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Supplement of

Event controls on intermittent streamflow in a temperate climate

Nils Hinrich Kaplan et al.

Correspondence to: Markus Weiler (markus.weiler@hydrology.uni-freiburg.de)

Supplement

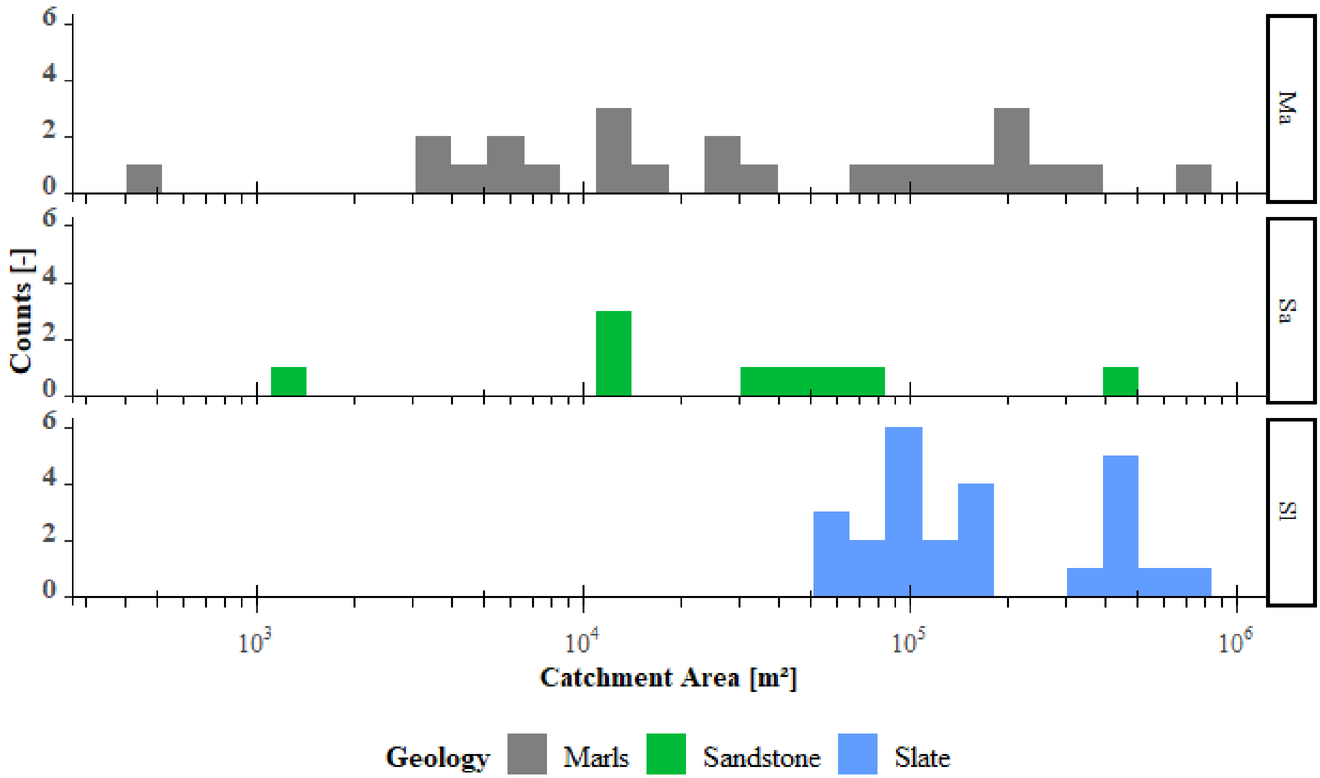


Figure S1: Distributions of the catchment areas of the modelled catchments in the geologies marls (Ma), Sandstone (Sa) and Slate (Sl). Please note, that the scale of the x-axis is logarithmic.

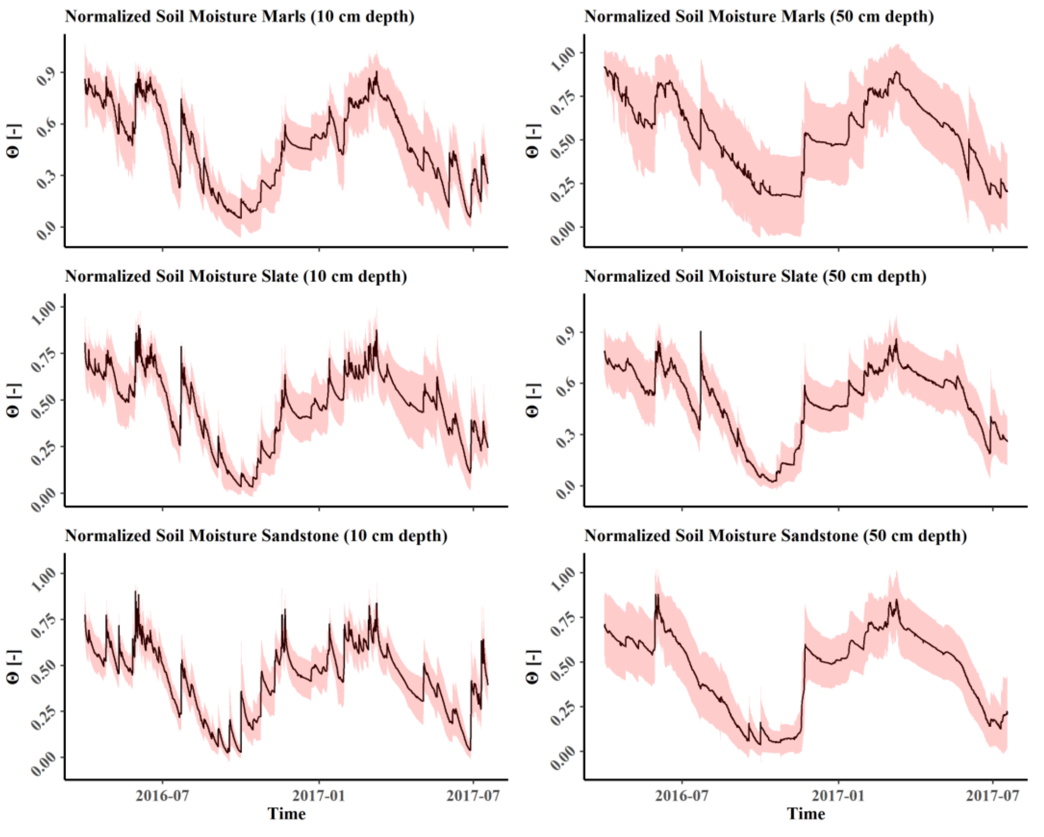


Figure S2: Normalized soil moisture dynamics in 10 cm and 50 cm depths for the three dominant geologies in the Attert catchment. The mean over all sites in one geology is shown as the black line, the red zone represents the standard deviation.

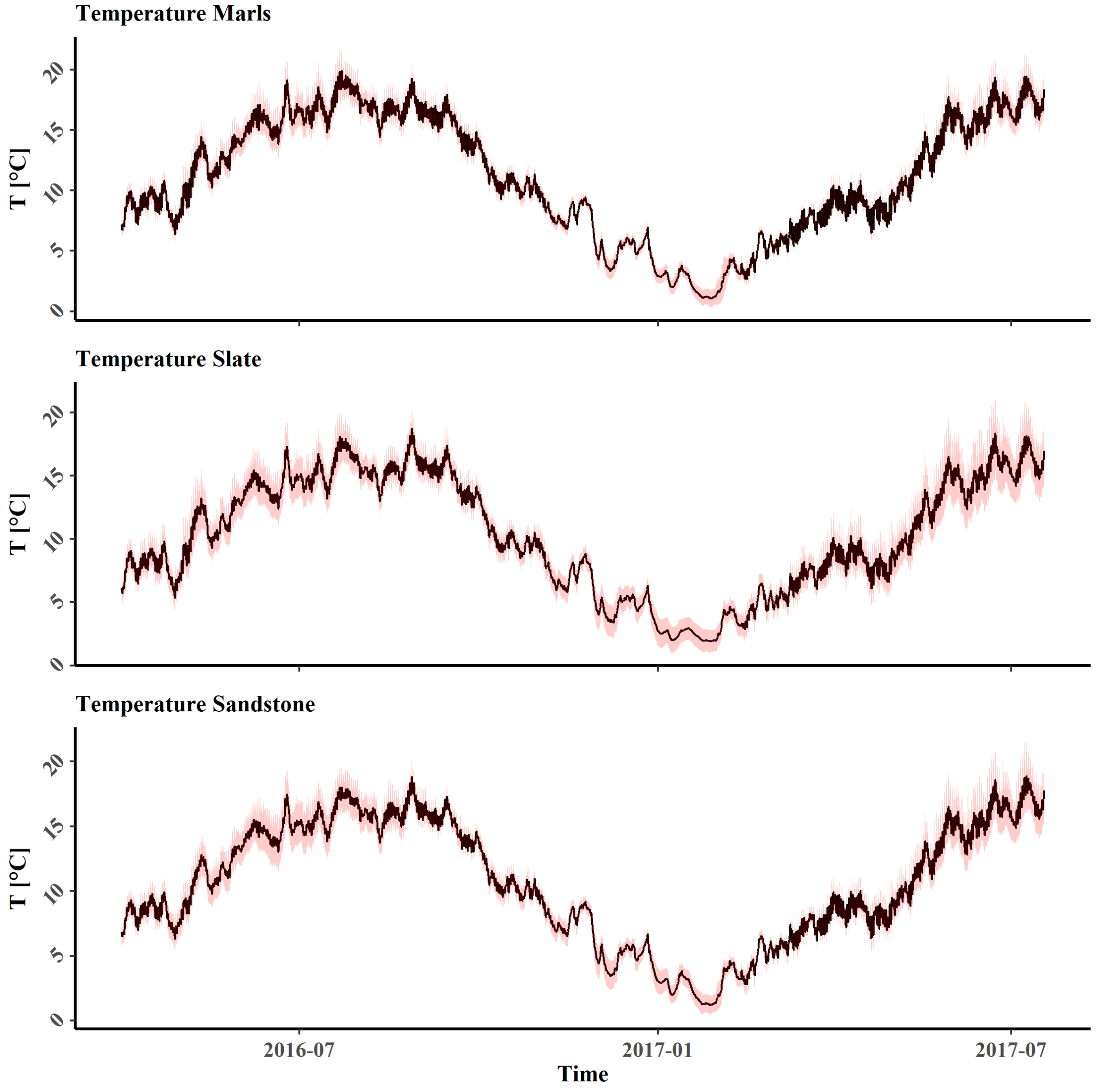


Figure S3: Average soil temperature in 10 cm depth dynamics in the three dominant geologies of the Attert catchment. The mean over all sites in one geology is shown as the black line, the red zone represents the standard deviation.

