



A GIS method for obtaining geologic bedding attitude maps from interpretation of stereoscopic images

Ivan Marchesini (1) , Federica Fiorucci (1) , Michele Santangeolo (1) , Mauro Cardinali (1) , Mauro Rossi (1) , and Fausto Guzzetti (1)

(1) Consiglio Nazionale Delle Ricerche - Istituto Di Ricerca Per La Protezione Idrogeologica, Perugia, Italy
(ivan.marchesini@irpi.cnr.it);

Landslide susceptibility models are important tools for planners and a fundamental step for the definition of landslide hazard and risk. To obtain such models it is necessary to determine a number of variables describing the geological-geomorphological setting of an area. One of the parameters that enter into these models is the arrangement of layers (bedding attitude, BA). This variable is traditionally obtained through the extrapolation of information from geological maps. This method has the clear limitation of using local measures that rarely represent the general bedding. The photo-interpretation is a valuable tool for obtaining such information in a more extensive way; moreover, by this method, observations are less influenced by local anomalous data (local folds) and make easy to detect the widespread BA. Bedding attitude is detectable both by photointerpretation of (i) aerial photographs and (ii) VHR stereoscopic satellite images. By this method a map of bedding traces (BT) is produced. The BTs are represented by linear elements that are distributed in parallel bands, assuming a straight line or wavy pattern. On the photographic image these linear elements can appear as a relief or depression, depending on the different resistance to erosion of the layers. The traditional approach up to now has allowed to obtain BA maps by a visual estimation arrangement of BTs on the stereo-model. Through the comparison between bedding planes and the slopes, it is possible to define six BA classes: horizontal, less inclined than the slope, inclined like the slope, inclined more than the slope, sub-vertical and overturned. With the aim of obtaining quantitative estimates of BA from BT we have developed a simple GRASS GIS script which uses in input the BTs and a DEM to assign the bedding to every BT in a semiautomatic way. In this work we used optical stereoscopic images to obtain a BT map by means of photointerpretation techniques. We obtained BA maps: (i) by the traditional approach (ii) by the script developed in Grass. Results of the two elaborations are compared.