

## **Eolian Facies Models Revisited**

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Modern eolian systems are difficult to relate to ancient counterparts because it remains unclear how wind dynamics and sediment budget control the development of complex 3D bedforms and modulate their behavior and accumulation. In turn, although theoretical models have been developed since the 1980's, it is only recently that detailed, large-scale, quantitative outcrop studies have been able to unequivocally demonstrate relationships between eolian bed-set architecture and original bedform morphology.

In dry eolian systems, dune facies are relatively insensitive to changes in fundamental controls such as sand budget and wind regime. Rather, the key to developing predictive models for erg reconstruction has been to understand the 3D geometry and hierarchical nature of bounding surfaces. Only through this approach can the products of allocyclic control be discerned from the complex mechanics of autocyclic bedform behavior.

Documentation of interdune facies relationships is required to explain mechanisms of accumulation and preservation in wet eolian systems. Yet interdune strata may account for <1% of preserved successions, necessitating that their study requires exceptional exposure. Independently developed models for wet eolian systems form a spectrum of types that can be explained in terms of the interaction of fundamental controls such as sand budget and groundwater table elevation, which in turn reflect sediment distribution pathways, climate and basin setting.

The development of eolian facies models remains important for hydrocarbon exploration, particularly in mature provinces (e.g. UK SNS), where good well control allows the employment of sophisticated models in the search for small plays based on subtle stratigraphic traps.