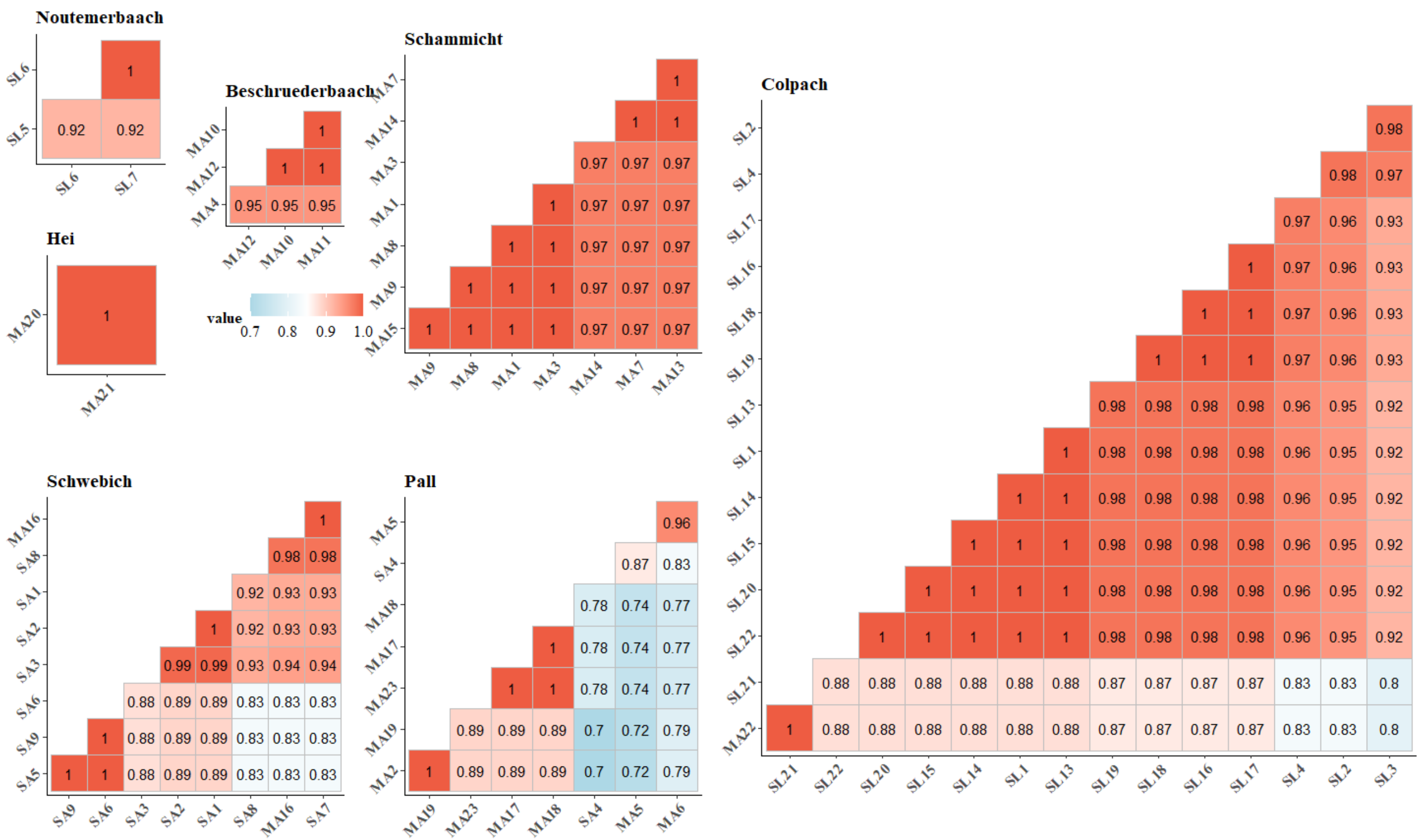


Figure S4: Correlation of precipitation time series between the sites of the 8 sub-catchments (Noutemberbaach, Hei, Beschruederbaach, Schammicht, Colpach, Schwebich, Pall, Colpach).

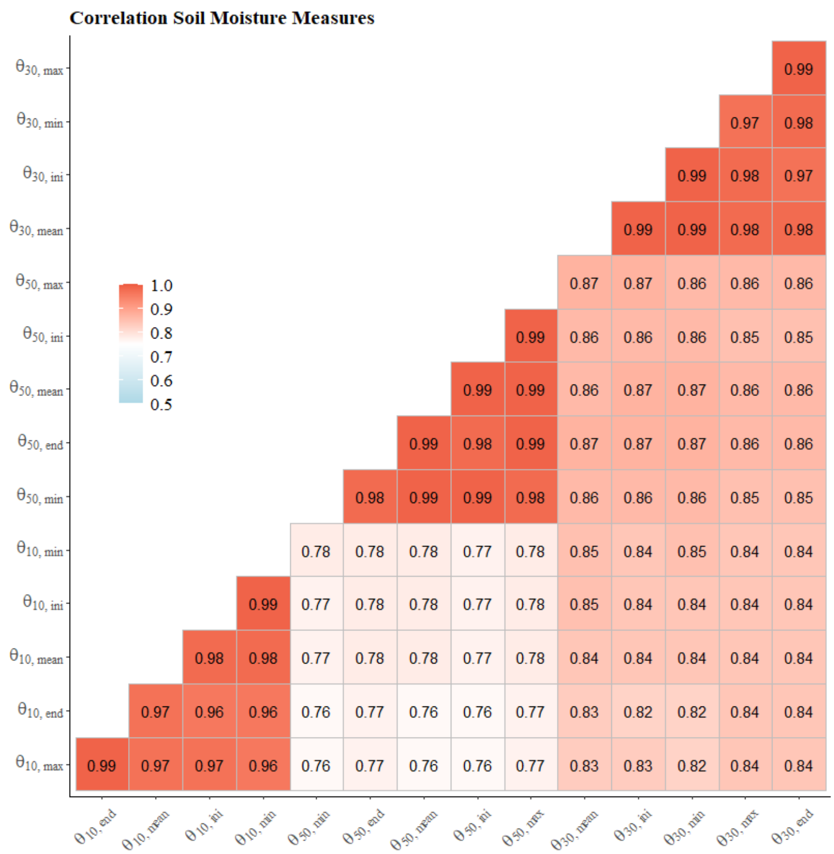


Figure S5: Correlation between different measures of soil moisture during the precipitation events. Soil moisture is shown for the depths of 10, 30 and 50cm at the initial (ini) and last timestep (end) of the precipitation event. Additionally, the minimum (min), maximum (max) and mean soil moisture during a precipitation event is included in this graph.

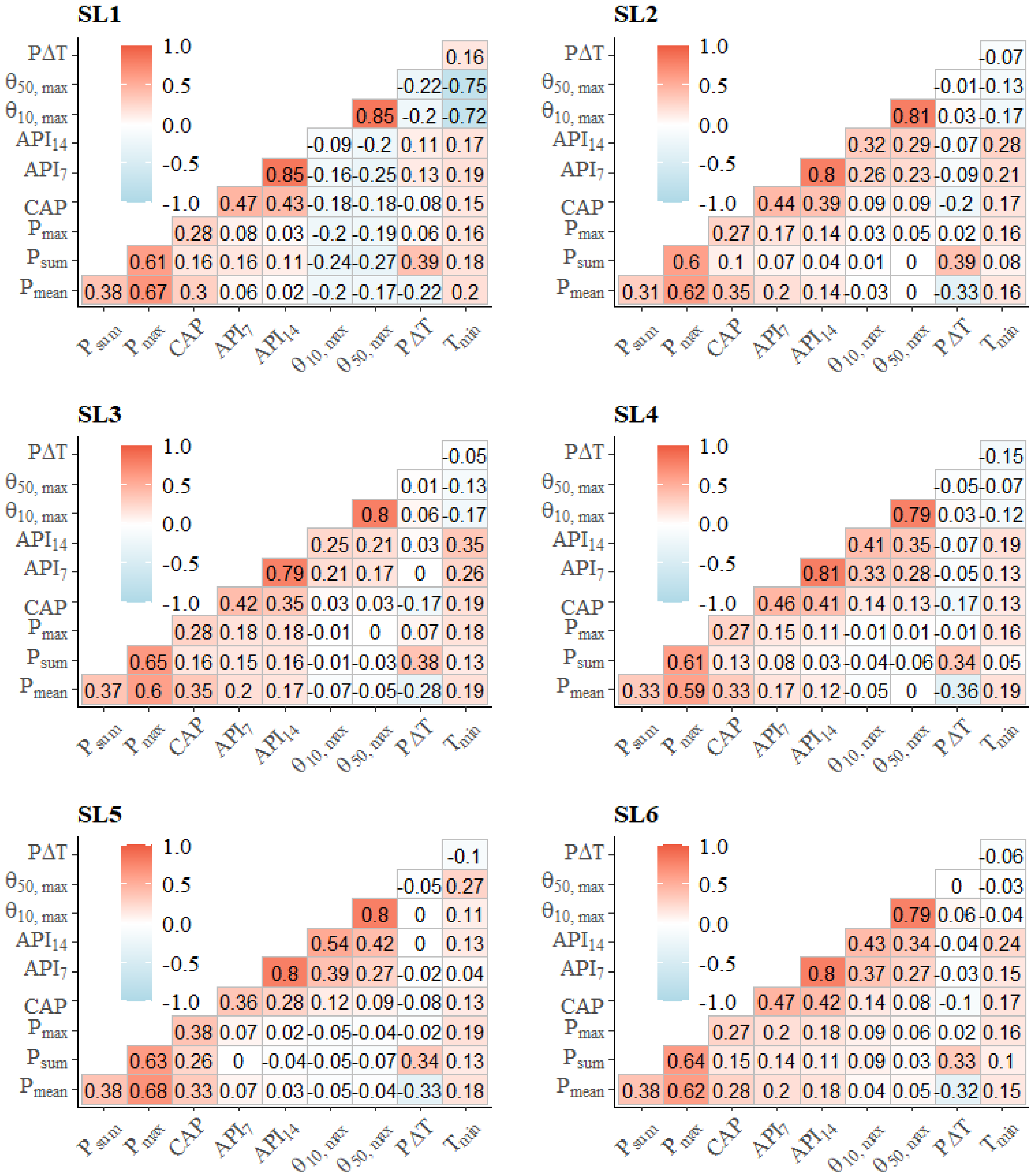


Figure S6: Correlations among the predictors at the sites on slate.

