

## Authors Response (AR) to RC #2

*This article addresses a highly needing yet challenging problem, deriving the topology of urban drainage networks from land surface data. A novel algorithm was developed and when applying to four various urban areas the accuracy (60-75%) is acceptable, especially given the complexity of the problem and uncertainties of the input data. Specific comments are as follows:*

**AR:** We would like to thank you for your constructive comments and criticism. We will try our best to address the issues that you've raised in the next revision. Here is our point-to-point response to the comments.

1. *The term "Below-ground Urban Stormwater Networks (BUSNs)" seems created by authors? Why not more commonly used term, such as "Urban Drainage Networks"?*

**AR:** Since "Urban Drainage Network" is a general term that includes both surface and subsurface components, we used BUSN to explicitly reflect the objective of the manuscript, i.e., estimating topology of the below-ground components (not surface components such as street inlets) of an urban stormwater (not sanitary/combined sewer) drainage network.

2. *Although not explicitly said, Figure 1 and line #23 seem indicating that authors focused on separate sewer systems (i.e., not combined sewer systems) and only stormwater drainage networks (i.e., not sewer networks)? Noting there are hundreds of cities in the US that have combined sewer systems, how well would this algorithm apply to those systems?*

**AR:** Yes, that is correct, our study only concerns with stormwater network. We will explicitly mention that Municipal Separate Storm Sewer System (MS4) is the subject of this study in the next revision. Regarding extensibility of our algorithm to combined sewer networks, it requires further study, since the design criteria of combined sewer networks are different than stormwater networks'.

3. *Validation was performed using a metric for coverage as the goal seems to be deriving the "topology". I'm curious if authors considered and compared slope and size of pipes? How would slope and size be implemented in large-scale urban hydrologic modeling?*

**AR:** Unfortunately, the slope and size of existing BUSN are not available publicly for the urban areas that we selected for this study. In our algorithm, however, we do provide an estimate for the pipe slopes and sizes (lines 237-251) but since real data are not available, we cannot estimate their accuracy.

4. *Line 15: "urban population will grow from half to more than two-thirds of the total population by 2050." I'd suggest to delete "from half", or add "from half by 2008".*

**AR:** Thanks for the suggestion, we will make this change in the next revision.

5. *Line 24: "most urban modules in existing hydrological models..." provide references and/or give examples.*

**AR:** We will add examples in the next revision.

6. *Line 159: "60% of a pipe length from the real BUSN is within this buffer zone, the pipe is considered "covered"." Did authors consider other values as the criteria? I'm curious how sensitive this criteria would be.*

**AR:** Yes, we tested the model sensitivity to this threshold using threshold values ranging from 50-80% and the difference in the total coverage percentage was in the order of 1%. So, the model is not very sensitive and we opted for using 60%.

7. *Line 381 vs. line 9: 59-76% vs. 60-75%. Which one is correct?*

**AR:** Thanks for catching this. The correct values are 59-76%. We will fix this in the next revision.