Hydrol. Earth Syst. Sci. Discuss., 2, S229–S231, 2005
www.copernicus.org/EGU/hess/hessd/2/S229/
European Geosciences Union

Hydrology and Earth System Sciences Discussions

Interactive comment on "Landslide susceptibility mapping of Cekmece area (Istanbul, Turkey) by conditional probability" *by* T. Y. Duman et al.

T. Y. Duman et al.

Received and published: 2 June 2005

Following explanations are carried out to clarify the comment of J. Siebert.

Two main approaches such as direct and indirect methods for preparation of landslide susceptiblity maps are used in literature. Our approach is one of the indirect methods. The indirect statistical methods are classified into bivariate and multivarite statistical techniques. The bivariate techniques are composed of landslide density (Brabb, 1984; van Westen, 1993), information value method (Yin and Yan, 1988) weights of evidence (Bonham-Carter, 1996) and conditional probability which is an application of bayesian statistics. On the other hand, the multivariate statistical methods are multivariate regression analysis, logistic regression analysis, discrimnant analysis and factor analysis. Of course, each of these methods has some advantages and disadvantages when compared each other. Each parameter is analysed individually in the bivariate statistical analyses. This is the main drawback of bivariate statistical methods. However,

the application of bivariate methods (conditional probability) to the production of landslide susceptibility maps is easy; the process of input, calculation, and output can be readily understood. Also, the speed of bivariate methods could be said to be an advantage over multivariate methods (Suzen and Doyuran, 2004). For these reasons, the conditional probability approach is preferred to prepare the landslide susceptibility map of Cekmece area. The map production process is completed by addition of parameter probability scores given in Table 1 (map combination stage). Applications of this method in landslide susceptibility studies can be found in the papers published by Carrara et al. (1995), Clerici et al. (2002), Suzen and Doyuran (2004) and Carasco et al. (2003). The comment of J. Siebert "The addition rule is p(X or Y) = p(X) + p(Y) - p (X and Y), the last term can be omitted only if X and Y are mutually exclusive, which they are not if p(X) is the landslide probability according to slope and p(Y) is the landslide probability according to elevation" is very important for the bivariate statistical techniques. The main assumption of the bivariate statistical techniques is that all parameters are mutually exclusive. For this reason, it is possible to say that the addition operation carried out in the study is applicable.

References

Bonham-Carter, G. F.: Geographical Information Systems for Geoscientists Modeling with GIS, Computer Methods in Geosciences, Vol. 13, Pergamon, Netherlands, 398 p., 1996.

Brabb, E. E.: Innovative approaches to landslide hazard and risk mapping, In: Proceedings of 4th International Symposium on Landslides, September 1984, Toronto, Canada, Vol. 1, pp. 307-323, 1984.

Carrasco, R., M., Pedraza, J., Martin-Duque, J., F., Mattera, M., Sanz, M., A., and Bodoque, J., M., Hazard zoning for landslides connected to torrential floods in the Jerte Valley (Spain) by using GIS techniques, Natural Hazards, 30, 361-381, 2003.

Carrara, A., Cardinali, M., Guzzetti, F., Reichenbach, P.: GIS based techniques for

HESSD

2, S229–S231, 2005

mapping landslide hazard, (http:// deis158.deis.unibo.it), 1995.

Clerici, A., Perego, S., Tellini, C. and Vescovi, P.: A procedure for landslide susceptibility zonation by the conditional analysis method, Geomorphology, 48, 349-364, 2002.

VanWesten, C. J.: 1993, Application of Geographic Information Systems to Landslide Hazard Zonation, Ph-D Dissertation Technical University Delft. ITC-Publication Number 15, ITC, Enschede, The Netherlands, 245 pp.

Suzen, M.L. and Doyuran, V.: A comparison of the GIS based landslide susceptibility assessment methods: multivariate versus bivariate, Environmental Geology, 45, 665-679, 2004.

Yin, K. J. and Yan, T. Z.: 1988, Statistical prediction model for slope instability of metamorphosed rocks, Proceedings 5th International Symposium on Landslides, Lausanne, Switserland, Vol. 2, 1269-1272.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 155, 2005.