Deep learning based automatic grounding line delineation in DInSAR interferograms

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Authors' response to review comments (https://doi.org/10.5194/egusphere-2024-223-RC1)

We thank the reviewer for providing their expertise and time in reviewing our work. We plan to revise our manuscript under consideration of their comments and suggestions. Below are point-by-point replies to the comments: reviewer comments are in black and the authors' response in blue.

1. The specific implementation details of error type analysis and uncertainty assessment are not mentioned in detail in this article. Error type analysis generally involves identifying and categorizing errors in model predictions because of the need to improve the model training process and the accuracy of the final output. Examples of unmentioned error classification include misidentifying non-baseline regions as baselines (false positives) or failing to identify true baseline regions (false negatives), and spatial errors, which are mislocalizations in the spatial distribution, such as shifts in baseline locations.

   We will provide the false positive and false negative detection rates on the test set in addition to the results provided in Section 6 of the manuscript. The median and mean deviations of the network delineated grounding lines from the manual delineations (Table 3 and 4 in the manuscript) is equivalent to the above mentioned mislocalization error.

2. The uncertainty assessment is mainly concerned with calculating and presenting the confidence ranges of the model outputs, often using things like confidence intervals, or Bayesian statistics to estimate the uncertainty of the predictions. It seems that this manuscript doesn't explicitly use Bayesian networks or other statistical methods to express the uncertainty of the predictions, and it also doesn't go into detail about the types of errors that the model might produce, such as the quality of the input data, the structural limitations of the model and so on.

   We will quantify the uncertainty of networks 1 and 3 (refer to Table 3 in the manuscript) by training an ensemble (Lakshminarayanan et al., 2017), (Valdenegro-Toro, 2019) of five networks each. The ensemble is built by initialising each network with a different set of random weights and by re-shuffling the training samples. We will provide the ensemble grounding line which is derived as the mean of the grounding lines of the individual members and 95% confidence intervals for test set samples. We will also include visualisations of the confidence interval as a buffer around the network delineations. The sub-categorisation of predictive errors into model and data uncertainties is a vast and active field of research. Currently, no consistent procedures or protocols are defined to estimate these errors (Gawlikowski et al., 2023). Therefore, an in-depth error quantification is beyond the scope of our work. We will add the uncertainties for the DEM, ice velocity and tide levels provided by the original sources to Table 2.

References

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