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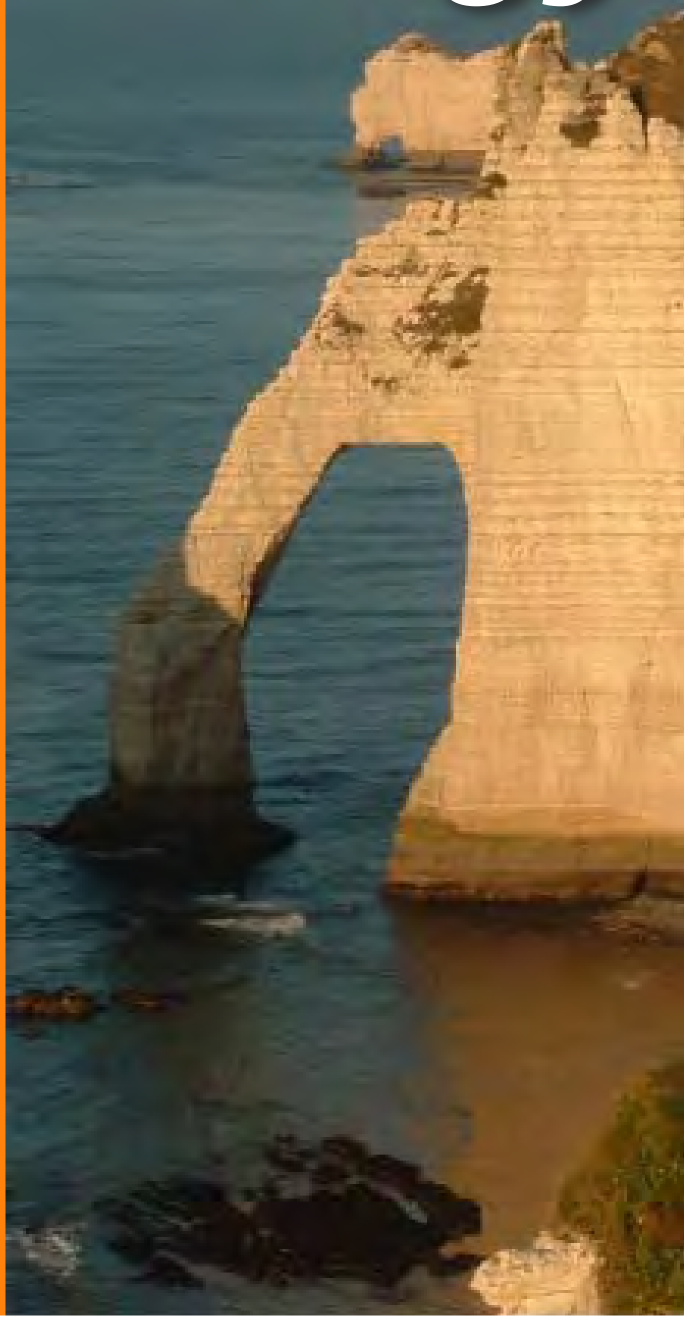
ABSTRACTS VOLUME



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Oral presentations:

Susceptibility analysis of landslide in the Bacia Do Marumbi (Morretes/PR) using bivariate and multivariate statistical methods

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This work aims to apply bivariate and multivariate statistical methods (the information value method and the logistic regression, respectively) to perform the landslide susceptibility assessment in the Bacia do Marumbi (Morretes/PR). The study area is a catchment with 102 km² located in the Serra do Mar, where landslides are very important processes within present geomorphic evolution. For the confection of the landslide susceptibility maps, the following procedures were made: (i) multi-temporal inventorying of landslides of slide type using aerial photo interpretation and field work validation; (ii) division of the landslide inventory in two subsets using a temporal criterion modeling group (landslides older than 2006, 39 cases), validation group (landslides occurred after 2006, 37 cases); (iii) identification and classification of landslide predisposing factors (elevation, slope, plan curvature, wetness index (inverse), lithology, soil type and land use); (iv) weighting of landslide predisposing variables; (v) integration of variable weights and production of landslide susceptibility map; (vi) evaluation of the predictive model performance (success rate and prediction rate; calculation of the Area Under Curve - AUC).

The predisposing factors that have the higher influence on the occurrence of landslides are elevation, slope and soil type. The smallest contribution was presented by the slope plan curvature.

According to the criterion of Guzzetti et al. (2005), the obtained results are considered very satisfactory, once the AUC of the success rate curve is 0.84, and the AUC of the prediction rate curve is 0.81 in both methods. However, although the rates are equal, the information value method shows a higher efficiency if we considered the 20% of the area classified as more susceptible by both methods. For this area, the predictive capacity is of 77.75% for the model built with the Information Value method and only 60% for the Logistic Regression model.

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Automated geomorphological classification for the creation of rigorous shaded relief maps

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Advances in remote sensing have increased the availability of high resolution digital elevation models. These data can be extremely useful for environmental studies, but they need processing in order to provide geomorphological insights. This can be done with two approaches: shaded relief maps and numerical identification of landforms.

In the first case, the landscape is classified by the cartographer, who is able to generalize different landforms and accentuate them in shaded relief maps. These are highly informative but also exposed to a certain degree of subjectivity. On the other hand, numerical landforms classification is mostly concerned with the identification of landforms elements, thus decreasing the informative power of the final output.

In this research we are trying to find a better way to classify major landforms, in order to provide a better framework for shaded relief mapping. For doing so we used Random Forest, trained on a set of interactively selected points, to classify a test area for rock outcrops, screes, alluvial fans and plains.

Random Forest is trained using DEM derivatives and imagery, and used for classifying the area of interest. The algorithm not only produces a classification value, but can also give a probability value, which can be used to show uncertainties.

With this approach the user select the training points were he is certain to find a particular landform, the boundary between landforms are set by the classification algorithm, thus creating a more objective result, keeping the user interaction to a minimum. On the other hand, the uncertainty map may shows areas where the prediction accuracy is low. The user can then easily go back to step one in order to optimize the training set and increase the overall accuracy.

Another advantage is that the map can be updated as soon as new data are available. This way even in highly dynamic environments the thematic map can be easily, automatically and almost effortlessly kept updated.