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Understanding hydrologic variability across Europe through catchment classification

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A. Correlation analysis

Significant correlations (based on a t distribution with a threshold of 0.05) were found for 400 (out of 786) correlations between flow signatures and catchment descriptors (Fig. A); for instance positive correlation between mean slope and specific flow or low flows, and negative correlation between agricultural area and runoff ratio, and between aridity index and specific flow, 5th and 95th percentiles and runoff ratio. Overall, we found relationships to be consistent with our a priori knowledge (e.g. Donnelly et al, 2016).

As shown in Fig. A, there were no big differences between the three types of correlations compared. As expected, more significant correlations appear when using Spearman correlation than Pearson correlation, but the coloring shows that the differences are not very large. Pearson and distance correlation matrices also exhibit similar patterns (putting aside that distance correlation cannot be negative). More significant correlations were found when using distance correlation compared to Pearson, but still less than when using the Spearman correlation metric. One exception appears however, which is the percentage of "Cenozoic-Mesozoic igneous" (CzMzi) geological class. This percentage appears to be highly correlated with some of the flow signatures including the skewness of daily flow, the high flow discharge and the mean 30-days maximum. These high correlations (around 0.8) are noticeable in the Pearson (Fig Aa) and distance matrices (Fig. Ac), but absent from the Spearman matrix (Fig Ab). This high correlation led to further examination of the scatterplot between the two variables. It appeared that only a few catchments contain a significant percentage of this geological class and the scatterplot shows that the high correlation is only due to a few points with high values for both "CzMzi" and the concerned flow signature. These high correlations were thus ignored in the following analysis. In addition, combined analysis of the Pearson correlation matrix and the scatterplots showed that a number of catchment descriptors did not have any significant relationship with any of the flow signatures (or only very low correlations – below 0.15). To simplify the process by reducing the number of variables, this led us to remove the following geological catchment descriptors for the rest of the analyses: CzMzi, Czv, i, m, Mzi, Mzm, MzPz, MzPzm, Mzv, pCmv, PzpCm, Pzv and karst. The low correlation of these variables could be due to small areal representativeness in the geographical domain, poor data quality or small influence of subsurface geology on surface hydrology.

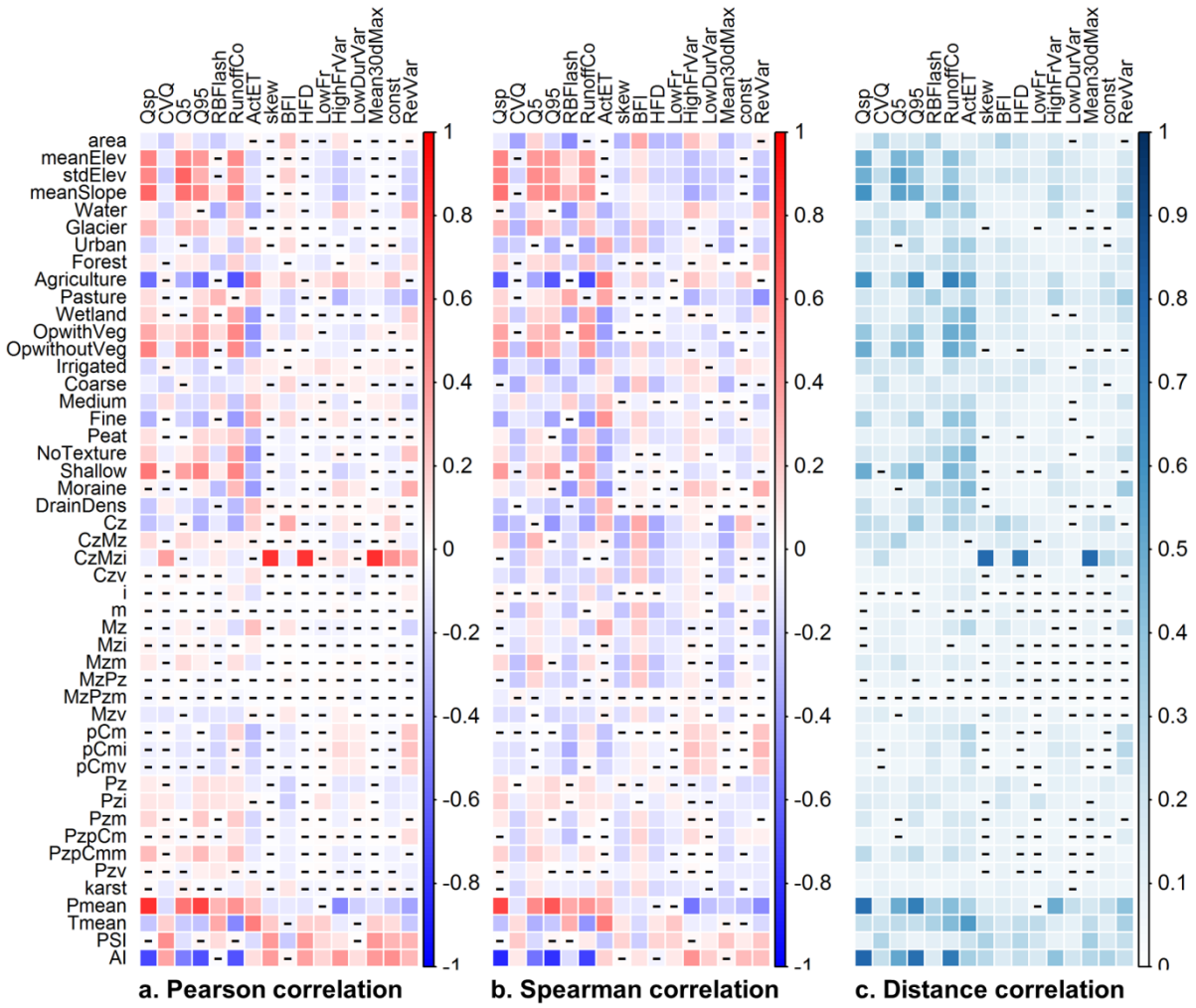


Figure A: Correlation between catchment descriptors and flow signatures using a) Pearson, b) Spearman and c) distance correlations, respectively. Non-significant correlation according to the significance test are indicated with a dash (-).

B. CART tree nodes description

Table A: CART tree nodes description. For each node: number of flow stations affected to the node, percentage of stations affected to the node according to their original class from the FS classification. And total number of catchments affected to the node. The nodes are named after the affected class from the FS classification (1a, 1b, 1c are the nodes affected to class 1, etc). The green boxes show the percentage of correctly classified gauges at each node.

For example, the node 1a contains 455 catchments of which 17 are gauged. Of these 17 gauges, 59% were originally classified in class 1 of the classification based on flow signatures, 6% in class 3, 29% in class 5 and 6% in class 6. As a majority (59%) of flow gauges at this node comes from class 1 of the FS classification, the node is affected to class 1.

CART node	Nb of Gauges	Repartition (% of nb of gauges) of original classes											Total No. catchments
		1	2	3	4	5	6	7	8	9	10	11	
1a	17	59	0	6	0	29	6	0	0	0	0	0	455
1b	98	77	0	2	1	4	0	5	0	5	4	2	6423
1c	9	56	0	0	0	33	0	0	11	0	0	0	811
3a	492	2	0	35	7	14	5	0	16	13	1	7	13645
3b	29	0	0	48	0	10	7	0	21	7	0	7	424
3c	18	0	0	50	0	6	6	0	17	11	0	11	213
3d	20	10	0	40	15	0	10	0	10	10	0	5	177

4	73	1	6	10	53	4	3	3	12	7	0	1	5112
5a	33	0	0	6	0	64	0	0	6	18	0	6	932
5b	43	0	0	9	0	88	0	0	0	2	0	0	833
6a	17	0	0	0	0	0	53	6	0	29	0	12	228
6b	14	0	0	14	14	0	57	0	14	0	0	0	138
6c	202	3	0	3	2	0	53	10	10	7	5	6	1971
7	33	3	0	0	0	0	12	70	0	3	6	6	678
8	64	2	0	6	8	0	20	5	45	8	2	5	670
9a	10	10	0	0	0	20	0	0	0	70	0	0	200
9b	48	4	0	6	8	13	0	0	0	67	0	2	769
10	81	0	0	1	0	0	11	17	3	3	57	9	762
11a	15	0	0	0	0	13	0	0	0	0	0	87	110
11b	10	0	0	0	0	10	0	10	0	0	0	80	146
11c	40	15	0	0	0	0	8	3	5	5	10	55	518

C. Material for the analysis of the CART classification (base material for table 3)

C.1 Flow signatures

C.1.1 Distribution (boxplots) of flow signatures in the different classes

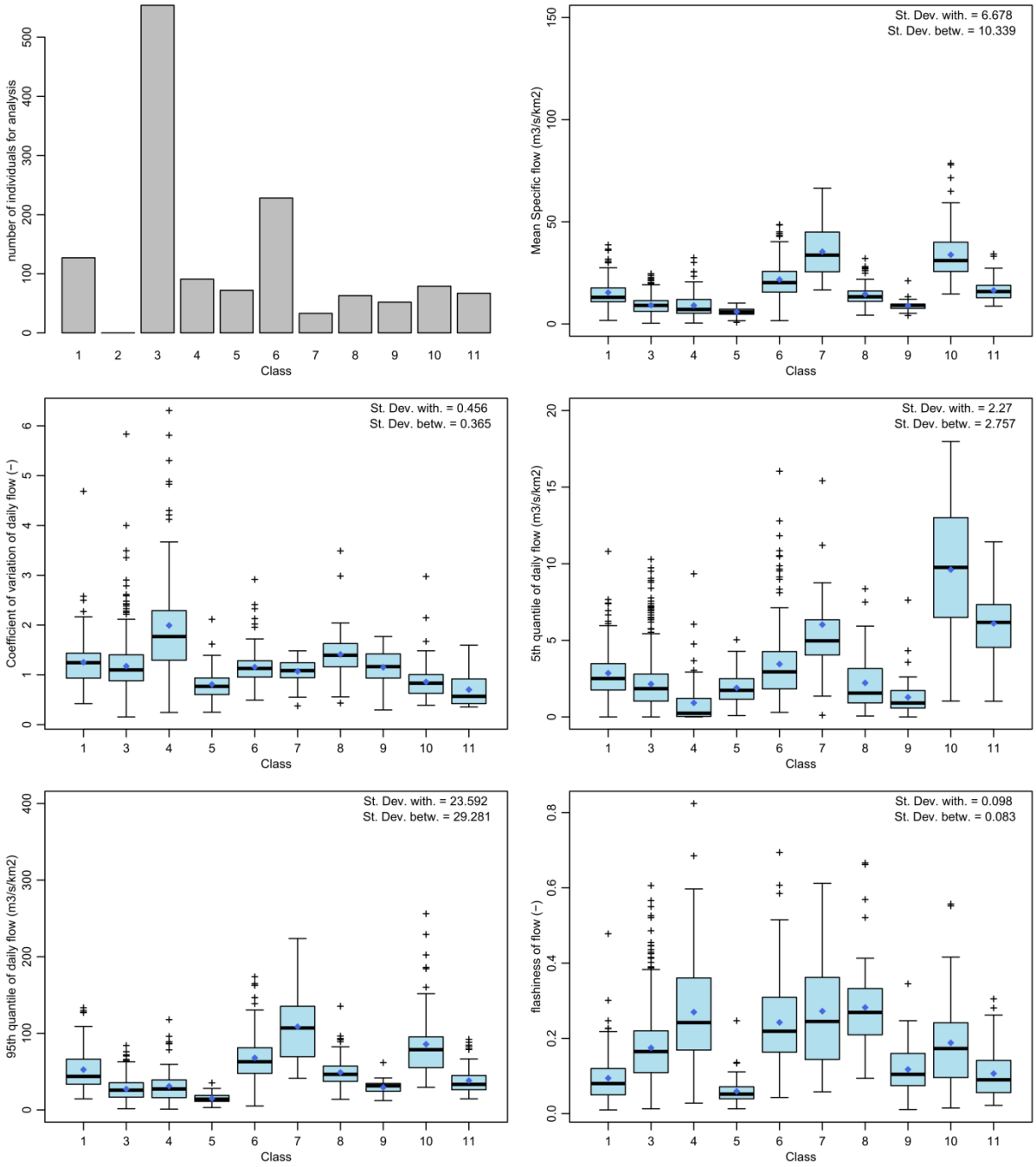


Figure B: boxplots of flow signatures in the different classes of the CART classification (1/3).

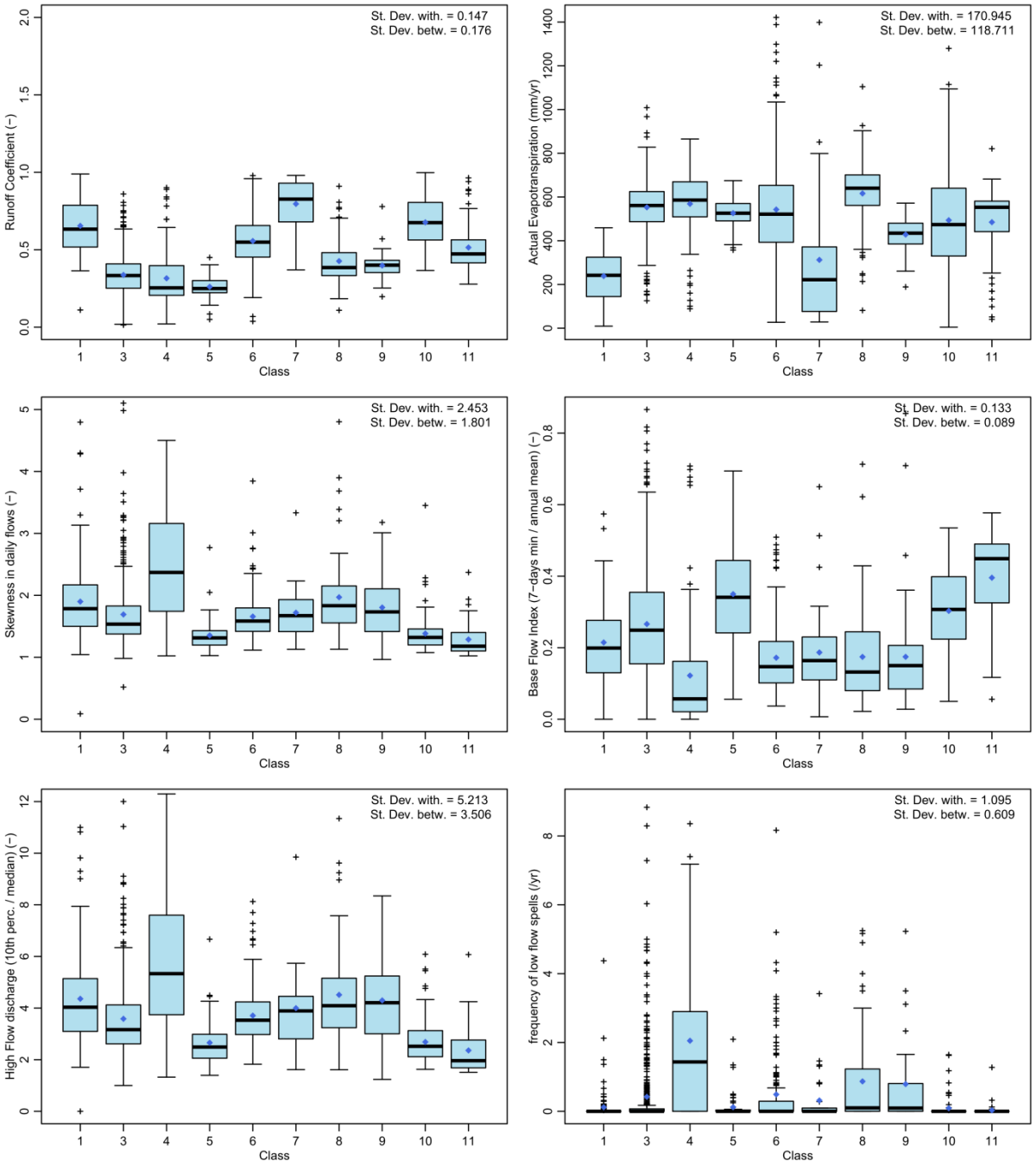


Figure C: boxplots of flow signatures in the different classes of the CART classification (2/3).

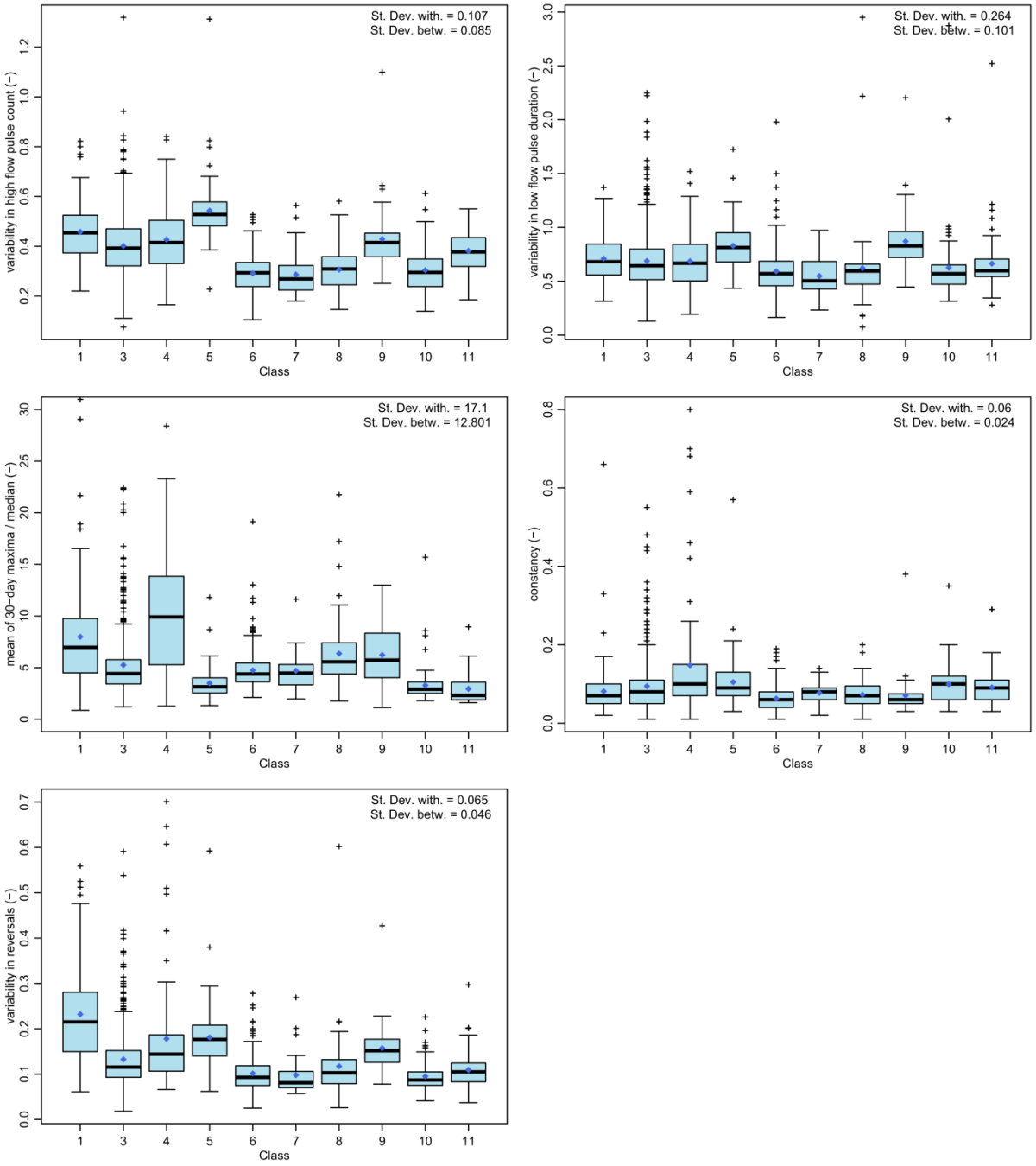


Figure D: boxplots of flow signatures in the different classes of the CART classification (3/3).

C.1.2 Matrix of median flow signatures for each class compared to the whole set of stream gauges

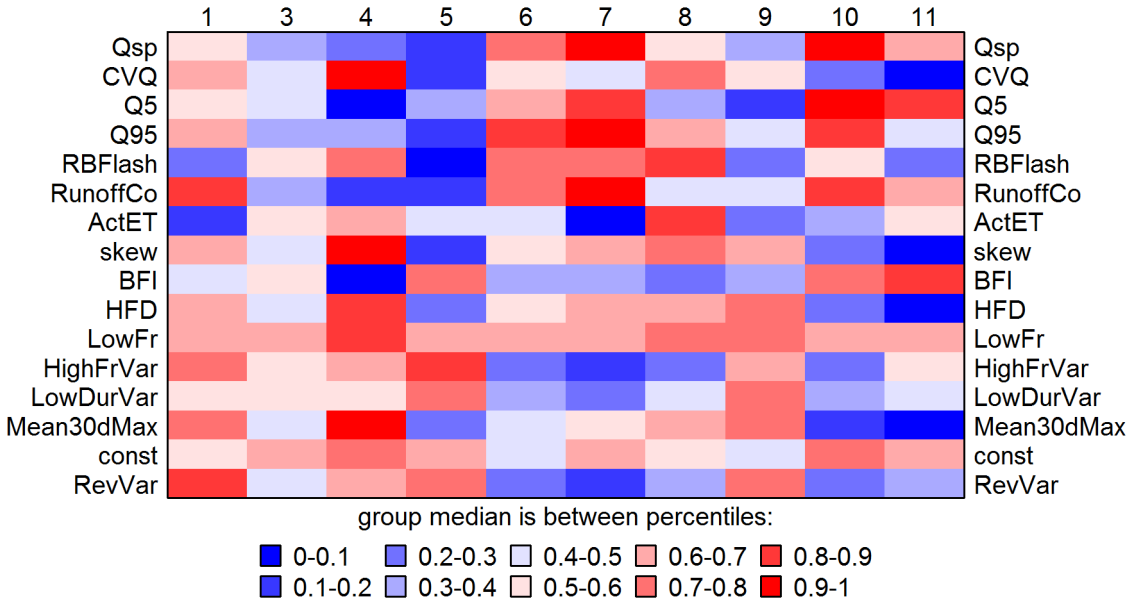


Figure E: Visualization of median flow signatures in each class of the CART classification - Position of the class median flow signature in the distribution (percentiles) of the same flow signature among the whole set of gauges.

