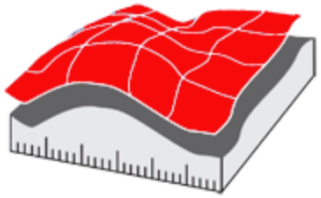

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Towards a consistent set of land-surface variables for landslide modelling

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INTRODUCTION

- land-surface variables (LSVs) are easy to obtain from Digital Elevation Models (DEMs)

- a consistent approach in selecting the ones that are the most relevant to landslides is still missing

- **Objective**: This work reports preliminary results of an experiment that aims at finding a set of LSVs capable to help in identifying landslide scarps in various landscape conditions

MATERIAL AND METHODS

Study areas

- **six study areas**, of different environmental conditions
- 3 study areas are located in **Romania** - **B1**, **B2**, **B3**
- 2 study areas are located in **Honshu Island, Japan** - **J1**, **J2**
- 1 study area is located in **Utah, USA** - **U**

MATERIAL AND METHODS

Data

- **databases of landslide scarps** compiled from different sources - archive data, geomorphological field mapping, local authority databases, stereographic photo interpretation, LiDAR
- **Presence data**: one point was randomly selected within each scarp
- **Absence data**: the same number of points was randomly selected outside scarp polygons
- 70% used for training and 30% for validation
- Shuttle Radar Topography Mission (SRTM) **DEM** at 30 m (1 arc second)

MATERIAL AND METHODS

Land-surface variables

- **14 LSVs** were retained after multicollinearity analysis (from initial of 24 LSVs)

Variable importance analysis

- aim: **generalizable subset of terrain variables** for landslide modelling
- **variable importance (VI) analysis** using Random Forest (RF) package in R
- mean decrease in accuracy (MDA) algorithm

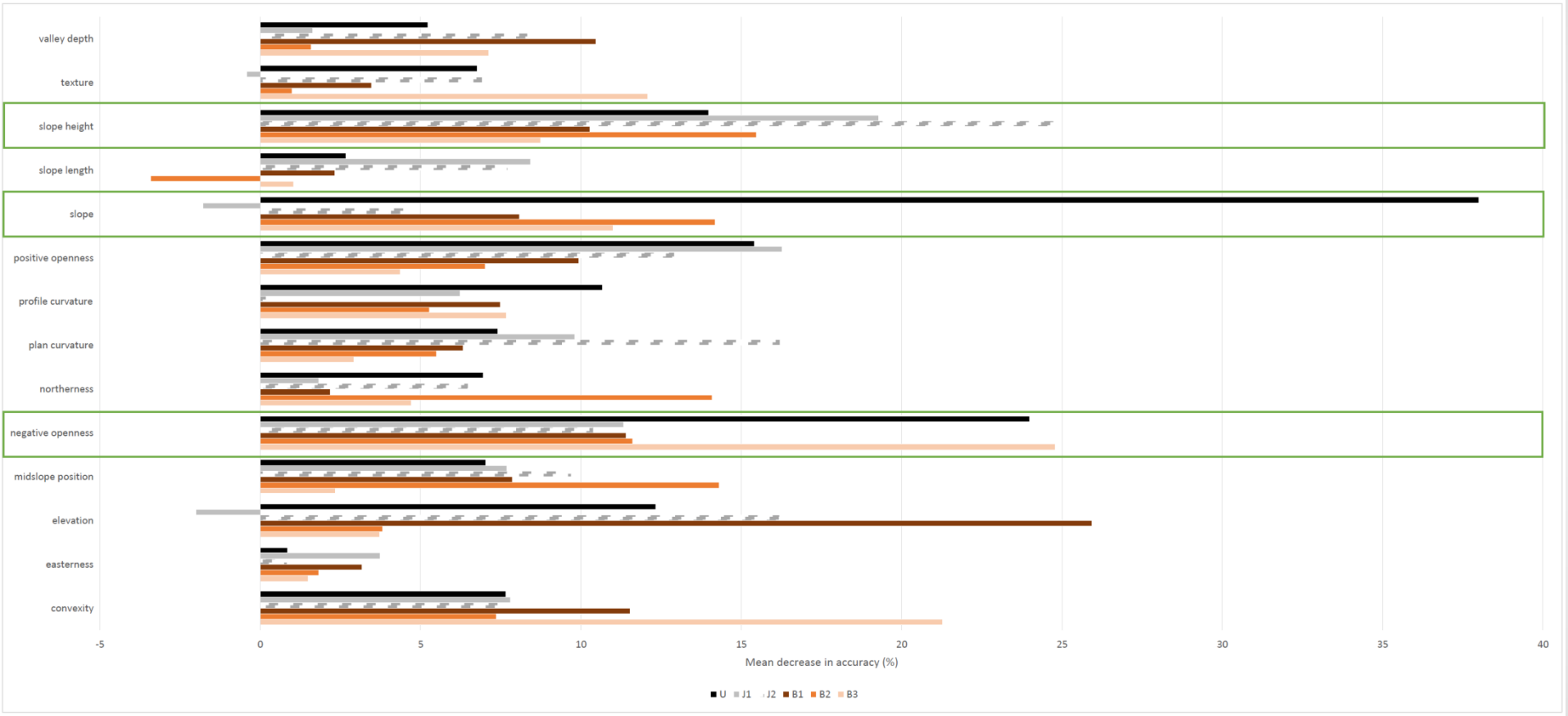
MATERIAL AND METHODS

Landslide modelling

- **logistic regression** was used for landslide modelling
- **three models tested**

