High-Definition Global Paleo Digital Elevation Models and Carbonate Presence: Impact on SE Asia & Pacific Paleo Landscapes and Exploration

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Despite carbonates accounting for more than 60% of the world's conventional petroleum resources our knowledge base and, therefore forecasting capability, lacks behind that of more predictable siliciclastic reservoirs. For example, carbonates are more challenging to predict spatially due to lack of trends and to identify on seismic data due to their variable anatomy, acoustic heterogeneity, and resemblance to volcanic bodies.

To improve our knowledge base and optimize basinal and regional assessment for carbonate presence, TotalEnergies developed a new and innovative GIS-based tool building paleo digital elevation models, augmented by a module that generates probabilistics for carbonate presence.

A dedicated semi-automated workflow was developed that generates state of the art paleo-DEM products by integrating exhaustive (i.e., wells, outcrops, seismic, GDE and other maps) data which is converted to relevant input parameters for paleo-DEM generation using simple ML algorithms. These paleo-DEMs show radical differences compared with current academic and industry products. For example, the location of basins, shallow-water areas and major seaways are, in many cases, radically different. Next, the paleo-DEM products form the basis for paleoclimate modeling and result in, among others, probabilistic products for GDE and thickness. These products have global (100x100 km) scale but can be refined to field-scale where desired. Currently, paleo digital elevation models have been generated for Ypresian, Rupelian and Burdigalian time slices with refinements for the Asia-Pacific region.

This presentation will share and illustrate product examples generated by this innovative tool which integrates and simplifies carbonate knowledge and exploration and effectively democratizes information by putting those directly in the hands of the explorer.