C.2 Catchment descriptors

C.2.1 Distribution (boxplots) of catchment descriptors in the different classes

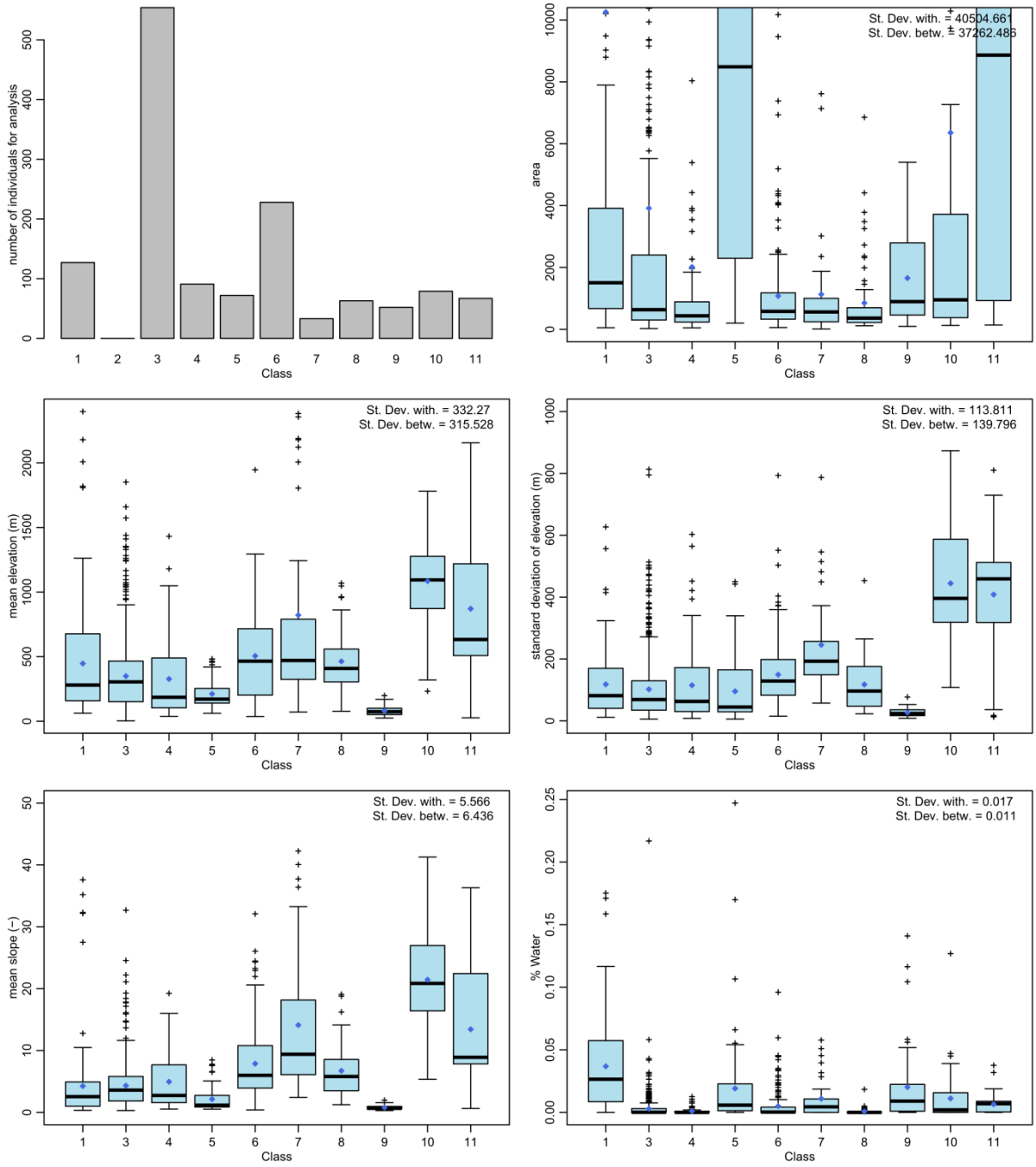


Figure F: boxplots of catchment descriptors in the different classes of the CART classification (1/7).

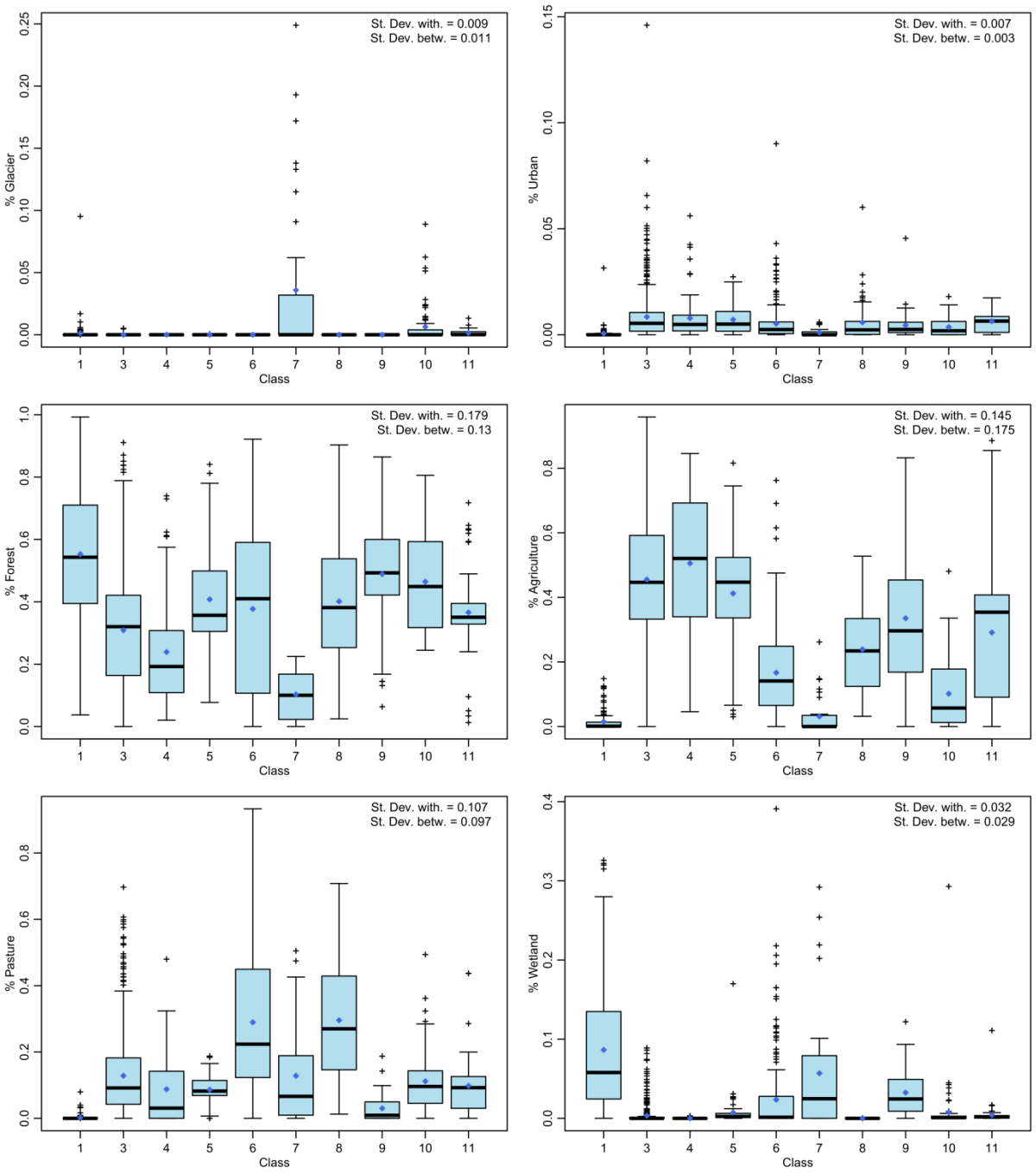


Figure G: boxplots of catchment descriptors in the different classes of the CART classification (2/7).

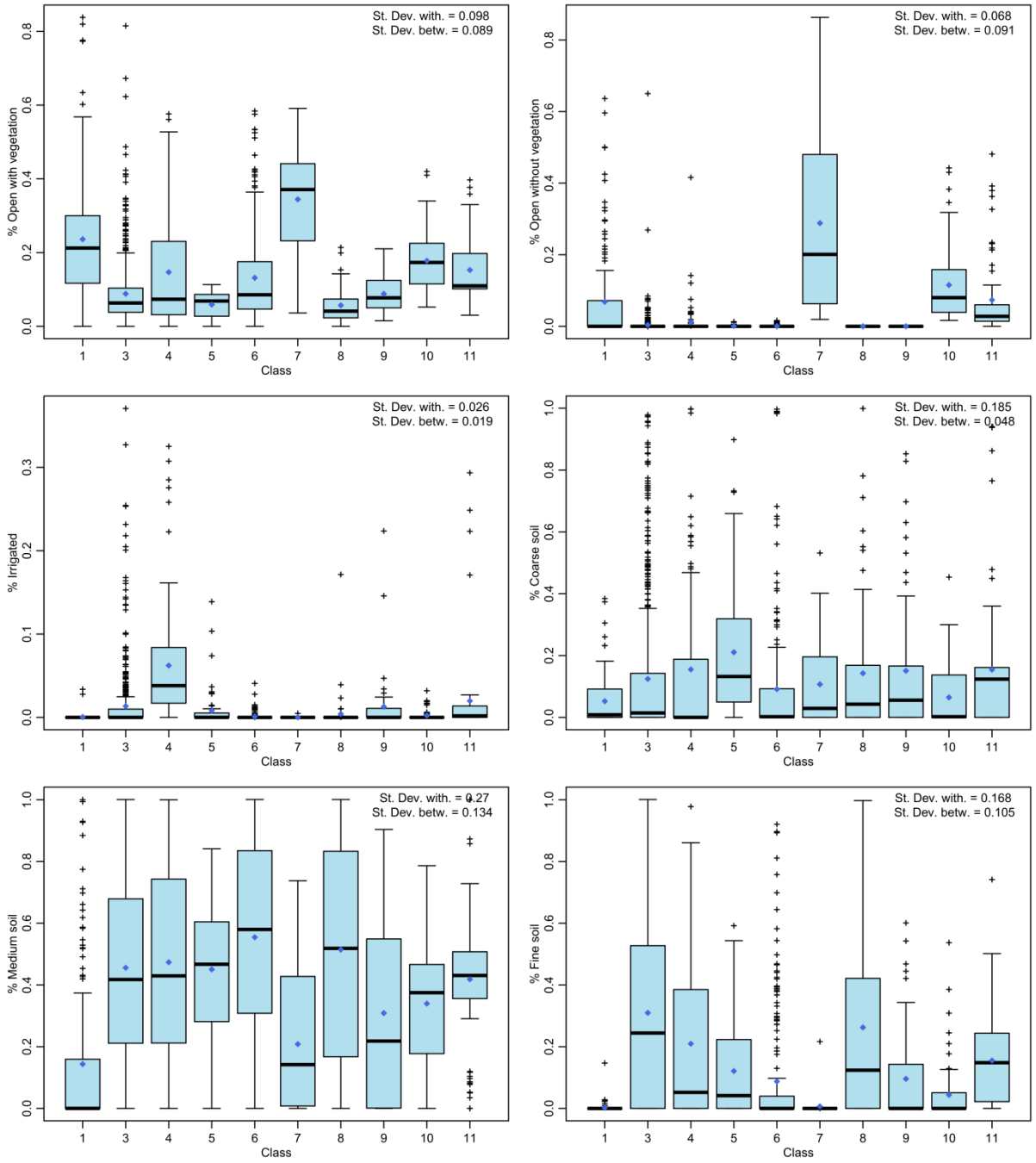


Figure H: boxplots of catchment descriptors in the different classes of the CART classification (3/7).

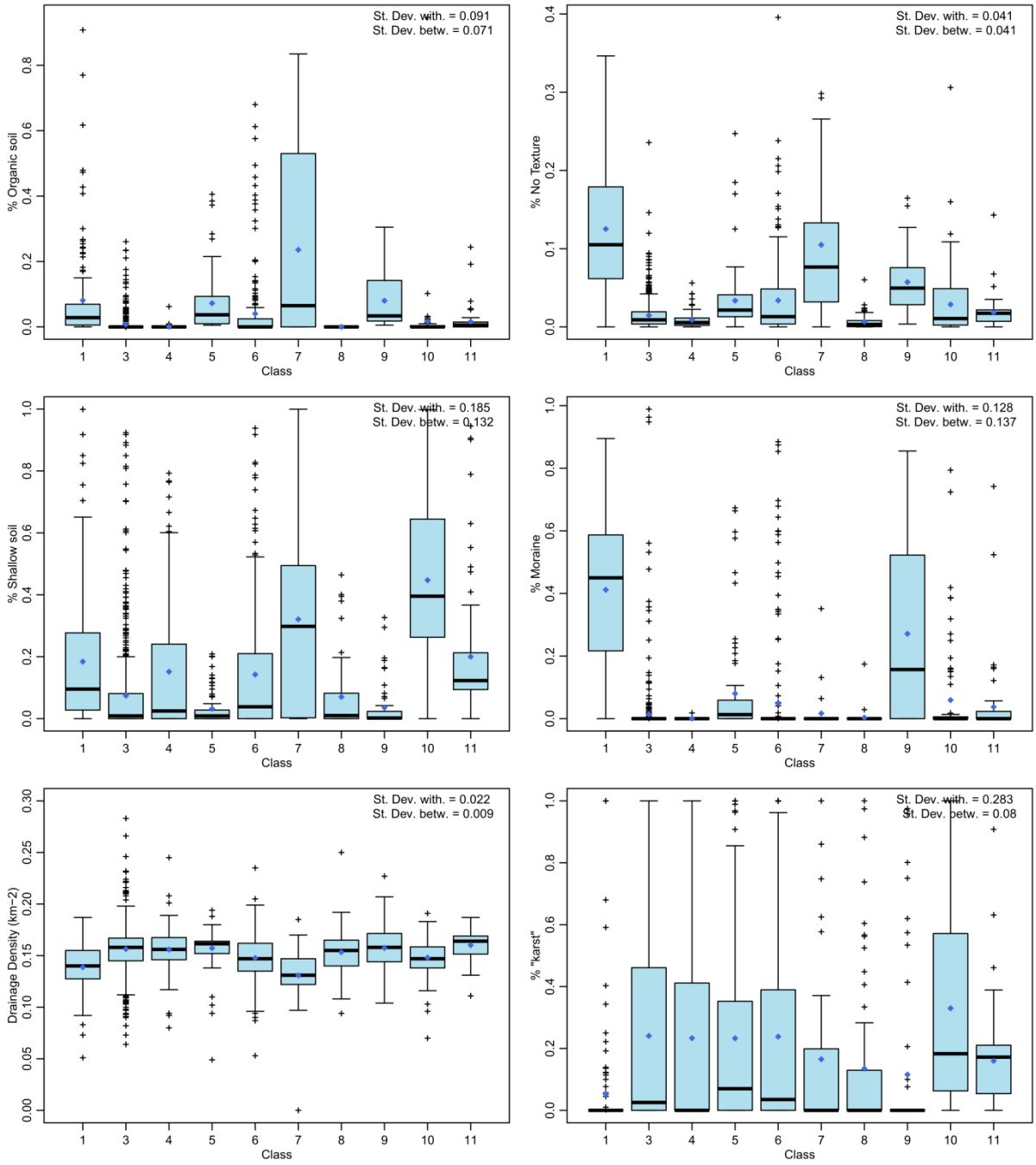


Figure I: boxplots of catchment descriptors in the different classes of the CART classification (4/7).

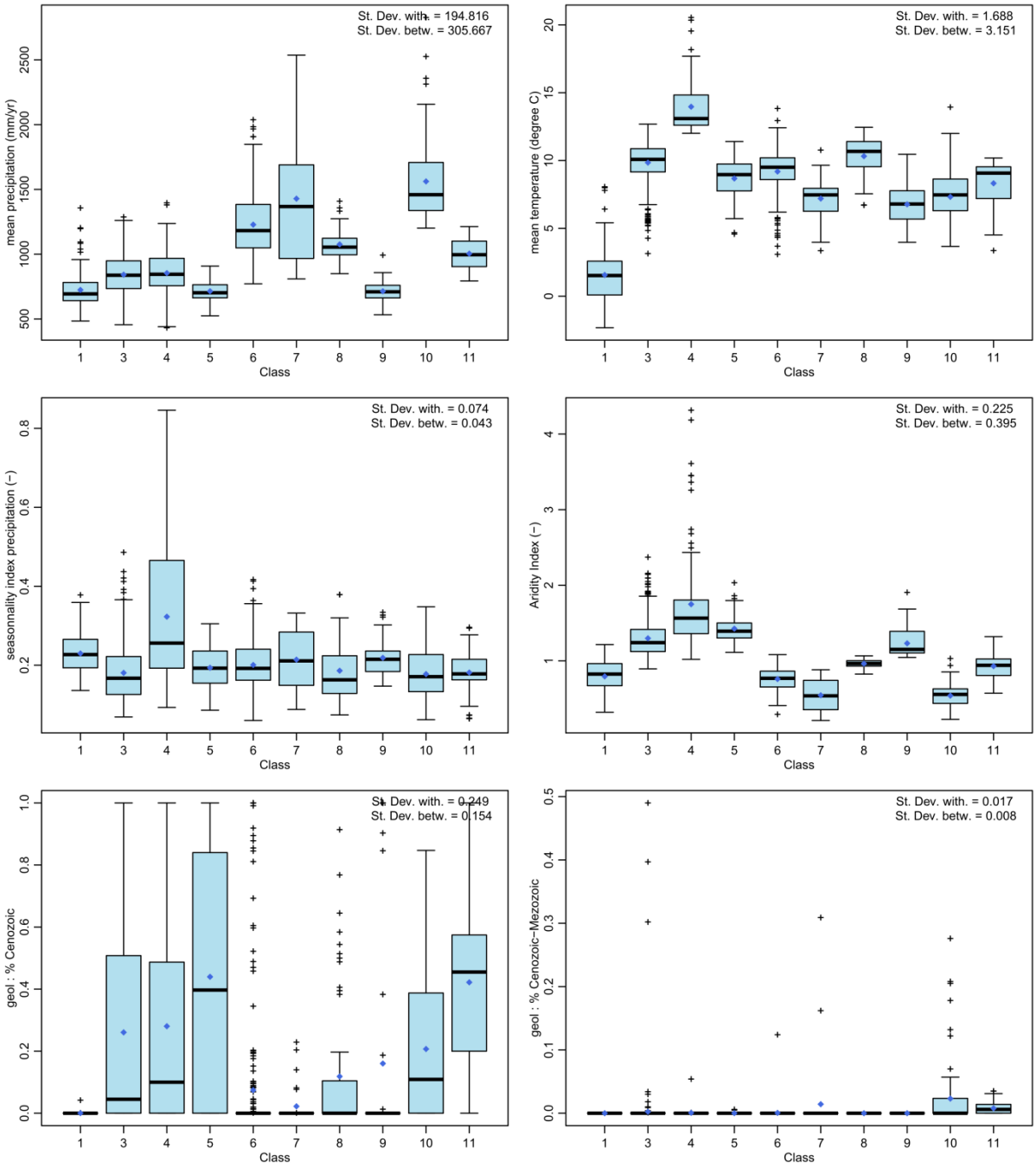


Figure J: boxplots of catchment descriptors in the different classes of the CART classification (5/7).

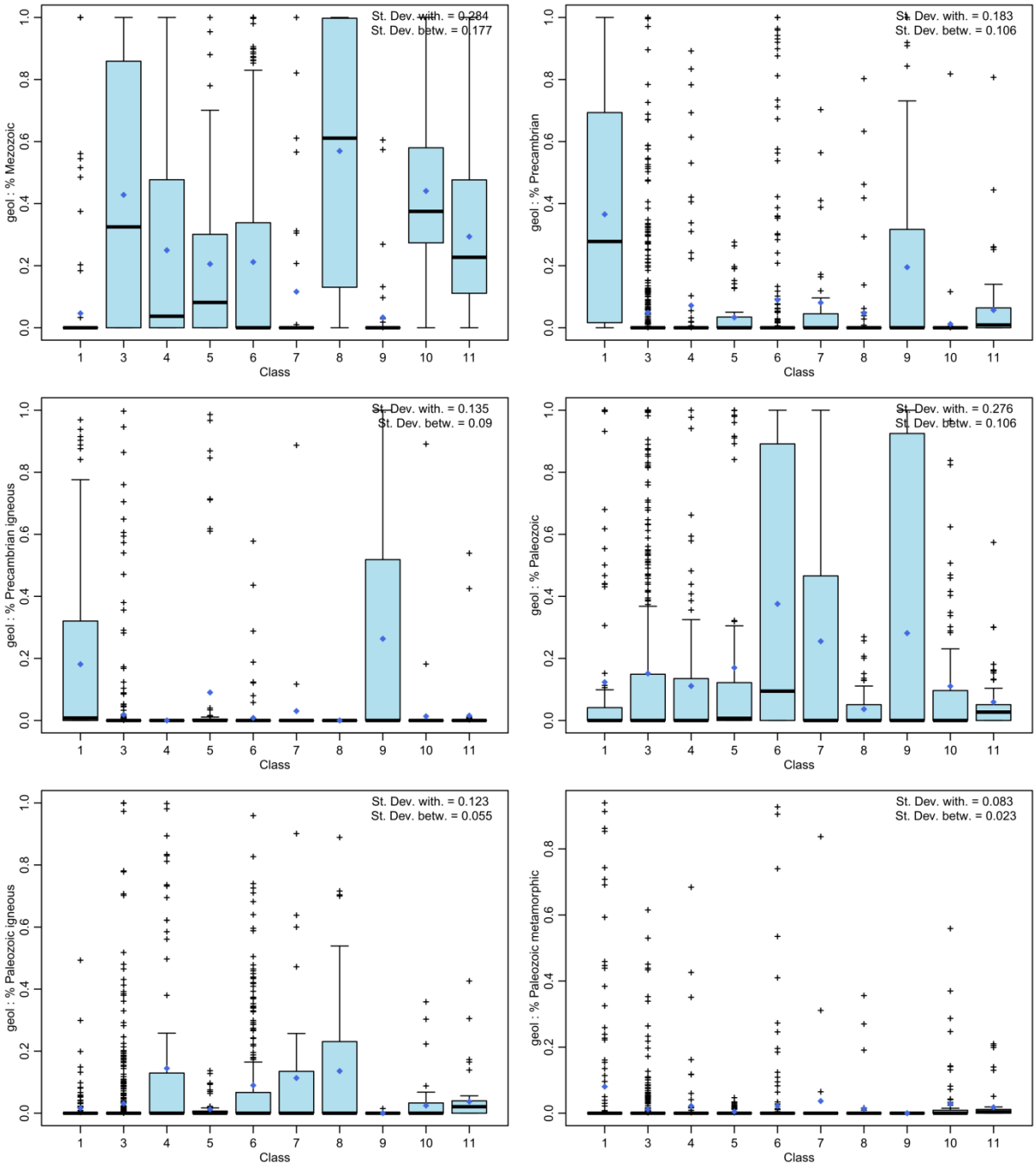


Figure K: boxplots of catchment descriptors in the different classes of the CART classification (6/7).

