

***Interactive comment on* “Brief communication: Preliminary hydro-meteorological analysis of the flash flood of 20 August 2018 on “Raganello Gorge”, Southern Italy” by Elenio Avolio et al.**

Anonymous Referee #1

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The manuscript analyzes an extreme rainfall-discharge event for a small ungauged mountainous catchment in southern Italy. The study describes in detail the synoptic preconditions that finally lead to the genesis of a strong convective precipitation event over orographically complex and steep terrain. Further, it is looked into how well such a local, short term event can be predicted by a dynamic hydrometeorological modeling system both for precipitation and discharge.

The manuscript is well structured, and gives a profound analysis of the available observations. The study fits in general to the objectives of the journal. The text is well written.

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I have the following comments

Major

- 1) Please provide some more detail on the radar data that you use in the comparison
 - 1) What kind of processing is done to get precipitation from reflectivity and how well do the derived values fit to the existing observations at the nearby precipitation stations?
 - 2) For the discussion: might a combined product, merged from rain gauges and radar give a better base for analysis, is this planned to be included for further investigation?
- 2) You do an interesting model setup intercomparison of coupled vs. non-coupled and variant surface boundaries vs. invariant but what is lacking is a comparison of the resulting hydrograph (figure 3) with one that has been modeled using the radar derived precipitation as input. One could disaggregate the SRT field with the assumption that a large portion of total aggregated rainfall occurred within the hour before the flood event.
- 3) You speak of “reasonably well” for the model to simulate the radar observed precipitation field. To me it doesn’t look so well, when looking to Fig. 2. With the fully-coupled SST configuration the amount of precipitation with respect to the surrounding rain gauges improves but the important peak (towards the east), as shown by the radar image on Fig. 2 is completely missed. In Figure 2 it is hard to locate the boundaries of the Raganello catchment, the black dot might be the outlet (but no description given in the figure caption), you should remove the administrative borders and print the catchment boundary instead. It seems that WRF initiates convection in a different location thus leading to the mismatch in

positioning of the convective cell. Improved soil moisture initialization may help here. The simulation shows reasonable (but not satisfactory as stated in the abstract) results, but with a displaced / underestimated precipitation field and a decreased infiltration parameter.

- 4) In the following you reduce infiltration in the model (by setting REFKDT to 1.5) which leads to a higher discharge peak, but with the higher precipitation amount seen by the radar also the original value of REFKDT = 3 could have led to similar outcome. That corroborates the need for a radar-driven simulation. How does the bias look like for the 10-13 UTC basin aggregated sums precipitation sums? To analyze this, the few pixels in Raganello creek catchment can be manually digitized to get the necessary information.
- 5) This study does only an analysis of a single event. With the given configuration a lead time of 6 hours might have been achieved but this does not mean that the configuration would perform likewise for other events. To provide reliable forecasts, the system needs to be tested / set-up / evaluated for a broader range of events in the region. This should also be honestly discussed on p7 around L10.
- 6) How do you plan to use radar information with 3d-Var? Do you plan to assimilate the reflectivity?

Minor

- Why it is gorge in the title and creek elsewhere?
- Figure 1c, highlight the catchment with different color or linetype than the administrative boundaries

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- For comparison with other studies and model setups, I would like to see also information about catchment size and typical land-cover in the basin description; is the catchment intermittent or is there a more or less constant baseflow?
- Fig.3e, the unit for the precipitation amount should rather be mm instead of mm h-1 as it is a sum and not an intensity
- Fig.1 description L8, blank between dot and “The” missing and catchment or watershed may fit better to the extent of the Raganello Creek than basin (should be replaced throughout the manuscript)

P2L8 small-scale events instead of event

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