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Comment on essd-2021-414

Cees van Westen (Referee)

Referee comment on "A national landslide inventory for Denmark" by Gregor Luetzenburg et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-414-RC2, 2022

The paper presents the first national landslide inventory for the country of Denmark, generated through visual-image interpretation of hill-shading images from a LiDAR survey, with additional high-resolution optical images. The authors have also made an evaluation of the accuracy of their mapping by checking each other's inventories, and by the checking of an independent third mapper. The resulting landslide inventory is available as a shapefile or in a web browser.

The dataset is very interesting and the introduction paper is certainty worth publishing, even though there is already another paper that describes the mapping as well (Svennevig et al., 2020a). In that paper, you indicated also different attributes in the landslide inventory database (shape, proximity to coastline, morphology indicator of recent activity, given name, name of mapper, hazard potential). Why are these not included in this version?

It would be advisable to indicate in the landslide inventory, which landslides have been confirmed by an independent mapper (by adding a field in the database with 1 and 0), which landslides have been field checked (by adding a field in the database with 1 and 0), and which landslides have been reported in other publication (by adding a field with the DOI of the publication).

It would be interesting to provide a more worked out analysis of the landslide inventory, based on the area/frequency of the various types of landslides.

The usefulness of the high-resolution optical images in mapping landslides, as compared to the hills shading images from the LiDAR DSM could be discussed more. From the examples shown it appears that the latter are much more useful for landslide inventory mapping.

The quality control procedure that you applied is very nice. However, the Venn diagram in Figure 3 is a bit confusing. I would expect three individual circles (of KSV , of GL and of MK). KSV and GL also checked each other's mapping results. Is that not taken into account in the evaluation of the quality?

One aspect missing in the paper is a proper estimation of the time involved in landslide inventory mapping. Many papers on automatic mapping claim that manual mapping is too time-consuming. This paper gives an ideal opportunity to quantify the time required, and specific it in time per landslide, and time per unit area.

The statement on the use of the dataset for deep learning algorithms for landslide mapping is only applicable if these algorithms would be applied using similar quality high-resolution elevation data. It would be good to discuss this further.

Even though you mention that you cannot include information on the age or activity of the landslides, based on a data source of a single date, there are certainly indications (also mentioned in Svennevig et al., 2020) of very ancient landslide complexes that occurred under different climatic conditions. Would it not be useful to include this as an attribute in the database?

Is there a procedure to regularly update the landslide inventory?

Some detailed comments:

L 40: the statement "new areas can be investigated (forest) " could be improved by adding the functionality of using LiDAR DSM hill-shading images.

L35-36: the statement on the reduction of subjectivity using automated approaches seems naïve to me. When you did the work yourself you have become better at recognizing landslides, and you have a learning curve. Expert interpreters will still function much better than deep learning algorithms.

L 110: Figure 1: Please provide a legend for the elevation. I advise showing the landslides in black so they are different from the elevation colors.