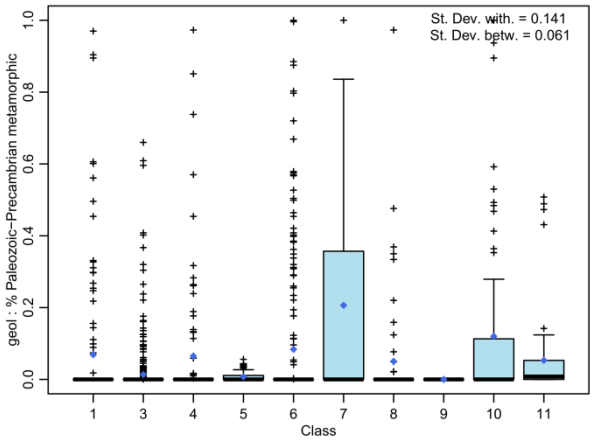


Figure L: boxplots of catchment descriptors in the different classes of the CART classification (7/7).

C.2.2 Matrix of median catchment descriptors for each class compared to the whole set of stream gauges / catchments

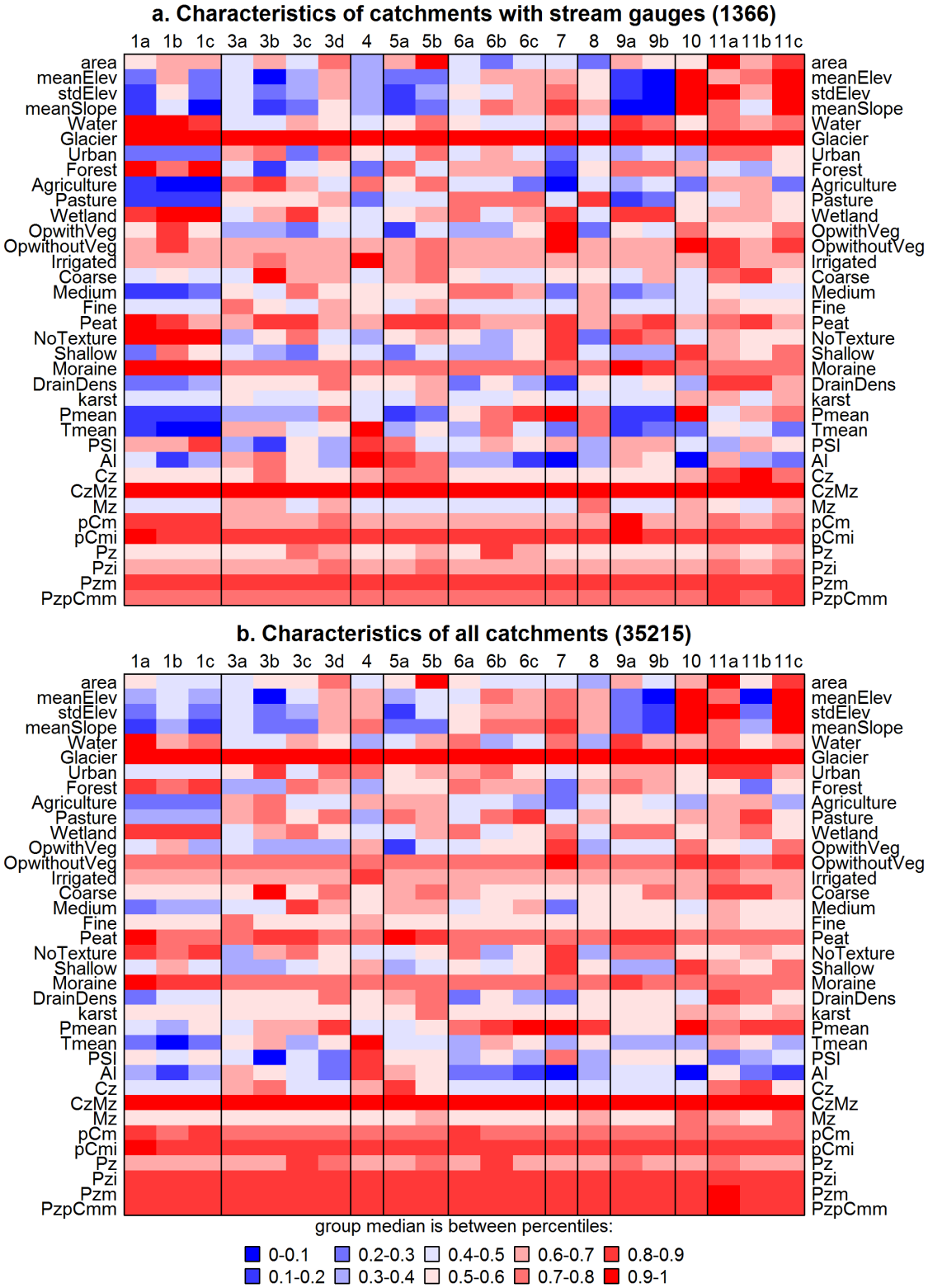


Figure M: Visualization of median catchment descriptors in each class of the CART classification - Position of the class median catchment descriptor in the distribution (percentiles) of the same catchment descriptor among the whole set of gauges (a)/catchments (b). Plot a is built when looking at only gauged catchments while plot b is built using all 35215 classified catchments. When more than one node in the CART tree (fig. 6 of the main article) is affected to a given class, the detailed characteristics of each node are shown in the figure.

C.3 Larger map of the classification and detailed maps for classes corresponding to more than one node in the CART tree

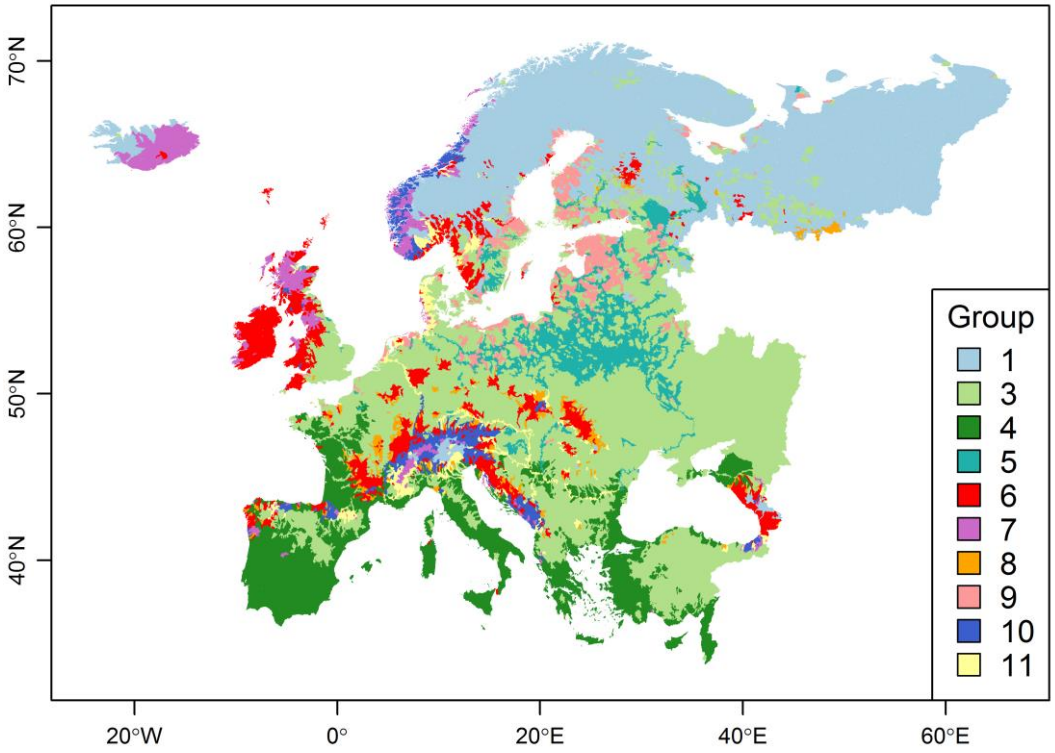


Figure N: Map of the CART classification

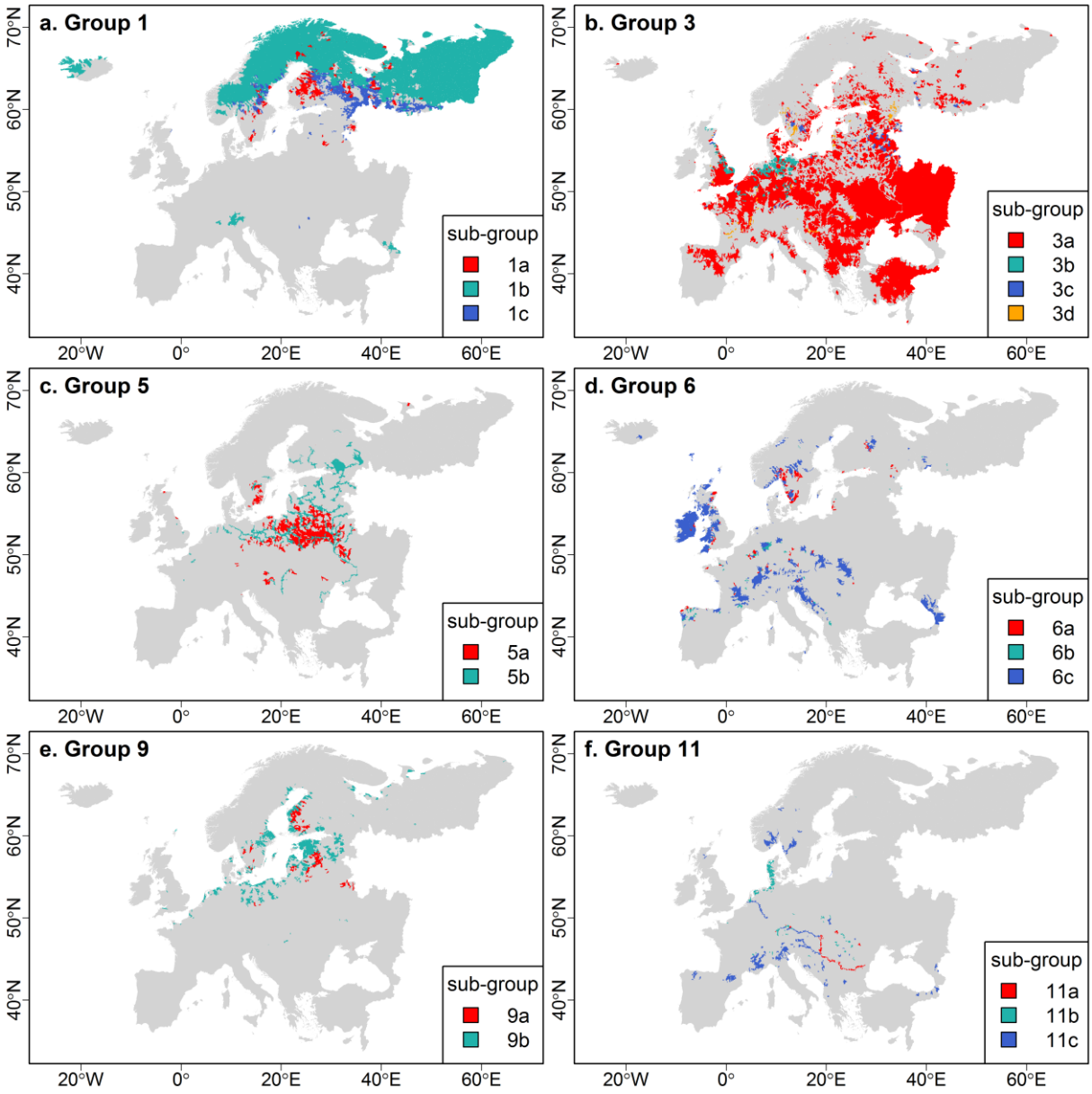


Figure O: detailed maps for classes corresponding to more than one node in the CART tree. The names 1a, 1b, 1c etc are the names of the nodes shown in Fig. 6 of the main article and table 1 of the present supplementary material.

D. Distribution (boxplots) of catchment descriptors and flow signatures in the different classes of FS and CD classifications (plots are commented in section 3.2)

D.1 Classification based on flow signatures (FS classification)

D.1.1 Boxplots of flow signatures

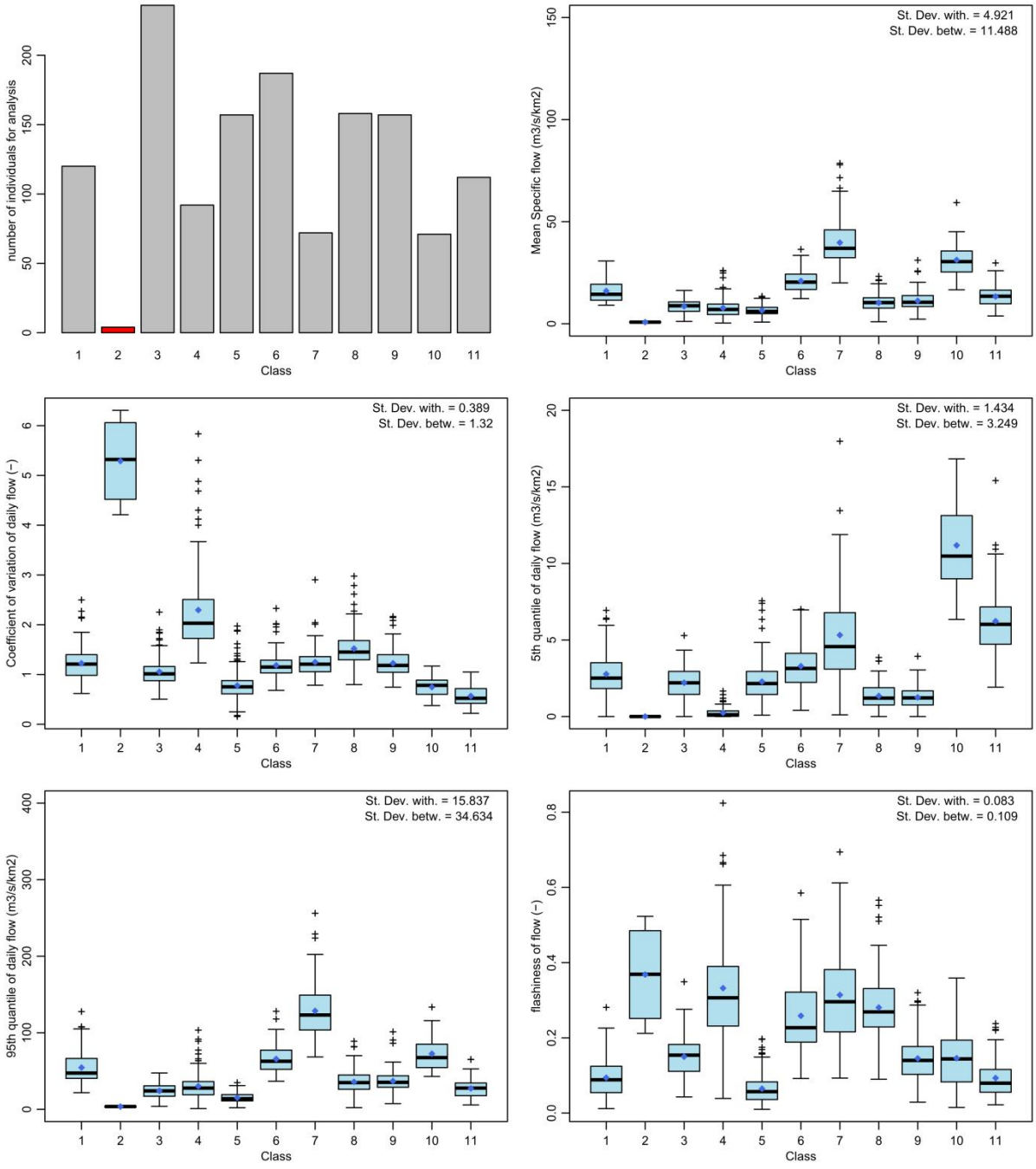


Figure P: boxplots of flow signatures in the different classes of the FS classification (1/3)

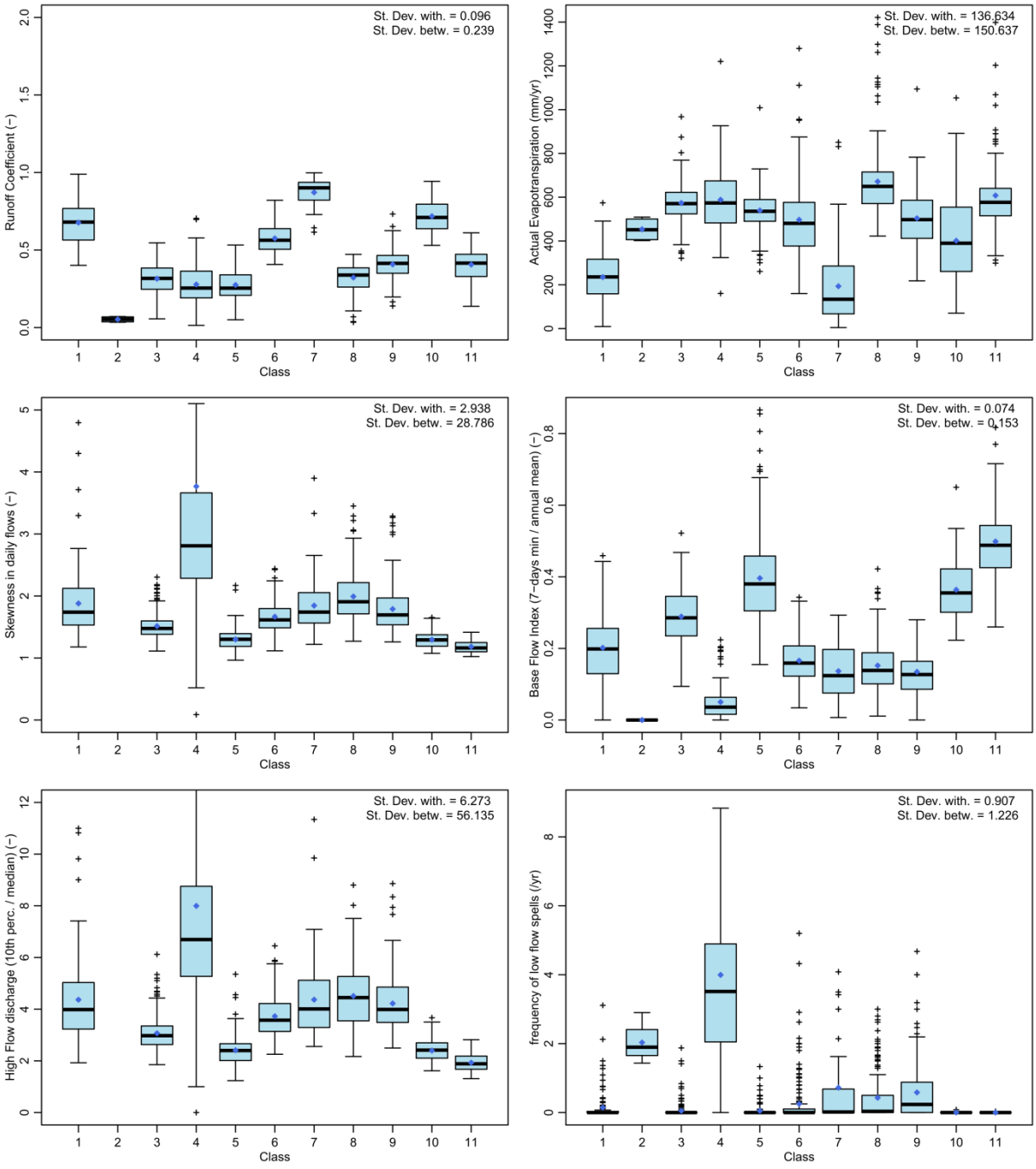


Figure Q: boxplots of flow signatures in the different classes of the FS classification (2/3)

