



## **The development of stromatolitic features from laminated microbial mats in the coastal sabkha of Abu Dhabi (UAE)**

Andreas Paul (1), Luiza Lessa Andrade (2), Kirsten E. Dutton (2), Angela Sherry (2), Wesley M. Court (1), Cees Van der Land (2), Stephen W. Lokier (1), and Ian M. Head (2)

(1) The Petroleum Institute, Petroleum Geosciences, Abu Dhabi, United Arab Emirates (apaul@pi.ac.ae), (2) Newcastle University, School of Civil Engineering and Geosciences, Newcastle upon Tyne, United Kingdom

Stromatolitic features are documented from both marine and terrestrial environments worldwide. These features form through a combination of trapping and binding of allochthonous grains, and through microbially mediated and/or controlled precipitation of carbonate minerals. The combined effects of these processes result in the continuous vertical and lateral growth of stromatolites. While the Abu Dhabi coastal sabkha is well known for a vast microbial mat belt that is dominated by continuous polygonal and internally-laminated microbial mats, no stromatolitic features have been reported from this area so far.

In this study, we report evidence for stromatolitic features from the coastal sabkha of Abu Dhabi, based on observations in an intertidal but permanently submerged pool. This pool lies embedded within the laminated microbial mat zone, and is marked by the development of true laminated stromatolite at its margins and microbial build-ups at its centre. In order to characterise processes that lead to the formation of these stromatolitic features, and to develop a conceptual model that describes their development in the context of variations in sea level, tidal energy and other environmental factors, we employ a multitude of environmental, sedimentological, mineralogical and geochemical methods. These methods include the analysis of water data in terms of temporal variations in temperature, salinity, dissolved oxygen and water level, the analysis of petrographic thin sections of both lithified and unlithified features as well as an analysis of the stromatolites' mineralogical composition, and the amounts of incorporated organic carbon and calcium carbonate.

Initial results suggest that the development of the observed stromatolitic features in the coastal sabkha of Abu Dhabi is the result of a complex interplay between simultaneous erosion of laminated microbial mat, and biotic/abiotic lithification processes. Initially, the location of this pool was characterised by a continuous laminated microbial mat. Through Recent changes in sea level and/or of the associated environmental conditions, this microbial mat was removed. At the same time as this erosion occurred, lithification processes set-in that continuously stabilised the extending pool margin. Through this extension, selected areas of the newly lithified mat were left behind, and formed the build-ups in the pool's centre that are observed today. This lithification might have been controlled by a change in the associated microbial mat communities from non-lithifying to lithifying, due to the permanent exposure to seawater by which this pool is characterised.