Landslide susceptibility assessment in mountainous and tropical scarce-data regions using remote sensing data: A case study in the Colombian Andes

Diana Ruiz-Vásquez (1) and Edier Aristizábal (2)

(1) Department of Geology, EAFIT University, Medellin, Colombia (diruva123@gmail.com), (2) Environmental and Geoscience Department, National University of Colombia, Medellin, Colombia (evaristizabalg@unal.edu.co)

Landslides triggered by rainfall are one of the most frequent causes of natural disasters in tropical and mountainous countries such as Colombia. However, landslide susceptibility assessments are often limited due to the scarcity of reliable observations and available information, particularly in remote high-mountain regions. Although Colombia has a tropical and mountainous terrain dominated by landslide prone regions, it has little available data for landslide susceptibility assessments. This study presents the application of a logistic regression model to assess landslide susceptibility in the Liboriana catchment. The basin is composed of a tropical inaccessible terrain in the northern Colombian Andes where, on May 18th, 2015, more than 40 landslides and a subsequent flash flood and debris flow killed 104 inhabitants. The applied approach is based on free access remote sensing tools used to determine and complete the missing landslide causative factors. To select key factors related to landslide occurrences, the prediction and success performances of the susceptibility maps for each combination of landslide causative factors were estimated using Receiver Operating Characteristics (ROC). The results show that only three factors produced the best prediction accuracy. All the factors were obtained using free remote sensing tools, indicating that they can provide adequate information to achieve a successful initial approach for landslide susceptibility assessments in complex terrains such as the study area. However, ancient shallow landslides are not included in the landslide inventories, which reduces the prediction capacity of the statistical models to shallow landslides triggered by rainfall.