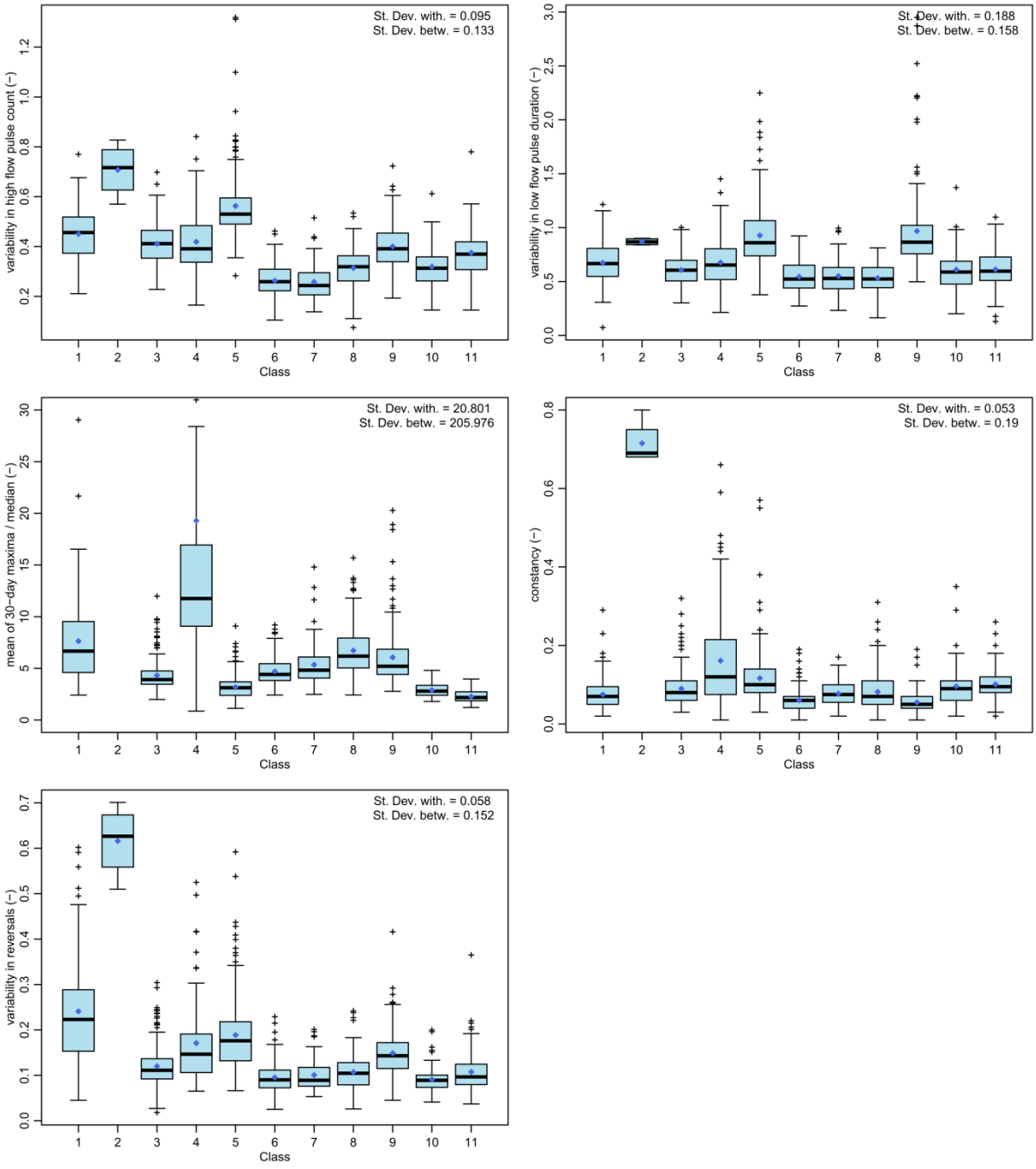


Figure R: boxplots of flow signatures in the different classes of the FS classification (3/3)

D.1.2 Boxplots of catchment descriptors

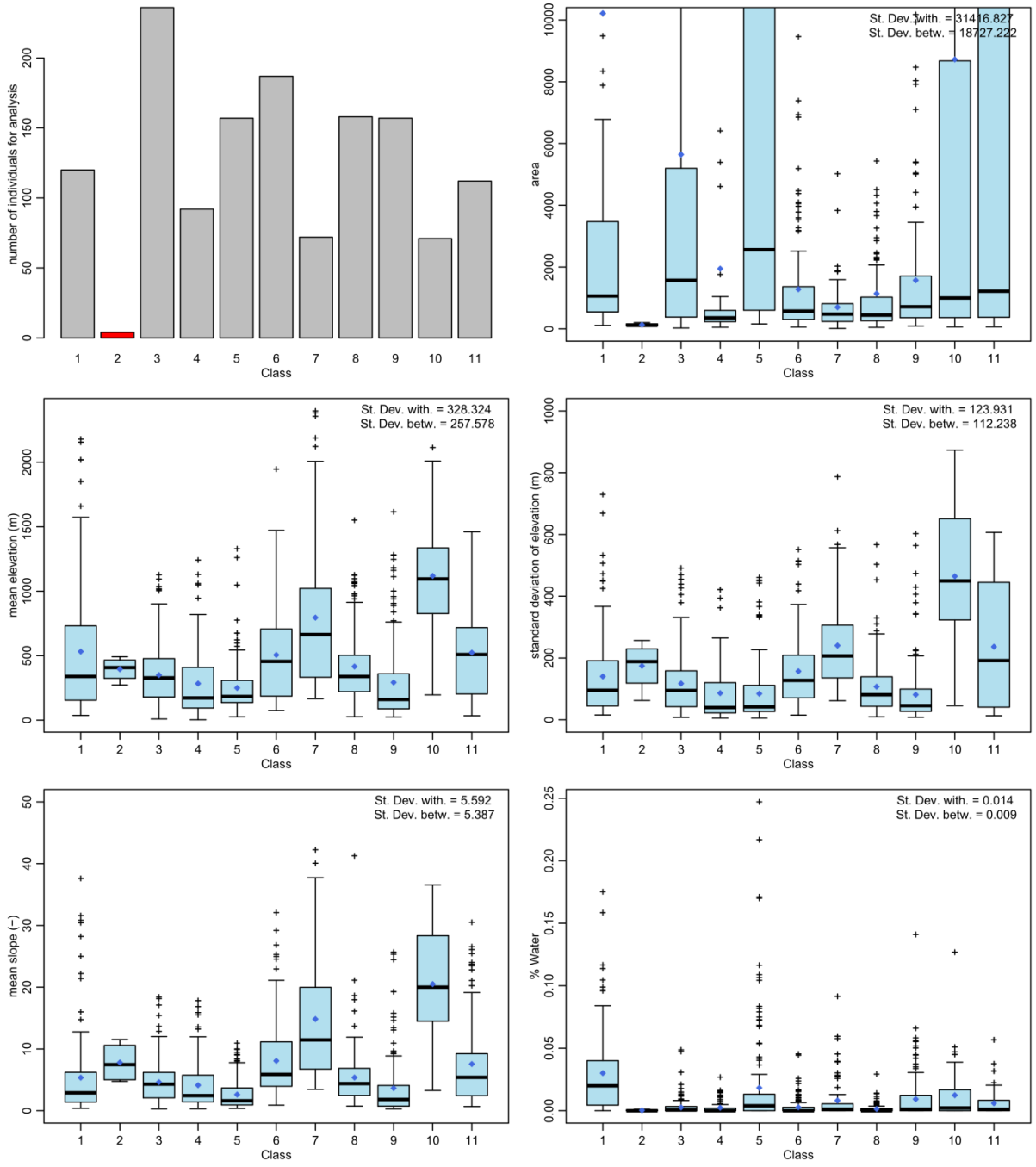


Figure S: boxplots of catchment descriptors in the different classes of the FS classification (1/7)

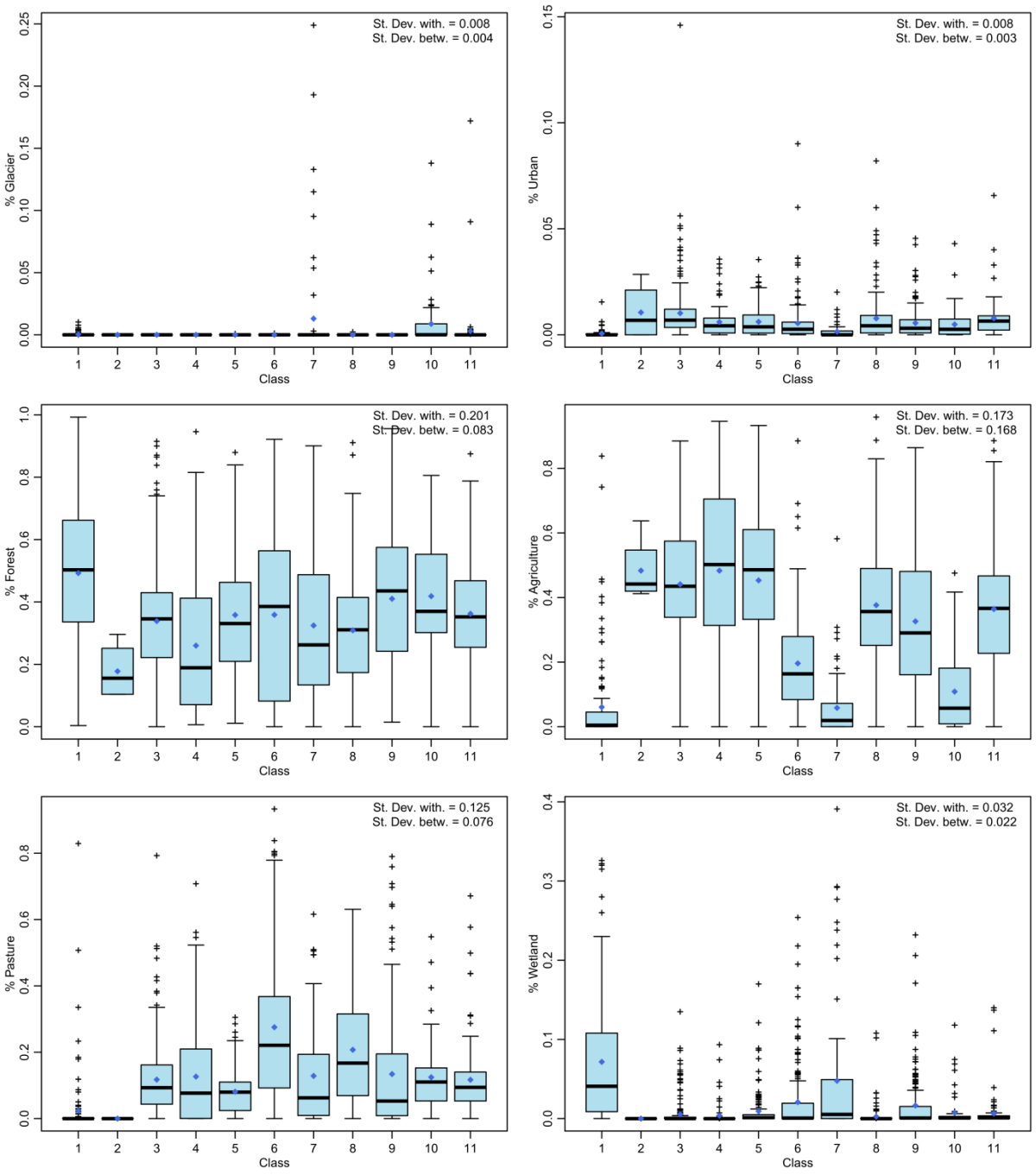


Figure T: boxplots of catchment descriptors in the different classes of the FS classification (2/7)

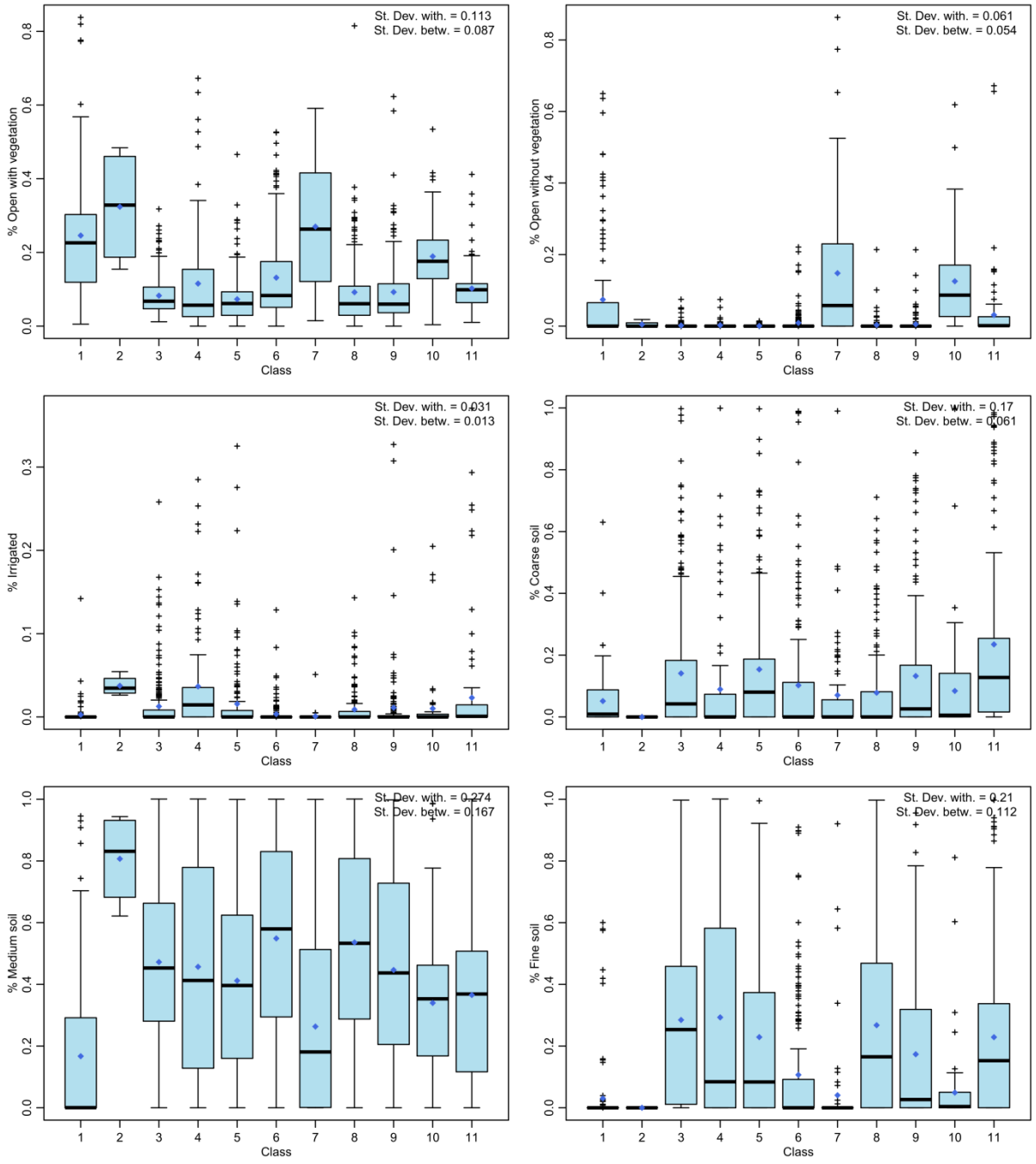


Figure U: boxplots of catchment descriptors in the different classes of the FS classification (3/7)

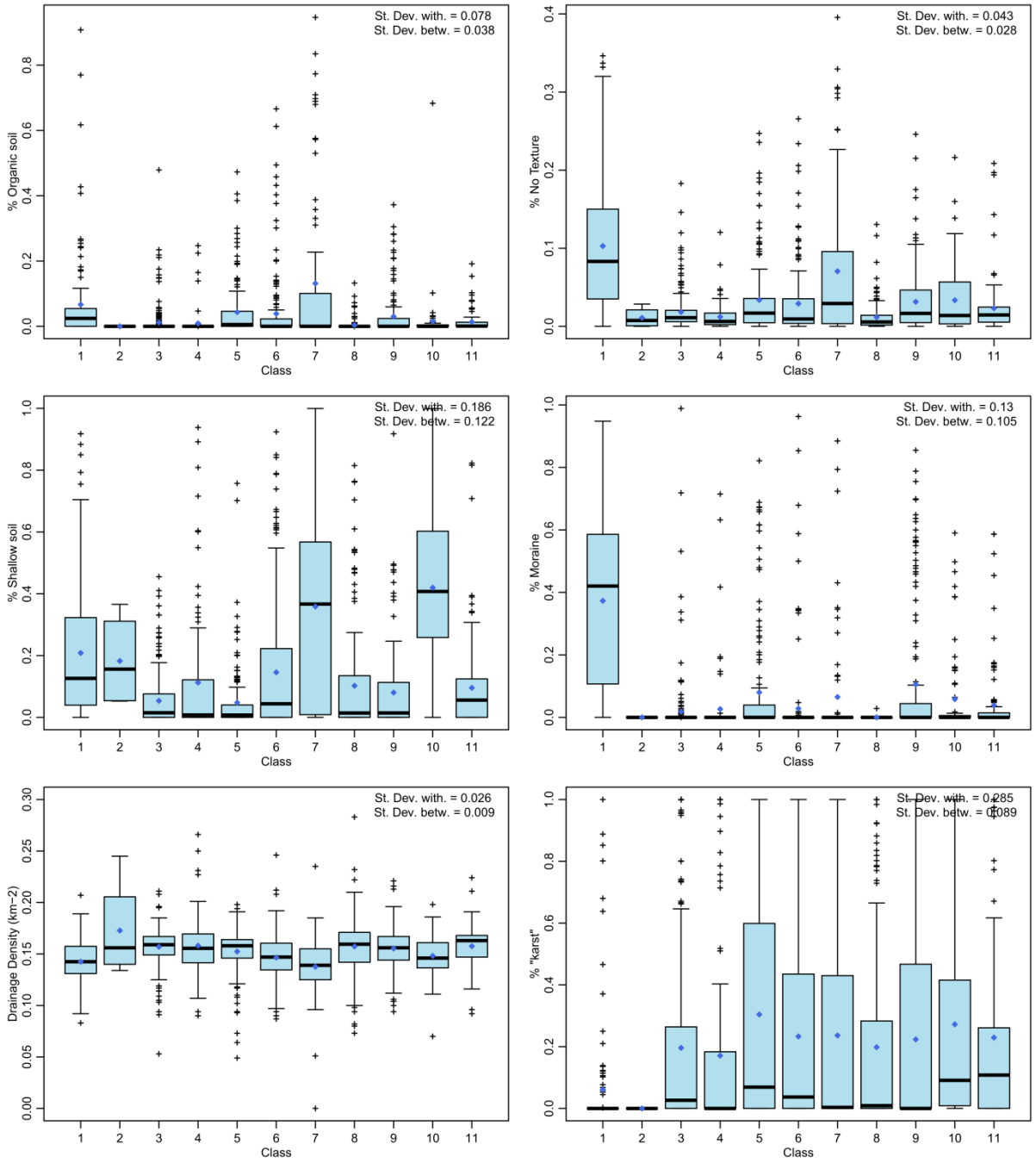


Figure V: boxplots of catchment descriptors in the different classes of the FS classification (4/7)

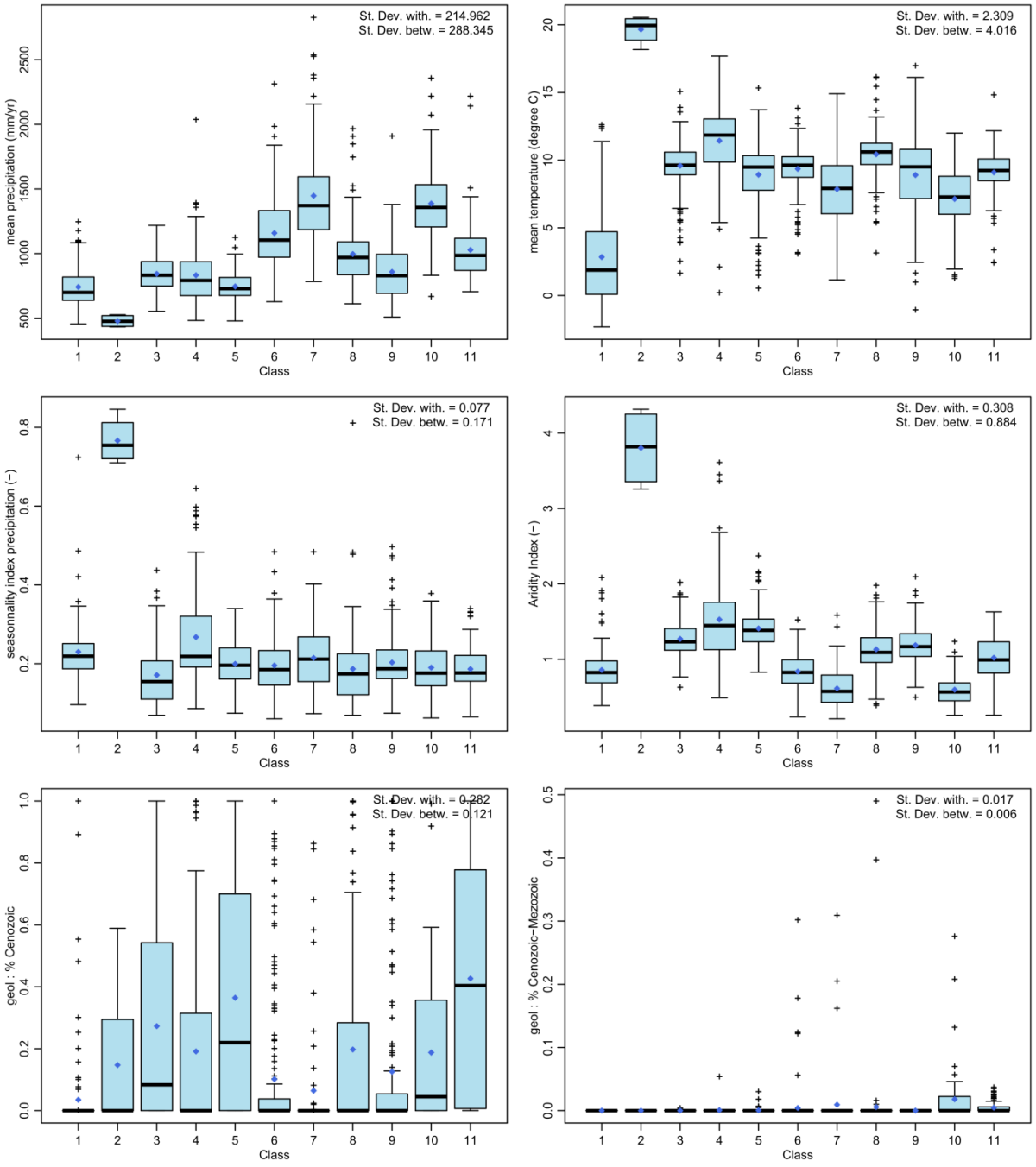


Figure W: boxplots of catchment descriptors in the different classes of the FS classification (5/7)

