Building of a Real 3-D Geologic Map from Analysis of Reference 3D data in the Ain Sefra Area (Western Saharian Atlas Mountains)

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We present an innovative method to produce a threedimensional geological map consisting of the volume and shape of all geological features in the Ain Sefra area located in the Western Saharian Atlas Mountains. This approach is pioneer in that it is based on surface information only coming from the Reference3D product consisting of a SPOT5 Digital Elevation Model and a SPOT5 HRS ortho-image, which allow a remarkable accuracy for geologic mapping. In a first step, we performed a tele-analysis of the SPOT5 image draped over the DEM in order to present an updated geological map of the area. Due to its perfect matching between elevation data and surface information combined with its superior accuracy without GCPs (planimetric accuracy of 15 m at 90%, elevation accuracy of 10 m at 90%), such analysis can be performed prior to any field survey, with results fully compatible with GPS measurements. In a second step, we used the EarthVision 3- D modeller to generate surfaces from each digitized geological contour (limits between layers, faults) and to intersect these surfaces following geological rules in order to generate layer volumes. The 3-D map makes the geometry of the studied area understandable at first glance, even by non specialists, the relationships between layers and faults being self explanatory. The interest the geometrically correct 3-D geological map is of primarily importance for institutions and people managing underground resources like water, oil, or mineral resources. From surface information only such 3-D map predicts where geological structures should be found at depth, and it therefore allows the characterization and visualisation of potential oil reservoirs in the area of study.

Key words : 3D, modelling, Atlas, Oil reserves