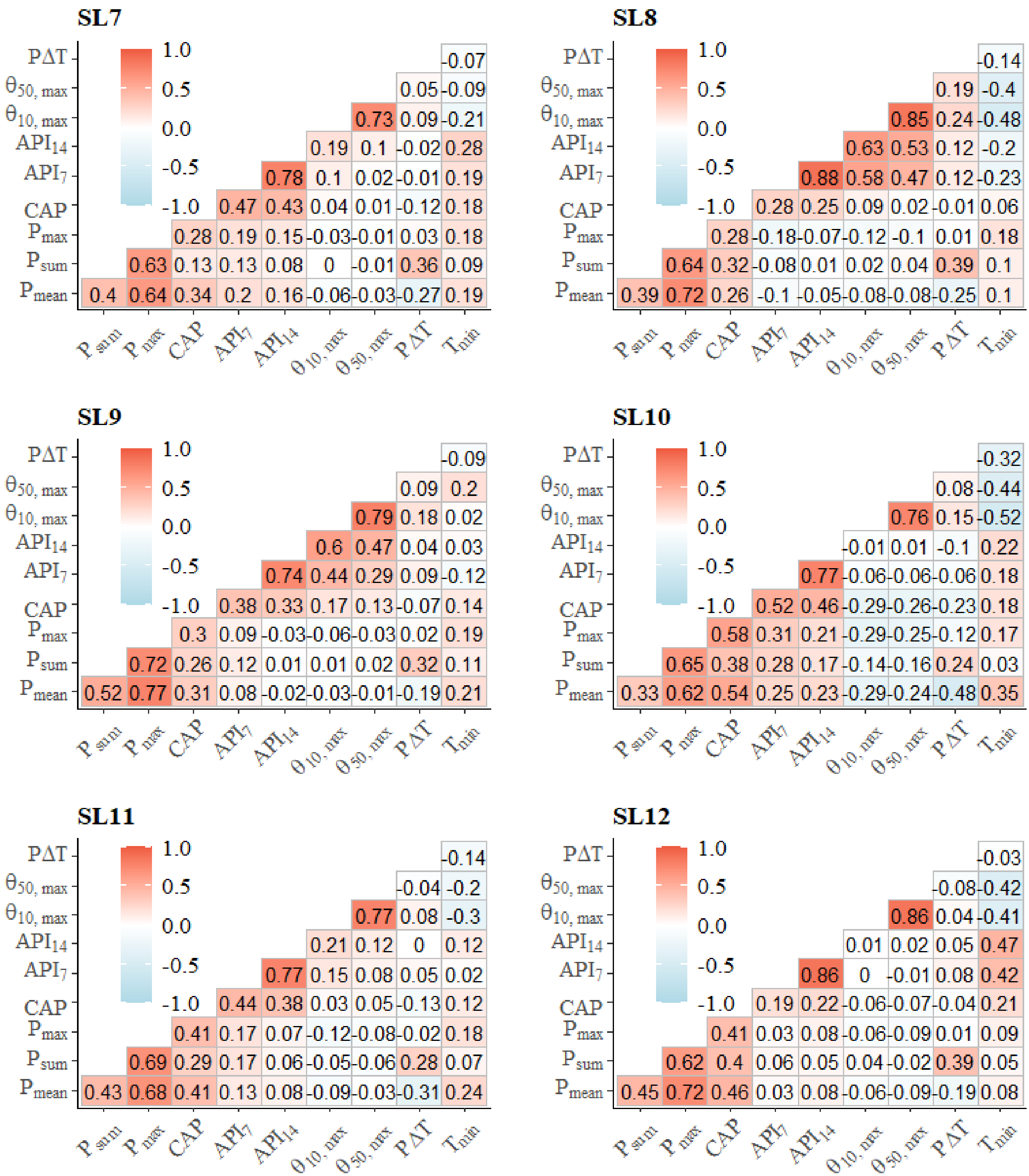
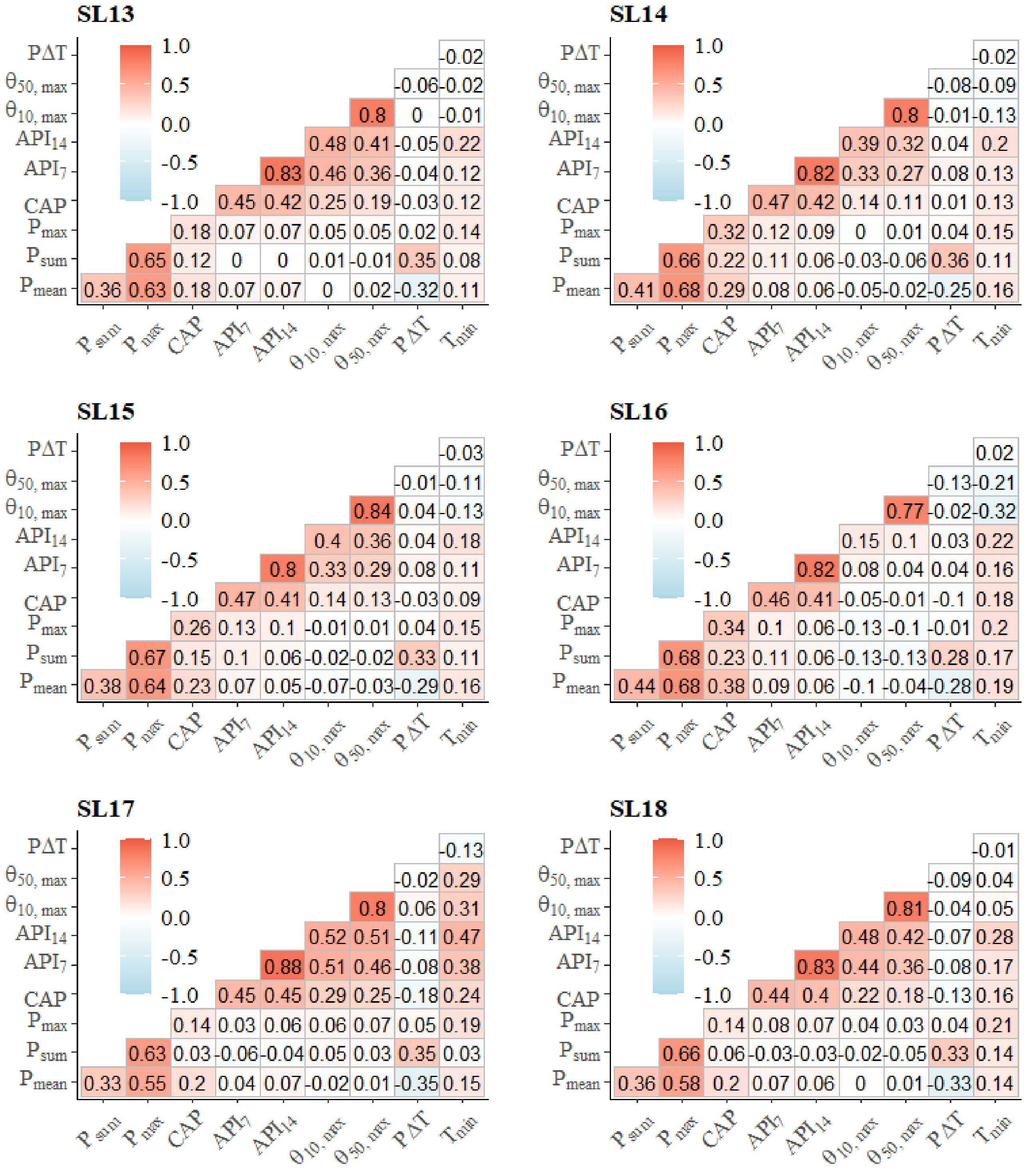


Figure S6 continued



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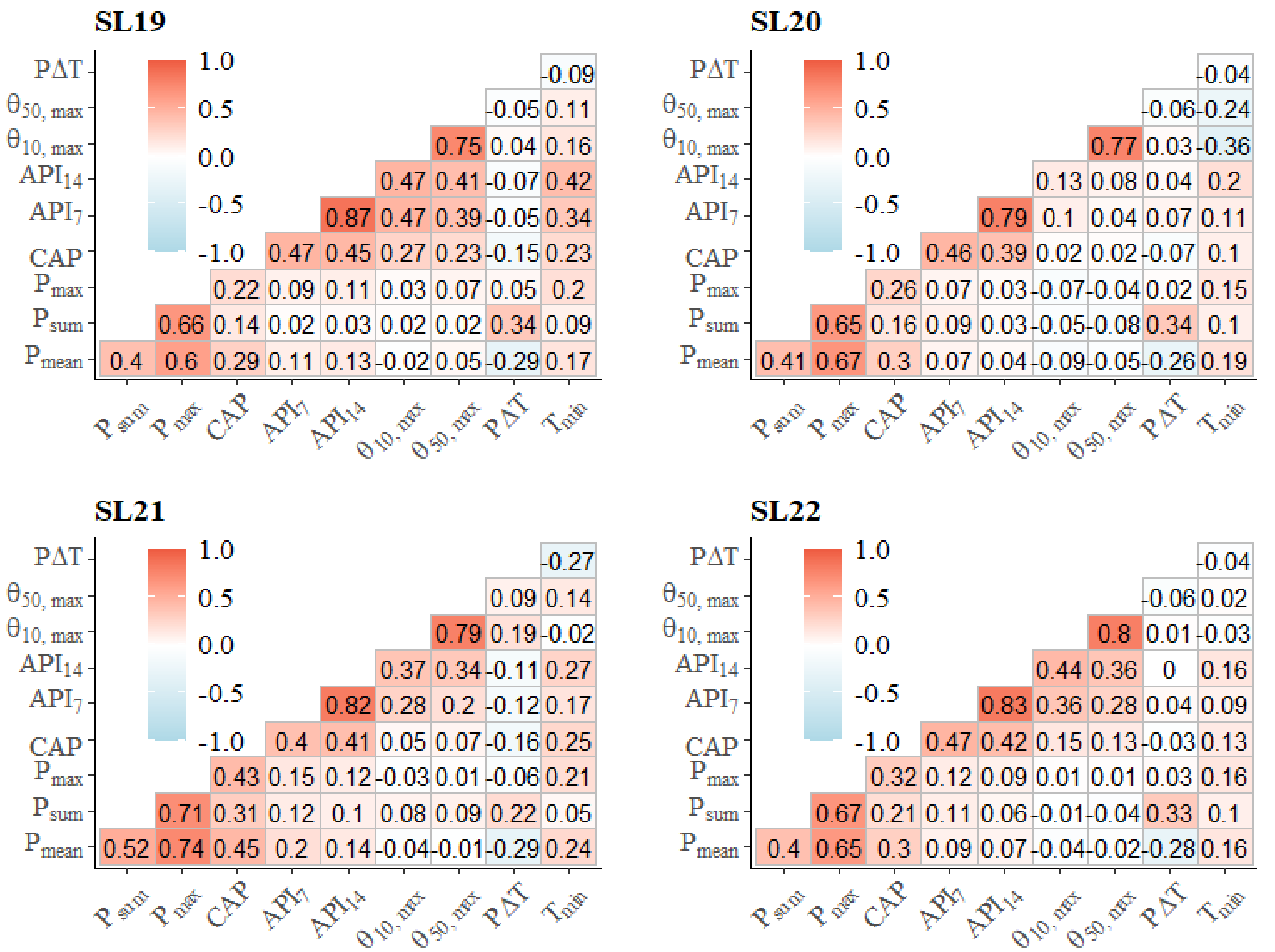