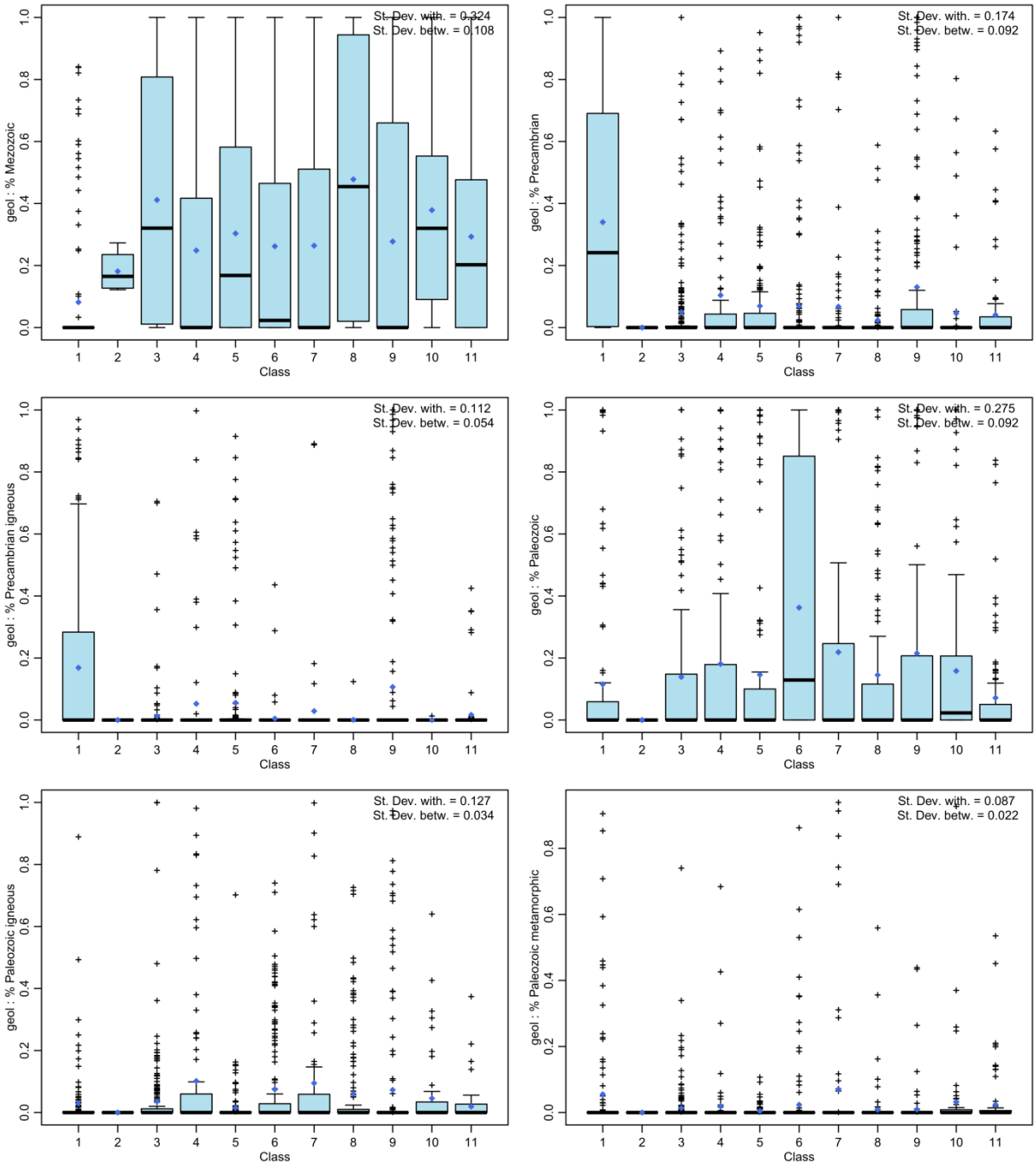


Figure X: boxplots of catchment descriptors in the different classes of the FS classification (6/7)

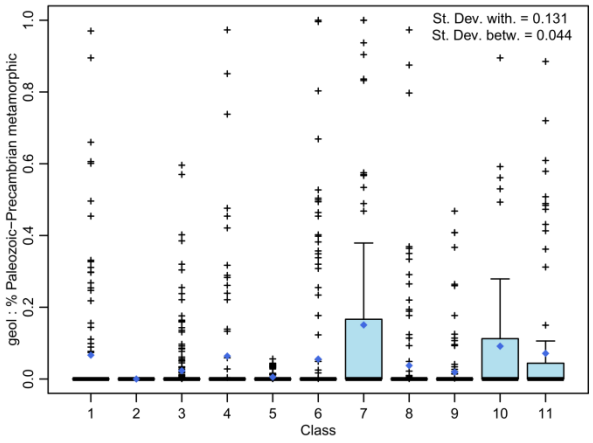
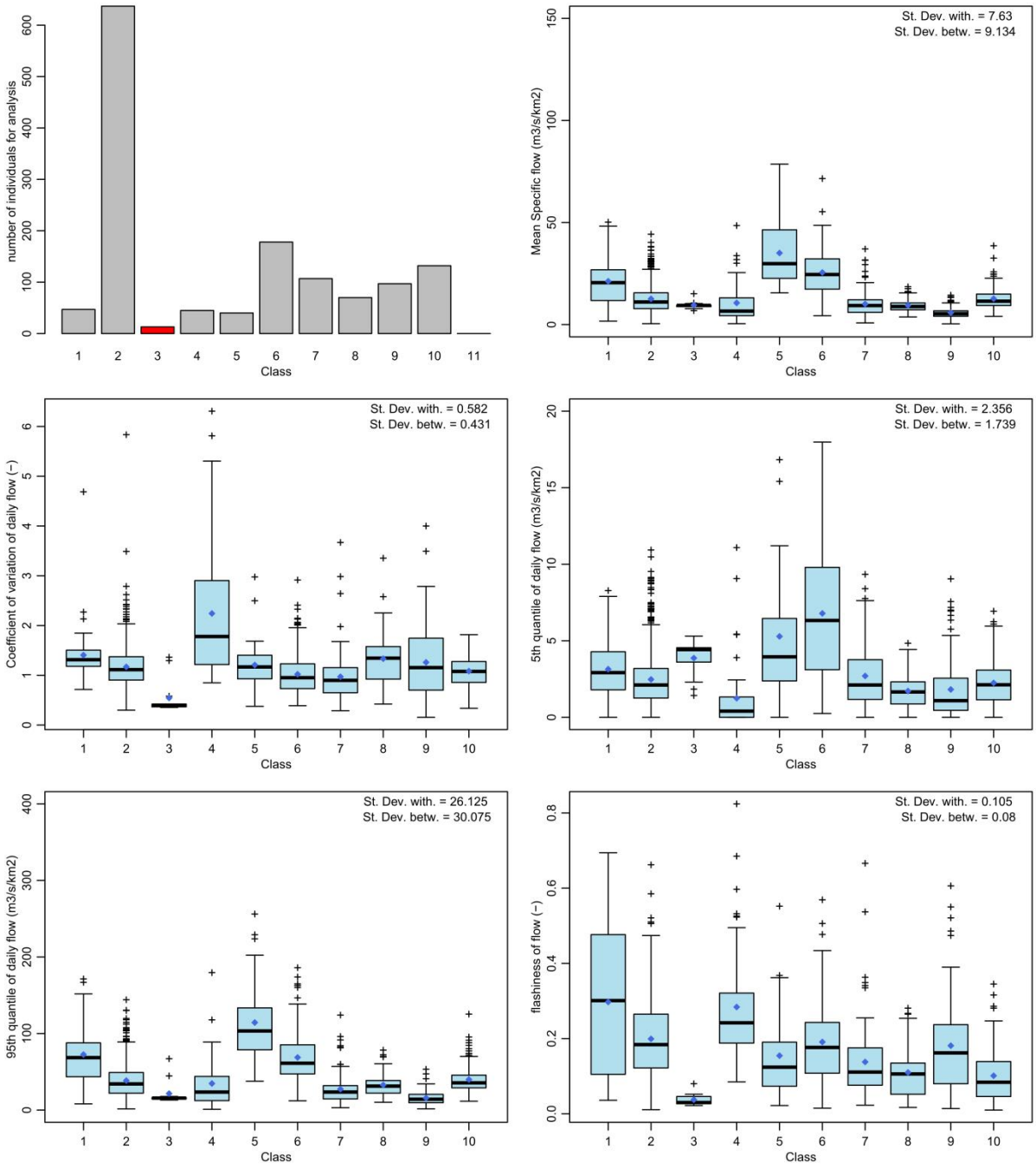


Figure Y: boxplots of catchment descriptors in the different classes of the FS classification (7/7)

D.2 Classification based on catchment descriptors

D.2.1 Boxplots of flow signatures



Figur Z: boxplots of flow signatures in the different classes of the CD classification (1/3)

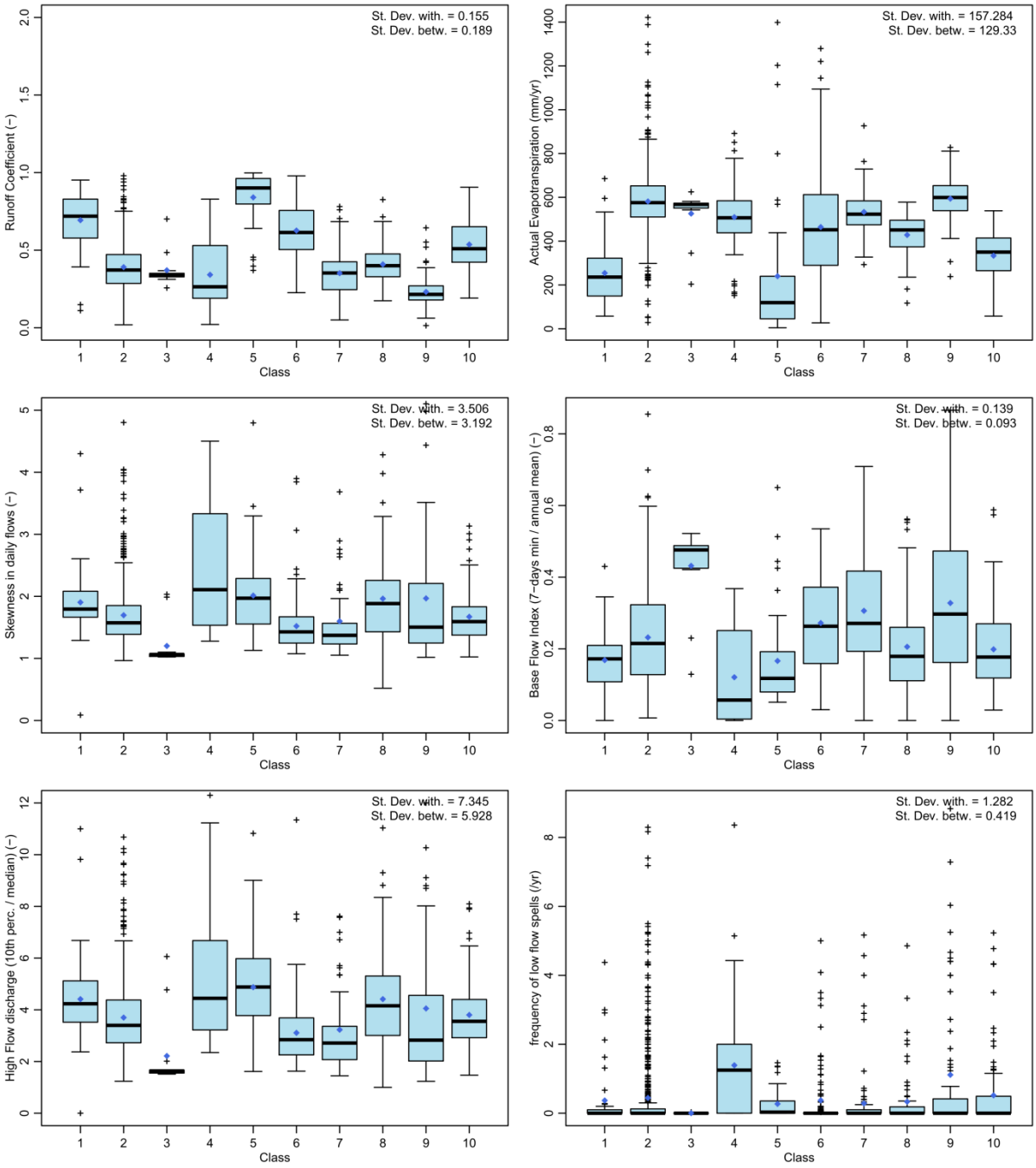


Figure AA: boxplots of flow signatures in the different classes of the CD classification (2/3)

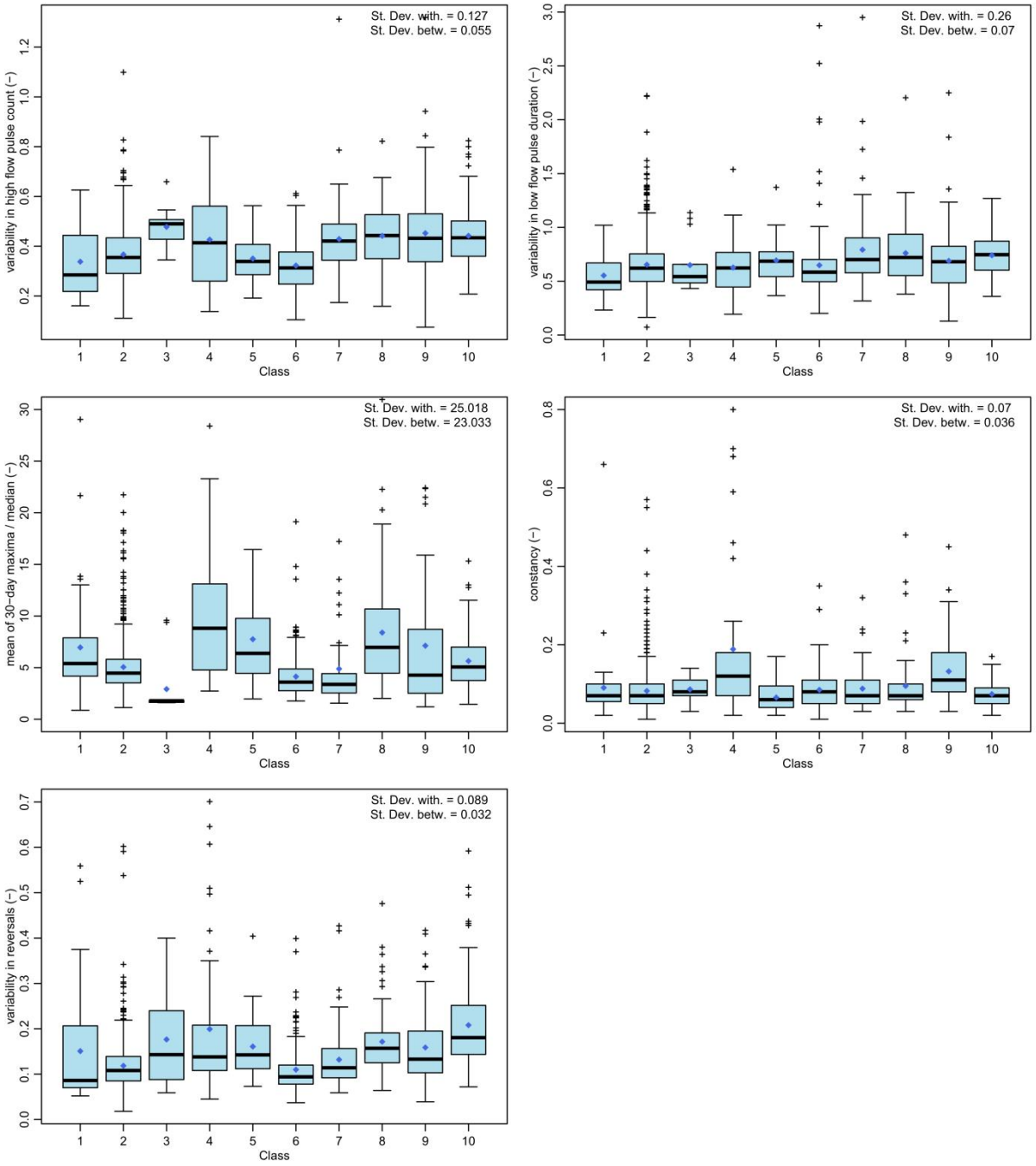


Figure BB: boxplots of flow signatures in the different classes of the CD classification (3/3)

D.2.2 Boxplots of catchment descriptors

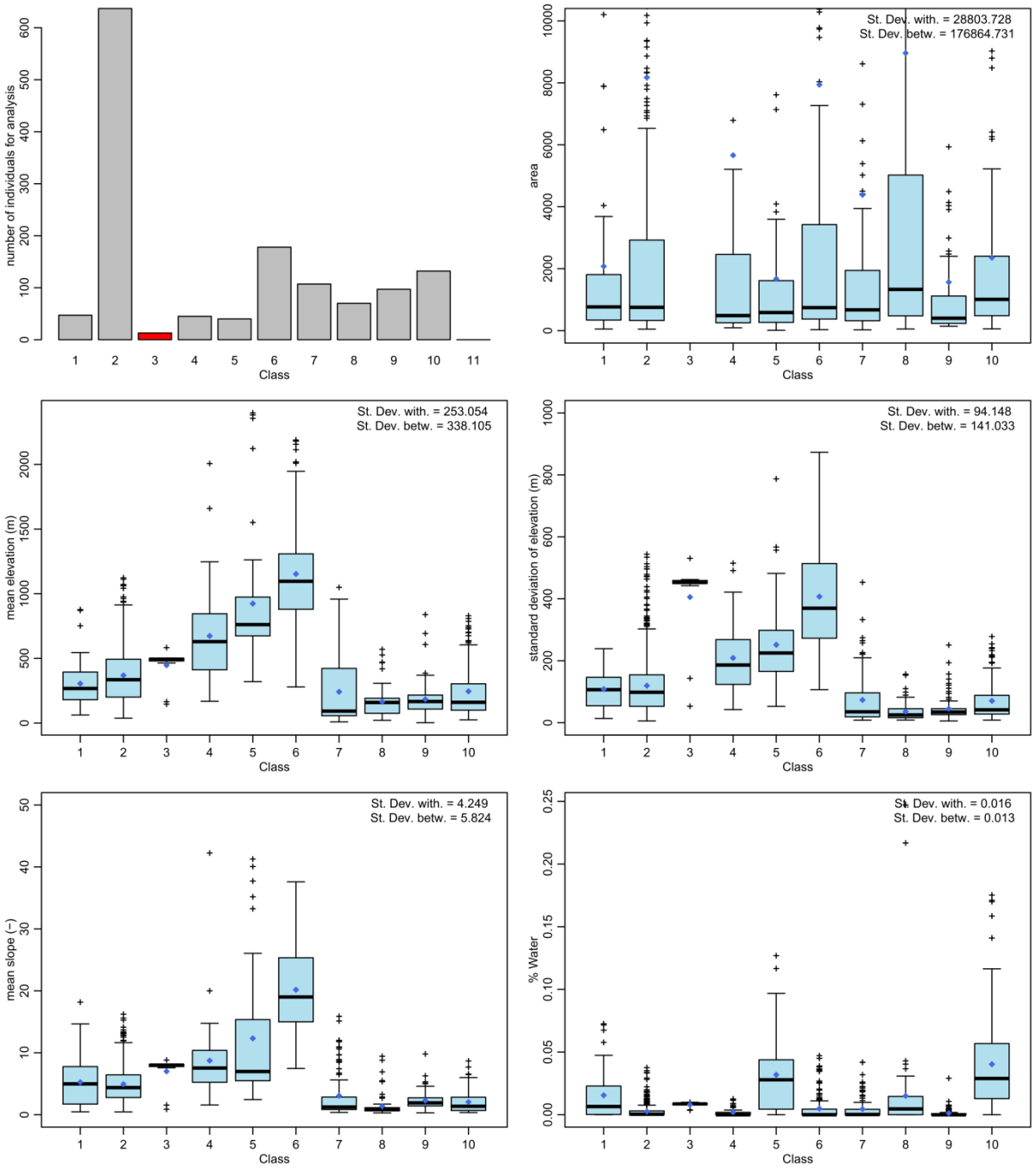


Figure CC: boxplots of catchment descriptors in the different classes of the CD classification (1/7).

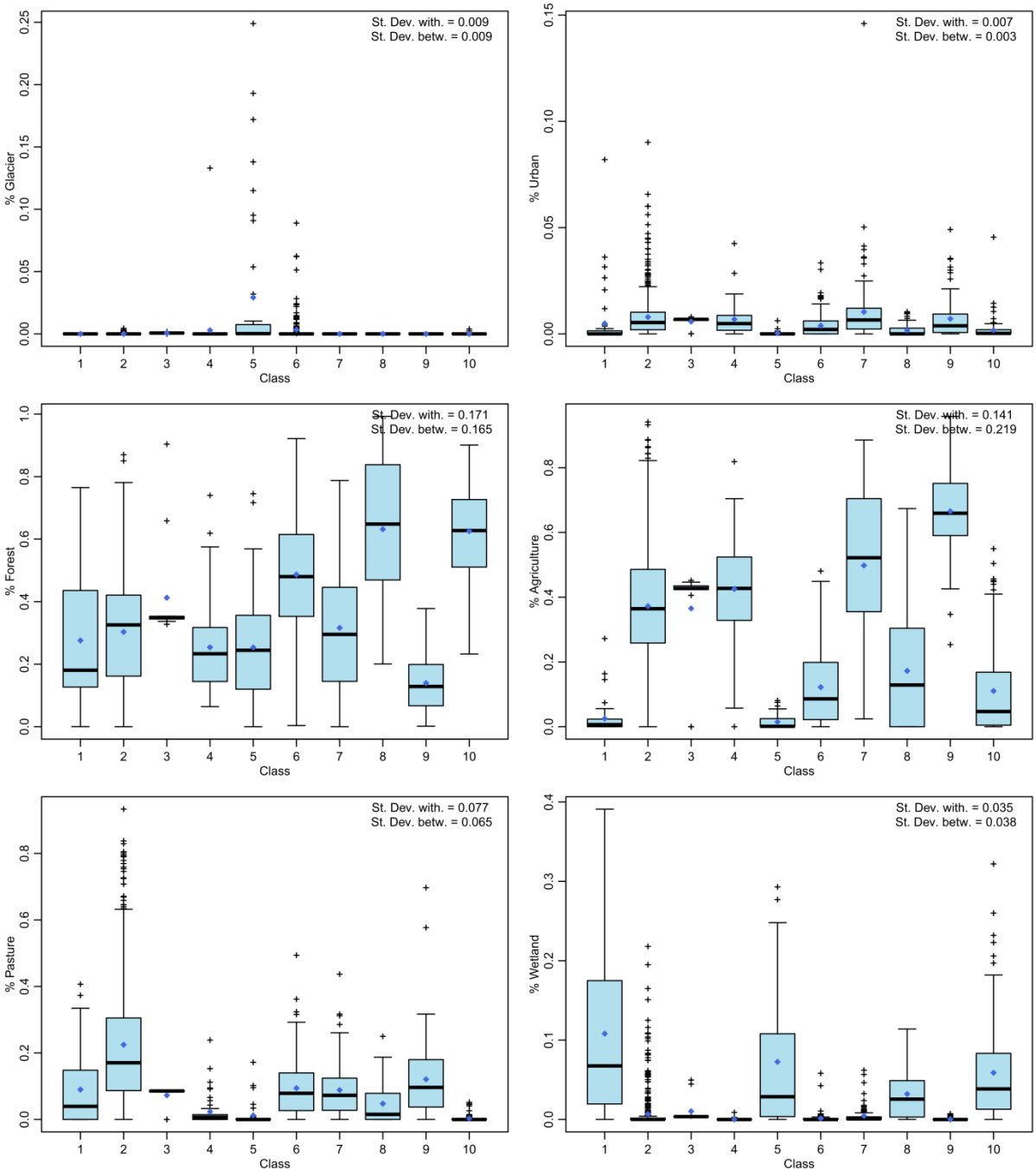


Figure DD: boxplots of catchment descriptors in the different classes of the CD classification (2/7).

