

A point-by-point reply to the comments

Anonymous Referee #2, 19 Feb 2022

The paper deals with implementation of a physically-based distributed karst hydrological model for flood simulations. The manuscript has several deficiencies, in part depending upon the English language and in part by problems with the scientific content.

I have a number of considerations and suggestions (presented in this comment, and in the attached file as well).

In general, the English language seems to me not satisfying the international standards for publication in several points, and needs some deep revision. In particular, I pointed out in the attached file some parts where the English was unclear to me.

Authors are probably not very familiar with karst literature and terminology. Since they are proposing a model for floods in karst, the karst literature cannot be not taken into account. From the beginning, it is stated that the works regards “karst though valley”.

This is not a term familiar to me, and I do not have seen it used in the karst literature.

Thus, its meaning should be clearly defined. In addition, references to the main works and textbooks as concerns karst landforms and morphology should be added. Below you will find some suggestions at this regard.

As regards the main topic of the article, that is floods, karst settings are typically characterized by flash floods, due to the lack or scarcity of water at the surface during most of the year. This is never mentioned in the manuscript, but should deserve some mention, also to cite similar examples in other karst areas worldwide. For instance, have a look at the paper by Gutierrez et al. (2014) and the abundant references about floods in karst (Parise, 2003; Bonacci et al., 2006; Jourde et al., 2007, 2014; Martinotti et al., 2017).

Also when dealing with sinkholes, no reference to the main classification of sinkholes is provided. All this indicate a quite poor knowledge of karst, which should be addresses for an article submitted to international journals.

Suggested references for karst (general textbooks and specific articles for floods and hazards in karst):

- Bonacci, O., Ljubenkovic, I., Roje-Bonacci, T., 2006. Karst flash floods: an example from the Dinaric karst Croatia. *Nat. Hazards Earth Syst. Sci.* 6, 195–203.
- Ford, D.C., Williams, P., 2007. *Karst Hydrogeology and Geomorphology*. Wiley, Chichester, 562 pp..
- Gutierrez, F., 2010. Hazards associated with karst. In: Alcantara, I. & A. Goudie (Eds.), *Geomorphological Hazards and Disaster Prevention*. Cambridge University Press, Cambridge, 161–175.
- Gutierrez F., Parise M., De Waele J. & Jourde H., 2014, A review on natural and human-induced geohazards and impacts in karst. *Earth Science Reviews*, vol. 138, p. 61-88.
- Jourde, H., Roesch, A., Guinot, V., Bailly-Comte, V., 2007. Dynamics and contribution of karst groundwater to surface flow during Mediterranean flood. *Environ. Geol.* 51 (5), 725–730.
- Jourde, H., Lafare, A., Mazzilli, N., Belaud, G., Neppel, L., Doerfliger, N., Cernesson, F., 2014. Flash flood mitigation as a positive consequence of anthropogenic forcings on the groundwater resource in a karst catchment. *Environ. Earth Sci.* 71, 573–583.
- Martinotti M.E., Pisano L., Marchesini I., Rossi M., Peruccacci S., Brunetti M.T., Melillo M., Amoruso G., Loiacono P., Vennari C., Vessia G., Trabace M., Parise M., & Guzzetti F., 2017, Landslides, floods and sinkholes in a karst environment: the 1–6 September 2014 Gargano event, southern Italy. *Natural Hazards and Earth System Sciences*, vol. 17, p. 467-480.
- Palmer, A.N., 2007. *Cave Geology*. Cave Books, Dayton, 454 pp..
- Palmer, A.N., 2010. Understanding the hydrology of karst. *Geol. Croat.* 63, 143–148.
- Parise, M., 2003. Flood history in the karst environment of Castellana-Grotte (Apulia, southern Italy). *Nat. Hazards Earth Syst. Sci.* 3 (6), 593–604.
- Parise, M., 2010, Hazards in karst, *Proceedings Int. Conf. “Sustainability of the karst environment. Dinaric karst and other karst regions”*, IHP-Unesco, Series on Groundwater, 2, 155-162.
- Parise M., Ravbar N., Ćizvanovic V., Mikszewski A., Kresic N., Mádl-Szönyi J. & Kukuric N., 2015, Hazards in Karst and Managing Water Resources Quality. Chapter 17 in: Z. Stevanovic (ed.), *Karst Aquifers – Characterization and Engineering*. Professional Practice in Earth Sciences, Springer, pp. 601-687.

White, W.B., 1988. *Geomorphology and Hydrology of Karst Terrains*. Oxford University Press, Oxford, 464 pp.