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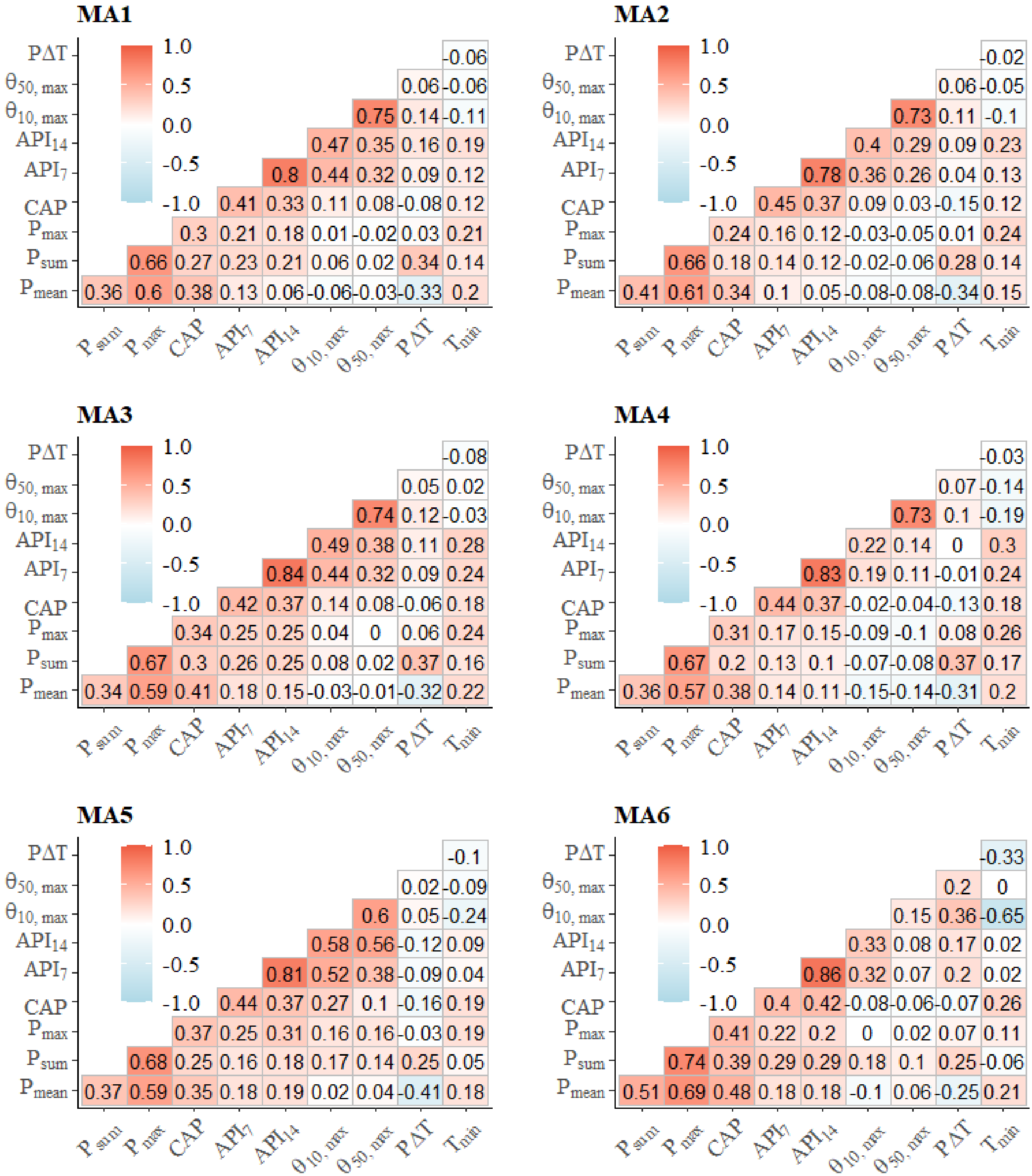
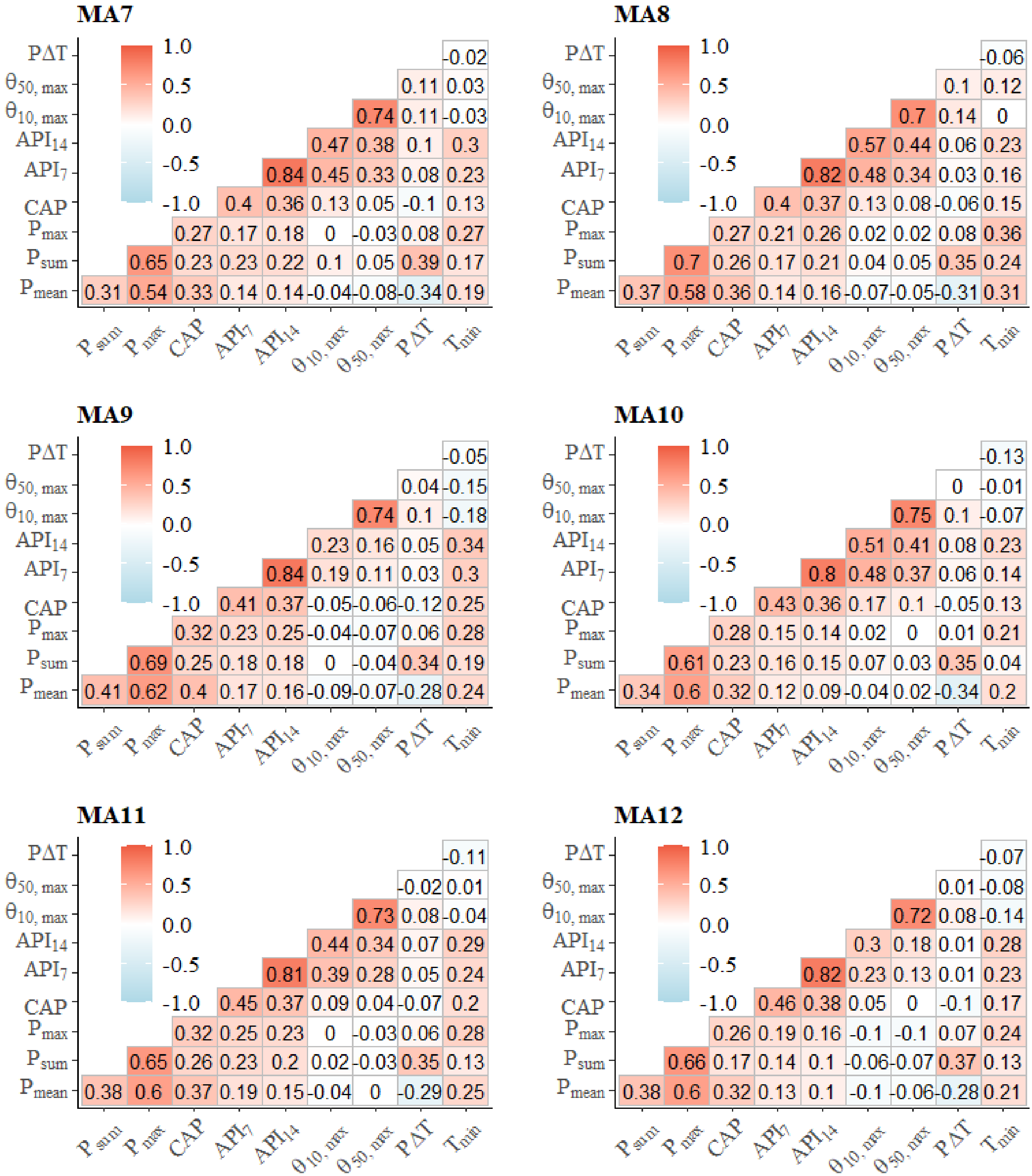


Figure S7: Correlations among the predictors at the sites on marls.



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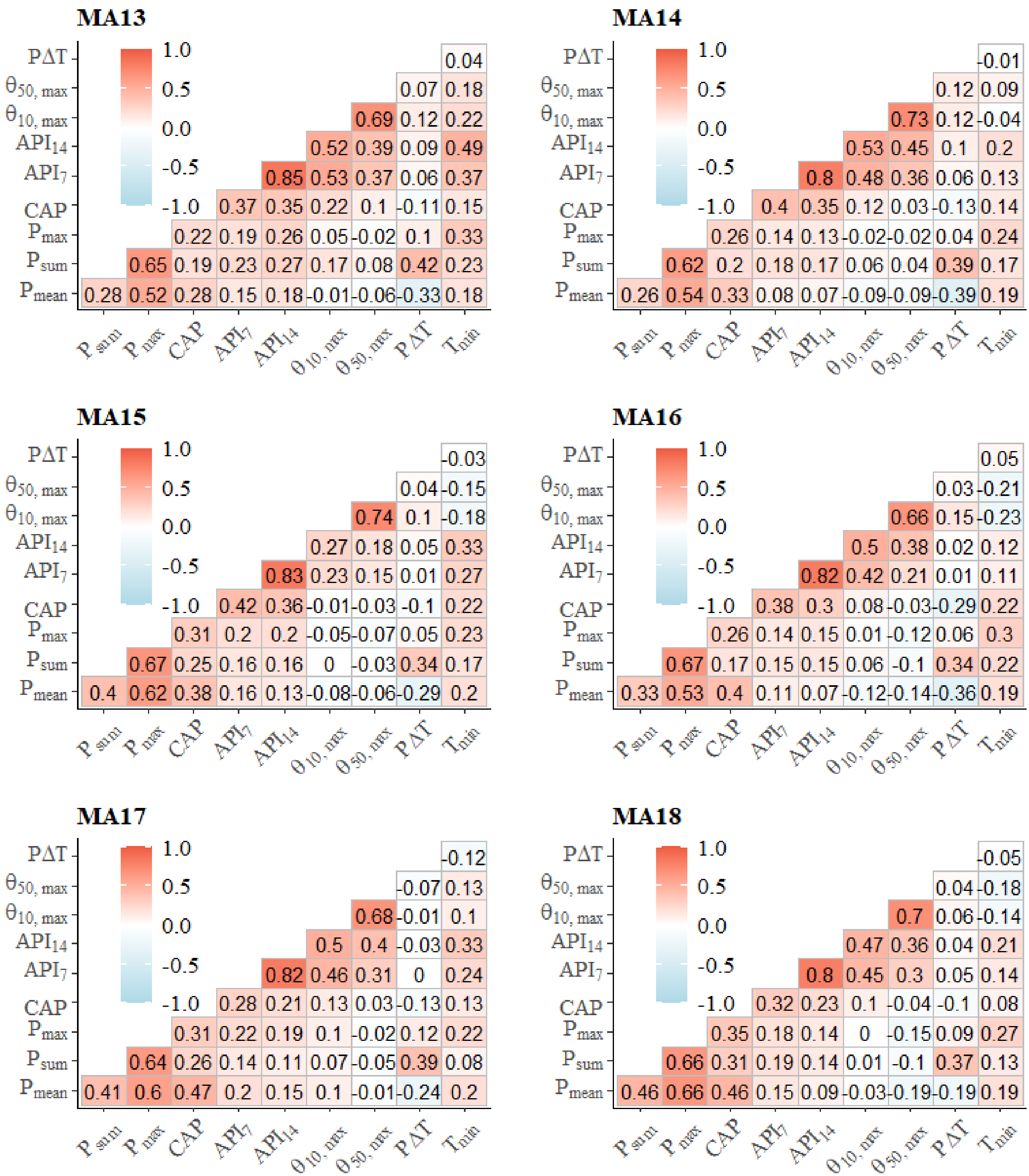

