

Morphological features of three North Patagonian volcanoes (Calbuco, Chaitén and Huequi) used for hierarchical Bayesian logistic regression for landslide prediction, Chile

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2. Citation

When using the data please cite:

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The data are supplementary material to:

Korup, Oliver (2021): R-script notebook for Hierarchical Bayesian logistic regression for predicting landslides in north Patagonia, Chile. GFZ Data Services. <https://doi.org/10.5880/fidgeo.2021.034>

Parra, E.; Mohr, C. H.; Korup, O. (2021) Predicting Patagonian Landslides: Roles of Forest Cover and Wind Speed. Geophysical Research Letters, <https://doi.org/10.1029/2021GL095224R>

3. Data Description

The data presented here correspond to a (point) sampling of areas with presence (or not) of landslides from three study areas located in North Patagonia (Calbuco, Huequi and Chaitén). Morphometric and geo-environmental parameter values have been obtained for each sample point (Parra et al., 2021).

We compiled inventories of landslides that occurred between 2001 and 2019 by mapping from Google Earth® imagery and local ground checks between 2014 and 2019. We mapped landslides using diagnostics such as distinct, elongate, and contrast-rich forest gaps with bare scars showing displaced soil, and rock together with transport zones and runout lobes (Fiorucci et al., 2011).

We mapped a total of 411 landslides in Calbuco, 38 in Huequi, and 616 in Chaitén, covering 0.6%, 0.4% and 0.8% of each study area. We performed a random sampling for each area considering a balanced number of landslide and unaffected terrain samples. For the Calbuco area, 411 points (pixels) were obtained in areas with landslides and 411 in areas not affected by landslides; in the case of Huequi the number of samples was 494 (landslides) and 494 (no landslides zones); in Chaitén 617 (landslides) and 617 (no landslides zones).

4. File description

The information presented here contains 3 files, one for each study area (i.e. Calbuco, Huequi and Chaitén). The names of the files are given below:

- Calbuco área: data_calbuco_411_411.csv
- Huequi área: data_huequi_494_494.csv
- Chaitén área: data_chaiten_617_617.csv

Although each file presents information for approximately 30 variables (morphological and geoenvironmental, see Table 1 below) the variables (fields) used for the article associated to the data correspond to:

Calbuco:

„wind_all_areas“ (wind speed [m/s]), „cover_calbuco“ (forest cover [%]), „landform_calbuco“ (landform), and „landslide_raster_calbuco (1= landslide; 2= no landslide).

Huequi

„wind_all_areas“ (wind speed [m/s]), „cover_huequi“ (forest cover [%]), „landform_huequi“ (landform), and „landslide_raster_huequi (1= landslide; 0= no landslide).

Chaitén

„wind_all_areas“ (wind speed [m/s]), „cover_chaiten“ (forest cover [%]), „landform_chaiten“ (landform) and „landslide_raster_huequi (1= landslide; 2= no landslide).

Additionally, each file provides the UTM coordinates (WGS 84 19H) of each sample point (coords.x1 = E; coords.x2 = N).

The model codes used to derive the data are published by Korup (2021).

As mentioned above, the publication associated with the data only considers the variables "wind speed", "forest cover", "landform", and the field associated with the presence (1) or absence (2) of landslides. Notwithstanding the above, the data presented includes a number of variables frequently used in landslide susceptibility/prediction analysis (Reichenbach et al., 2018). The following table shows all variables contained in the dataset, their units and a description.

Table 1: Overview on the morphological and geoenvironmental variables in the data files. <site> is a placeholder for “calbuco”, “huequi” and “chaiten”

Variable name	Unit	Description
OBJECTID	-	Identifier
CID	-	Identifier
aspect_<site>	°	Aspect (orientation)
slope_<site>	°	Slope
curva_<site>	m ⁻¹	Curvature
tpi_<site>	m	Topographic position Index
dem_<site>	m	Elevation
twi_<site>	-	Topographic wetness index
plan_<site>	m ⁻¹	Plan curvature
cover_<site>	%	Forest cover
geology_<site>	-	Geology
geology_<site>_ambientes	-	Geology (environments)
geology_<site>_rock	-	Geology (rocks)

Table 1 (continued)

Variable name	Unit	Description
land_use_<site>	-	Land use
landslide_raster_<site>	-	Landslide (yes= 1; no= 0)
landslide_raster_year_<site>	-	Landslide year
hansen_<site>	-	Fores loss (yes= 1; no= 0)
hansen_year_<site>	-	Forest loss year
pp_<site>	mm	Annual precipitation
dist_fault_<site>	m	Distance to fault
dist_river_<site>	m	Distance to river
dist_road_<site>	m	Distance to roads
wind_all_areas	m/s	Wind speed (annual average)
WindExposurePatagonia_30m_SOUTH	-	Wind exposure
landform_<site>	-	Landform
land_use_USO_<site>	-	Land use (use)
land_use_SUBUSO_<site>	-	Land use (sub use)
land_use_estructura_<site>	-	Land use (structure)
land_use_especie1_<site>	-	Land use (species)
coords.x1	m	East Coordinate
coords.x2	m	North Coordinate

5. References

- Fiorucci, F., Cardinali, M., Carlà, R., Rossi, M., Mondini, A. C., Santurri, L., ... Guzzetti, F. (2011). Seasonal landslide mapping and estimation of landslide mobilization rates using aerial and satellite images. *Geomorphology*, 129(1–2), 59–70.
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