Assessment of Mass-Transport Deposits occurrence offshore Espírito Santo Basin (SE Brazil) using a bivariate statistical method

Aldina Piedade (1,2), Tiago Alves (1), and José Luís Zêzere (2)

(1) School of Earth and Ocean Sciences, Cardiff University, United Kingdom (piedadeam@cardiff.ac.uk), (2) Centre for Geographical Studies, Institute of Geography and Spatial Planning, Universidade de Lisboa

Mass Transport Deposits (MTDs) are one of the most important process shaping passive and active margins. It is frequently happening and its characteristics, features and processes has been very well documented from diverse approaches and methodologies.

In this work a methodology for evaluation of MTDs occurrence is tested in an area offshore Espírito Santo Basin, SE Brazil. MTDs inventory was made on three-dimensional (3D) seismic volume interpreting a high amplitude reflection which correspond to the top and base of the MTDs. The inventory consists of four MTDs which were integrated into a GIS database. MTDs favourability scores are computed using algorithms based on statistical/probabilistic analysis (Information Value Method) over unique condition terrain units in a raster basis. Terrain attributes derived from the Digital Terrain Model (DTM) are interpreted as proxies of driving factors of MTDs and are used as predictors in our models which are based on a set of different MTDs inventories. Three models are elaborated independently according to the area of the MTDs body (Model 1, Model 2 and Model 3). The final result is prepared by sorting all pixels according to the pixel favourability value in descending order. The robustness and accuracy of the MTDs favourability models are evaluated by the success-rate curves, which are used for the quantitative interpretation of the models expressing the goodness of fit of the MTDs. In addition, a sensitivity analysis was performed and the predisposing factors which have highest prediction performance on MTDs occurrence were identified.

The obtained results allow to conclude the method is valid to apply to submarine slopes as it is demonstrated by the highest obtained goodness of fit (0.862).

This work is very pioneer, the methodology used was never applied to submarine environment. It is a very promising and valid methodology within the prediction of submarine slopes regarding failing and instability to the industry. In terms of academia is a very interesting exercise.

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