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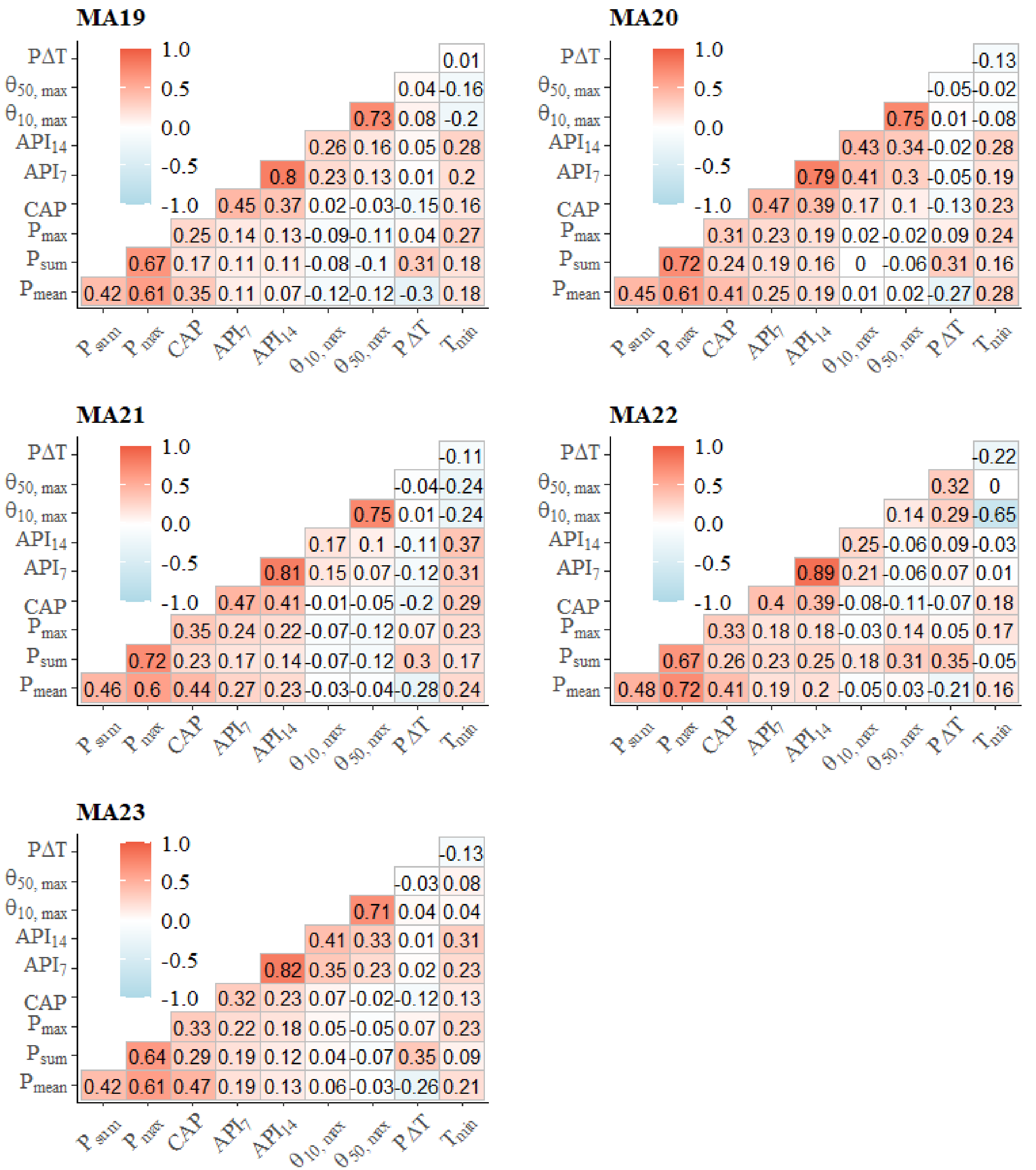

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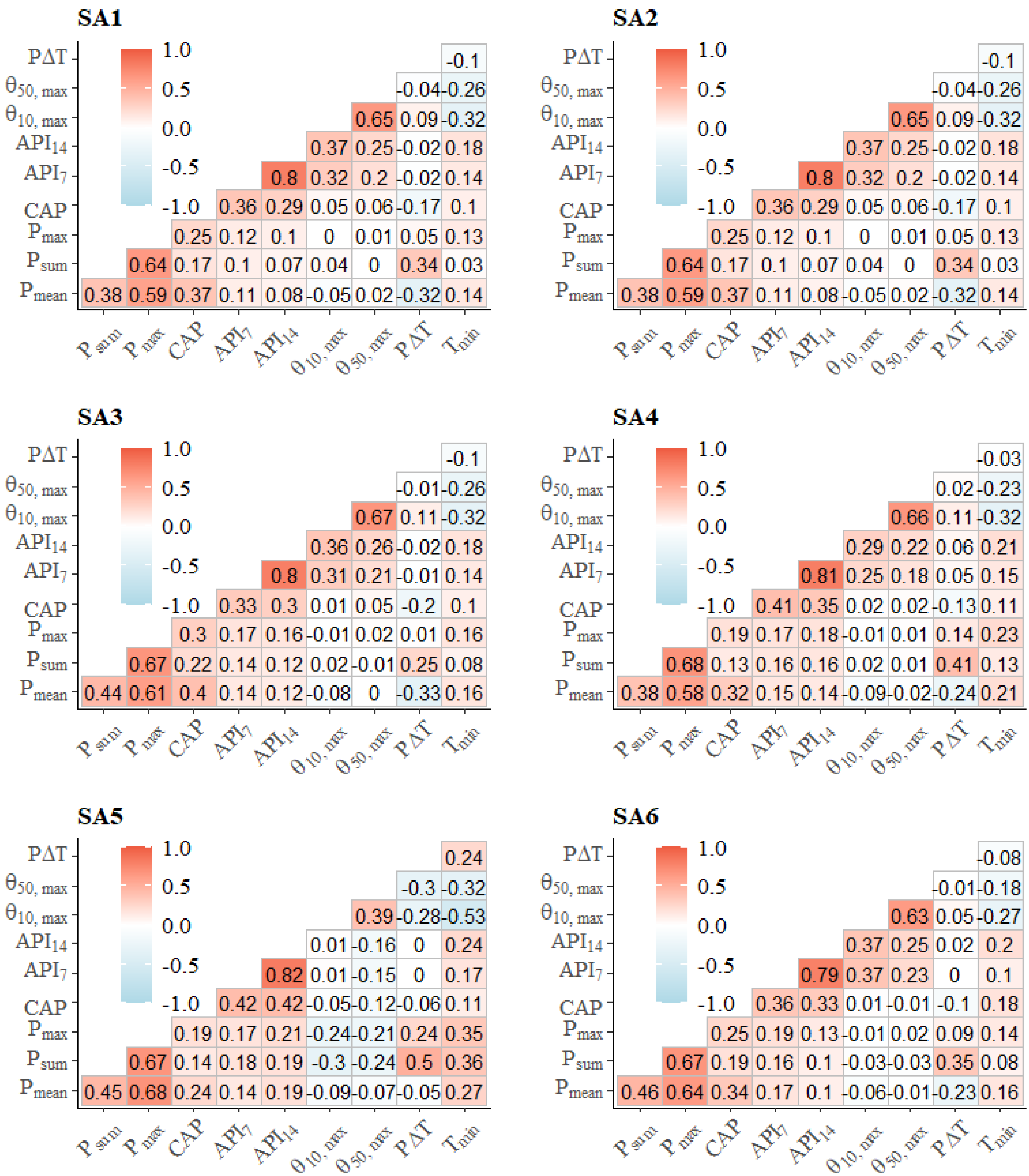
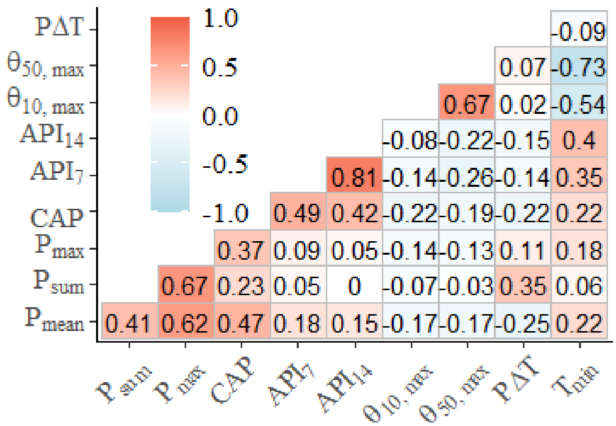
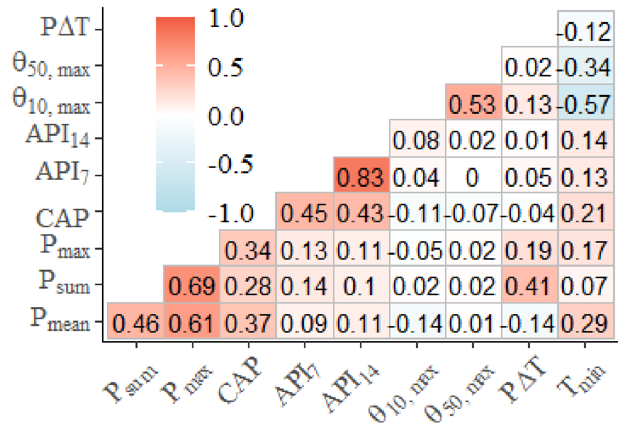


Figure S8: Correlations among the predictors at the sites on sandstone.

SA7



SA8



SA9

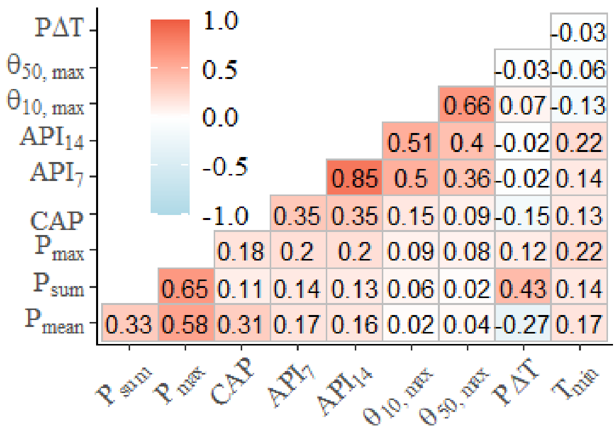


Figure S8 continued

Table S1: Number of precipitation events detected at sites of marl geology and the corresponding number of flow / no-flow responses at the sites.

Marl Sites	Events (total)	Response (flow)	Response (no- flow)
MA1	101	87	14
MA2	106	19	87
MA3	69	14	55
MA4	75	48	27
MA5	95	65	30
MA6	72	72	0
MA7	108	39	69
MA8	51	28	23
MA9	93	35	58
MA10	111	75	36
MA11	111	46	65
MA12	111	91	20
MA13	108	20	88
MA14	108	91	17
MA15	105	54	51
MA16	108	8	100
MA17	110	28	82
MA18	110	19	91
MA19	106	67	39
MA20	114	64	50
MA21	114	17	97
MA22	85	60	25
MA23	72	11	61

Table S2: Number of precipitation events detected at sites of sandstone geology and the corresponding number of flow / no-flow responses at the sites.

Sandstone Sites	Events (total)	Events (flow)	Events (no- flow)
SA1	68	12	56
SA2	61	12	49
SA3	67	12	55
SA4	110	29	81
SA5	75	73	2
SA6	101	76	25
SA7	40	25	15
SA8	109	93	16
SA9	80	75	5

Table S3: Number of precipitation events detected at sites of slate geology and the corresponding number of flow / no-flow responses at the sites.

Slate Sites	Events (total)	Events (flow)	Events (no- flow)
SL1	113	103	10
SL2	119	116	3
SL3	84	53	31
SL4	80	64	16
SL5	88	88	0
SL6	86	30	56
SL7	86	55	31
SL8	64	51	13
SL9	84	78	6
SL10	74	72	2
SL11	84	65	19
SL12	84	64	20
SL13	117	13	104
SL14	117	97	20
SL15	117	113	4
SL16	114	94	20
SL17	114	38	76
SL18	114	42	72
SL19	114	17	97
SL20	117	105	12
SL21	73	66	7
SL22	111	100	11

Table S4: Sensitivity and specificity for the evaluation of three different site-specific random forest models in marl geology, using the original data, oversampling data and over- and undersampling data Sites which were selected for the analysis of parameter importance are highlighted in bold together with their corresponding resampling method used for that analysis.

