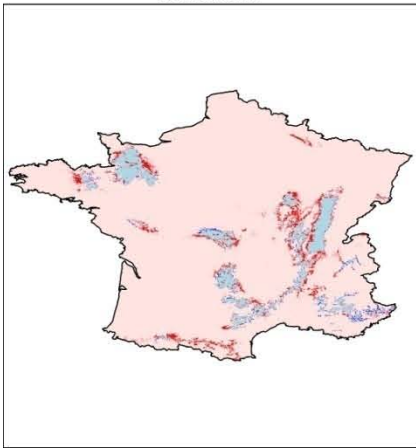
Percentage of mispredicting models



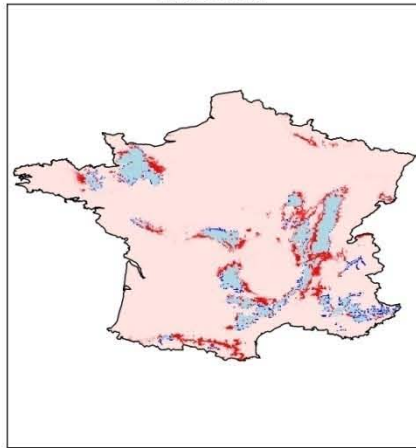
Grain size 30"x30"



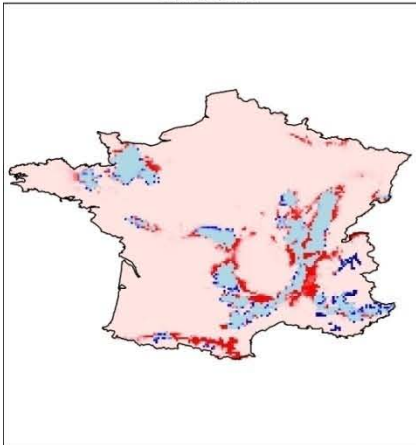
Grain size 1'x1'



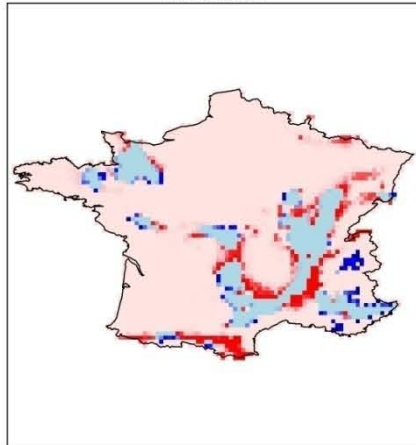
Grain size 2'x2'



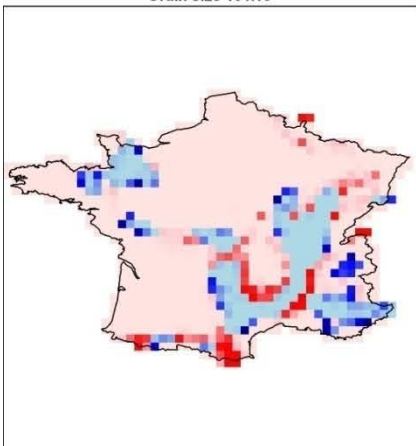
Grain size 4'x4'



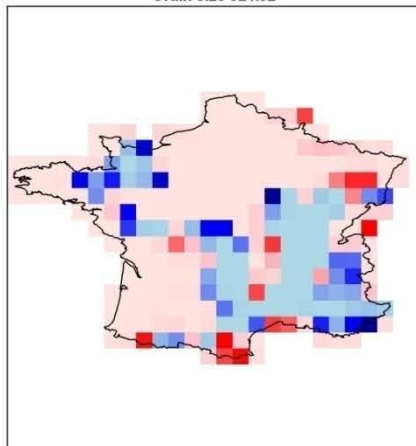
Grain size 8'x8'



Grain size 16'x16'

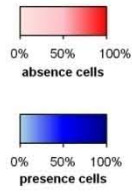


Grain size 32'x32'