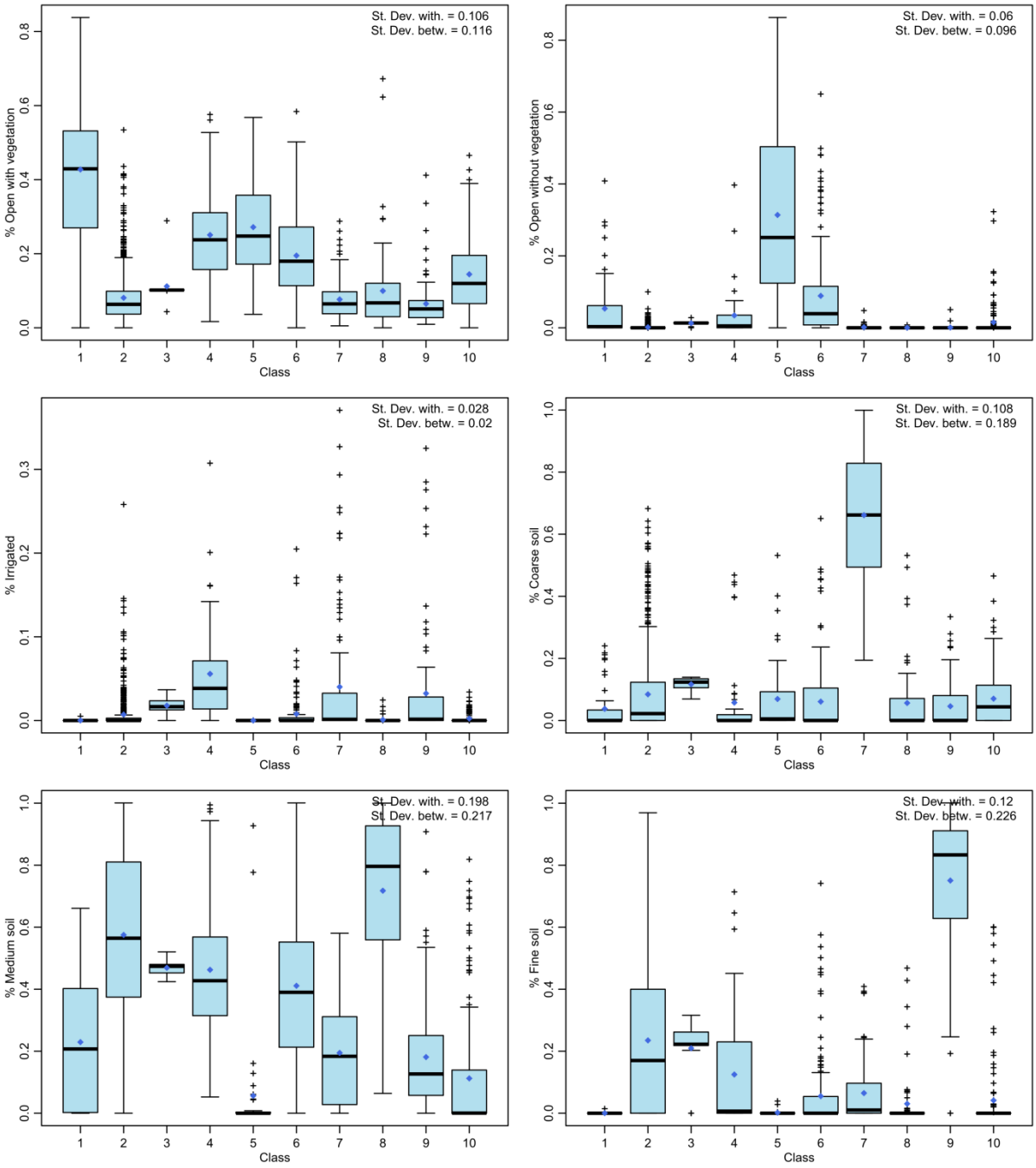


Figure EE: boxplots of catchment descriptors in the different classes of the CD classification (3/7).

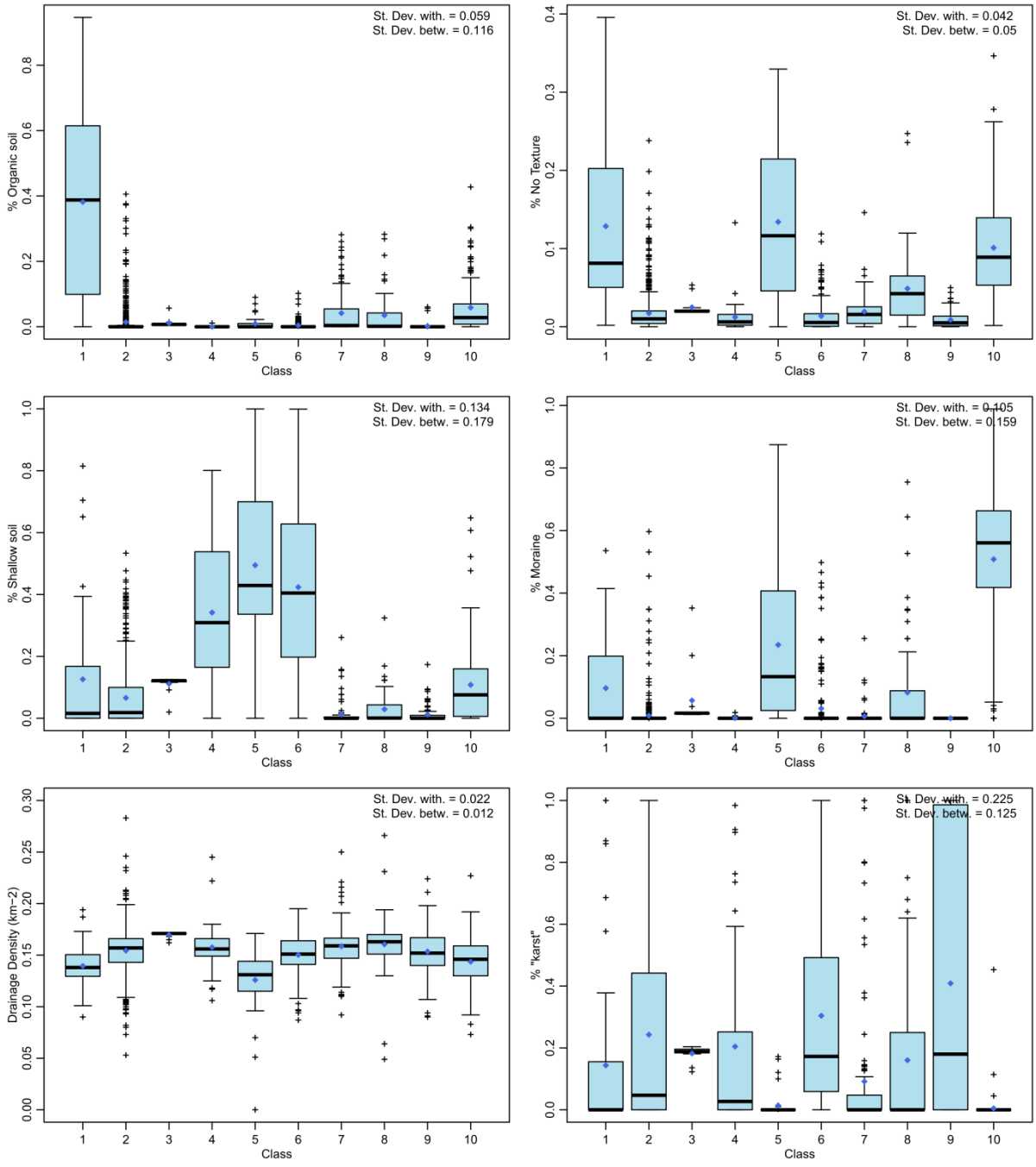


Figure FF: boxplots of catchment descriptors in the different classes of the CD classification (4/7).

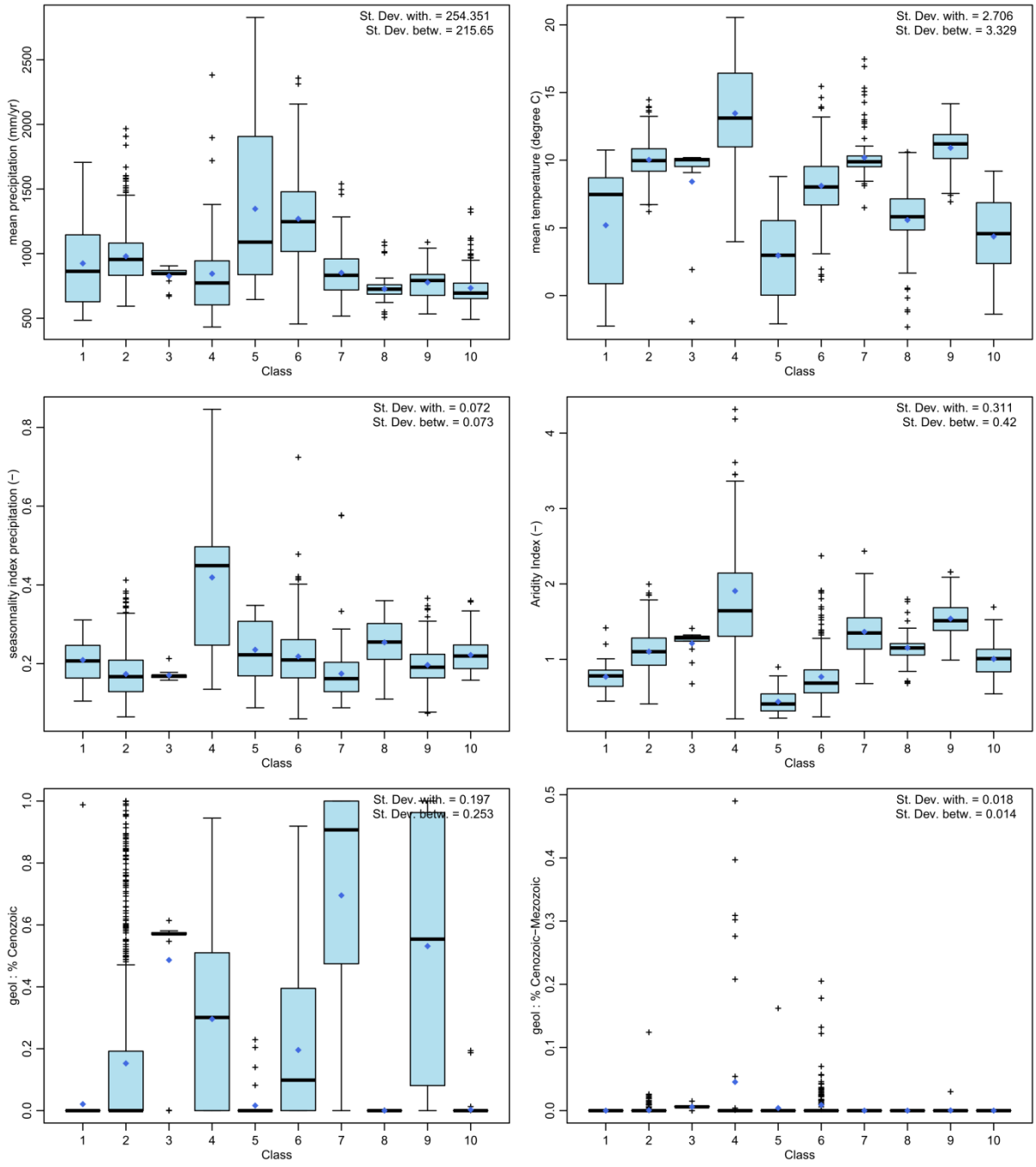


Figure GG: boxplots of catchment descriptors in the different classes of the CD classification (5/7).

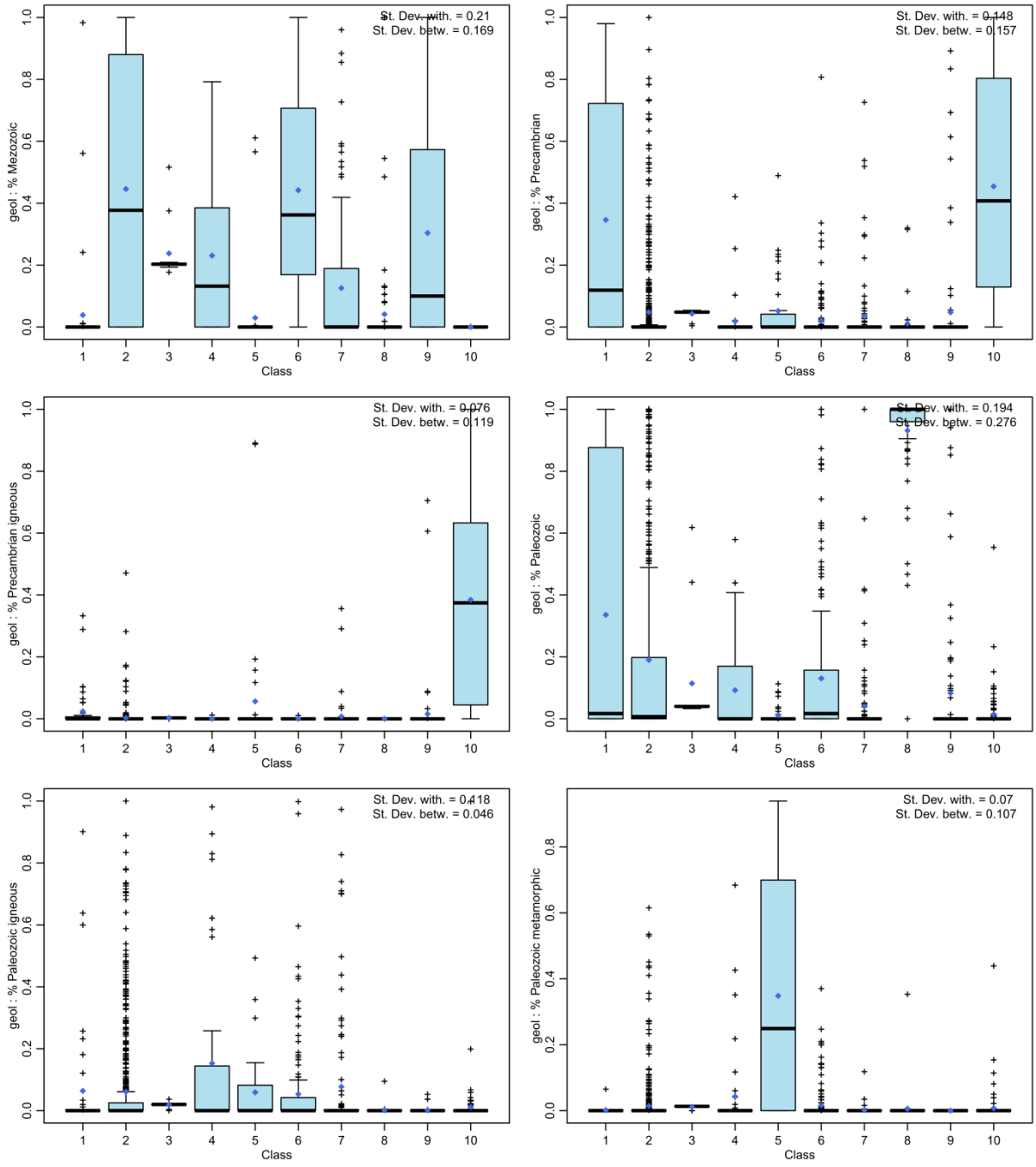


Figure HH: boxplots of catchment descriptors in the different classes of the CD classification (6/7).

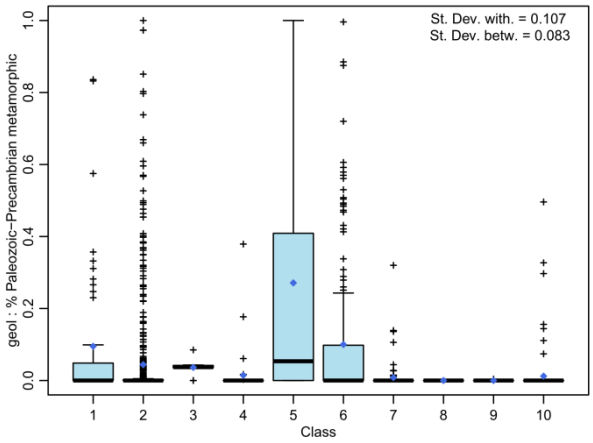


Figure II: boxplots of catchment descriptors in the different classes of the CD classification (7/7).

E. Linear regression coefficients

E.1 Linear regressions calibrated over the whole domain

Table B: Coefficients of the linear regression calibrated over the whole domain. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-0.516	-0.287	0.823	-19.4	-0.038	0.643	16.3	-15.2	0.282	-40.2	-0.582	0.334	0.878	-119	-0.107	0.0345
area		-9.55E-07										1.47E-07				
meanElev																
stdElev		-0.000518	0.00811	-0.0265	-0.000156				0.000282							
meanSlope										0.144					0.00179	
Water		-5.27	15.9		-1.11				0.999			1.13				0.516
Glacier																
Urban											-12.4		-2.36			
Forest								-5.51						-33.7	-0.0439	
Agriculture	-6.79			-28.4		-0.199	214	-7.28			0.894	0.0864		-52.9		
Pasture										14.3		-0.0174	-0.152			
Wetland				94.6	0.359	0.468				26.2						0.177
OpwithVeg	10.5	0.676		45.6	0.234	0.272	-332			8.11			-0.267			
OpwithoutVeg	15.1		3.03	52.6		0.301	-476	-5.46								
Irrigated											3.6					
Coarse			1.59		-0.096											
Medium															0.017	
Fine																
Organic																
NoTexture																
Shallow						0.129			-0.126					-15.5	-0.0292	
Moraine																3.50E-02
DrainDens	-27						852									
Pmean	0.0233	0.000574	0.00232	0.0693	0.000115		0.264	0.00974	-4.64E-05	0.0181		-2.94E-05	-0.000146	0.0695	9.60E-05	2.98E-05
Tmean	-0.342	-0.032			0.0134		10.8	-0.518	-0.00501	-1.14	0.089	-0.012		-3.51	-0.0101	-0.00908
PSI		1.91						11.8	-0.233	23.7	2.01			86.5	0.0938	0.125
AI		0.858	-1.43			-0.185		13.6		26.5		0.135		98.2	0.16	0.113
Cz		-0.402	0.624					-2.34	0.169	-5.38	-0.96			-16.8		-0.019
CzMz																
Mz									0.0886		-0.528					
pCm																
pCmi																
Pz																
Pzi			-2.49						-0.0548				0.167			
Pzm			-2.38													
PzpCmm																

E.2 Linear regressions calibrated inside each classification group

E.2.1 CART Classification

Table C: Coefficients of the linear regression calibrated in group 1 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	2.53	1.38	-1.83	14.4	0.237	0.808	-79.8	2.36	0.211	-1.36	0.603	0.216	0.699	9.88	0.0895	0.232
area				-3.47E-05	-3.70E-07							1.71E-07				5.27E-08
meanElev																1.14E-05
stdElev			0.00884	-0.00285					0.000265	0.00353					-1.12E-05	-4.08E-05
meanSlope		-0.0114						-0.0116						-0.0806		
Water		-5.72	22.5	56.2	-1.47			-9.41	0.943	6.83		1.76		-58.3		
Glacier			5.9													
Urban	-66.9	-4.37			0.657	-1.79	2110	3.07		-63.7	-5.72			37.2	0.294	-1.17
Forest																
Agriculture					-0.0749											
Pasture																
Wetland																
OpwithVeg									-0.21							
OpwithoutVeg																
Irrigated																
Coarse		-0.495			-0.0884			-1.26	0.116					-8.46		
Medium																-0.0245
Fine																
Organic																
NoTexture																0.276
Shallow																
Moraine		-0.00813			-0.127			-0.409		7.21				-1.53		
DrainDens																
Pmean	0.0198		0.00357	0.0542		-2.14E-05	0.375			-0.00447	-8.04E-05					-8.89E-05
Tmean										1.03			-0.00255			
PSI																
AI	-6.66			-22.4		-0.314	210					0.138				
Cz																
CzMz																
Mz															0.000454	
pCm																
pCmi																
Pz	1.1					0.0223	-34.7									
Pzi																
Pzm	7.22		-1.83	37.5	0.00628	0.208	-228	1.03	-0.117	5.33	0.0231					
PzpCmm	3.78	0.206	-0.82	14.4		0.102	-119	-0.467	-0.0773	1.95				-2.92		

Table D: Coefficients of the linear regression calibrated in group 3 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	1.82	0.938	4.53	9.86	0.157	0.691	108	2.23	0.21	5.02	-0.184	0.398	0.689	9.53	0.0422	0.0916
area		-1.52E-06		-2.97E-05	-3.36E-07							1.54E-07				
meanElev																
stdElev								-0.000644		-0.00223				-0.00575		
meanSlope	0.0911		0.171				-2.57									
Water					-1.67							1.52	0.904			
Glacier			18				-632									
Urban								3.54		-1.79		-0.825	-2.02	34.4		-0.781
Forest																
Agriculture	-8.51			-29.1		-0.281	359					0.0644			0.0653	
Pasture		0.159	-0.735		0.176				-0.131							
Wetland																
OpwithVeg					0.198											
OpwithoutVeg						0.322										
Irrigated								11.3		23.6				69.4		
Coarse	1.88	-0.292	2.22	1.58	-0.0653	0.0701	-50.2	-1.39		-3.07				-11.3		
Medium																
Fine			0.342													-0.00113
Organic															0.0113	
NoTexture		-1.03														
Shallow	7.78			26.7		0.172	-226		-0.0725							0.016
Moraine																
DrainDens																
Pmean	0.0181	-0.000246		0.052			0.35					-0.000114			-2.39E-05	2.76E-05
Tmean																-0.0133
PSI		2.69													0.247	
AI	-3.55		-2.49	-9.5		-0.176					0.614	0.0609				0.126
Cz	-0.432			-6.23		-0.0241	21.5	-0.444	0.159	-1.37						
CzMz					0.224											
Mz									0.078							
pCm																
pCmi																
Pz				4									-0.0686	-3.1		
Pzi			-2.46										0.0905			
Pzm																
PzpCmm																0.0174