	Original Data		Over-sampling		Over- & Under-sampling	
Marl sites	Sensitivity	Specificity	Sensitivity	Specificity	Sensitivity	Specificity
MA1	1.00	0.00	**0.96**	**0.67**	0.92	0.67
MA2	0.50	0.96	**0.83**	**0.88**	0.83	0.84
MA3	0.00	0.95	0.00	0.95	0.00	0.95
MA4	**0.46**	**0.55**	0.54	0.27	0.54	0.45
MA5	1.00	0.67	**1.00**	**0.78**	1.00	0.78
MA6	NA	NA	NA	NA	NA	NA
MA7	**0.83**	**0.85**	0.83	0.85	0.75	0.85
MA8	**0.67**	**1.00**	0.58	1.00	0.67	1.00
MA9	0.83	0.88	**0.83**	**0.94**	0.83	0.75
MA10	**0.86**	**0.50**	0.86	0.33	0.76	0.58
MA11	0.93	0.95	0.86	0.95	**1.00**	**0.95**
MA12	1.00	0.50	0.93	0.50	**0.89**	**0.67**
MA13	0.29	0.96	0.71	0.92	**0.86**	**0.80**
MA14	0.88	0.17	**0.85**	**0.50**	0.81	0.50
MA15	0.73	0.87	**0.73**	**0.93**	0.67	0.93
MA16	0.50	0.97	**0.50**	**1.00**	0.50	1.00
MA17	**0.89**	**0.83**	0.89	0.83	0.89	0.83
MA18	0.17	0.96	0.33	0.85	**0.67**	**0.77**
MA19	0.90	0.60	0.86	0.60	**0.90**	**0.70**
MA20	0.65	0.79	0.70	0.71	**0.60**	**0.86**
MA21	0.17	0.96	**0.50**	**0.96**	0.50	0.93
MA22	0.94	0.57	**0.83**	**0.71**	0.83	0.71
MA23	NA	1.00	NA	1.00	NA	1.00

Table S5: Sensitivity and specificity for the evaluation of three different site-specific random forest models in sandstone geology, using the original data, oversampling data and over- and undersampling data. Sites which were selected for the analysis of parameter importance are highlighted in bold together with their corresponding resampling method used for that analysis.

	Original Data		Over-sampling		Over- & Under-sampling	
Sandstone sites	Sensitivity	Specifictiy	Sensitivity	Specificity	Sensitivity	Specificity
SA1	0.40	0.94	0.40	0.94	**0.40**	**0.94**
SA2	0.20	0.85	0.20	0.85	0.20	0.77
SA3	0.00	1.00	0.20	0.93	0.00	1.00
SA4	0.67	1.00	0.67	0.91	**0.89**	**0.83**
SA5	1.00	NA	1.00	NA	1.00	NA
SA6	0.90	0.00	0.90	0.38	**0.81**	**0.75**
SA7	0.75	0.50	0.75	0.83	**0.75**	**0.83**
SA8	1.00	0.33	0.97	0.67	**0.90**	**1.00**
SA9	1.00	NA	0.96	NA	1.00	NA

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Table S6: Sensitivity and specificity for the evaluation of three different site-specific random forest models in slate geology, using the original data, oversampling data and over- and undersampling data. Sites which were selected for the analysis of parameter importance are highlighted in bold together with their corresponding resampling method used for that analysis.

	Original Data		Over-sampling		Over- & Under-sampling	
Slate sites	Sensitivity	Specifictiy	Sensitivity	Specificity	Sensitivity	Specificity
SL1	1.00	0.00	0.93	0.00	0.87	0.00
SL2	1.00	NA	1.00	NA	1.00	NA
SL3	0.87	0.80	**0.87**	**0.90**	0.80	0.90
SL4	**0.90**	**1.00**	0.90	1.00	0.90	1.00
SL5	NA	NA	NA	NA	NA	NA
SL6	0.50	1.00	0.50	1.00	**0.63**	**0.94**
SL7	0.86	0.55	**0.86**	**0.64**	0.71	0.73
SL8	1.00	0.75	0.93	0.75	**1.00**	**0.75**
SL9	1.00	0.00	1.00	0.00	1.00	0.00
SL10	NA	NA	NA	NA	NA	NA
SL11	0.89	0.00	0.84	0.00	0.89	0.00
SL12	**0.86**	**0.75**	0.86	0.50	0.86	0.75
SL13	**0.75**	**1.00**	0.25	1.00	0.50	0.94
SL14	1.00	0.17	0.97	0.67	**0.93**	**0.83**
SL15	1.00	0.00	1.00	0.00	1.00	0.00
SL16	0.90	0.33	0.90	0.67	**0.87**	**1.00**
SL17	0.86	0.90	**0.93**	**0.95**	1.00	0.75
SL18	**0.87**	**0.95**	0.73	0.95	0.80	0.95
SL19	**0.60**	**1.00**	0.60	1.00	0.60	0.97
SL20	0.97	0.33	0.94	0.67	**0.88**	**1.00**
SL21	1.00	0.00	1.00	0.33	1.00	0.33
SL22	0.97	0.50	**0.97**	**1.00**	0.97	1.00

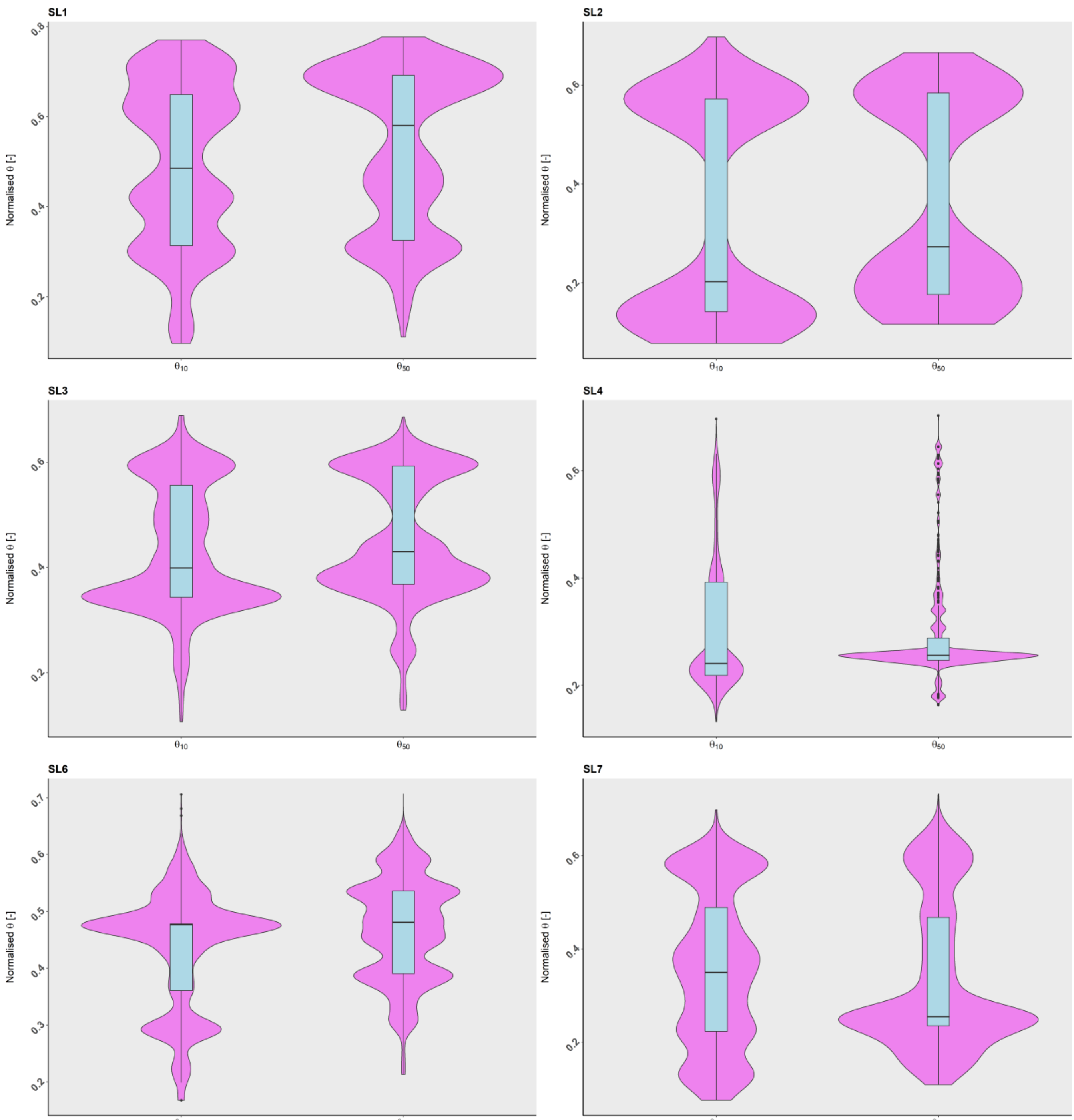
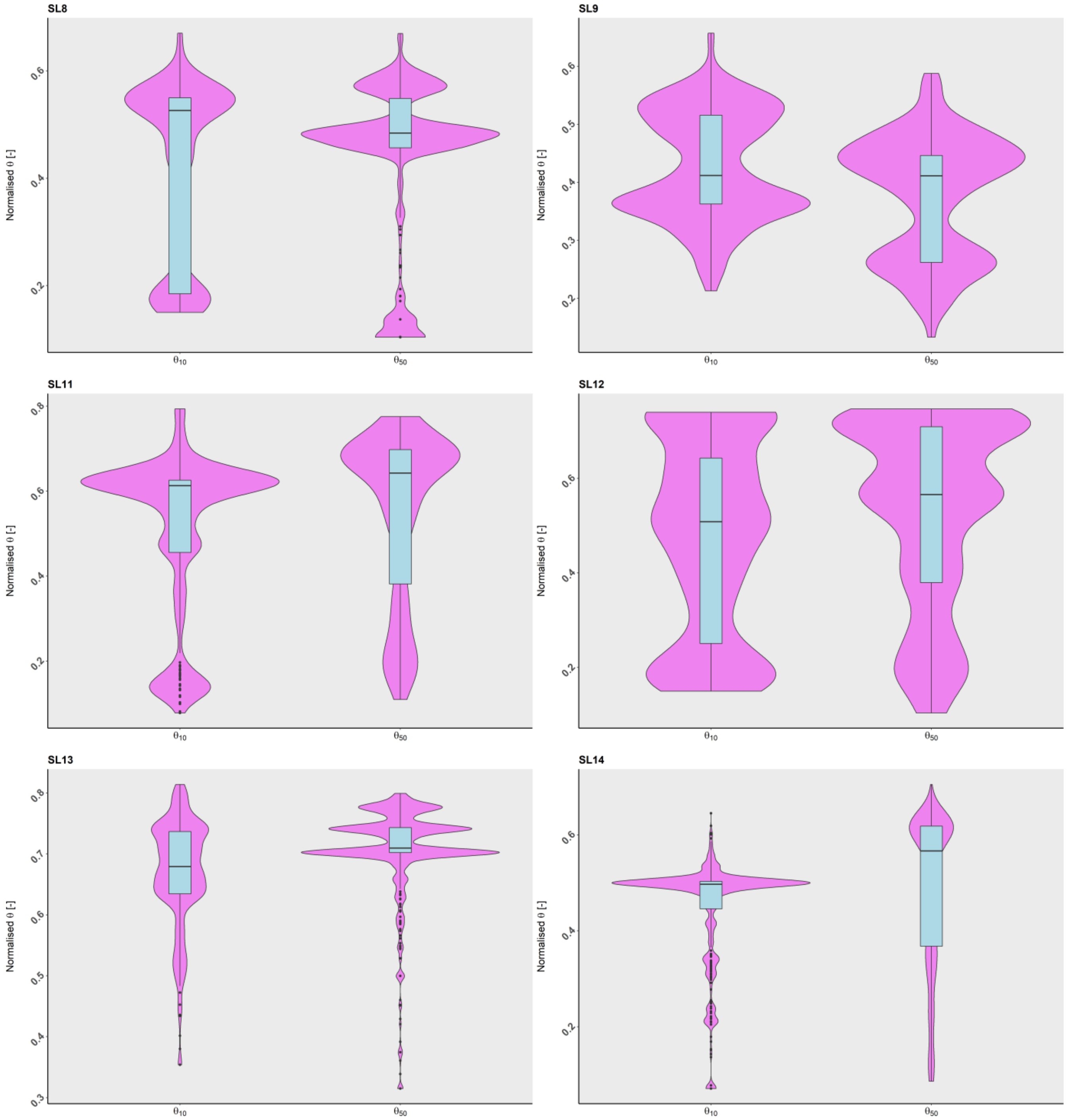


