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Inventory of ground instabilities on the western Mediterranean coast of Morocco (between Tetouan and Jebha)

Haytam TRIBAK¹, Muriel GASC-BARBIER², Abdelkader EL GAROUANI³

Keywords: ground instabilities, remote sensing, GIS, inventory, Moroccan Rif

ABSTRACT IN ENGLISH:

The mountainous geosystem of the Moroccan Rif is considered to be one of the most sensitive regions to ground instabilities in the world. In order to carry out, for example, a land use plan or to initiate more in-depth scientific research studies in a given region, an inventory mapping the instabilities is necessary. The latter, will be the object of the present work, and will be generated from space remote sensing tools, mainly thanks to the Google Earth Professional program but also through direct observations in the field. GIS tools will then be used for digital processing. The results obtained correspond to inventory maps mentioning the distribution, typology and extent of ground instabilities.

ABSTRACT IN FRENCH:

Le géosystème montagneux du Rif marocain est considéré comme l'une des régions les plus sensibles aux instabilités de terrain dans le monde. Afin de réaliser, à titre d'exemple, un plan d'aménagement territorial ou d'entamer des études de recherches scientifiques plus poussées dans une région donnée, un inventaire cartographiant les instabilités de terrain est nécessaire. Ce dernier, fera l'objet du présent travail, et sera généré à partir des outils de télédétection spatiale, principalement grâce au programme Google Earth Professionnel, aussi à travers des observations directes sur le terrain. Les outils SIG viendront ensuite pour le traitement numérique. Les résultats obtenus correspondent à des cartes d'inventaire mentionnant la répartition, la typologie et l'étendue des instabilités de terrain.

INTRODUCTION

Before any study concerning the ground instabilities of a given region, it is essential to proceed to their inventorying and organizers in a well-defined inventory. The latter represents the simple form of their mapping (Hansen, 1984), and makes it possible to define their type insofar as perceptible traces still exist (Varne, 1984).

1 AIM OF THE STUDY

The coastal region, stretching from Tetouan city to Jebha village, is considered among the areas most affected by the different types of instability in the north-western Rif. The ground movements constitute very active phenomena there which find in the geological formations of this zone a place of predilection. Taking into account our scientific research studies concerning ground instabilities, based essentially on heuristic and conceptual approaches, and in the absence of a national database, it was inevitable to produce an inventory covering the entire region of study.

2 METHODOLOGY

Obtaining our inventory of ground instabilities is based on two essential steps, the first of which consists of a visual analysis of high resolution satellite images, combined with field campaigns for a confirmatory and complementary purpose. Images from the Google Earth Professional program database were the subject of this analysis. The second corresponds to importing the various digital data into GIS tools for the final processing of the inventory.

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3 RESULTS

The results are translated into maps of distribution of ground instabilities in the study region, while mentioning their typologies and their extent. The synthetic cartography presents four main families of instabilities : landslides, rockslides, forms of gullying and collapses of developed slopes considered to be purely anthropogenic movements. Two types of inventory map have been created ; the general map of instabilities indicating the location of the phenomena (figure 1). Then, four other inventory maps, even more detailed, were generated from the general map in order to present the instabilities as they are actually in the field.

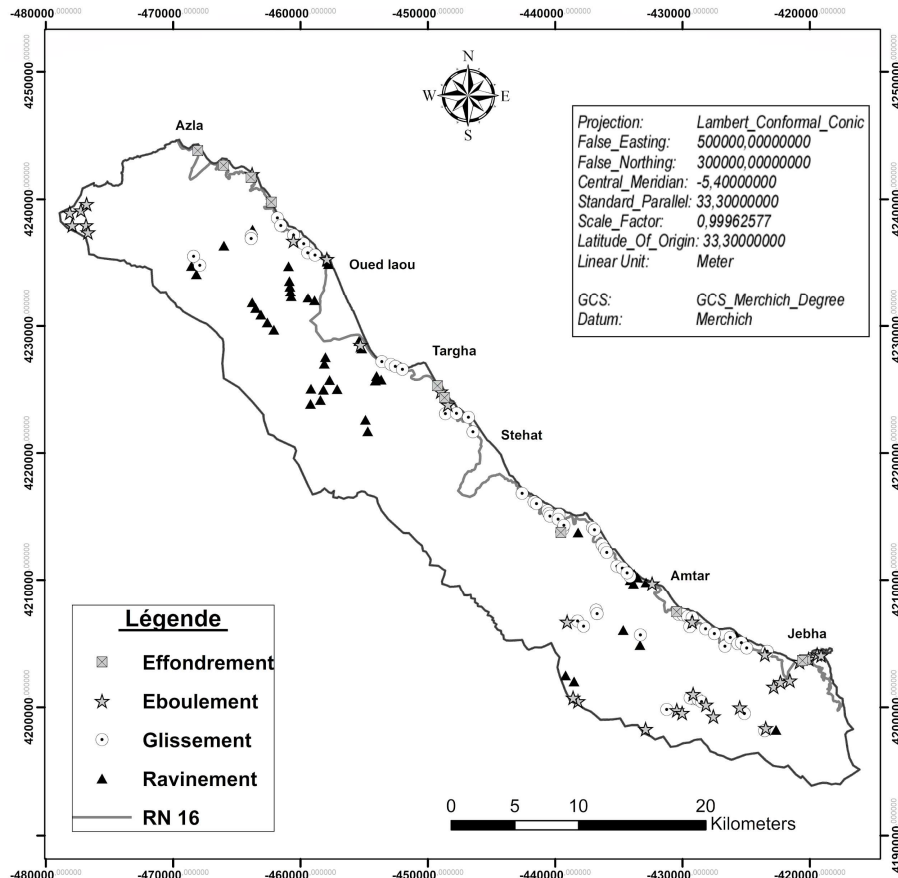


Figure 1 : inventory map of ground instability

CONCLUSION

The surveys of ground instabilities at the level of the Moroccan Rif, through the spatial analysis of satellite images and field observations, allowed the creation of inventory maps. The latter will be essential elements for our detailed studies of instabilities. They will also participate in interpretative approaches thereafter. On the other hand, they will be part of the national database of ground instabilities and will be used for other applied finality.

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