Table E: Coefficients of the linear regression calibrated in group 4 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-10.8	0.695	-0.867	-32.7	0.0648	0.688	342	-18.6	0.279	-34.2	0.738	0.258	0.691	-141	-0.0402	0.095
area		-1.63E-06						-7.31E-07		-2.81E-06				-2.90E-06	-3.61E-08	5.68E-08
meanElev																
stdElev												-4.69E-05				-4.84E-05
meanSlope	0.23			0.654		0.00191	-7.25									
Water		-4.24														
Glacier																
Urban									2.15							
Forest			0.738	-6.72							-0.704					
Agriculture																
Pasture					0.121			6.51		12.7				47.3	-0.0458	
Wetland																
OpwithVeg																
OpwithoutVeg	20		5.97			0.309	-632									
Irrigated																
Coarse					-0.0931							0.00742				
Medium		0.133														
Fine																
Organic																
NoTexture																
Shallow						0.197							-0.11			
Moraine	10.7			43.6			-336									
DrainDens									-0.131							
Pmean	0.0233		0.00502	0.0732			0.265	0.00946		0.0175				0.0689	3.91E-05	
Tmean		-0.0164	-0.192		0.0119			-0.669	-0.00756	-1.26				-5.08		
PSI								16.1		31.2				115		
AI		0.65				-0.264		12.1		22.5		0.124		89.1	0.0899	0.0455
Cz		-0.445	1.67						0.164			-0.0137				
CzMz		0.895			0.23	-0.183		-3.2		-7.47	-0.943	-0.204		-23.7	0.158	-0.101
Mz																
pCm																
pCmi																
Pz											0.0599					
Pzi	0.532			7.12			-16.8									
Pzm					0.0501							-0.00251				
PzpCmm					0.0786											

Table F: Coefficients of the linear regression calibrated in group 5 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-5.17	0.668	-0.0717	86.7	0.14	0.803	240	-2.9	0.116	-9.5	-0.652	0.592	0.679	-30.6	0.0867	0.195
area		-1.48E-06			-3.52E-07			-5.90E-08	4.83E-07	-8.65E-06				1.71E-07		
meanElev									9.00E-05							
stdElev																
meanSlope					0.00263											
Water																
Glacier					-0.762					53.5						-0.544
Urban																
Forest									0.127			-0.0499				
Agriculture			0.604						0.303							
Pasture					0.194							-0.176				
Wetland	21.5															
OpwithVeg	17.1			54.2			-518			15.5	0.537				0.0246	
OpwithoutVeg													-0.0617			
Irrigated																
Coarse								0.319		-3.09		0.0189				
Medium			-0.468							2.15				8.29		-0.0305
Fine																
Organic																
NoTexture		-0.926		1.33				-4.38	0.329							
Shallow		-0.176	1.87						-0.0892							
Moraine																
DrainDens			-0.13							-3.8	-1.03					
Pmean	0.0225		0.00502				0.149					-0.000174				
Tmean			-0.219				22				0.0921					-0.00487
PSI		2.89						25.1						181		
AI	-4.38			-46.4		-0.328			-0.0572	10.8	0.314					
Cz																
CzMz																
Mz																
pCm							-36.5									
pCmi	3.07			-9.16		0.0537	-34.3				0.968					
Pz					0.0112						0.194			-8.96		
Pzi																
Pzm	4.7															
PzpCmm				17.9												

Table G: Coefficients of the linear regression calibrated in group 6 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	0.0645	-0.225	4.63	-6.79	0.0924	0.555	153	-17.4	0.265	-25.1	0.556	0.225	0.826	-17.6	0.0917	0.126
area			-2.64E-06													
meanElev			-0.0016	-0.00674	-4.84E-05											
stdElev		-0.00138	0.00899					6.98E-05	0.000347	-0.000427				0.00292		-8.91E-05
meanSlope		0.0198	0.0978													
Water					-1.89			1.39				1.77		-105		1
Glacier																
Urban									1.84							
Forest															-0.0185	0.0418
Agriculture	-7.77			-39.2		-0.494	329									
Pasture														5.08		
Wetland															-0.0841	
OpwithVeg		1.17			0.158	0.353		7.51		17.3						
OpwithoutVeg																
Irrigated		-0.966						-9.93						9.14		0.148
Coarse																
Medium																
Fine																
Organic	11.6			41.6	0.11		-382		-0.0776	0.658		-0.00708				
NoTexture																
Shallow	10.1			33.9			-302		-0.155							
Moraine																
DrainDens																
Pmean	0.0193	0.000464		0.0618	0.000112		0.315	0.00946	-6.89E-05	0.0105	-6.81E-05		-0.000167	-0.0113		
Tmean								-0.444								
PSI			-1.38									-0.0517		179		
AI	-3.19	0.81	-2.55					12.2		15.6		0.144				
Cz			1.27		-0.0224							-0.0102	0.0174		0.0307	
CzMz																
Mz																
pCm																
pCmi																
Pz					0.00396											
Pzi												-0.0173	0.147			
Pzm		0.46														
PzpCmm																

Table H: Coefficients of the linear regression calibrated in group 7 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	33.6	1.25	2.77	99.4	0.118	0.505	106	-3.37	0.275	5.37	-1.96	0.383	0.663	-24.2	0.0876	0.224
area		-1.69E-06	3.71E-06	-3.76E-05				-3.83E-07	4.52E-07	-7.73E-06				-1.54E-05	-1.04E-08	
meanElev											0.000112		-1.64E-05			
stdElev											-0.0012					
meanSlope		-0.00845														-0.00248
Water	-10.7	-5.28														
Glacier					-0.404											
Urban						-3.72										
Forest				-7.2												
Agriculture							448						0.0756			0.00801
Pasture					0.223							-0.257				
Wetland		0.537		26.6	-0.037			-3.73					-0.168			
OpwithVeg															0.0311	
OpwithoutVeg					0.0699											
Irrigated																
Coarse		-0.502					1.2	-0.105		-2.91				-12.6		
Medium												0.0379				-0.0409
Fine					0.00241							0.084				-0.0204
Organic					0.169							-0.0126				-0.071
NoTexture												0.19				
Shallow								-1.95								
Moraine											-0.0535					
DrainDens		0.655						3.62	-0.367	17				44.4		
Pmean							0.272		-1.36E-05	-0.00335	0.00127					
Tmean														2.93		-0.00475
PSI								26								
AI	-17.3			-48.2	0.0232						1.18					
Cz	-0.425		0.414	-7.86		-0.185	-5.91		0.143							
CzMz		0.0241						2.7		0.432	-0.449			-6.69		
Mz																-0.0198
pCm											0.649			13.3		
pCmi	-3.51							-1.25								
Pz																
Pzi														-9.61		
Pzm				31.9							0.628		0.132	24.9		-0.0133
PzpCmm			2.67						-0.0224				-0.0496		-0.0327	

Table I: Coefficients of the linear regression calibrated in group 8 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-4.23	0.852	1.44	-27	0.147	0.529	603	4.3	0.255	6.91	-0.255	0.379	0.565	23.5	0.0651	0.0808
area		-1.53E-06			-3.62E-07							3.81E-07				
meanElev																
stdElev				-0.0457				-0.000957		0.000173		-0.000211				
meanSlope			0.232	0.76		0.0141	-1.48	0.0635								
Water	42.5			163		1.93	-2080									
Glacier																
Urban																
Forest	3.53															
Agriculture										3.48	0.0287				0.0573	
Pasture																
Wetland			4.4					-2.27						-22		
OpwithVeg					0.102		-585									
OpwithoutVeg																
Irrigated							379				3.47					
Coarse																
Medium																
Fine																
Organic																
NoTexture																
Shallow				36.6						3.96						
Moraine																
DrainDens	-56.8					-1.27										
Pmean	0.0267	-0.000209		0.0684				-0.00247		-0.00386				-0.0149		
Tmean											0.0791				0.000764	
PSI		2.71			0.131							0.163				
AI													0.0887			0.0522
Cz								-0.57		-2.57				-4.91		
CzMz																
Mz			0.0488													
pCm			-0.112						-0.0689				0.0909			
pCmi																
Pz																
Pzi									-0.188				0.114			
Pzm																
PzpCmm																

Table J: Coefficients of the linear regression calibrated in group 9 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-4.85	1.59	4.64	87.3	0.211	0.718	153	2.61	0.159	9.59	0.499	0.39	0.708	-53.8	0.0895	0.141
area			3.21E-06	-4.30E-05	-3.47E-07						-1.31E-06					
meanElev										-0.00305						
stdElev		-0.000517						-8.03E-04	0.00016					0.034		
meanSlope			0.165							0.227						
Water		-5.59		-102	-1.85			-13.4		-26.5				19		
Glacier																
Urban											-6.36					
Forest																
Agriculture	-9.78						309									
Pasture													-0.149			
Wetland	24.7						-779									
OpwithVeg														43.4		
OpwithoutVeg																
Irrigated																
Coarse								-1.34					0.0832			-0.0183
Medium	-1.66						52.5									
Fine			0.164		-0.0121						0.253					
Organic													-0.141			
NoTexture																
Shallow	7.93			47.6		0.293	-250									
Moraine																
DrainDens																
Pmean	0.0224	-0.000241					0.293			-0.00496						
Tmean													-0.00182	0.232		
PSI																
AI			-2.83	-44.7		-0.284								48.6		
Cz		-0.265	1.77		-0.0374				0.167	-1.93				-21.9		-0.00335
CzMz																
Mz								-0.565	0.0717			-0.0174			0.00102	
pCm																
pCmi																
Pz																
Pzi																
Pzm																
PzpCmm																

Table K: Coefficients of the linear regression calibrated in group 10 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-11.1	-0.154	3.94	-36.5	0.0154	0.777	350	-1.38	0.328	-2.79	0.672	0.334	0.706	-28.3	0.0819	0.151
area			-2.45E-06		-2.79E-07				3.06E-07						-3.65E-08	
meanElev																
stdElev		-0.000685	0.00996		-4.63E-05			0.00144	0.000267	0.00143	-0.00128					
meanSlope																
Water		-5.25	10.6		-1.12				0.771	22		1.06				
Glacier																
Urban													-2.54		0.167	
Forest						-0.244										
Agriculture						-0.674										
Pasture																-0.123
Wetland				153				4.23		20.7						
OpwithVeg				60.2				6.29	-0.209	12.9						
OpwithoutVeg	25.5						-804									
Irrigated													0.307			
Coarse				-10.1		0.00195										
Medium	-0.801			-5.37		-0.0898	25.3									
Fine		-0.0532	-0.0762						0.091				-0.0222			
Organic					0.241						-0.705					
NoTexture								6.06								
Shallow																
Moraine	9.27						-293				-0.429					
DrainDens																
Pmean	0.0254	0.000544		0.0759	9.35E-05		0.199	-0.00269	-7.68E-05	-0.0046		-3.59E-05				
Tmean		-0.0281			0.0108			0.533	-0.0054	1.03		-0.0113				
PSI		2.26											-0.0647	180		
AI		0.668	-2.25									0.161				
Cz					-0.0385										0.0357	
CzMz																
Mz			0.469													
pCm		0.194							-0.0889			-0.0224				0.0597
pCmi																
Pz																
Pzi			-2.04								1.19					-0.0134
Pzm	4.06	0.407			0.0513	0.196	-128	2.18		3.85				-3.05		
PzpCmm																

Table L: Coefficients of the linear regression calibrated in group 11 of the CART classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-11.8	0.649	-1.5	32.4	0.0971	0.345	349	3.54	0.318	5.19	0.591	0.582	0.693	11.4	-0.0154	0.0841
area	-2.41E-06	-1.47E-06		-4.23E-05	-3.35E-07	-1.26E-07	7.74E-05	-2.95E-06	4.91E-07	-7.06E-06				-1.91E-05		
meanElev																
stdElev															4.52E-05	
meanSlope				1.51							-0.0185					
Water																
Glacier			2.96												0.0411	
Urban		0.122	10.2		-0.25			-10.6	1.42	-6.89				18.1		
Forest		-0.14			-0.0562			-2.32								
Agriculture																
Pasture								-3.42		-3.9				-18.7		
Wetland	42.9			186		1.42	-1240	-1.13		2.84	-2.57			3.87		0.286
OpwithVeg											0.206					
OpwithoutVeg			7.94				-557						-0.092		0.0926	
Irrigated															-0.0743	
Coarse																
Medium				-2.82												
Fine		0.154			-0.042											
Organic																
NoTexture		-0.75			0.0507				-0.143							
Shallow	11.9			36.7		0.466	-264									
Moraine								-0.148		-1.44				-5.34		
DrainDens									-0.156							
Pmean	0.0245		0.00453				0.25					-1.97E-04				
Tmean					0.0141											
PSI		2.93							-0.269							0.249
AI															0.0881	
Cz				-21	-0.0534											
CzMz		0.244	5.92						0.113							
Mz			-0.0823									-0.00485				
pCm	3.72		0.388	-6.91		0.0998	-116	-0.306		-0.795				-3.08		
pCmi				-14.4				-0.444	-0.0471	-0.997	0.371			-4.41		0.0853
Pz											0.123	-0.0364	-0.0785			-0.0248
Pzi	0.952		-2.32			0.121	-30		-0.179							
Pzm																
PzpCmm		0.0729			0.064					-0.703						

E.2.2 Classification based on flow signatures

Table M: Coefficients of the linear regression calibrated in group 1 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-3.1	1.06	1.39	5.78	0.195	0.672	279	-3.13	0.194	-2.81	0.523	0.38	0.709	-27.6	0.0907	0.147
area					-3.71E-07							2.16E-07				1.14E-07
meanElev			-4.02E-04						8.08E-05							
stdElev		-0.00104	0.0111					0.000752						0.00629		-9.53E-05
meanSlope													-0.00324			
Water		-3.6	12.7	-30.5	-1.77			6.77	0.879	28.6				53.5		
Glacier																
Urban				-162									-2.45			-1.09
Forest	-2.44						87.4									
Agriculture																
Pasture																
Wetland																
OpwithVeg																
OpwithoutVeg			6.29													
Irrigated			-3.33									0.194				
Coarse											-0.349					
Medium																
Fine																
Organic		0.155								2.91						
NoTexture																0.336
Shallow	9.23	0.546		28.7	0.0486	0.249	-153		-0.144							
Moraine								4.32						31.3		
DrainDens																
Pmean	0.0248			0.06												
Tmean	-0.845	0.0256		-1.76			30.7	0.525		0.756				3.6		
PSI	3.86					0.27	-265									
AI				-8.23		-0.282			0.0212							
Cz	-1.56					-0.0509	27.2									
CzMz																
Mz																
pCm																
pCmi		0.0728											0.108			
Pz	1.35						-32.2				0.0531					
Pzi				9.54												
Pzm			-2.38	27.2		0.127		2.51	-0.136	5.18					-0.0417	
PzpCmm				12.4		0.0706		0.172		0.4				1.94		

Table N: Coefficients of the linear regression calibrated in group 3 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	0.195	0.877	4.63	7.12	0.186	0.701	-6.15	-2.19	0.266	3.54	-0.133	0.211	0.699	-23.3	0.0622	0.0859
area		-1.54E-06			-3.81E-07											
meanElev																
stdElev								-0.000649						-0.00451		
meanSlope			0.158							0.0115						
Water												1.7			-0.334	
Glacier																
Urban															0.541	
Forest								-2.09						-13.5		
Agriculture	-10.5			-38.6		-0.251	330			1.69						
Pasture									-0.113						-0.0718	
Wetland					-0.0329											
OpwithVeg						0.403										
OpwithoutVeg	21.6		3.67				-680									
Irrigated									-0.0368	13.2	3.68					
Coarse	0.534			-3.53		0.0473	-16.9								-0.00964	
Medium																
Fine													-0.0396			
Organic																
NoTexture		-1.01										0.0681				
Shallow		-0.0505														
Moraine																
DrainDens									0.01						-0.0342	
Pmean	0.02	-2.04E-04		0.0592			0.368									
Tmean																
PSI		2.77	-2.76					25.3						183	0.222	0.26
AI	-2.17		-1.97	-6.87		-0.212	68.6				0.527	0.141				
Cz	-0.108			-5.75		-0.00671	3.39									
CzMz																
Mz												0.00467				
pCm															-0.011	
pCmi																
Pz				1.51					-0.0641	0.0796			-0.079			
Pzi																
Pzm																
PzpCmm																

Table O: Coefficients of the linear regression calibrated in group 4 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-10.3	0.28	-1.97	-3.21	0.076	0.525	325	-7.67	0.177	-13.6	0.329	0.575	0.774	-62.5	-0.117	0.224
area		-1.64E-06			-3.85E-07											1.28E-08
meanElev															7.44E-06	
stdElev	-0.000526						0.0166	0.00288						0.0217		
meanSlope	0.328	-0.000377					-10.4									
Water																
Glacier																
Urban																
Forest	2.04		0.197				-64.4									
Agriculture				-48.5		-0.448										
Pasture			-2.93													
Wetland																
OpwithVeg						0.243				6			-0.276		0.0484	0.062
OpwithoutVeg										6.01						
Irrigated									-0.368	-5.47						
Coarse									0.0582							
Medium																
Fine																
Organic																
NoTexture																
Shallow		0.116				0.208										0.0334
Moraine															-0.0296	
DrainDens											1.07					
Pmean	0.0228		0.00556	0.064			0.281					-1.99E-04			9.14E-05	-1.03E-04
Tmean		0.00388			0.0124								-0.00577		-0.0085	
PSI		2.28						20.4		34.7				146	0.0855	
AI		0.383						4.4		9.77				32.3	0.152	
Cz									0.174	-4.76						
CzMz					0.272				0.0601							
Mz								0.907	0.0758	0.788				5.84	0.00687	
pCm																
pCmi		-0.18														
Pz													-0.0655			
Pzi	-0.0354					0.0329	1.12									
Pzm								2.36		1.96				18.9		
PzpCmm																

Table P: Coefficients of the linear regression calibrated in group 5 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-5.02	1.5	1.39	-1.52	0.0951	0.699	130	3.9	0.256	7.5	0.468	0.41	0.832	-2.13	0.0909	0.0954
area					-3.51E-07											
meanElev					-6.75E-05		-0.00103									
stdElev												-0.000168				
meanSlope					0.00252											
Water								-12						104		
Glacier					-0.939			10.5								
Urban		-3.89												-212		
Forest																
Agriculture				-29.4		-0.233	172									
Pasture							-69.1									
Wetland																
OpwithVeg	17.9			49.3		0.399	-314									
OpwithoutVeg																
Irrigated								6.85								
Coarse				-4.59												
Medium																-0.0197
Fine			-0.868						0.0764							
Organic																
NoTexture		-0.8			-0.205										-0.149	
Shallow					0.0145		-203									
Moraine	6.08					0.0507										
DrainDens																
Pmean	0.0226	-0.000279	0.00378	0.0596	0.000115		0.261	-0.00194	-3.22E-05	-0.00332			-0.00017	-0.0161	-4.28E-05	3.52E-05
Tmean							16.9							2.93		-0.0137
PSI															0.223	
AI	-4.56		-1.55	-8.26		-0.214										0.126
Cz											-0.149					
CzMz																
Mz																
pCm																
pCmi																
Pz																
Pzi			-2.55								1.06		0.142			
Pzm																
PzpCmm											-0.0237					

Table Q: Coefficients of the linear regression calibrated in group 6 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-2.75	0.677	4.35	-43.4	0.21	0.413	86.7	-0.201	0.297	1.41	-0.0811	0.399	0.667	-44.2	0.0822	0.117
area		-1.42E-06			-3.46E-07											
meanElev		-2.04E-04	-0.000632													
stdElev																
meanSlope			0.203			0.00766										
Water									0.511							
Glacier																
Urban																
Forest					-0.109			1.02						-4.43		0.0536
Agriculture	-11.7					-0.354	369	3.37		4.81						
Pasture		0.0976										-0.219		-16.1		
Wetland				163		1.05										
OpwithVeg		0.356		62	0.0772			6.56		11.4						
OpwithoutVeg	22						-693									
Irrigated																0.123
Coarse			1.93													
Medium																
Fine																
Organic					0.108											
NoTexture													-0.279			
Shallow																
Moraine																
DrainDens																
Pmean	0.0219			0.0765		0.000118	0.31									
Tmean									-0.00435					2.38		
PSI	-1.8	2.78		12.4		-0.135	57		-0.417		2.51	0.0655		174		
AI			-2.37						0.0546							
Cz					-0.025							0.0214	0.039		0.0358	
CzMz			6.81							-5.16				13.2		
Mz	-1.46				0.0226	-0.0376	46.1									
pCm		-0.0735													0.00267	
pCmi											0.323		0.19			
Pz																
Pzi								-0.0924		-0.255	1.05	-0.0233				
Pzm													0.127			
PzpCmm																

Table R: Coefficients of the linear regression calibrated in group 7 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-11.2	0.273	1.8	-19.2	0.0397	0.439	354	2.12	0.361	4.42	0.561	0.427	0.691	7.68	0.0468	0.0309
area		-1.61E-06		-2.37E-05	-3.56E-07											
meanElev			-0.000551		3.55E-05				-2.89E-05			-5.07E-05	-3.58E-05			
stdElev												-9.77E-05				
meanSlope			0.245						0.00318							
Water					-1.08											
Glacier			28.2						0.424							
Urban																
Forest																
Agriculture																
Pasture	-5.51					0.0353	174									
Wetland		1.03		180	0.442											0.315
OpwithVeg																
OpwithoutVeg												0.1				
Irrigated																
Coarse																
Medium									-0.0235							
Fine																
Organic					0.217							-0.0906				
NoTexture								-2.46		-3.01					-0.136	
Shallow																0.0443
Moraine																0.14
DrainDens				-142												
Pmean	0.0274			0.0774			0.135		-8.56E-05							
Tmean					0.0141											
PSI		2.25		30.3											0.236	
AI		0.414							-0.0217							0.0781
Cz																
CzMz																
Mz											-0.226	-0.0148				
pCm																
pCmi																
Pz			-0.292						-0.0756							
Pzi			-1.97		0.018											
Pzm				30.4									0.0967	7.45		0.000657
PzpCmm																

