MONITORING AND QUANTIFICATION OF SUSPENDED-MATTER TRANSFERS IN A DRAINED PLAIN AGRICULTURAL CATCHMENT

Pierre VANHOOYDONCK, Louis MANIERE, Sébastien SALVADOR-BLANES, Anthony FOUCHER, Olivier CERDAN, Olivier EVRARD, Aurélia MATHIEU, Marc DESMET
CONTEXT

20th century: Agricultural transformations

- erosion
- transfer
- silting

Aquatic environment degradation

Station CY (25/02/2015)

Station BP (drain outlet) (05/05/2015)
OBJECTIVES

- Quantification of suspended-matter transported

- Understanding of the transfer dynamics at several spatial and temporal scales
INSTRUMENTATION

- 6 stations:
  - 5 river
  - 1 drain outlet
HIGH FREQUENCY FLUXES QUANTIFICATION

FLOW

Venturi flume

Suspended sediment concentration

Turbidity

X

FLUX

Gauging

Filtration 0.45 µm
TURBIDITY – SUSPENDED SEDIMENTS CONCENTRATION CALIBRATION

\[ y = 0.7178x \]
\[ R^2 = 0.9395 \]

\[ y = 0.5401x \]
\[ R^2 = 0.9463 \]
MEASURE AND TREATMENT OF TURBIDITY DATA FOR SMALL HEADWATER CATCHMENT

High and quick water level variations

Artefacts:
- Plant residues
- Big particules
- Bubbles
  => remove

Sensor accuracy
  => mean

Filtering example of 1min instant turbidity data
BE STATION 2014-2015:
ANNUAL VARIABILITY

- Surface: 592 ha
- Total = 67 tonnes
- 29 tonnes = 43%
- 6 floods => 90% export flux
- 1 week => 74%
- 2 days 8 hours => 50%
- Flux rate: 0.13 t.ha\(^{-1}\).yr\(^{-1}\)
**ANNUAL FLUX DYNAMICS (2014-2015)**

<table>
<thead>
<tr>
<th>Station</th>
<th>MS2% : flux transferred in one week (%)</th>
<th>TS50% : minimal time to export 50% of the total annual flux</th>
</tr>
</thead>
<tbody>
<tr>
<td>CY</td>
<td>65</td>
<td>2 days 16 hours</td>
</tr>
<tr>
<td>BE</td>
<td>74</td>
<td>2 days et 8 hours</td>
</tr>
<tr>
<td>GB</td>
<td>72</td>
<td>1 day 15 hours</td>
</tr>
<tr>
<td>MA</td>
<td>64</td>
<td>2 days 13 hours</td>
</tr>
<tr>
<td>BP</td>
<td>65</td>
<td>2 days 14 hours</td>
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</tbody>
</table>

Transfers during short time periods

High frequency acquisition

Uncertainties during floods
### Spatial and Inter-annual Variability

<table>
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</thead>
<tbody>
<tr>
<td>CY</td>
<td>-</td>
<td>0.015</td>
<td>0.065</td>
</tr>
<tr>
<td>BE</td>
<td>0.36</td>
<td>0.13</td>
<td>0.18</td>
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<tr>
<td>GB</td>
<td>0.38</td>
<td>0.07</td>
<td>0.16</td>
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<tr>
<td>MA</td>
<td>0.24</td>
<td>0.13</td>
<td>0.22</td>
</tr>
<tr>
<td>BP</td>
<td>0.03</td>
<td>0.02</td>
<td>0.07</td>
</tr>
</tbody>
</table>

**Important inter-annual variability**

**Spatial variability**

**Land use**

**Sources**

Louroux watershed
Measure station
Erosion rate (t/ha/an)

- 0.02
- 0.05
- 0.1

N
0 0.5 1 1.5 2 km
SEASONAL VARIABILITY
CONCLUSION

- Long time monitoring
  - Important inter-annual and seasonal variability
  - Data quality needs time
    - Calibration improvement
    - Reduce uncertainties
    - Filtering signal
THANK YOU FOR YOUR ATTENTION
Erosion Vulnerability

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