Automated Quantitative Outcrop Analysis (AQOA) – An Optimized Workflow for Efficiency in Integration and Knowledge Transfer From Surface to Sub-Surface

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ABSTRACT

In the petroleum industry, remote sensing combined with 3D modelling of outcrop and modern reservoir analogues has become an effective method to improve the understanding of sub-surface. This method provides an indirect source of information and insight to bridge the gap between the seismic- and well-scales, including inter-well facies and structural architectures. While the acquisition and processing of 3D digital models are affordable, fast and mostly automatic, their interpretation remains subjective and time-consuming as it is still primarily performed manually. Therefore, most of the time only a limited part of the geological information captured within 3D photorealistic models is extracted. Even though the integration of analogues is done routinely in the petroleum industry, there is still a need for new supervised automated approaches to perform a complete analysis of surface data into a single framework including loading, visualization, quantitative characterization and integration into reservoir modelling workflows. This study aims at demonstrating how outcrop analogues and surface data can be handled and integrated into a single framework to complement conventional input data (e.g. seismic and well). The proposed methodology is built on an optimization of workflows and technologies primarily developed for seismic interpretation enriched with recent advances in 3D scene generation, visualization and quantitative interpretation workflows. The optimal integration of multi-type datasets will improve knowledge transfer from surface to sub-surface, increasing efficiency and consistency in modelling reservoirs to ultimately reduce exploration risks and improve reservoir management.