Table S: Coefficients of the linear regression calibrated in group 8 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-1.48	0.265	4.88	-13.1	0.189	0.617	46.5	-5.2	0.309	5.01	-0.788	0.377	0.687	-60	-0.00726	0.0546
area		-1.63E-06						-4.19E-06							-4.56E-08	
meanElev			0.00268					0.0018		-0.00165				0.00736		
stdElev				-0.0321												
meanSlope		0.00326													0.0022	
Water					-1.71											
Glacier		-1.39			-0.399			16.7						92		
Urban			25.2		0.247			-26.4	1.71	-3.34			-2.35	58.2		
Forest																0.0602
Agriculture	-8.92			-32.9		-0.555	282		0.147						0.00267	0.0307
Pasture																
Wetland									-0.577							
OpwithVeg				43.8												
OpwithoutVeg										-1.72						
Irrigated		-0.954						-5.18								
Coarse				-0.18												
Medium	-5.93						187						0.0108			
Fine	-6.62						209			-1.25						
Organic			0.431			0.131										
NoTexture																
Shallow				23.3						2.69						
Moraine																
DrainDens																
Pmean	0.0236			0.0664			0.256									
Tmean									-0.0124		0.0837				-0.00349	
PSI		2.3	-1.09								2.51			140		0.259
AI		0.421	-2.61					6.08						32.6	0.103	
Cz	-1.12			-5.09		-0.0147	35.4									
CzMz														23.5		
Mz																
pCm												0.0356				
pCmi												0.117				
Pz					0.034											
Pzi			-2.65						-0.138		0.748					
Pzm																
PzpCmm																

Table T: Coefficients of the linear regression calibrated in group 9 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-11.7	0.456	1.43	-16.3	0.186	0.588	369	-6.56	0.228	-1.81	-0.237	0.58	0.703	-49.7	0.104	0.163
area		-1.46E-06	-1.70E-06	-3.64E-05				-6.29E-09	5.19E-07		-1.40E-06					1.24E-08
meanElev	-0.000872			-0.00342		1.65E-05	0.0275						-3.96E-05			
stdElev			0.00912							-0.00109				-0.00179	-2.17E-05	
meanSlope	0.444			0.776	0.000288	0.00929	-14	0.00607								
Water		-3.47			-1.73			5.3		28.5				73.3		
Glacier																
Urban																
Forest																
Agriculture																
Pasture															-0.0821	-0.146
Wetland				160		1.17										
OpwithVeg			-0.0438									-0.0447				
OpwithoutVeg													0.0158			-0.0541
Irrigated																
Coarse			1.88			0.0364		-0.398	0.137	-4.28	-0.651					-0.0269
Medium		0.101												1.03		
Fine													-0.0412	-1.36		
Organic																
NoTexture	46						-1450									
Shallow					0.0421											
Moraine								1.9								
DrainDens																
Pmean	0.0226		0.00201	0.0716			0.286					-1.97E-04				
Tmean		0.0189		-1.74				0.413		0.745				2.45		
PSI		2.79						23.8					-0.00399	176		
AI			-1.57			-0.223					0.684					
Cz																
CzMz																
Mz															0.00252	
pCm	3.33					0.0928	-105									
pCmi																
Pz																
Pzi			-3.03		0.0626				-0.21		1.33	-0.011				
Pzm																
PzpCmm																

Table U: Coefficients of the linear regression calibrated in group 10 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-4.25	1.3	-2.04	-2.79	0.226	0.643	134	2.5	0.391	5.19	0.635	0.218	0.843	8.1	0.0431	0.163
area	-8.01E-06			-3.18E-05	-3.13E-07	-1.47E-07	0.000253	-2.06E-06	3.82E-07					-1.28E-05		
meanElev					-4.24E-05	0.000218					-0.000361	-1.21E-05				
stdElev	0.00741	-0.00105					-0.234	-0.00116		-0.00421				-0.00436		-9.91E-05
meanSlope														0.0386		
Water	26.1	-5.74	22.3		-2.03		-823	-10.5	0.844	-21.9		1.67		-43.8		0.651
Glacier			24.1	3.91					0.594							
Urban													-2.55			
Forest																
Agriculture	-12.3			-48.9			388									
Pasture								-1.96		-3.17						-0.127
Wetland									-0.453							
OpwithVeg												-0.0316				
OpwithoutVeg		-0.409										0.13				
Irrigated				15.2				6.51	-0.162	12.8				59.2		
Coarse		-0.475			-0.0949											-0.0216
Medium																
Fine																
Organic																
NoTexture												0.0377				0.129
Shallow		0.508						0.524		2.03						
Moraine													0.00128			
DrainDens		0.838			-0.609	-1.94										
Pmean	0.0221		0.00505	0.0639	0.000111		0.302		-7.38E-05				-0.00016			
Tmean																
PSI						-0.00601			-0.302						0.232	
AI									-0.051			0.143				
Cz									0.16							
CzMz	0.863			-19		0.056	-27.2									
Mz		-0.172			-0.0218											
pCm																
pCmi								-0.658		-0.842			0.0741	-1.28		
Pz								-0.118		-0.0238						
Pzi																
Pzm		0.25			-0.0151											
PzpCmm										0.132	0.385					

Table V: Coefficients of the linear regression calibrated in group 11 of the FS classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	23.8	1.23	2.64	-7.17	0.171	0.573	39.7	-3.85	0.288	-6.62	0.0622	0.382	0.677	-49.1	0.0894	0.166
area		-1.62E-06		-3.03E-05	-2.72E-07			-2.30E-06		-5.55E-06		2.19E-07	-7.97E-09	-1.61E-05		
meanElev					-6.14E-05				2.28E-05		-0.000533			-0.00432		-3.11E-05
stdElev					-0.00013										-1.05E-05	
meanSlope					0.00703				0.00173					1.21		
Water					-1.28											
Glacier	96.7															
Urban					0.602											-1.23
Forest																
Agriculture																
Pasture					0.156											
Wetland			-22.7								-1.95					
OpwithVeg	14.6			51.6		0.6	-528									
OpwithoutVeg				47.5												
Irrigated									0.178						0.161	
Coarse																
Medium			-0.866						-0.0295							
Fine		0.0268												-20.9		
Organic																
NoTexture			16.4													
Shallow																
Moraine								1.05		2.09	-0.752					
DrainDens																-0.0319
Pmean			0.00302	0.0564			0.366				0.000129					
Tmean	0.841					-0.0233			-0.0065							
PSI	18.5			24.4			-270		-0.458		3.05					
AI	-20.3		-2.41	-16.8			214	5.89	0.0806	11				53.8		
Cz		-0.166	1.65					-2.85		-5.89	-0.31			-21.6		-0.00504
CzMz		-0.0758	5.29			0.445		8.31	0.127	14.4				18.8		
Mz																
pCm				10.8		-0.00845		-0.83		-1.52	0.35					
pCmi																
Pz	-1.61			7.4			5.53									
Pzi											0.992					
Pzm																
PzpCmm														6.35		

E.2.3 Classification based on catchment descriptors

Table W: Coefficients of the linear regression calibrated in group 1 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-8.33	0.991	0.212	19.6	0.189	0.736	446	-2.68	0.257	-4.36	-0.043	0.357	0.67	-49.9	0.0759	0.169
area			4.22E-06						3.95E-07							
meanElev																
stdElev	0.0105					0.000231	-0.123	4.96E-04								
meanSlope			0.15							-0.00399					0.000738	
Water			18.7	42.5	-1.5				0.928			1.39		72.2		
Glacier																
Urban	-94.5	0.0108					2740		1.35						0.564	
Forest																
Agriculture																
Pasture	-4.07			-14.3			253									
Wetland		0.327						-2.86		0.367						
OpwithVeg																
OpwithoutVeg									0.183			0.00918				
Irrigated																
Coarse																
Medium																
Fine													-0.0136			
Organic										-3.11						
NoTexture								-2.97		-7.3						
Shallow					0.0383			-2.26	-0.0504	-3.99		-0.132				
Moraine		-0.603											0.0606			
DrainDens					-0.788											
Pmean	0.0242	-0.000306	0.00353	0.0553											-5.19E-05	
Tmean			-0.122		0.0107							-0.00139		2.45		-0.00392
PSI		2.94	-3.42		0.184			26.3	-0.333	49.9	2.66	0.179		177	0.245	
AI				-25.5		-0.3										
Cz	-4.56	-0.342			-0.0567		119	-0.928	0.15	-2.26		0.0425				
CzMz																
Mz															0.0195	
pCm												0.00423				
pCmi													0.11			0.0917
Pz																
Pzi						0.0542	50.1									
Pzm					0.0144											
PzpCmm																

Table X: Coefficients of the linear regression calibrated in group 2 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-4.42	0.23	4.38	6.68	0.0497	0.694	107	-6.8	0.331	-1.02	-0.788	0.248	0.618	-55.3	-0.117	0.0847
area		-9.30E-07			-3.28E-07			-1.56E-06	4.23E-07	-5.92E-06				-8.97E-06		
meanElev																
stdElev		-0.00104	0.00864	-0.0363												
meanSlope		0.0207		0.293	0.000916											
Water					-0.993							1.52				1.04
Glacier			13.3													
Urban			12.7				2170		1.82	-50.2				23		-1.21
Forest				-19.7			115									
Agriculture	-7.76			-50.4		-0.235	398									
Pasture			-1.42		0.13				-0.0754			-0.118				-0.0773
Wetland	18.2					0.33										
OpwithVeg	13				0.237	0.385	-366						-0.206			
OpwithoutVeg																
Irrigated									-0.25							
Coarse										-4.06						
Medium																
Fine															-0.00972	
Organic				33.8												
NoTexture		0.486														
Shallow				30.6					-0.086						0.00266	
Moraine																
DrainDens									-0.471							
Pmean	0.0225			0.06			0.277								1.10E-04	
Tmean		0.0107	0.0608		0.0109			0.0787	-0.00922	0.705	0.0837			0.355	-0.00872	
PSI		2.28						20.3			2.51			147		
AI	-2.12	0.374	-2.79			-0.21		3.7				0.13	0.0706	27.7	0.164	0.0573
Cz					-0.0298	0.0048			0.186			-0.0135				
CzMz			3.23													
Mz									0.101							
pCm																
pCmi																
Pz																
Pzi											0.748		0.126			
Pzm															-0.0177	
PzpCmm																

Table Y: Coefficients of the linear regression calibrated in group 4 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-9.82	0.0596	2.53	-29	0.162	0.718	310	-12.8	0.297	-20.4	-0.547	0.245	0.691	-97.8	-0.0527	0.0721
area		-1.82E-06													-7.47E-08	
meanElev					-1.32E-05											
stdElev															6.17E-05	
meanSlope																
Water								24.7						187		1.15
Glacier											2.36					
Urban																
Forest			1.24	8.18												
Agriculture																
Pasture			0.371													
Wetland																
OpwithVeg					0.125											
OpwithoutVeg																
Irrigated		-1.13			-0.0416										-0.0855	
Coarse																
Medium								0.773	-0.039	0.777	0.149			5.57	0.00676	-0.0267
Fine		-0.273														
Organic																
NoTexture																
Shallow	12.4			36.8	0.0289	0.293	-390						-0.11			
Moraine																
DrainDens																
Pmean	0.0235	0.00038		0.0669			0.259	0.00573		0.00944				0.0402	2.71E-05	
Tmean																
PSI									-0.363		2.02					
AI		0.765			0.0057	-0.284		7.99		13.9	0.513	0.127		57.4	0.0968	0.0615
Cz									0.156							
CzMz																
Mz																
pCm																
pCmi																
Pz																
Pzi																
Pzm																
PzpCmm																

Table Z: Coefficients of the linear regression calibrated in group 5 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	3.76	0.896	2.04	-16.7	0.083	0.719	308	-1.26	0.147	-3.73	-1.7	0.41	0.673	-17.2	0.0915	0.188
area		-1.73E-06		-2.41E-05				-2.60E-06	4.17E-07	-5.81E-06		2.19E-07		-1.67E-05		
meanElev																
stdElev	0.00898		0.0117		-0.000128											-8.93E-05
meanSlope									0.0017							
Water			17.5		-1.62				1.38							
Glacier					-0.943											
Urban						-1.61			1.57							
Forest											-0.691				-0.0199	
Agriculture																
Pasture		-0.178				0.319										
Wetland					0.177					27.5						
OpwithVeg																
OpwithoutVeg																
Irrigated													0.198			
Coarse	-0.557					-0.348	-0.109									
Medium				-14.2		-0.408			-0.0179							
Fine						-0.506					-0.252					
Organic										-0.323						
NoTexture							-631									
Shallow																
Moraine											0.441					
DrainDens		2.43						2.24		4.3	0.613			32.9		
Pmean	0.0181			0.0731	0.000135						0.00108					
Tmean							24.8	0.339		0.795		-0.00314		2.3		-0.00466
PSI			-4.58													
AI	-7.33										1.33					
Cz		-0.205	0.15	-20.3					0.173		-0.675				0.0315	
CzMz	-2.85						370									
Mz									0.0868							
pCm									0.00584							0.0451
pCmi																
Pz																
Pzi																
Pzm									-0.0453		0.249		0.0786			
PzpCmm															-0.0195	

Table AA: Coefficients of the linear regression calibrated in group 6 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-10.8	0.577	4.12	-3.42	0.0644	0.316	341	-8.24	0.193	-13.5	0.691	0.565	0.705	-67.9	0.0375	0.11
area		-1.15E-06			-2.76E-07				3.72E-07						-1.17E-08	
meanElev			-0.000583							0.00106			-4.00E-05	0.0057		
stdElev		-0.000507	0.0102		-6.35E-05			0.00412	1.98E-04	0.00222	-0.00109			0.0211		-7.10E-05
meanSlope	0.228					0.0129	-7.18									
Water			15.4	-20.3	-1.03				0.499			1.1				
Glacier																
Urban			10.9								-6.18					
Forest					-0.0481											0.0355
Agriculture				-46.4												
Pasture		-0.0768						3.98					-0.197	30.4		-0.105
Wetland						1.78										
OpwithVeg												-0.0776				
OpwithoutVeg	18.9					0.438	-596					0.15			-0.0343	
Irrigated									0.11							
Coarse																
Medium													0.0405			
Fine																
Organic																
NoTexture																
Shallow			0.394									-0.0217				
Moraine	10.4		-0.911				-327									
DrainDens																
Pmean	0.0232	-0.000135		0.0623	9.68E-05		0.267					-1.93E-04				
Tmean		0.0314			0.00807			-0.0541	-0.00224	0.125				-0.629		
PSI		2.68						20.1		37.8				142	0.232	
AI			-2.45					5.08	0.0353	7.54				39.3		0.0374
Cz					-0.0423							0.0185			0.0328	
CzMz																
Mz			0.581													
pCm																
pCmi																
Pz																
Pzi		0.201						-0.91	-0.18					-7.14		
Pzm	3.9	0.296		36	0.025	0.108	-123		-0.135							
PzpCmm	1.12			12.4			-35.3									

Table BB: Coefficients of the linear regression calibrated in group 7 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-4.39	0.282	7.68	-32.6	0.0952	0.844	385	-5.64	0.259	-8.61	0.0623	0.228	0.832	-25.2	0.042	0.057
area		-1.38E-06			-3.65E-07			9.75E-07	4.46E-07	1.03E-06				6.75E-06		
meanElev	-0.00198			0.00998		8.14E-06	0.0333	-0.000419	1.72E-05	-0.00105	-0.000391			-0.00562	-5.22E-06	
stdElev	-0.00021			-0.0392			0.00989								1.14E-05	
meanSlope	0.346	0.00299		0.726	0.00216	0.00722	-8.65		-0.000326		9.02E-04					
Water					-1.03							1.77				
Glacier																
Urban																
Forest		-0.102		8.35	-0.0547	-0.028			0.0313	-1.79						
Agriculture																
Pasture							-175									
Wetland															-0.166	
OpwithVeg																
OpwithoutVeg																
Irrigated																
Coarse	1.04		0.607			-0.0134	-28									-0.0211
Medium																
Fine						-0.142										
Organic																
NoTexture																
Shallow												-0.0391			-0.0327	
Moraine																
DrainDens			-4.51						-0.33		0.24				0.0273	
Pmean	0.0245			0.0695		-9.13E-05							-0.00017			
Tmean	-0.882	0.00196			0.00871		44.8	0.354		0.681						
PSI	7.55	2.26			0.155			24.9		50	2.8			184	0.256	0.212
AI		0.504	-3.97			-0.296	-186		-0.021			0.133				0.0404
Cz		-0.436	1.89					-1.38	0.159	-5.11				-5.26		
CzMz																
Mz					-0.0109											
pCm																
pCmi		-0.26	-1.22						-0.0254							
Pz				11.8						-3.57						-0.0189
Pzi				6.9						-6.5			0.142	-7.4		
Pzm		0.213			0.0241			1.02		1.05				-1.22		
PzpCmm																

Table CC: Coefficients of the linear regression calibrated in group 8 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-9.96	0.902	2.44	82	0.174	0.38	110	-3.74	0.238	-5.89	0.459	0.555	0.681	-33.1	0.12	0.214
area		-1.71E-06			-3.61E-07							1.64E-07			-3.19E-08	1.76E-08
meanElev																4.06E-06
stdElev	0.00574					0.000533										
meanSlope				0.294	0.000488		-4.17									
Water		-3.48			-1.84			-8.52	0.781	-17.2		1.07				
Glacier																
Urban																
Forest	0.244					0.0615										
Agriculture																
Pasture																
Wetland															-0.188	
OpwithVeg		0.809	4.12		0.151				-0.148		-0.245				0.0503	
OpwithoutVeg										-7.12					0.0412	
Irrigated		0.362	-6.55	1.26				1.97	-0.00546		5.17					
Coarse	1.84	-0.546	1.26			0.06	-49.4	0.592	0.113							
Medium																
Fine																
Organic		-0.248											-0.122	-4.71		
NoTexture																
Shallow	10.7			41.8			-241									
Moraine																
DrainDens										-2.95					0.118	
Pmean	0.0229						0.249					-1.89E-04			-5.51E-05	-8.67E-05
Tmean		0.0397					25.4									
PSI								26.6		51.1				190		
AI				-42.9												
Cz	-3.46					-0.218										
CzMz																
Mz		-0.179						1.33		2.31				9.07	0.00424	
pCm	4.98															0.0548
pCmi																
Pz					0.0265											
Pzi				13.6												
Pzm																
PzpCmm																

Table DD: Coefficients of the linear regression calibrated in group 9 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-9.08	1.53	-1.9	0.28	0.000435	0.719	287	2.68	0.318	5.6	0.482	0.358	0.832	5.41	0.108	0.239
area																
meanElev			0.00222			7.41E-05					-0.00037					
stdElev																
meanSlope		5.96E-04														
Water																
Glacier																
Urban		-5.13									-8.22					-1.16
Forest		-0.168						-1.49		-2.89						
Agriculture					-0.0825	-0.278								12.7	0.0559	
Pasture	-4.09			-6.11			129									
Wetland																
OpwithVeg											0.242					
OpwithoutVeg																
Irrigated		0.517	0.468					7.3	-0.0838	19.6				36.1		
Coarse																
Medium											0.204					
Fine	-7.51			-20.2		-0.0734	237	-1						-10.7	-0.0142	
Organic		-0.159	1.78		0.215				-0.0343			-0.0271				
NoTexture																
Shallow																
Moraine																
DrainDens				-177	-0.305						0.719					
Pmean	0.0265	-0.000278	0.00405	0.076	9.35E-05		0.165		-5.27E-05				-0.000162		-3.44E-05	-9.07E-05
Tmean					0.0154											
PSI												0.137				
AI					0.0196	-0.188										
Cz										-2.31						
CzMz																
Mz																-0.0225
pCm		-0.0018	0.29	14.1					-0.106							
pCmi																
Pz			-0.263						-0.0911							
Pzi																
Pzm																
PzpCmm																

Table EE: Coefficients of the linear regression calibrated in group 10 of the CD classification. One model is calibrated for each flow signature and reads as a column in the table.

	Qsp	CVQ	Q5	Q95	RBFlash	Runoff Co	ActET	skew	BFI	HFD	LowFr	HighFr Var	LowDur Var	Mean30d Max	const	RevVar
(Intercept)	-6.81	1.28	4.34	-3.63	0.115	0.65	373	2.63	0.232	5.74	0.336	0.538	0.7	-25.6	0.0937	0.175
area	-2.91E-06			-1.36E-05		-9.44E-08	5.49E-05		5.29E-07			1.71E-07				
meanElev			-0.000165						3.03E-05							-2.66E-06
stdElev			0.00938	-0.037						-0.00303			-0.000175	-0.0082		-8.56E-05
meanSlope				0.947		0.00648	-0.825									
Water		-4.96	11.9	12.8	-1.55			-14.4	0.597	-25.9		1.06		119		0.829
Glacier			13.3													
Urban	-65.3										-8.72					
Forest																
Agriculture					-0.0161											
Pasture				8.64	0.205	-0.0586	2.68	-2.27		-3.54						
Wetland																
OpwithVeg	17.1				0.227		-457							48.8		
OpwithoutVeg									-0.000312							
Irrigated										17.2	5.51					
Coarse		-0.475	1.18			0.0396		-1.28		-3.88				-11.1		
Medium																
Fine																
Organic																
NoTexture															-0.117	
Shallow											0.0937					
Moraine																
DrainDens											0.853					
Pmean	0.0265			0.0724								-1.87E-04				
Tmean	-0.68			-2.87			23		-0.00118					3.29		-0.00342
PSI			-0.867			0.362						0.0726	0.0166			
AI			-2.61		0.0259	-0.299										
Cz			0.964													
CzMz																
Mz																
pCm						0.115	-80.9									
pCmi					-0.0128											
Pz																
Pzi																
Pzm			-2.09						-0.143		0.0491					
PzpCmm				12.1		0.0489			-0.0812	-0.0416				-2.76		