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)

The copyright of individual parts of the supplement might differ from the article licence.
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, Schweibich, 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
Figure S6 continued
Figure S6 continued
Figure S7: Correlations among the predictors at the sites on marls.
Figure S7 continued
Figure S7 continued
Figure S7 continued
Figure S8: Correlations among the predictors at the sites on sandstone.
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.

| Marl sites | Original Data | Over-sampling | Over- & Under-sampling |
|------------|---------------|---------------|-----------------------|
|            | Sensitivity   | Sensitivity   | Sensitivity           |
| MA1        | 1.00          | 0.96          | 0.92                  |
| MA2        | 0.50          | 0.83          | 0.83                  |
| MA3        | 0.00          | 0.00          | 0.00                  |
| MA4        | 0.46          | 0.55          | 0.54                  |
| MA5        | 1.00          | 1.00          | 1.00                  |
| MA6        | NA            | NA            | NA                    |
| MA7        | 0.83          | 0.85          | 0.75                  |
| MA8        | 0.67          | 1.00          | 0.67                  |
| MA9        | 0.83          | 0.83          | 0.83                  |
| MA10       | 0.86          | 0.86          | 0.86                  |
| MA11       | 0.93          | 0.86          | 1.00                  |
| MA12       | 1.00          | 0.93          | 0.89                  |
| MA13       | 0.29          | 0.71          | 0.86                  |
| MA14       | 0.88          | 0.85          | 0.85                  |
| MA15       | 0.73          | 0.73          | 0.67                  |
| MA16       | 0.50          | 0.50          | 0.50                  |
| MA17       | 0.89          | 0.89          | 0.89                  |
| MA18       | 0.17          | 0.33          | 0.67                  |
| MA19       | 0.90          | 0.86          | 0.90                  |
| MA20       | 0.65          | 0.70          | 0.60                  |
| MA21       | 0.17          | 0.50          | 0.50                  |
| MA22       | 0.94          | 0.83          | 0.83                  |
| MA23       | NA            | 1.00          | 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.

| Sandstone sites | Original Data | Over-sampling | Over- & Under-sampling |
|----------------|---------------|---------------|------------------------|
|                | Sensitivity   | Specificity   | 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          |
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.

| Slate sites | Original Data | Over-sampling | Over- & Under-sampling |
|-------------|--------------|---------------|------------------------|
|             | Sensitivity  | Specificity   | 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.
Figure S9 continued
Figure S9 continued
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 ($r^2 \ll 0.8$).
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 ($r^2 << 0.8$).