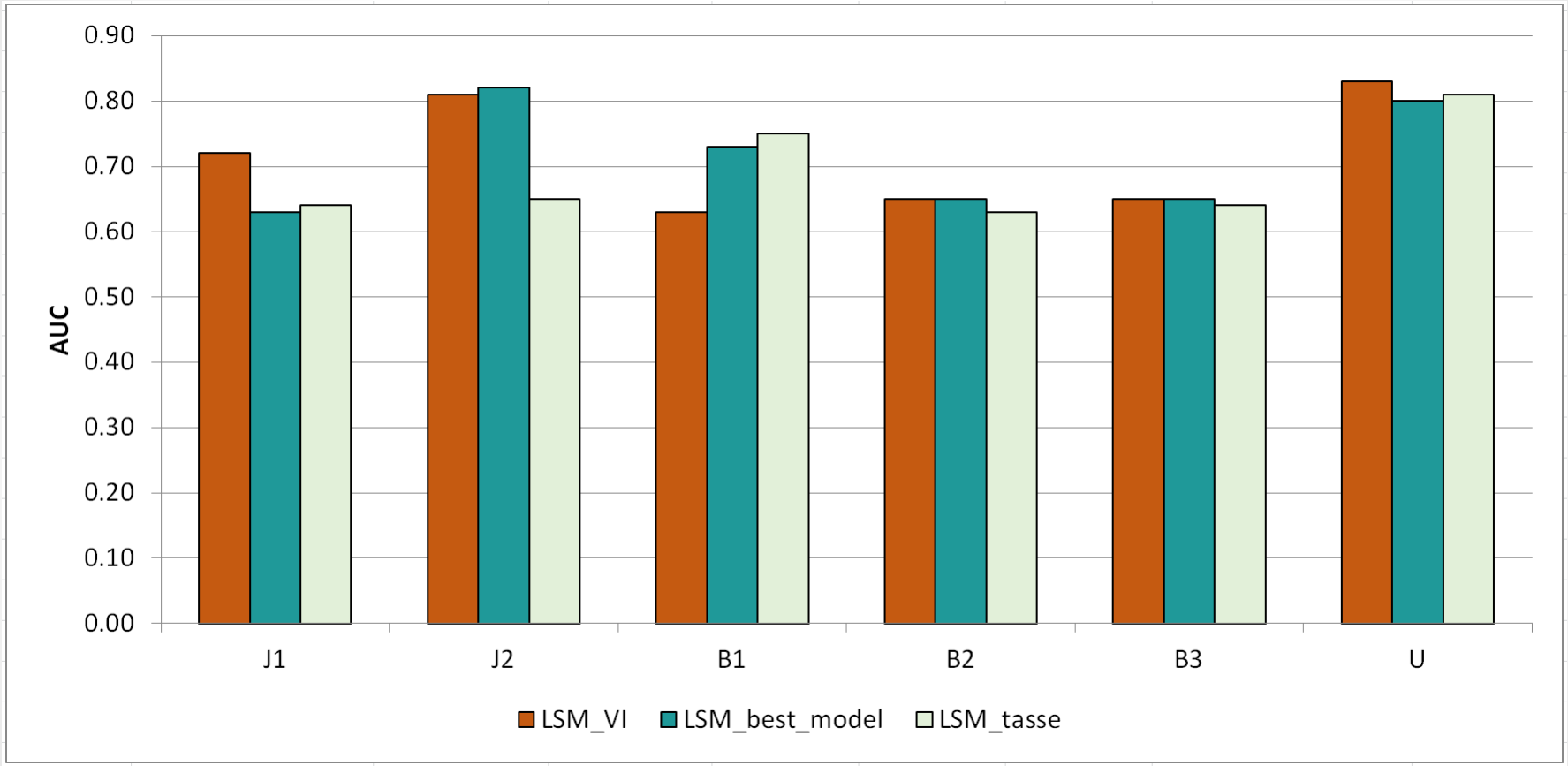
1. LSM_VI	• The **identified generalizable subset of variables**, emerging as important predictors in all study areas
2. LSM_best_model	• **Best model specific to each study area**, identified with backward stepwise logistic regression
3. LSM_tasse	• **Six terrain variables**, proposed by Lecours et al. 2017, as they capture more than **70% of the topographic structure of an area** • relative difference to mean elevation value, standard deviation of DEM, easterness, northerness, local mean and slope

RESULTS



Variable importance expressed as mean decrease in accuracy in the six study areas

RESULTS



Models prediction performance

CONCLUSIONS

- **three LSVs with the potential of describing satisfactorily landslide scarps** in various landscape conditions
- **negative topographic openness** = scarps shape
- **slope height** = position on the slope
- **slope** = landslide favorability factor
- models based on these three LSVs produced results comparable or even better (in some cases) than:
  - models built on locally calibrated LSVs
  - models built on a larger number of LSVs

Thank you!