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Interactive comment on “Development and verification of a real-time stochastic precipitation nowcasting system for urban hydrology in Belgium” by L. Foresti et al.

Anonymous Referee #2

Received and published: 12 November 2015

Summary: The current work describes the implementations of the Short-Term Ensemble Prediction System (STEPS) for Belgium and assesses its impact of a number of case studies.

Overall quality: This is a nicely written paper and I really enjoyed reading it! The authors address an important topic in radar remote sensing dealing with the probabilistic forecasting of precipitation. I only have a few small concerns with respect to this manuscript (see below). Once these issues have been properly addressed, I believe this paper can be accepted for publication in Hydrology and Earth System Science.

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Major concerns:

- 1) A major concern that I have with this work is that the authors have failed to discriminate the impact of work with respect to previous contributions where STEPS was used. Sure the area of focus is different (Belgium in this case), but it would be nice if the authors could address this issue a bit further in the manuscript.
- 2) Page 6846 lines 7-8 and Fig. 2 a,b: The authors mention here the impact of the bright band resulting in high rainfall rates around the radar. For the current example in Fig. 2 a,b the impact of hitting the bright band is rather smaller, as the forecasted accumulation is quite similar to the observed accumulation around the Zaventem radar. I get the feeling that this is mainly due to the relatively low horizontal velocity field of this event. I am wondering what the quality of the forecast is for larger lead times or for cases where the horizontal velocity is larger.
- 3) In line with the previous remark, I was wondering whether the authors have opted to apply some kind of bright band correction method as the bright band is observed at relatively low elevation (500-2000) during the fall and winter season in Belgium (see Hazenberg et al., 2013). For this period of the year my expectation is that many CAPPI images are contaminated with the impact of the bright band and its impact will be extrapolated while running the STEPS-BE algorithm. As the precipitation intensities are overestimated within the bright band, these forecasts will lead to incorrect urban hydrological model simulations.
- 4) Page 6850 lines 26-29 Another explanation ... Z-R relationship: Since all the Marshall-Palmer relationship was used to convert radar reflectivities into rainfall estimates, I do not understand why space time variations in Z-R lead to a higher under-dispersion at lead times of 5 minutes. Please elaborate on this in the text.

Minor concerns: -Page 6837 lines 1-2: Please add the elevation of the CAPPI.

-Page 6843 lines 22-23: I would suggest to remove the line "Thus, a ... MPI implemen-

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tations)."

-Page 6850 line 26: Add a “.” after times.

References: Hazenberg, P., P.J.J.F. Torfs, H. Leijnse, G. Delrieu and R. Uijlenhoet 2013: Identification and uncertainty estimation of vertical reflectivity profiles using a Lagrangian approach to support quantitative precipitation measurements by weather radar, *J. Geophys. Res. Atm.*, 118(18), 10243-10261.

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