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Sedimentological context of the continental sabkhas of Abu Dhabi

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For more than half a century, the coastal sabkhas of Abu Dhabi have been the focus of intensive research focusing on deposition, early diagenesis and the role of microbial communities. Given all of this activity, it is somewhat surprising that their continental counterparts have been largely neglected with only a brief mention in larger-scale regional studies. This study redresses this imbalance by documenting the sedimentological, mineralogical and early diagenetic characteristics of continental sabkhas that are hosted in the Rub al Khali desert of the United Arab Emirates.

During reconnaissance surveys it has been established that organic-rich microbial mats and evaporite minerals, both similar to those observed in the coastal sabkha, also occur in these continental sabkha settings. Satellite imagery was utilised to identify potential field locations for surface and shallow sub surface investigation; subsequent field reconnaissance established the validity of sites in terms of anthropogenic disruption and accessibility. At each site, surface features were described in detail, particularly with reference to any microbial communities or evaporite crusts; sample pits were dug in order to document sub-surface facies geometries and to recover both sediment and pore water samples for subsequent analysis. In each pit, a range of environmental parameters was measured over a prolonged period, including surface and sub-surface temperatures, ground water salinity and dissolved oxygen.

Sediment samples were subjected to a range of analyses in order to establish and quantify primary sediment composition and any early diagenetic mineral phases. The results of this study are used to build an atlas of sedimentary structures and textures that are associated with continental sabkha settings. These observations allow us to establish the defining sedimentological and early diagenetic characteristics that can be employed to identify similar depositional environments in ancient successions. This will, ultimately, enable the development of better reservoir models, in terms of lateral and vertical depositional and petrophysical facies variability, and fluid flow.