

Coupling urban event-based and catchment continuous modelling for combined sewer overflow river impact assessment

Authors: I. Andrés-Doménech, J. C. Múnera, F. Francés and J. B. Marco

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Response to Referee Comment RC-C1634 – Anonymous Referee #2

On behalf of co-authors, I thank gratefully Anonymous Referee #2 for his positive review and useful comments. Then, here are the responses for specific referred issues.

1. Event based vs. continuous modelling

This idea was also pointed out by referee #1 (minor comment 9). Event based approach allow to quickly screening a wide range of design possibilities or alternatives. Nevertheless, simulation procedures are more time consuming. However, they can be used to refine the solution by exploring with more details few final alternatives. A more detailed explanation of this issue will be incorporated in the revised version of the manuscript.

2. Independence between variables

This fact is widely discussed in the referred reference (Andrés-Doménech et al., 2010). Nevertheless, we are pleased to include here some evidences which support the adopted hypothesis of independence.

To provide further support to the assumption of independence among the identified rainfall events, it is necessary to check the independence between variables. In fact, independent events are characterised by the absence of temporal correlation for each of the stochastic processes as well the absence of mutual correlation between them. From the cross correlation analysis, the computed cross correlations coefficients between s,v , s,i_M and s,b are very close to 0 ($\rho_{s,v}(0)=-0.06$, $\rho_{s,i_M}(0)=-0.05$ and $\rho_{s,b}(0)=-0.03$). Notice that mutual independence

1 between all variables and s is confirmed while one notes the presence of correlation between v
2 and b ($\rho_{v,B}(0)=0.54$) and also between i_M and b ($\rho_{B,iM}(0)=0.49$). This outcome was also found
3 by other authors (Adams and Papa, 2000). However, the above cross correlation is not
4 appreciable enough to affect the results (see also Andrés-Doménech et al., 2010).

5

6 **3. Infoworks**

7 Indicative data over computational time could be included in the revised version of the
8 manuscript. The simulation of the set of 27 synthetic events takes about 10-15 minutes, while
9 a continuous simulation of about 10 years could take some hours (10-15). Nevertheless, apart
10 from the relative importance of the computational time (perfectly assumable in this specific
11 case), we think that both approaches could be valid taking into account its own advantages
12 and disadvantages. In this sense, the decision of adopting the event based approach has more
13 to do with the statistical representativeness of the rainfall.

14

15 **4. Hydrologic model**

16 We completely agree on this point. The paper only presents a first approach based on dilution
17 criteria where dynamics and reactions between pollutants are not analysed. A more detailed
18 explanation of this limitation will be included in the revised version of the manuscript.
19 Referee should understand the main objective was coupling hydrological and urban models at
20 the proper time scale, with less attention to quality submodel, mainly because the lack of data
21 in this case study.

22

23 **5. Coupling with a full 2D hydraulic model**

24 We also agree with this interesting suggestion. A future development could include in the
25 coupled scheme a full hydraulic model, which will allow also to analyse the pollutants
26 transformations along the river. Nevertheless, we think it would be enough with a 1D
27 hydraulic model because the study focuses on the river.