Figure S9: Distribution of thresholds that have been picked by the random forest to split the datasets of the sites on slate into the flow and no-flow classes. Each sub-plot shows the soil moisture in 10 cm depth on the left and in 50 cm depth on the right.



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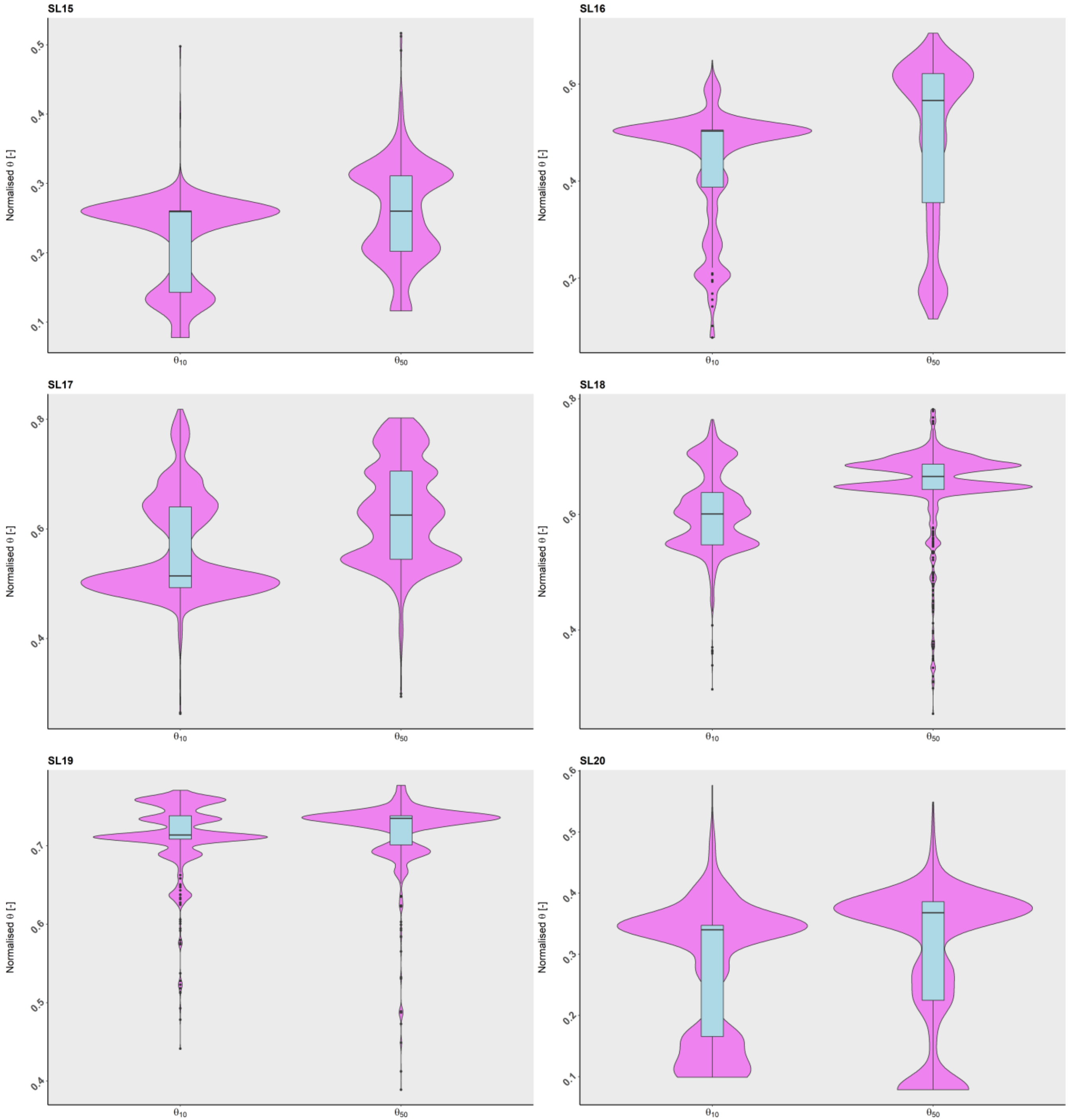

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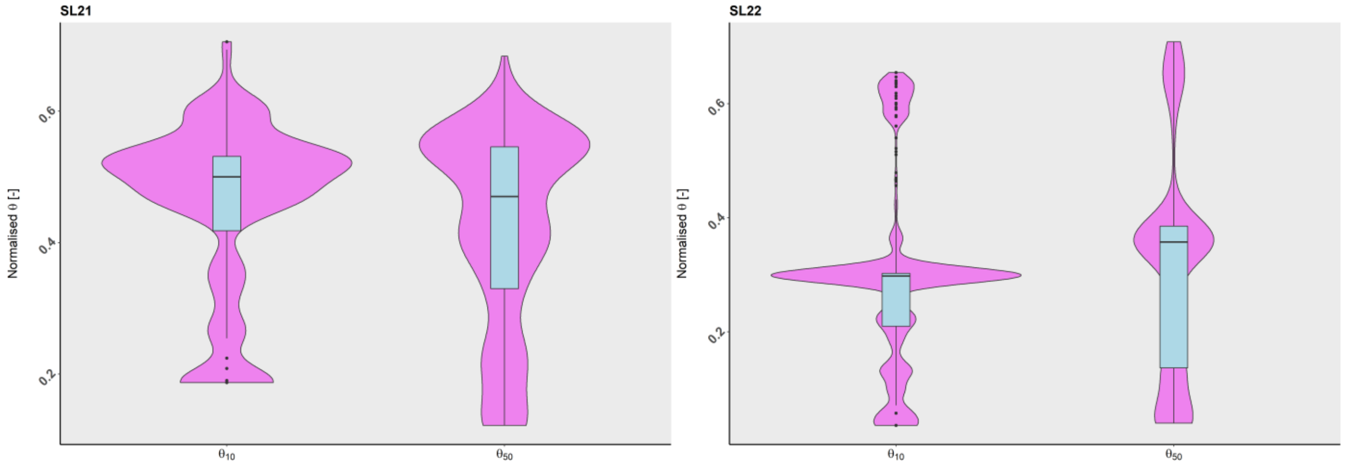

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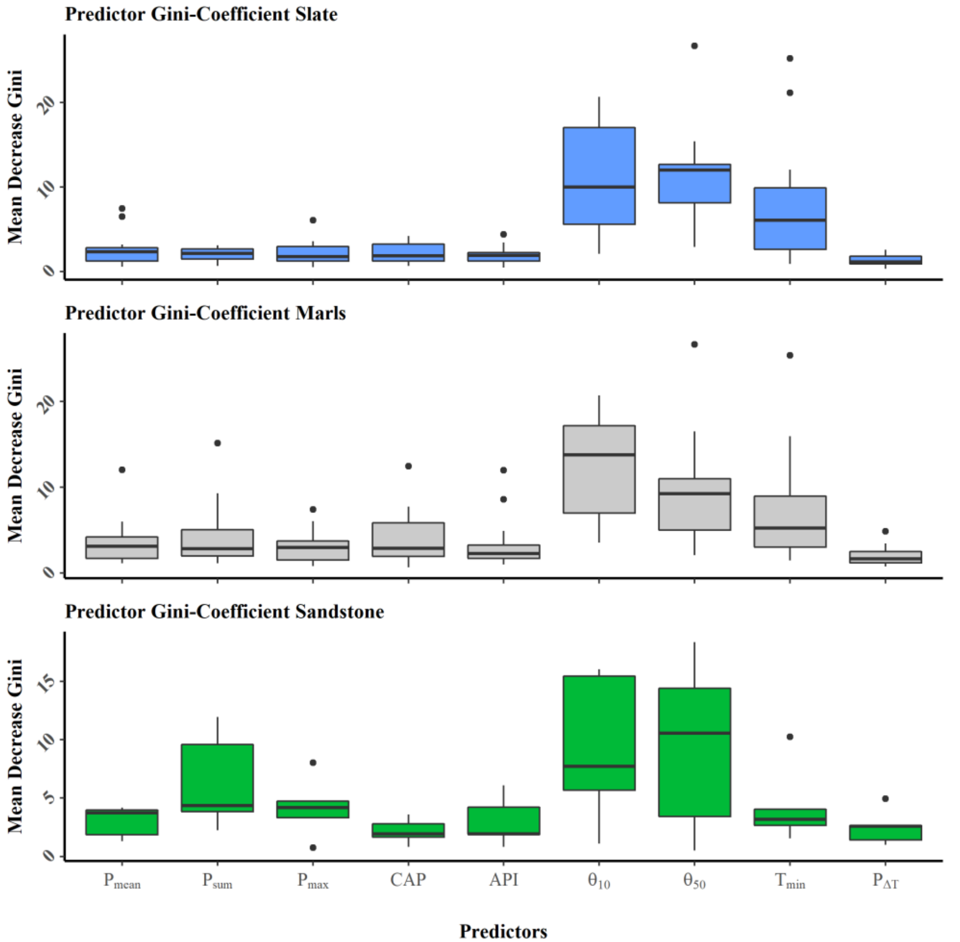

Figure S10: Distribution of Gini-coefficient for the different predictors at the different sites in the three predominant geologies.

