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The diagenetic and reservoir-quality evolution pathways of shoreface sandstones within a sequence stratigraphic context: an example from the Ponta Grossa formation (Devonian), Paraná Basin, Brazil

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Understanding the diagenetic and related reservoir-quality evolution pathways of shoreface sandstones has considerable applications for hydrocarbon exploration because they form important reservoirs in many basins worldwide. Linking the diagenetic alterations to sequence stratigraphic framework of in shoreface sandstones of the Ponta Grossa Formation (Devonian), Parana Basin, Brazil, allows better elucidation and prediction of diagenetic and reservoir quality evolution pathways. Early, near-surface diagenetic alterations include the formation of grain coating and ooidal berthierine, ooidal Fe-oxyhyroxides, grain-coating micro-quartz, pyrite and siderite in transgressive system tracts (TST), particularly below the transgressive (TS) and maximum flooding surface (MFS). Grain-coating micro-quartz and berthierine, which has been subjected to partial chloritization, retarded cementation by quartz overgrowths, and hence preservation of reservoir quality. The formation of siderite (delta 13CV-PDB = -16.1per mil to -3.8per mil), pyrite, micro-quartz and berthierine was presumably aided by low sediment supply and elevated organic matter content, which enhanced the microbial suboxic to sulfate-reduction diagenesis. Low rates of sediment supply also enhanced the formation of ooidal Fe-oxyhydroxides. Relatively low delta18OV-PDB values of the siderite (-11.9per mil to -5.9per mil) is attributed to the addition of siderite cement during burial diagenesis. Early, near-surface diagenetic alterations in the highstand systems tract (HST) sandstones are dominated by the dissolution and kaolinitization of feldspars, which are attributed to meteoric waters circulation during fall in the relative sea level. Deep-burial diagenetic alterations in these sandstones include cementation by quartz overgrowths, calcite and Fe-

dolomite/ankerite and transformation of kaolinite into dickite. Textural and oxygen isotopic (delta18OV-PDB = -11.6per mil to -5.5per mil) evidence suggest that cementation by calcite occurred at wide range of burial depths. Albitization of plagioclase was encountered in TST and HST sandstones. This study demonstrates that despite overprinting by deep-burial diagenetic processes, the spatial and temporal distribution of early diagenetic alterations can still be linked to the sequence stratigraphic framework of the shoreface sandstones, i.e. primarily to variations in the rates of changes in the relative sea level and rates of sediment supply.