White, W.B., 2002. Karst hydrology: recent developments and open questions. *Eng. Geol.* 65, 85–105.

Williams, P.W., 2008. The role of the epikarst in karst and cave hydrogeology: a review. *Int. J. Speleol.* 37, 1–10.

Zhou W, Beck BF (2011) Engineering issues on karst. In: P. van Beynen (Ed), *Karst Management*. Springer, Dordrecht, 9–45.

Please also note the supplement to this comment:

<https://gmd.copernicus.org/preprints/gmd-2021-120/gmd-2021-120-RC2-supplement.pdf>

General comment:

The paper deals with implementation of a physically-based distributed karst hydrological model for flood simulations. The manuscript has several deficiencies, in part depending upon the English language and in part by problems with the scientific content.

I have a number of considerations and suggestions (presented in this comment, and in the attached file as well).

Response:

We greatly appreciate the reviewer's comments. The reviewer point out that there are two major deficiencies in this manuscript, in part depending upon the English language errors and in part by the scientific content problems. We have carefully revised the problems pointed out by the reviewer. The following is our point-by-point response to specific comments.

Specific Comment

1) English language errors

In general, the English language seems to me not satisfying the international standards for publication in several points, and needs some deep revision. In particular, I pointed out in the attached file some parts where the English was unclear to me.

Response:

We apologize for the poor English language of the text, and will be happy to edit the manuscript further based on the helpful comments. In fact, the first reviewer also pointed out that the English language problems of this manuscript need to be deeply revised. Therefore, we have carefully revised the language errors in the full text, including wrong words,

terminologies, grammar and unclear sentences, etc. And to correct the language problems, we turned to a professional English editing company (Charlesworth Advanced) to help fix the language errors in the manuscript.

2) Terminology problems

Authors are probably not very familiar with karst literature and terminology. Since they are proposing a model for floods in karst, the karst literature cannot be not taken into account. From the beginning, it is stated that the works regards “karst though valley”. This is not a term familiar to me, and I do not have seen it used in the karst literature. Thus, its meaning should be clearly defined.

Response:

As mentioned above, we have corrected the terminology errors in the text, for instance, the karst though valley was replaced by karst though and valley landform (Lines 37); skylights was replaced by karst windows (Lines 311).

3) References

In addition, references to the main works and textbooks as concerns karst landforms and morphology should be added. Below you will find some suggestions at this regard.

Response:

The reviewer pointed out literature citations are inadequate, and references to karst landforms and morphology should be added. Thus, we have added some relevant literatures based on the suggestions (most of them were added in the Introduction part, for example, Lines 41, 48-50, and Lines 54, 58, etc.).

As regards the main topic of the article, that is floods, karst settings are typically characterized by flash floods, due to the lack or scarcity of water at the surface during most of the year. This is never mentioned in the manuscript, but should deserve some mention, also to cite similar examples in other karst areas worldwide. For instance, have a look at the paper by Gutierrez et al. (2014) and the abundant references about floods in karst (Parise, 2003; Bonacci et al., 2006; Jourde et al., 2007, 2014; Martinotti et al., 2017).

Response:

The coexistence of drought and flood is a typical phenomenon in karst areas, and Indeed, as the reviewer stated, the water shortage in karst areas for most of the year. Therefore, the lack or scarcity of water problems have been added in the text (Lines 38-39 and 41-42), and some relevant literatures have also been added accordingly (Lines 48-50).

Also when dealing with sinkholes, no reference to the main classification of sinkholes is provided. All this indicate a quite poor knowledge of karst, which should be addresses for an article submitted to international journals.

Response:

References to the main classification of karst sinkholes have been added in the revised version (Lines 163-164, and Lines 202-207).

Suggested references for karst (general textbooks and specific articles for floods and hazards in karst):

Bonacci, O., Ljubenkovic, I., Roje-Bonacci, T., 2006. Karst flash floods: an example from the Dinaric karst Croatia. *Nat. Hazards Earth Syst. Sci.* 6, 195–203.

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Response:

Some of the above mentioned references for karst have been added to the article (for example, References: Lines 813-814, 861-865, 876-881, and 932-939, etc, and the corresponding literatures have also been added to the text).

Please also note the supplement to this comment:

<https://gmd.copernicus.org/preprints/gmd-2021-120/gmd-2021-120-RC2-supplement.pdf>

Response:

We have carefully revised the errors based on the comments in the supplement file (gmd-2021-120-RC2-supplement.pdf), and these changes are highlighted in revision mode (a marked-up manuscript.docx).