Geophysical Research Abstracts, Vol. 9, 10615, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10615
© European Geosciences Union 2007

Analysis of sensitivity in Artificial Neural Network models: application in landslide susceptibility zonation, Guantánamo Province, Cuba

C. Melchiorre (1), E. Castellanos (2), M. Matteucci (3)

(1) NGU/ICG, 7491 Trondheim, Norway, (2) ITC, Enschede, The Netherlands,

(3) Department of Electronic and Information, Politecnico di Milano, 20133 Milan, Italy

(caterina.melchiorre@ngu.no, telephone 004722021007- 004773904114)

While Artificial Neural Networks ANNs have been proved to be a promising method in landslide susceptibility modelling, their application is still depending on the difficulty to interpret the results and the influences of each conditioning factor on landslide occurrence.

This contribution proposes the application of a graphical method [1] to analyse the function computed by a Multi-Layer Perceptron (MLP) network. This approach allowed us to qualitatively investigate the degree of interaction among the conditioning factors.

The experimental results were obtained in the Guantánamo province. This study area is the most eastern province of Cuba with 75% of mountainous area, 6186 km2, and 516,311 inhabitants (2006). The territory is constantly affected by different landslides types with known casualties and economic damage. To determine the susceptibility of Guantánamo to slides we have used 186 events previously photo-interpreted and 12 conditioning factors including: geomorphology, geology, soil, landuse, slope angle, aspect, internal relief, drainage density, road and fault distance, rainfall intensity and ground peak acceleration.

The final slide susceptibility map has relatively good accuracy with over 80% of the landslides correctly classified. The most susceptible areas are located over ophiolites and metavulcanites in the northeast part of the province or they are related to steep

slopes in the coastal terraces and less frequently inland.

The results coming out from the sensitivity analysis show an increase of landslide susceptibility with increasing slope angle, internal relief, and pick ground acceleration, whilst an increasing distance from roads and faults reduces the landslide susceptibility. Other variables, as geology, landuse, rainfall, drainage have shown more complex relationships with the output of the model: their influence on landslide susceptibility do not follow the same trends in all the range of the variables.

[1] Plate, T., Bert, J., Band, P., 2000. Visualizing the function computed by a feedforward neural network. Neural Computation, 12, 6, 1337-1354