Insights on the prediction of landslide areal density in South Tyrol, Italy

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❶Background

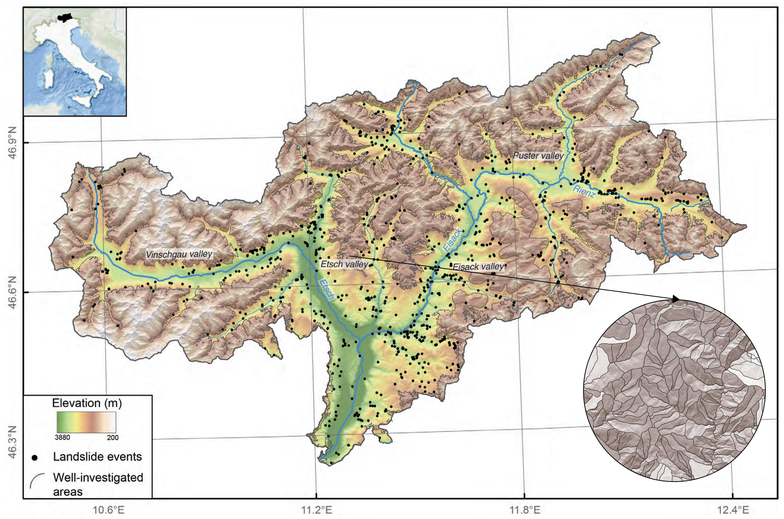
The concept of landslide hazard entails evaluating landslide occurrence in space (where), time (when), and intensity (how destructive). At regional scales, data-driven methods are implemented to separately analyze the spatial component (landslide susceptibility) and the temporal conditions leading to landslide occurrence (e.g., rainfall thresholds). However, assessing how large a landslide may develop once triggered is seldom conducted and poses a persistent challenge to satisfying the complete definition of landslide hazard.

Aim

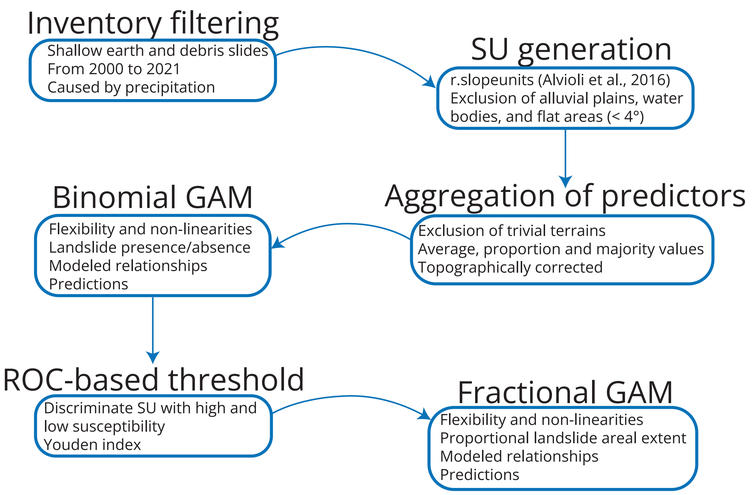
To predict the landslide area proportion per slope unit

❷Study area

- South Tyrol (7,400 km²)
- IFFI landslide inventory (*Inventario dei Fenomeni Franosi in Italia*)
- DTM 2.5 x 2.5, land cover, lithology, and insfrastructure

