



Landslide mapping and analysis of Korbous area, Cap Bon (Northern Tunisia)

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Djbel Korbous is an important relief dominating the south-eastern edge of the Gulf of Tunis. It is an anticline truncated by a NS fault that passes through the axis of the fold, reason of the collapse of western slopes under the sea. This geometry gives the appearance of a large cased fold and the individualization of series of crests forming the massive of Korbous where altitudes exceed sometimes 400.0 m.

Different types of landslides, with various origins and evolution, affect this area. Reactivated pre-existing structures, heterogeneity of lithology and water flow infiltration are the main agents of this phenomenon. The degradation of steep cliffs along the road is strongly accentuated by physico-chemical alteration due to the dissolution of rocks by the runoff flowing through a dense network of fractures and cracks and the spalling of the sandstone bar.

The situation has become increasingly critical since 2009 when a large rock slide affected the slope over the sea, threatening, especially the only access to the village with heavy consequences for the population of the region (infrastructure, regional medical center, trade and tourism).

The present study aims at defining (i) the main structurally controlled failure types; (ii) the detection of potential instabilities from steep slopes and cliff areas; (iii) the preliminary estimation of potential run-out areas.

Geographical Information System GIS (generation of slope map and azimuth map), digital elevation modeling (DEM) are among the most useful tools used for a reliable analysis in this area. Additionally, field work in this paper includes a program of in situ recognition of inventoried instabilities (field measurements, discontinuities characterization, stereoplots and kinematic tests) and digital photogrammetry using a Canon EOS 7D camera (construction of 3D models and discontinuity measurements were all achieved using VisualSFM and CloudCompare software).

The application of those techniques on the area of Korbous showed different families of discontinuities NW-SE and NE-SW whose kinetic conditions allowed the identification of three main failure mechanisms: (1) wedge sliding (dense, intense and inter-crossed fracturing of two dominant directions oriented $N075^\circ$ and $N140^\circ$); (2) toppling (located in the middle of the cliff where lithology is more less tender) and (3) circular sliding (affects the clay slopes which are sensitive to water and have apparent stability. It's where the main road MC128 passes and this presents the greatest threat facing these instabilities).

The dense cutting, weathering and erosion of the whole study area lead, also, to loosen rock blocks from the slope. Their size is variable but the fall height still important reaching in many zones the sea and destroying the protection measures (retaining wall, gabion, drains, etc.).

This continued landslide and its evolution in time and space are really alarming and need a more detailed diagnosis.