

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
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## **Comment on hess-2021-387**

Mario Rohrer (Referee)

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Referee comment on "Compound flood impact forecasting: integrating fluvial and flash flood impact assessments into a unified system" by Josias Láng-Ritter et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-387-RC1>, 2021

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Review of the paper: 'Compound flood impact forecasting: Integrating fluvial and flash flood impact assessments into a unified system' by Josias Ritter and colleagues.

This paper proposes to combine the simulations of two impact forecasting methods (fluvial and flash floods, i.e. EFAS RRA respectively ReAFFIRM) for a recent catastrophic episode of compound flooding: the DANA event of September 2019 in Southeast Spain

The strong points of this publication are that the authors can explain how to attain a significant improvement in missed severe flood damages in this case: the false negatives (misses) in 15 heavy hit municipalities have been reduced to zero through the combination of the two methods (Fig. 9).

Also, of particular interest is figure 3, where it is obvious how important real-time adjusting of OPERA-radar in this case was.

In my opinion this publication merits in any case a publication, mainly because a clear description of the proposed procedure.

The paper is well written, the structure is clear, the authors largely mention the necessary and useful references.

All the same, I have some suggestions how to improve the paper.

Abstract:

Lines 7ff:

..., this paper proposes the integration of different flood type-specific approaches into one compound flood impact forecast. This possibility has been explored by combining the simulations of two impact forecasting methods (representing fluvial and flash floods) for a recent catastrophic episode of compound flooding:

Suggestion:

*..., this paper proposes the integration of two flood type-specific approaches (representing fluvial and flash floods) into one compound flood impact forecast. For this scope a 'unified system' was developed by combining the simulations of two impact forecasting methods: One based on the European Flood Awareness System (EFAS), the other on flash flood hazard nowcasts obtained with the European Rainfall-Induced Hazard Assessment (ERICA) system. This possibility has been explored by combining the simulations for a recent catastrophic episode of compound flooding:...*

I think it's important to mention already in the abstract on what existing products your proposed impact forecast is based.

Lines 10-11:

the DANA event of September 2019 in Southeast Spain.

Suggestion:

*the DANA (Depresión Aislada en Niveles Altos, Cut-off Low) event of September 2019 in Southeast Spain.*

For the non-Hispanic reader, it may not be clear what DANA means.

Line 14:

Although the compound impact estimates were less accurate at municipal level, they corresponded significantly better to the observed impacts ...

Suggestion:

*Although the compound impact estimates were less accurate at municipal level, they corresponded much better to the observed impacts...*

It's only one case, thus 'significantly' may not be adequate, I would say: MUCH better

Introduction:

Line 85:

has been taken as an opportunity to explore the possibility of such an integrated system.

Suggestion:

*has been taken as an opportunity to explore the possible advantages and drawbacks of such an integrated system.*

I think to make a system more complex may always also imply some disadvantages/drawbacks.

2 The DANA event of September 2019 in Southeast Spain:

Perhaps you can explain a little bit more in detail what a DANA-event is:

see e.g. Ferreira, 2021; Garcia-Ayllon, S.; Radke, J., 2021; Giménez-García et al., 2021; Giménez-García et al., 2021.

### 3 Methods employed for assessing the compound flood impacts

Figure 2:

Concerning the legend: I suppose the colors are representing the RETURN PERIOD! If this is the case, please write it!

This is a very nice figure, but I don't see how the reader can compare the return period at a gauging station with a peak flow runoff in m<sup>3</sup>/s. Perhaps you can calculate a return period of the runoff gauges, if not, perhaps you can indicate the rank of the runoff, or a similar metric which is in a way comparable to a return period.

### 5 Conclusion

Perhaps you should mention in the conclusion that this is a case study and that is important to try this method also for other extreme large events as for example the event of 01.09.2021 over Castilla to explore better the advantages and drawbacks of the proposed product.

### References:

Ferreira, Rosana N. 2021. Cut-Off Lows and Extreme Precipitation in Eastern Spain: Current and Future Climate, *Atmosphere* 12, no. 7: 835.  
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Garcia-Ayllon, S.; Radke, J., 2021. Geostatistical Analysis of the Spatial Correlation between Territorial Anthropization and Flooding Vulnerability: Application to the DANA Phenomenon in a Mediterranean *Watershed*. *Appl. Sci.* 2021, 11, 809.  
<https://doi.org/10.3390/app11020809>

Giménez-García, R., Ruiz-Álvarez, V., and García-Marín, R., 2021. Chronicle of a forecast flood: exposure and vulnerability on the southeast coast of Spain, *Nat. Hazards Earth*

*Syst. Sci. Discuss.* [preprint], <https://doi.org/10.5194/nhess-2021-134>

Martín-Vide, J., Moreno-García, M.C., López-Bustins, J.A., 2021. Synoptic causes of torrential rainfall in south-eastern Spain (1941–2017). *Geographical Research Letters* 47, 143–162. doi:10.18172/cig.4696