Regional and detailed multi-hazard assessment of debris-flow processes in the Colombian Andes

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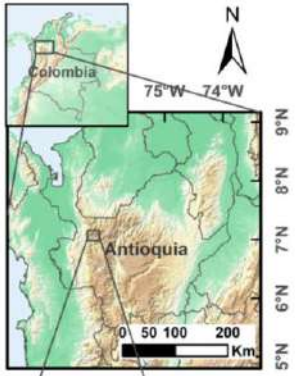
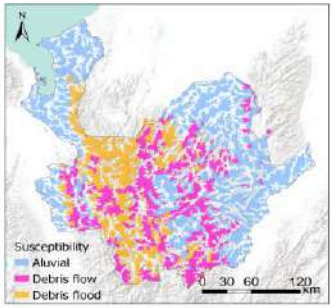
Regional Analysis (10m)



Susceptibility

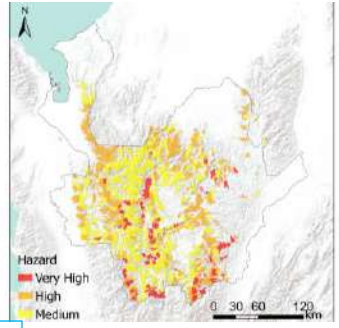
Morphometry (machine learning)

Slope stability (SHALSTAB)



Hazard

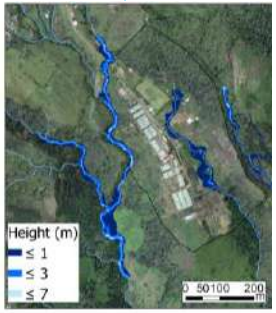
Rain, landslides and flows probability



Detailed Analysis (0.5m)

IBER 2D

Flood + 40%

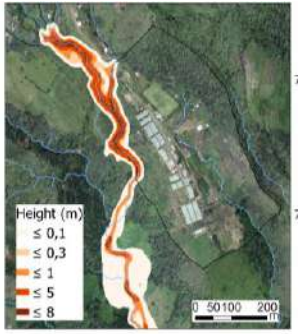


r.avaflow

flash flood (40%)

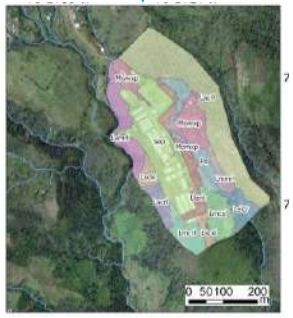
Hypercon-centrated flow (60%)

debris flow (80%)

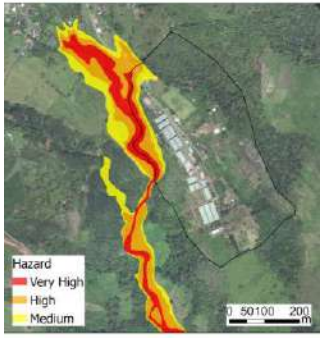


Geomorphology

Torrential Landforms



Final Hazard



The regional study area, Antioquia, is located in the **central Colombia Andes**, with an extension of **63,612 km²**, where **3,039 catchments** were analysed. A detailed hazard analysis was carried out on prioritized areas.

The regional analysis assessed debris-flow proccesses hazard by combining **susceptibility, slope stability, and soil type** at the catchment scale. The results were used to select critical catchments for a more detailed scale, where hazard was assessed through **hydraulic software (IBER), along with a fluid-dynamic mass routing model (r.avaflow).**

Regional analysis show most catchments in mountainous terrains exhibit **torrential behavior** and allowed to localize the most critical zones. In the detailed analysis, hazard was calculated based on the **overlapping of the three methodologies**, and their different flow type simulations.