

## ***Interactive comment on “A GIS-based monitoring and early warning system for cover-collapse sinkholes in karst terrane in Wuhan, China” by Li Xueping et al.***

**Anonymous Referee #2**

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The paper deals with cover-collapse sinkholes in China, with the goal to describe an early warning system for this type of phenomenon. The present version of the manuscript needs extensive work before being fully considered for publication. This derives from many reasons, that I will try to delineate in the following (with further comments, questions and suggestions in the attached file). First and foremost, the English language needs to be carefully checked by an English-native speaker. I tried my best to improve the English, but at several points (highlighted in the attached file) I simply could not catch the meaning of what the Authors were trying to convey. A check of the manuscript by an English-native speaker is mandatory for acceptance of the article. This should also be accompanied by a check of the terminology, which sometimes was not

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properly used to me. In particular, at this latter regard (terminology), there is confusion about the use of the term risk. At many points, risk is used in an inappropriate way, with the actual meaning of susceptibility or of hazard. Authors must refer to the internationally accepted definition of risk, and use it in a correct way.

In general, the overall structure of the work is very poor, and causes great confusion in the reader. It is not easy to understand what of the manuscript is supported by real data, and real monitoring data are lacking. In my opinion, this cannot be considered as an early warning system, as stated by the Authors.

The geological background is very poor, and does not allow the reader to understand the situation in the study area. A geological map, with a schematic cross section, would be very useful at this aim.

Soil caves are mentioned in the paper, but there is no explanation of what they are. More details should be presented. I guess the Authors are talking about epikarst. In this case, they should better explain what they mean, also by quoting the wide available international literature on the subject.

A big drawback in the article is the lack of a clear geological-geotechnical model, which is crucial for understanding and explaining the type of sinkholes occurring, and for designing any possible system of prediction. A model is never presented in the article, which is a very weak point. At this regard, in reference to forecasting of sinkhole occurrence, see for instance Parise & Lollino (2011).

It is not clear to me how many of the references in the list are written in Chinese language. This should be clearly shown. I am afraid many of the papers are in Chinese. If this is true, the Chinese references should be kept at a minimum number, given they are not available to international readers. Further, the international literature deserves more attention, and at this aim I am suggesting a number of articles about sinkholes.

There are several problems with the figures. Many of them are missing the north, the

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graphic scale, or both. In many others, at least the contour lines, or some elevation points of reference should be shown, in order to facilitate the reading. Others (for instance, figures 8 to 11) can be deleted, since they do not add anything to the content of the article.

In addition to those already indicated in the accompanying file, there are many references that should be cited by the Authors. These must be introduced, in order to better organize the article, and to put it in a more international context. Below I list some suggestions.

As regards karst hazard and management: Brinkmann R. & Parise M., 2012, Karst Environments: Problems, Management, Human Impacts, and Sustainability. An introduction to the Special Issue. *Journal of Cave and Karst Studies*, vol. 74 (2), p. 135-136. Gutiérrez F (2010) Hazards associated with karst. In: Alcántara I, Goudie A (Eds), *Geomorphological Hazards and Disaster Prevention*. Cambridge University Press, Cambridge, 161-175. North, L.A., van Beynen, P.E., Parise, M., 2009. Interregional comparison of karst disturbance: west-central Florida and southeast Italy. *J. Environ. Manag.* 9 (5), 1770–1781. Parise M., 2015, Karst geo-hazards: causal factors and management issues. *Acta Carsologica*, vol. 44 (3), p. 401-414. Parise M, Gunn J (Eds.) (2007) Natural and anthropogenic hazards in karst areas: Recognition, Analysis and Mitigation. *Geol. Soc. London*, sp. publ. 279. van Beynen, P.E., Townsend, K.M., 2005. A disturbance index for karst environments. *Environ. Manag.* 36 (1), 101–116.

As regards geophysical methods for cave information: Kaufmann G (2014) Geophysical mapping of solution and collapse sinkholes. *J Applied Geophysics* 111: 271–278. Kaufmann G, Romanov D, Nielbock R (2011) Cave detection using multiple geophysical methods: Unicorn cave, Harz Mountains, Germany. *Geophysics* 76 (3): 71–77. Margiotta S., Negri S., Parise M. & Valloni R., 2012, Mapping the susceptibility to sinkholes in coastal areas, based on stratigraphy, geomorphology and geophysics. *Natural Hazards*, vol. 62 (2), p. 657-676, DOI 10.1007/s11069-012-0100-1. Margiotta S., Negri

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S., Parise M. & Quarta T.A.M., 2016, Karst geosites at risk of collapse: the sinkholes at Nociglia (Apulia, SE Italy). *Environmental Earth Sciences*, vol. 75 (1), p. 1-10, DOI: 10.1007/s12665-015-4848-y.

As regards epikarst: Jones W.K., 2013, Physical structure of the epikarst. *Acta Carsologica*, vol. 42 (2-3), p. 311-314. Williams P.W. (1983) The role of subcutaneous zone in karst hydrology. *J. Hydrol.*, 61, 45–67. Williams P.W. (2008) The role of the epikarst in karst and cave hydrogeology: a review. *Int. J. Speleol.*, 37 (1), 1–10.

As regards engineering problems in karst: Parise M., Closson D., Gutierrez F. & Stevanovic Z., 2015, Anticipating and managing engineering problems in the complex karst environment. *Environmental Earth Sciences*, vol. 74, p. 7823-7835, DOI :10.1007/s12665-015-4647-5. Waltham AC, Fookes PG (2003) Engineering classification of karst ground conditions. *Quarterly Journal of Engineering Geology and Hydrogeology* 36: 101-118. Zhou W, Beck BF (2011) Engineering issues on karst. In: P. van Beynen (Ed), *Karst Management*. Springer, Dordrecht, pp. 9-45.

As regards geological and geotechnical models for predicting sinkholes: Parise M. & Lollino P., 2011, A preliminary analysis of failure mechanisms in karst and man-made underground caves in Southern Italy. *Geomorphology*, vol. 134 (1-2), p. 132-143. Lollino P., Martimucci V. & Parise M., 2013, Geological survey and numerical modeling of the potential failure mechanisms of underground caves. *Geosystem Engineering*, vol. 16 (1), p. 100-112, DOI 10.1080/12269328.2013.780721.

For all the above reasons, I recommend major revisions for the manuscript in its present form.

Please also note the supplement to this comment:

<http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-22/nhess-2017-22-RC4-supplement.pdf>

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., doi:10.5194/nhess-2017-22,

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