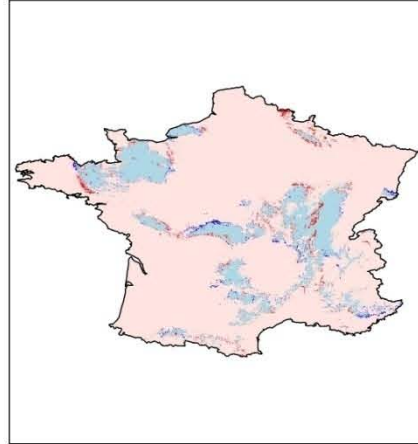


(B)

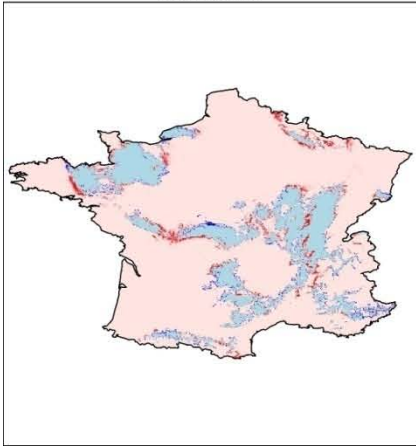
Percentage of mispredicting models



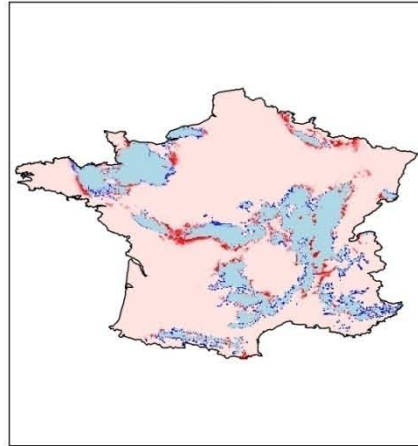
Grain size 30"x30"



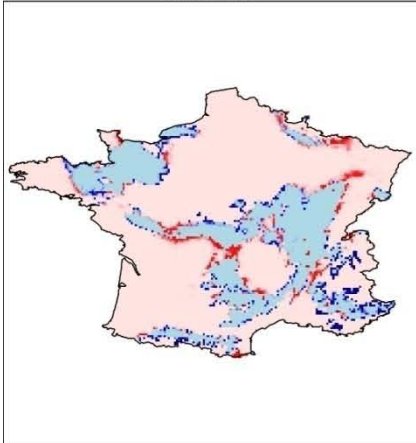
Grain size 1'x1'



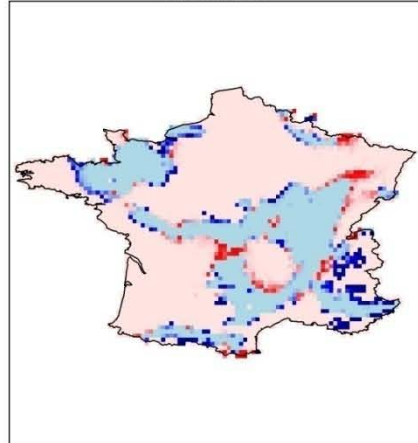
Grain size 2'x2'



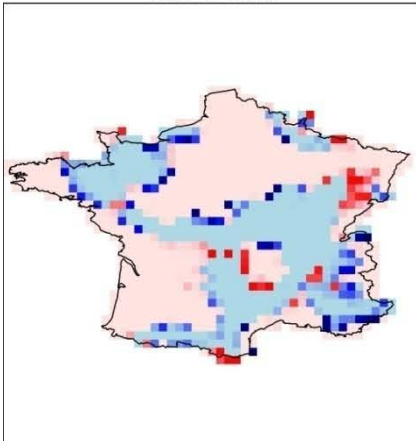
Grain size 4'x4'



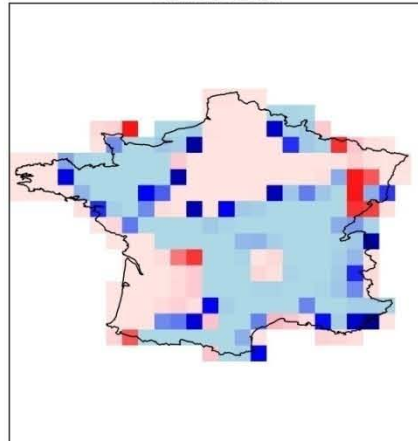
Grain size 8'x8'



Grain size 16'x16'

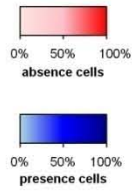


Grain size 32'x32'

