Supporting Materials

**Attachment, re-mobilization and inactivation of a surrogate pathogenic virus during bank filtration simulating an accidental spill and an extreme rain event**

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**Figure caption**

Figure S1 The linear regression between total MS2 concentration and infectious MS2 concentration.

**Table caption**

Table S1 Grain size distribution of the coarse-grained medium sand in the enclosure

Table S2 The temporal resolution water samples for biological parameters in experimental phase 1 (blue: infectious MS2; orange: total MS2; red: microbial activity; purple: prokaryotic cell counts).

Table S3 The temporal resolution water samples for biological parameters in experimental phase 2 (blue: infectious MS2; orange: total MS2; red: microbial activity; purple: prokaryotic cell counts).

Table S4 The coefficient of spearman correlation analysed from infiltration water samples during the whole experiment

Table S5 The coefficient of spearman correlation analysed from sediment samples collected at the end of both experimental phases



Figure S1 Sketch of facility for simulation of riverbank and slow sand filtration

Table S1 Grain size distribution of the coarse-grained medium sand in the enclosure.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Grain size (mm) | < 0.002 | 0.002 - 0.0063 | 0.0063 - 0.02 | 0.02 - 0.063 | 0.063 - 0.2 | 0.2 - 0.63 | 0.63 - 2.0 |
| Fraction (%) | 0.0 | 0.0 | 0.1 | 0.4 | 14.8 | 73.8 | 10.9 |

Table S2 The temporal resolution water samples for biological parameters in experimental phase 1 (blue: infectious MS2; orange: total MS2; red: microbial activity; purple: prokaryotic cell counts).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sampling date | sampling time | time | time interval | surface | 20 cm | 40 cm | 80 cm | outlet |
| [m/d/y]  | [h:m] |  [h] |  [h] |  |  |  |  |  |
| 11/2/2011 | 13:30 | 0 |  | ××× | ××**×**× | ×**×**× | ××**×** |  |
| 11/2/2011 | 14:30 | 1 | 1 | **×**× | ×**×**× | ×**×**× | ×**×** |  |
| 11/2/2011 | 15:30 | 2 | 1 | ×**×** | ×**×**× | ×**×**× | ×**×**× |  |
| 11/2/2011 | 16:30 | 3 | 1 |  | ×**×**× | ×**×**× | ×**×**× |  |
| 11/2/2011 | 17:30 | 4 | 1 | ×**×**× | ××**×**× | ××**×** | ×**×**× |  |
| 11/2/2011 | 18:30 | 5 | 1 | ×**×**× | ×**×**× | ×**×**× | ×**×**× |  |
| 11/2/2011 | 19:30 | 6 | 1 | **×** | ×**×**× | ××**×**× | ××**×**× |  |
| 11/2/2011 | 20:30 | 7 | 1 | ××**×**× | ×**×**× | ×**×**× | ×**×**× |  |
| 11/2/2011 | 22:30 | 9 | 2 | **×**× | ×**×**× | ×**×**× | ×**×**× |  |
| 11/3/2011 | 0:30 | 11 | 2 | ××**×** | ×**×**× | ×**×**× | ××**×**× |  |
| 11/3/2011 | 2:30 | 13 | 2 | **×** | ×**×**× | ×**×**× | ××**×**× |  |
| 11/3/2011 | 4:30 | 15 | 2 | ×**×** | ××**×**× | ×**×**× | ××**×**× |  |
| 11/3/2011 | 6:30 | 17 | 2 | **×** | ×**×**× | ×**×**× | ××**×**× |  |
| 11/3/2011 | 10:30 | 21 | 4 | ×**×** | ×**×**× | ××**×**× | ××**×**× | × |
| 11/3/2011 | 12:30 | 23 | 2 | ××**×** | ××**×**× | ×**×**× | ××**×**× | ×× |
| 11/3/2011 | 15:30 | 26 | 3 | **×**× | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/3/2011 | 18:30 | 29 | 3 | **×**× | ×**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/4/2011 | 8:30 | 43 | 14 | ××**×**× | ×**×**× | ××**×**× | ××**×**× | ××**×**× |
| 11/4/2011 | 11:30 | 46 | 3 | ×**×**× | ×**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/4/2011 | 14:30 | 49 | 3 | ××**×**× | ××**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/4/2011 | 18:30 | 53 | 4 | ×**×**× | ×**×**× | ×**×**× | ××**×** | ×**×**× |
| 11/5/2011 | 10:30 | 69 | 16 | ×**×**× | ×**×**× | ××**×**× | ×**×**× | ×**×**× |
| 11/5/2011 | 14:30 | 73 | 4 | ××**×**× | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/5/2011 | 18:30 | 77 | 4 | ×**×**× | ××**×**× | ×**×**× | ××**×**× | ××**×**× |
| 11/6/2011 | 11:30 | 94 | 17 | ×**×**× | ×**×**× | ××**×**× | ×**×**× | ×**×**× |
| 11/7/2011 | 11:30 | 118 | 24 | ××**×**× | ×**×**× | ×**×**× | ××**×**× | ×**×**× |
| 11/7/2011 | 17:30 | 124 | 6 | ×**×**× | ×**×**× | ××**×**× | ×**×**× | ××**×**× |
| 11/8/2011 | 12:30 | 143 | 19 | ×**×**× | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/8/2011 | 17:30 | 148 | 5 | ×**×**× | ××**×**× | ×**×**× | ××**×**× | ××**×**× |
| 11/9/2011 | 11:30 | 166 | 18 | ××**×**× | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/9/2011 | 16:30 | 171 | 5 | ×**×**× | ×**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/10/2011 | 12:30 | 191 | 20 | ××**×**× | ×**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/10/2011 | 17:30 | 196 | 5 | ×**×**× | ××**×**× | ××**×**× | ××**×**× | ×**×**× |
| 11/11/2011 | 10:30 | 213 | 17 | ×**×**× | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/11/2011 | 16:30 | 219 | 6 | ××**×**× | ××**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/17/2011 | 11:30 | 358 | 139 | ×**×**× | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/21/2011 | 14:30 | 457 | 99 | **×**× | ××**×**× | ××**×**× | ××**×**× | ××**×**× |

