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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Quaternary lava tubes distribution in Jeju Island and their potential deformation risks" *by* Jungrack Kim et al.

Jungrack Kim et al.

kjrr001@gmail.com

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(Please refer attached supplement rather than this answer form as the attached figures/text are not demonstrated properly)

The manuscript presents an original application of a number of combined methods including InSAR, machine learning, field mapping, spatial analysis. I think it's a good job but it needs to be presented properly. It is written in a confusing way, I had a lot of difficulty reading the different parts of the text. The geological background is very poorly written and the presentation of the data is confusing and further complicated by an excess of acronyms.

Printer-friendly version

Discussion paper

I recommend two things: 1) a good revision of English, and

Answer: The revised draft will be applied to rigorous proofreading, once after revision is accepted.

2) A rereading done by people other than the authors who can help simplify the text.

Answer: A geologist who has specialty in lava geomorphology conducted additional proofreading.

For the rest, I think it is a really very interesting job and that it can have a good result in terms of audience. Attached you will find a pdf with the main comments.

Answer: We very much appreciate for reviewer's comments and encouragement. In follows, we addressed reviewer's comments.

Comments noted in the pdf file:

L17 : In this study the overall distribution of the Jeju lava tube network and the potential collapsing risk have been investigated.

Answer : Corrected as suggested.

L19 : lava flow unit

Answer : Corrected as suggested.

L 20 : The risk is always linked to the presence of anthropogenic constructions. Perhaps you meant that the presence of artificial artifacts, causing the load on the lava flows, can induce to collapse.

Answer: Proposed to be changed "Secondly, the risk of collapse is high especially when heavy loads are applied by artificial structures around the undisclosed lava tube network."

L40 : it is not very clear what you mean

Answer : Delete “induced in deformation mode”

L 50 : The more than 200 lava tubes distributed on an area of 1850 km2 in Jeju are up to 4-11 km long lava, showing a large variety of cave structures presenting all sorts of development stages (Son, 2019).

Answer : Corrected as suggested.

L57 : I would use the term “critical: or “danagerous”

Answer: Corrected as suggested.

L71 : There are conflicting theories about the origin of volcanism on Jeju Island. One theory interprets the entire island as a shield volcano (Kim and Choi, 2012), while another suggests that it is a basaltic volcanic field (Brenna et al., 2011; Brenna et al., 2012a; Brenna et al., al., 2012b)

Answer : Corrected as suggested.

L80 : The alkali-basalts lava effusion on land started about 1 Ma years ago and continued until Holocene (Koh et al. 2008; Koh and Park 2010b; Koh and Park 2010a)

Answer : Corrected as suggested.

L 82 : I don’t understand what you mean, I would ask you to reformulate the sentence.

it’s all very confusing. Also, perhaps such a thorough detail does not even serve much to this study, I would focus on the effusive activity that you will generate tubes and write just a few sentences about the previous geological evolution.

Answer : All above corrections were done as the reviewer suggested. The text was simplified as “The geologic structure indicated that the activity of alkali basaltic lava effusion started about 1 Ma years ago and continued until Holocene (Koh et al. 2008; Koh and Park 2010b; Koh and Park, 2010a)”

L 91 : I would insert some pictures with photos of the lava tubes. I would introduce

modify figure 1 by inserting photos and some pie diagrams showing the distribution of the different tubes.

Answer : Figure 1 (c) is now appended to show the places and their photos in major lava tube which were used in our study.

L 132 : please add the website

Answer : Web address (https://scihub.copernicus.eu/) is now appended.

L 141 : Please add references related to PS and SBAS

Answer : Corrected including the reference reviewer suggested.

L 173 : I would also introduce it in the geological background

Answer : Corrected.

L 194 : please consider also:

Answer : Blue fronted references are now appended to introduce SBAS technique.

Casu, F., Manconi, A. (2016). Four-dimensional surface evolution of active rifting from spaceborne SAR data, Geosphere, 2016, doi: 10.1130/GES01225.1

Casu F, Manzo M, Lanari R (2006) A quantitative assessment of the SBAS algorithm performance for surface deformation retrieval from DInSAR data. Remote Sens. Environ. 102(3–4): 195–210

Casu, F., Elefante, S., Imperatore, P., Zinno, I., Manunta, M., De Luca, C., & Lanari, R. (2014). SBAS-DInSAR parallel processing for deformation time-series computation. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 7(8), 3285-3296.

Casu, F., Manconi, A., Pepe, A., & Lanari, R. (2011). Deformation time-series generation in areas characterized by large displacement dynamics: The SAR amplitude pixel-offset SBAS technique. IEEE Transactions on Geoscience and Remote Sensing,

49(7), 2752-2763.

De Luca C., Zinno I., Manunta M., Lanari R., and Casu F. (2017). Large areas surface deformation analysis through a cloud computing P-SBAS approach for massive processing of DInSAR time series, Remote Sens. Environ., vol. 202, pp. 3–17, Dec. 2017.

Lanari R, Mora O, Manunta M, Mallorquí JJ, Berardino P, Sansosti E (2004a) A small baseline approach for investigating deformations on full resolution differential SAR interferograms. IEEE Trans Geosci Remote Sens. 42:1377–1386

Lanari, R., Lundgren, P., Manzo, M., Casu, F. (2004b) Satellite radar interferometry time series analysis of surface deformation for Los Angeles, California. Geophys Res. Lett. 31(23):L23 613–1–L23 613–5.

All references listed below were cited in the text.

L 300 : I didn't understand why you only used one orbit. By combining asc and desc you would have avoided this assumption that they will also be true but that they decrease the quality of the article.

Answer : Ascending mode time series observations of Sentinel-1 do not exist. Therefore, we can't apply combined interpretations of ascending & descending mode such as horizontal/vertical decompositions.

Please also note the supplement to this comment:
https://nhess.copernicus.org/preprints/nhess-2020-321/nhess-2020-321-AC3-supplement.pdf

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