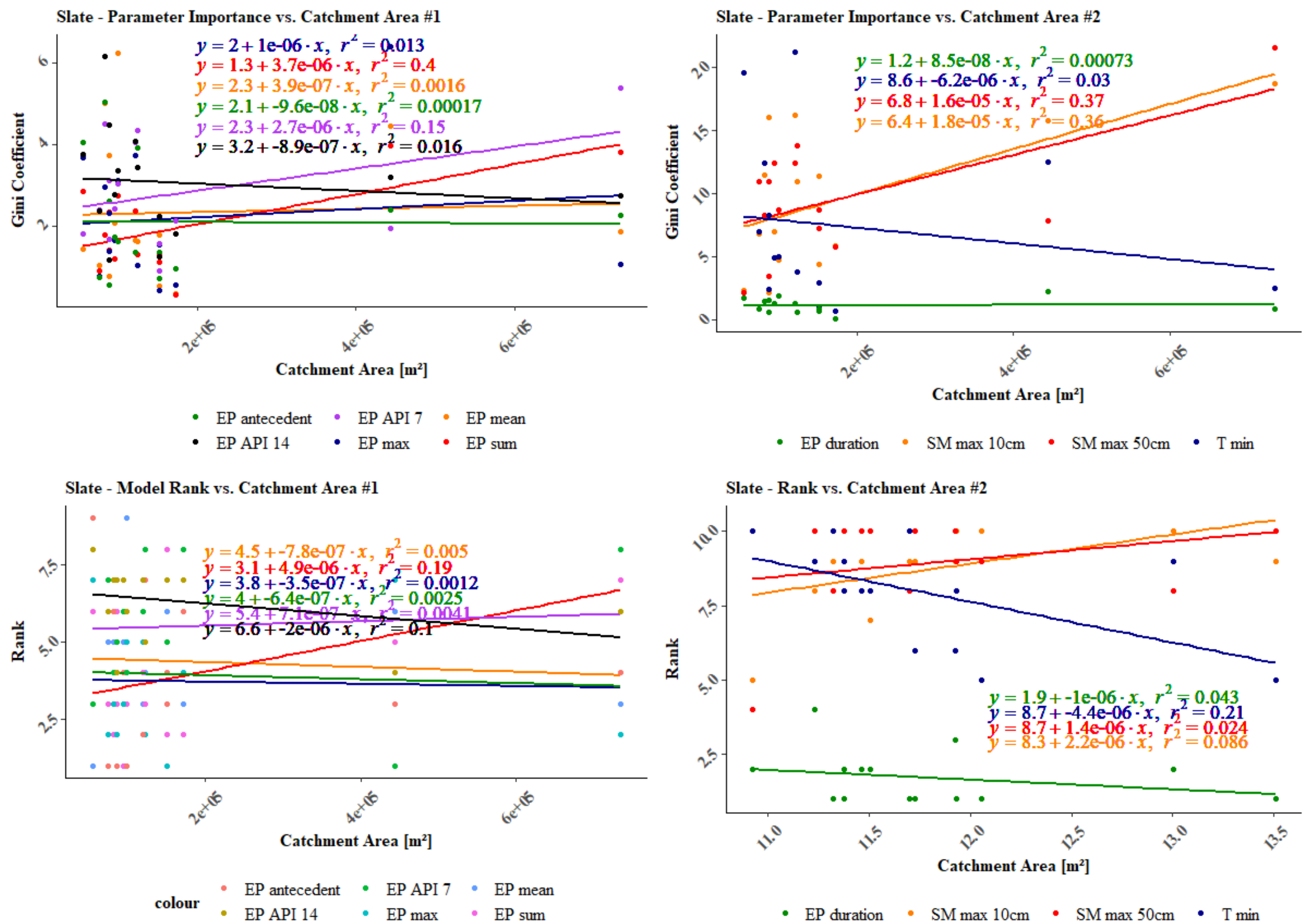

Figure S11: Correlation between catchment area and mean decrease Gini measure (top row) as well as the predictor rank (bottom row) in the slate geology. All predictors show low or very low correlation ($r^2 << 0.8$).

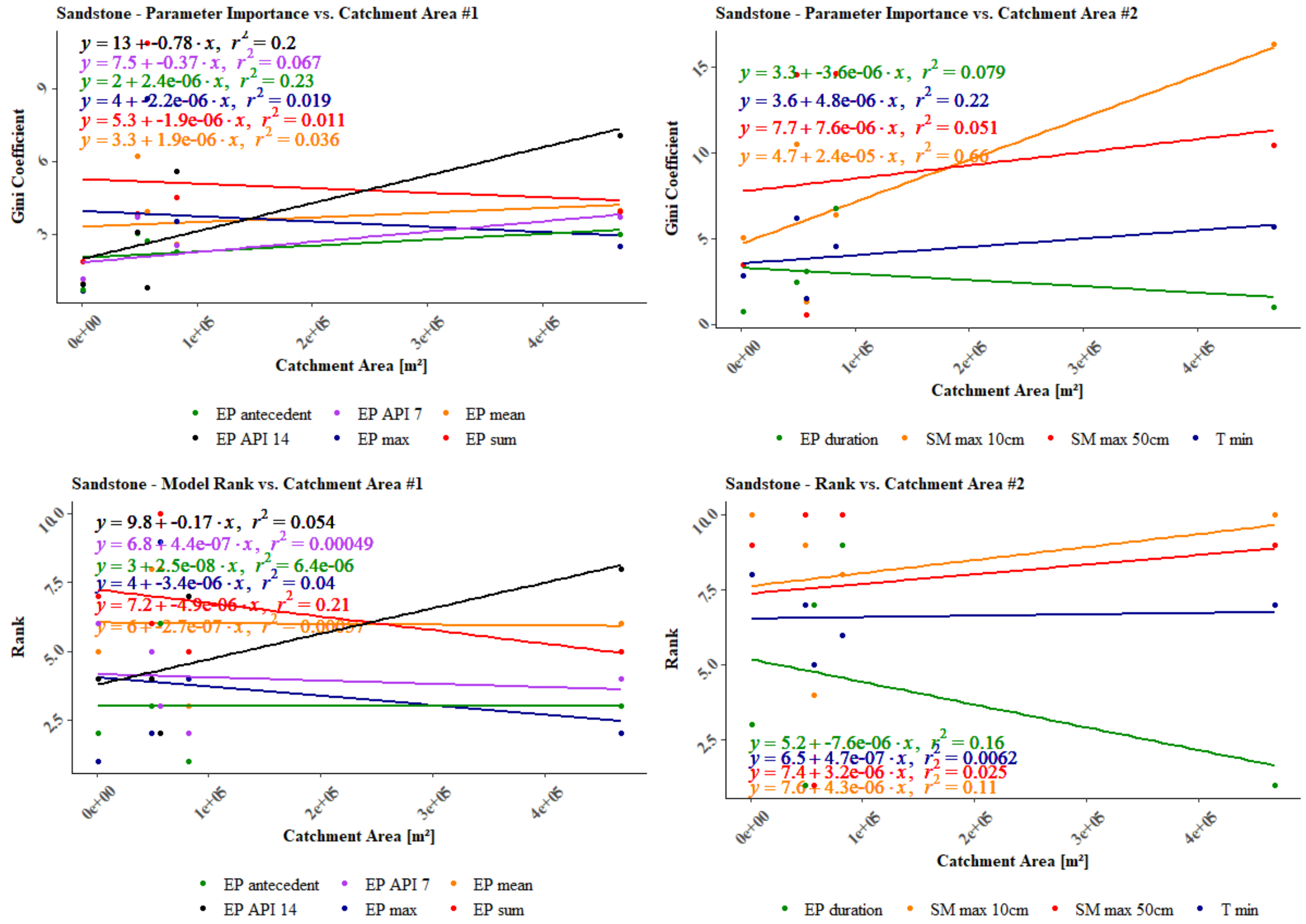

Figure S12: Correlation between catchment area and mean decrease Gini measure (top row) as well as the predictor rank (bottom row) in the sandstone geology. All predictors show low or very low correlation ($r^2 << 0.8$).

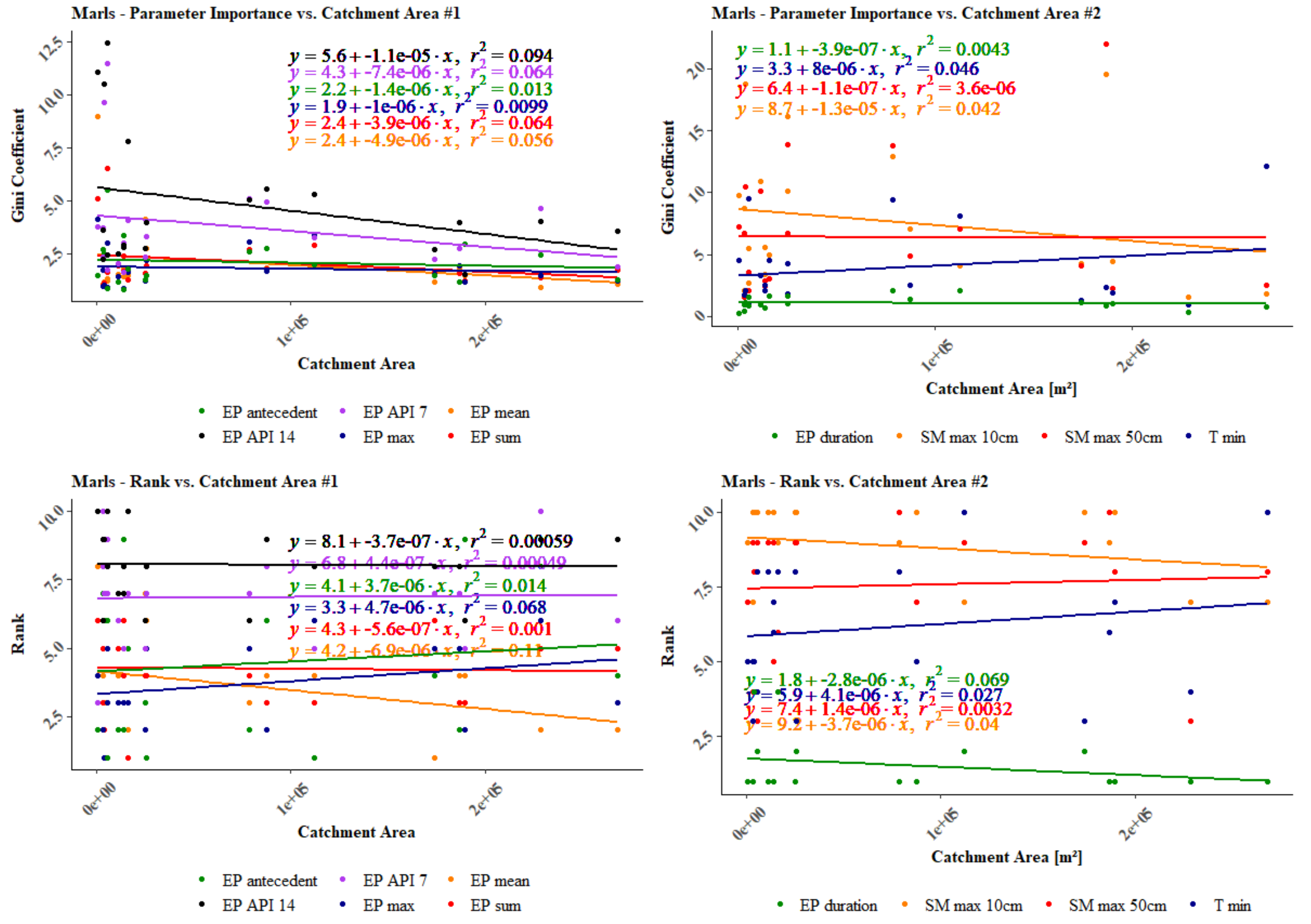

Figure S13: Correlation between catchment area and mean decrease Gini measure (top row) as well as the predictor rank (bottom row) in the marls geology. All predictors show low or very low correlation ($r^2 << 0.8$).