Table S3 The temporal resolution water samples for biological parameters in experimental phase 2 (blue: infectious MS2; orange: total MS2; red: microbial activity; purple: prokaryotic cell counts).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sampling date | sampling time | time | time interval | surface | 20 cm | 40 cm | 80 cm | outlet |
| [m/d/y]  | [h:m] |  [h] |  [h] |  |  |  |  |  |
| 11/21/2011 | 18:00 | 1 | 1 | ××× | ××**×**× | ×**×**× | **×**× |  |
| 11/21/2011 | 19:00 | 2 | 1 | × | ××**×**× | ×**×**× | **×**× | **×**× |
| 11/21/2011 | 20:00 | 3 | 1 | ××**×** | ×× **×**× | ××**×**× | ×**×**× | ×× |
| 11/21/2011 | 21:00 | 4 | 1 |  | ××**×**× | ××**×**× | ×**×**× | **×**× |
| 11/21/2011 | 22:00 | 5 | 1 |  | ××**×**× | ××**×**× | ×**×**× | **×**× |
| 11/21/2011 | 23:00 | 6 | 1 |  | ×**×**× | ×**×**× | ××**×**× | ×**×**× |
| 11/22/2011 | 0:00 | 7 | 1 |  | ×**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/22/2011 | 1:00 | 8 | 1 |  | ×**×**× | ××**×**× | ×**×**× | **×**× |
| 11/22/2011 | 2:00 | 9 | 1 |  | ×**×**× | ××**×**× | ××**×**× | ×**×**× |
| 11/22/2011 | 3:00 | 10 | 1 |  | ××**×**× | ×**×**× | ××**×**× | ×**×**× |
| 11/22/2011 | 4:00 | 11 | 1 |  | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/22/2011 | 5:00 | 12 | 1 | ×**×** | ×**×**× | ×**×**× | ××**×**× | ×**×**× |
| 11/22/2011 | 7:00 | 14 | 2 |  | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/22/2011 | 9:00 | 16 | 2 |  | ×**×**× | ×**×**× | ×**×**× | ××**×**× |
| 11/22/2011 | 15:00 | 22 | 6 | ×**×** | ××**×**× | ××**×**× | ×**×**× | ××**×**× |
| 11/22/2011 | 20:00 | 27 | 5 |  | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/23/2011 | 10:00 | 41 | 14 | ××**×** | ××**×** | ××**×**× | ××**×**× | ×**×**× |
| 11/23/2011 | 13:00 | 44 | 3 |  | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/23/2011 | 18:00 | 49 | 5 | ×**×** | ××**×**× | ××**×** | ××**×**× | ××**×**× |
| 11/24/2011 | 12:00 | 67 | 18 |  | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/24/2011 | 16:00 | 71 | 4 |  | ×**×**× | ×**×**× | ×**×**× | ×**×**× |
| 11/25/2011 | 12:00 | 91 | 20 | ×**×** | ××**×**× | ××**×**× | ××**×**× | ××**×**× |

Table S2 The coefficient of spearman correlation analysed from infiltration water samples during the whole experiment. (DO: oxygen concentration; EC: electrical conductivity; T: water temperature; Eh: redox potential; IMS2: infectious MS2 concentration by plaque assay; TMS2: total MS2 concentration by qPCR; TCC: prokaryotic cell number by flow cytometry, different probablity shown with a different color, yellow: P < 0.001; orange: 0.001< P < 0.01; white: 0.05<P).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | TMS2 | IMS2 | TCC | ATP | Eh | DO | EC | T |
| pH | 0.25 | 0.29 | 0.56 | 0.64 | 0.01 | 0.31 | -0.03 | -0.32 |
| T | 0.67 | 0.52 | 0.02 | -0.21 | 0.60 | -0.71 | -0.72 |  |
| EC | -0.45 | -0.77 | -0.36 | -0.10 | -0.53 | 0.50 |  |   |
| DO | -0.34 | -0.22 | 0.10 | 0.32 | -0.26 |  |  |  |
| Eh | 0.64 | 0.38 | 0.26 | 0.22 |  |  |  |  |
| ATP | 0.10 | 0.13 | 0.77 |  |  |  |  |  |
| TCC | 0.27 | 0.13 |  |  |  |  |  |  |
| IMS2 | 0.75 |  |  |  |  |  |  |  |

Table S3 The coefficient of spearman correlation analysed from sediment samples collected at the end of both experimental phases. (IMS2: infectious MS2 concentration by plaque assay; TMS2: total MS2 concentration by qPCR; TCC: prokaryotic cell number by flow cytometry different probablity shown with a different color: blue: 0.01< P < 0.05; white: 0.05<P).

|  |  |  |  |
| --- | --- | --- | --- |
|  | TCC | iATP | TMS2 |
| IMS2 | 0.12 | -0.01 | -0.01 |
| TMS2 | -0.49 | -0.53 |  |
| iATP | 0.48 |  |  |