



## **Application and verification of fuzzy logic to landslide susceptibility mapping**

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The aim of this study was to apply and verify the use of fuzzy logic to landslide susceptibility mapping in the Gangneung area, Korea, using a geographic information system (GIS). For this aim, in the study we combined a data derived model (frequency ratio) and a knowledge-derived model (fuzzy operator). Landslide locations were identified by changing the detection technique of KOMSAT-1 images and checking the field. For landslide susceptibility mapping, maps of the topography, lineaments, soil, forest, and land cover were constructed from the spatial data sets, and the eight factors that influence landslide occurrence were extracted from the database. Using the factors and the detected landslide, the relationships were calculated using the frequency ratio, one of the probabilistic models. Then, the fuzzy membership function was calculated using the frequency ratio. The fuzzy membership function was obtained by combining the fuzzy and, fuzzy or, fuzzy algebraic product, fuzzy algebraic sum and the fuzzy gamma operator (13 cases) for landslide susceptibility mapping. Finally, the map was verified by comparing with existing landslide locations for calculating prediction accuracy. Among the fuzzy operators, in the case in which the gamma operator ( $\lambda = 0.975$ ) was applied showed the best accuracy (84.68%) and the case in which the fuzzy or operator was applied showed the worst accuracy (66.50%).