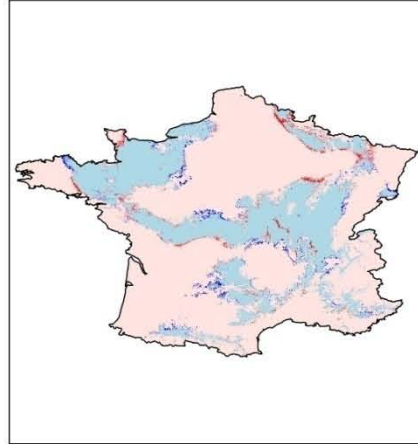


(C)

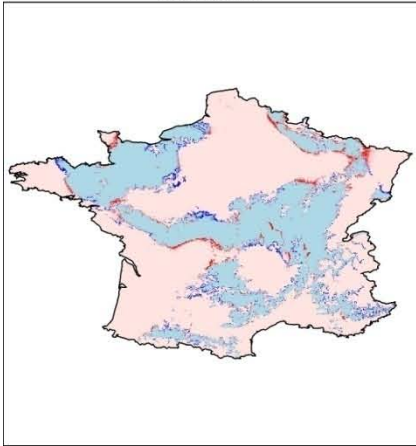
Percentage of mispredicting models



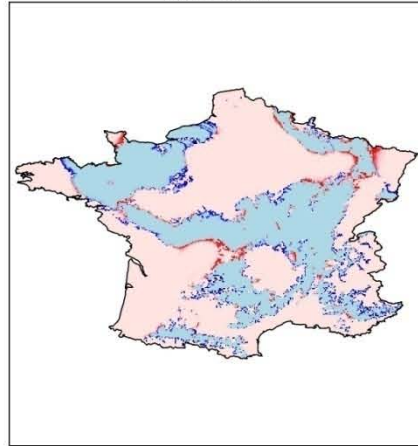
Grain size 30"x30"



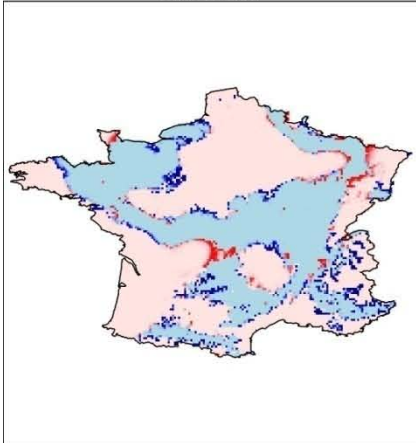
Grain size 1'x1'



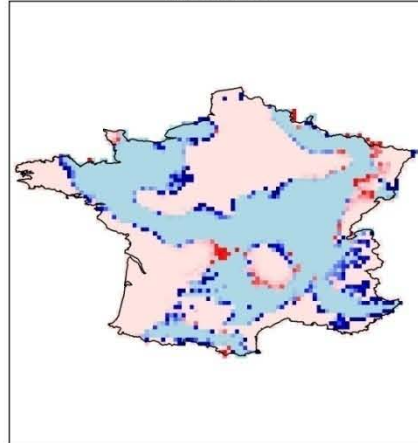
Grain size 2'x2'



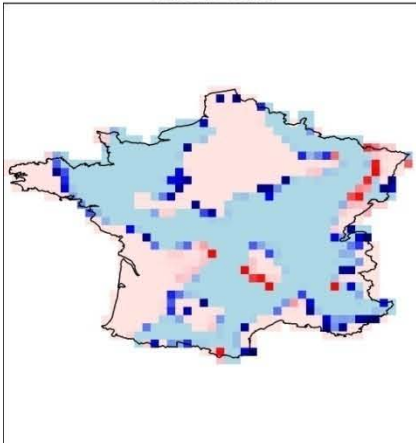
Grain size 4'x4'



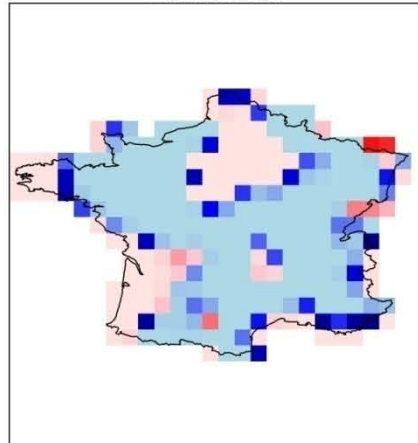
Grain size 8'x8'



