Geological map updates in engineering geology,

Application to the Rif-Chain and its foreland, (Northern Morocco)

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Lots have been done in geological mapping all around the world and presently we benefit excellent numerical data such as world Digital Terrain Model (SRTM), remote sensing images with an excellent ground resolution and plenty of different geologigcal field work. It just miss to complie and gather together all this in order to get an homogenous bird' eye view This study highlights the importance of geological map updates in engineering geology.

The aim of this research is to recognize both detailed geology including lithology and structural aspects as well as the analysis and modeling of the physical processes controlling the deformation. The research is oriented in a first step towards the development of a digital terrain model (DTM) built from topographic data; The use of satellite images with multi-source, multi-resolution and multi-date (Radar-ERS, Landsat ETM 30m, Aster and Quickbird 2.4 m 15m) and aerial photographs; and Geological and geomechanical analysis of land facing the numerical simulation of neotectonic deformation process, building on GIS software.

This study shows the importance of a detailed knowledge of the faults system affecting the Rif chain and its foreland (Northern Morocco). They highlight the conditions of deformation and neotectonics activities and their current and recent developments. The focus is on directional discontinuities families, their hierarchy and their degree of connectivity, their geometric and geotechnical parameters.

The use of digital tools can also understand some typical scenarios such as the triggering or reactivation of mass movements and landslides. These phenomena (rockslide - landslide) are the subject of detailed investigations of land and geomechanical analyzes. Trigger conditions are analyzed as well as the process of propagation of rock masses. In some of the cases studied, the propagation process resulting from the appearance of some surfaces or major shear zones.

The results of this study will be a reference for further engineering studies. They will develop different types of maps at different scales (a) Regional geological engineering maps on a scale

of 1: 10,000 or smaller and (b) Engineering geological plan was larger than 1:10 000 scale. These documents are of great use to Interested Individuals, consulting and civil engineering concerns contraction, and to Government organizations.

A multidisciplinary methodological approach is developed, in which the contribution of Earth Sciences is emphasized, as well as digital terrain models (DTM) and integrated of remote sensing space and airborne images within a GIS data base.