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GEORESERVOIR: RESERVOIR GEOMETRY DESCRIPTION AND DETECTION OF ANALOGOUS

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The study of many sedimentary deposits has led to the development of conceptual models of occurrence, geometry, and spatial distribution of sedimentary bodies. These models support understanding the spatial distribution of the facies, facies association, stacking pattern, and internal heterogeneity of reservoir occurrences in subsurface. Reservoir conceptual models allow geologists to find out the better analogous occurrences in previous studies that improve new prospects' understanding. However, the comparative analysis to determine the closer analogous is hindered by the wide variety in data collection methods, scales of observation, classification approaches, and, mainly, the terminologies. Deep-water deposits are associated with relevant oil and gas reservoirs worldwide and most of Brazil's historical production. Therefore, we have developed a domain ontology to support the systematic description of deep-water deposits in their several scales of analysis, especially outcrop and seismic section scales. A domain ontology is an artifact that formally represents the intended meaning of the vocabulary applied by geologists when describing the objects of study on Geology. The ontology covers the terminology for describing the geometrical and sedimentological properties of the rock bodies. Each term included in the domain ontology is defined and disambiguated by specializing previous upper-level ontologies -the Basic Formal Ontology (BFO) and the GeoCore ontology-, which allows the integration of this artifact with previous existent ontologies for temporal relations, geographic location, information content, and other domain ontologies for industrial uses. GeoCore defines a small set of formally defined general concepts in Geology, and the upper Basic Formal Ontology (BFO) provides a backbone for deriving more specialized concepts while establishing a baseline for integrating different existing domain ontologies. This integration conception offers a robust framework for software development and further expansion and integration. The GeoReservoir ontology disposes of a uniform view, format, and vocabulary to describe the shape, dimensions, lithology, texture, and structures of channels, overbank, lobes, and associated deposits, as well as their mereotopological relations and stacking patterns. It is completed with conceptual constructs to model geological processes to support interpretation reasoning about the deposition evolution. A software application based on the ontology framework allows both to visualize the geometry and spatial distribution of the bodies and query every described aspect of the deep-water occurrence. A visual graphical animation of the channel and related elements helps the geologists understand the sedimentary deposits' spatial distribution under repetitive cycles of erosion and deposition. A database built under this conceptual framework intends to support clustering artificial intelligence methods to evidence potential analogous occurrences and extract tendencies and patterns on similar deposits. The GeoReservoir ontology might also be used as a standard language for communication between stakeholders, supporting query interfaces, and information retrieval. Although this initial research step covers deep-water occurrences only, we designed the ontology to be extensible, allowing further descriptions of all types of sedimentary deposits.

KEY-WORDS: DEEP MARINE DEPOSITS, RESERVOIR PARAMETRIZATION, ONTOLOGY

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