

ABSTRACT

The Gabonese sedimentary basin located on the southwestern African margin contains several pre-saliferous basins with different geological histories since the opening of the South Atlantic Ocean. The origin of two proven potential hydrocarbon reservoirs here, but the Gamba and Dentale Formations still remain poorly understood. Previous studies suggested an acidic volcanic provenance linked to the geotectonic development of the region albeit based on the analysis of clays contained in these sandstones. The objective of this study is to determine the provenance of these reservoir sands in order to understand and interpret the basin evolution in the context of exhumation and erosion of the South-Gabonese sub-basin. Core samples from the highly permeable, quartz-rich sandstone of the Gamba and Dentale Formation were analyzed. Several methods including QEMSCAN analysis, conventional metering of light minerals, classification of texture, scans, total rock geochemistry (ICP-MS), Sr-Nd-Pb isotope analysis, total rock XDR analysis, and U/Pb dating of detrital zircons by laser ablation (LA-ICP-MS) was adopted. Findings from this study reveal the sandstones are quartz-rich and to a lesser extent feldspar, detrital modes suggest a recycled and/or transitional continental-craton origin, consistent with the paleo-

geotectonic activity of the region. The composition of the grains indicates the origin of the acidic and metamorphic protolith sources. The detrital zircons ages range from Archean to Paleozoic, but two main sources are clearly distinguished, namely the Paleoproterozoic (Gamba Fm) and Neoproterozoic (Dentale Fm). Indeed, the main populations of zircons aged 520-810 Ma and 1950-2110 Ma are characteristic and very common in the region of the northwestern part of the West Congolian Belt (WCB). The Gamba Fm sandstone must have originated from the rocks eburnean plutonic intrusion (1980 to 2080 Ma), while the Dentale Fm sandstone is related to the rocks of the Pan-African orogeny (520-733 Ma), the component of the WCB orogenic belt. Thus, the stratigraphic association and the sedimentary source suggest a kind of inversion of sedimentary layer, presenting the sediments of Neoproterozoic origin below those of the Paleoproterozoic across an unconformity structure related to the denudation and fault movements of the region (post-rift). The findings for this study are significant for exploration and development of hydrocarbon in these two formations, but also in understanding the processes of evolution of the basin.

Keywords: *Gabonese Sedimentary Basin, Provenance Study, Reservoir, Gamba Formation, Dentale Formation.*