Grain size 16'x16'

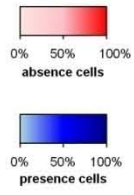


Grain size 32'x32'

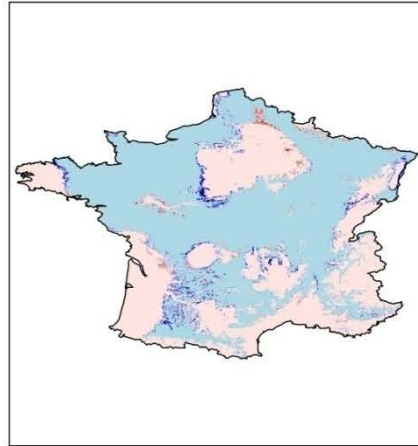


(D)

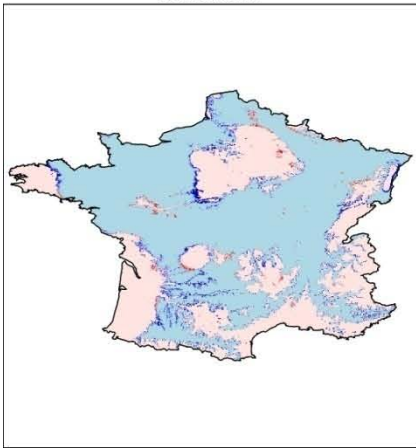
Percentage of mispredicting models



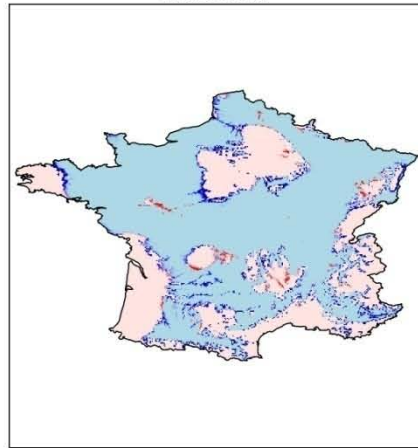
Grain size 30"x30"



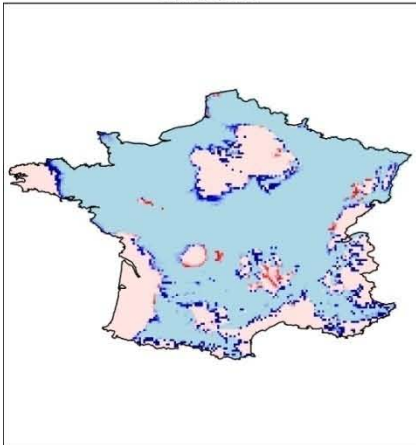
Grain size 1'x1'



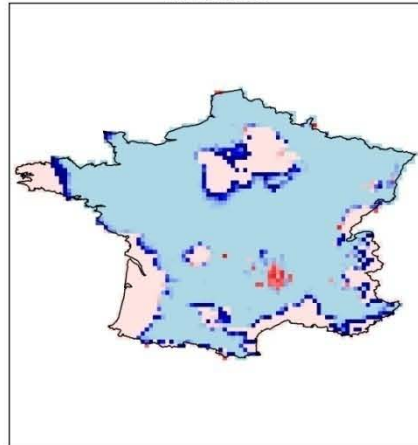
Grain size 2'x2'



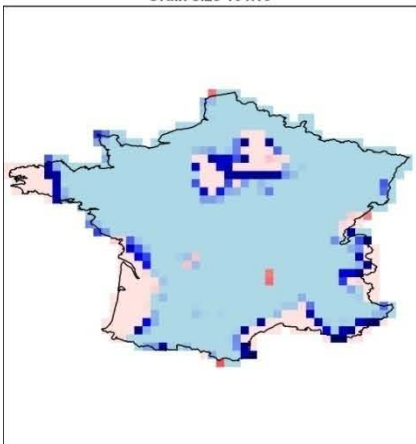
Grain size 4'x4'



Grain size 8'x8'



Grain size 16'x16'



Grain size 32'x32'

