
The Sedimentology and Stratigraphic Architecture of Late Carboniferous to Early Permian Glacigenic Deposits in Lower 'Unayzah Reservoirs, East-Central Saudi Arabia

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In the subsurface of east-central Saudi Arabia, deposition of the Lower 'Unayzah reservoir (C and B members) commenced in Late Carboniferous times during the earliest stages of the late Paleozoic Gondwanan glaciation. The 'Unayzah C comprises quartzose sandstones, laid down upon the so-called Hercynian Unconformity during (probably several) glacial retreat stages, in a glacio-fluvial outwash braidplain depositional setting. These were overridden and deformed during intervening, major glacial readvances, when the sediments were thrust over each other with the construction of push moraines ahead of the advancing ice sheets. The uppermost surface of the 'Unayzah C is a significant unconformity representing the final sub-glacial contact of the Gondwanan ice-sheet. Subsequent (Early Permian) deposits of the 'Unayzah B represent the final glacial retreat phase. They are sharply divided into a lower Unit B1 and an upper Unit B2. Unit B1 is dominated by glacigenic sediments, including highly deformed material attributed to localized push moraines (and hence representing minor glacial readvances); ice-proximal, subaqueous outwash fans (lacustrine turbidites and massive diamictites); and ice-distal, glaciolacustrine deposits including laminites and stratified diamictites. In contrast, Unit B2 is characterized by fine-grained redbeds, representing low-lying alluvial floodbasin deposits. Embedded within these occur eolian and fluvial sandstones. A significant drainage event is thus implied between Units B1 and B2. The end of 'Unayzah B time is represented in places by paleosol development, indicating a disconformable contact with the overlying 'Unayzah A. This study significantly extends the record of the advance and retreat of the Gondwanan ice sheets in southern Saudi Arabia, phases of which can now confidently be correlated with coeval deposits in Oman.
