

### **3d Modelling of Continental Mixed Fluvial/Aeolian Systems Integrating “Lidar” Digital Outcrop Images with High-Resolution Sedimentology of Fluvial Facies: Upper Triassic, High Atlas , Morocco**

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In the last few years new approaches have been developed aimed at building more realistic “deterministic” reservoir models, combining classic field data collection and new digital outcrop collection techniques.

This research project focuses on the characterisation of the Triassic fluvial/aeolian Oukaimeden Sandstones from the High Atlas, Morocco. The study area offers extensive outcrops in excess of 1000m high and extending for many kilometres. The formation is composed of stacked lenticular shaped sand bodies often containing cross-bedding and current and oscillation ripples. Some have erosional bases with conglomeratic lags containing rounded pebbles of quartz, chert and felsic volcanics. Minor amounts of interbedded siltstones and mudstones are also present showing bioturbation and some lamination.

This project aims to compare and model different fluvial/aeolian systems using a combination of digital outcrop images obtained with LIDAR (Light Detection and Ranging) and sedimentological data such as sedimentary facies logs and paleocurrent information. These data will be used to evaluate the Oukaimeden Sandstones and the controls on facies architecture, such as basin evolution, depositional system, and influence of climate cycles, as well as build a 3D reservoir model of the different fluvial/aeolian facies.

Detailed 3D digital outcrop images have been obtained using a RIEGL LMS-Z420i LIDAR geo-referenced with DGPS data. The RIEGL LMS-Z420i is a fully portable sensor designed for rapid acquisition of high-quality 3D images capable of capture up to 12000 individual X,Y,Z and laser intensity points per second. In conjunction with the scanner, an integrated calibrated digital camera (6.1 megapixels Nikon D100) provides the RGB information to colour code the different scans.

Preliminary results regarding the processing of the digital outcrop data show a proximal area characterised by the presence of coarser sediment and more distal facies defined by finer stacking fluvial sand bodies, where it is also possible distinguish major incisional surfaces and characterise channel evolution.