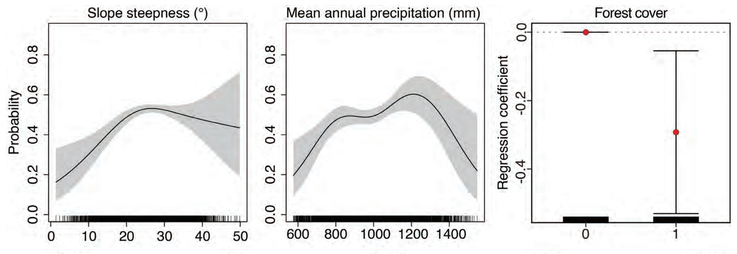


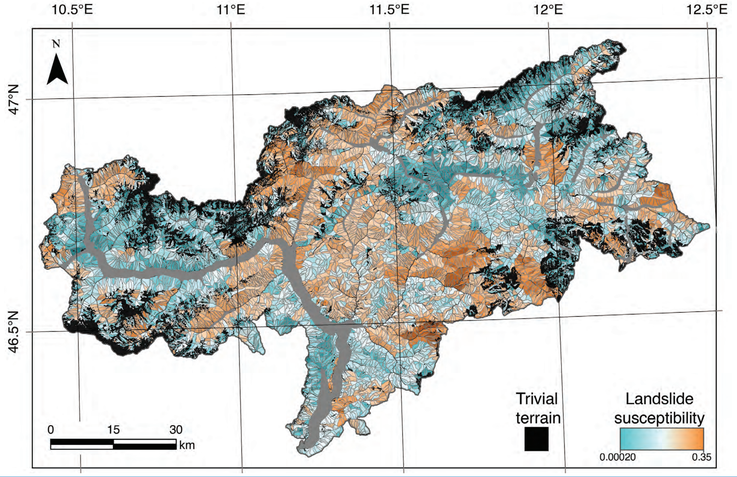
❸Method



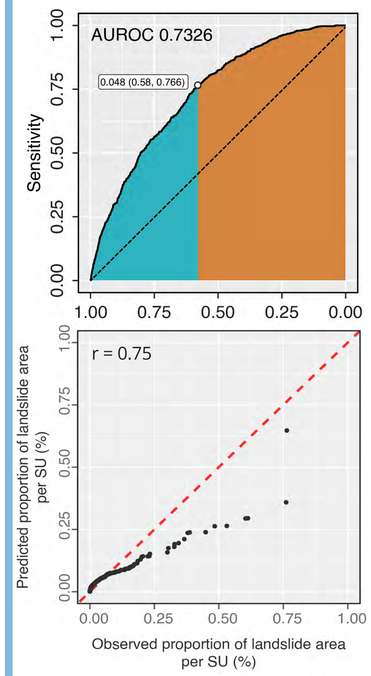
❹Results: landslide susceptibility

Sample of the modeled relationships. The black lines and red dots are the mean effects, and the grey bands are the 95% confidence interval. Below is the estimated landslide susceptibility.

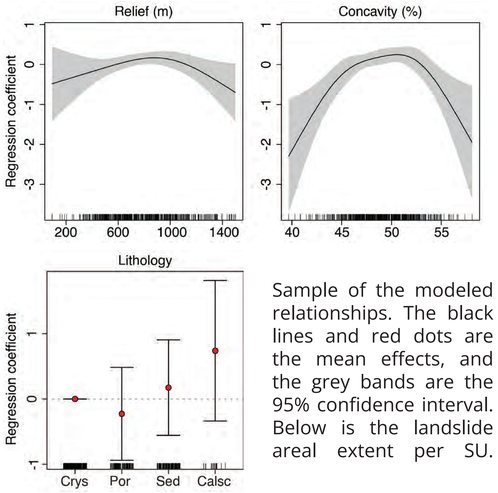




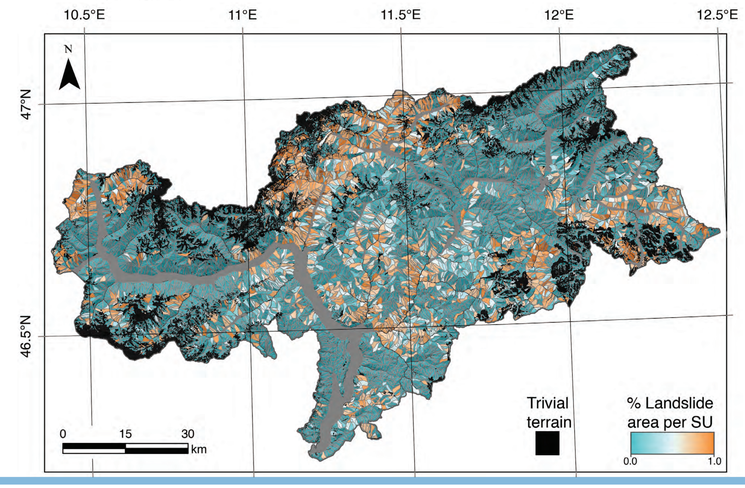
❹Results: % of landslide areal extent/SU



ROC curve and threshold based on the Youden index to separate SU with high and low susceptibility. Below is the Q-Q plot with the observed and predicted proportion of landslide area per SU.



Sample of the modeled relationships. The black lines and red dots are the mean effects, and the grey bands are the 95% confidence interval. Below is the landslide areal extent per SU.



❺Conclusion

- Static landslide controls were used to predict where shallow landslides may occur. Subsequently, the proportional landslide area per SU was estimated for those SUs classified as 'high susceptibility'.
- The results show an overestimation of the predicted % of landslide area for low observed values and an underestimation of % of landslide area for high observed values.

Get in touch!

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