

Paper Number: 1764

## **Geological Evolution of Parabolic Bedforms in Great Indian Thar Desert**

Wadhawan, Sudesh Kumar

Former Director General, Geological Survey of India

[wadhawansk.leo@gmail.com](mailto:wadhawansk.leo@gmail.com)

---

A large variety of distinctive dune fields ranging from clustered parabolic to transverse, linear, reticulate, star and barchanoid have been mapped across the vast span of the Thar Desert. The characteristic aeolian landforms of the Thar Desert, i.e., the clustered parabolic dunes constitute the present day active desert front that experiences contemporary aeolian dynamism. These older stabilized dune forms have been worked upon by winds episodically that resulted in producing several evolved and superimposed complex dune forms. Morphostratigraphically, episodic nature of multi-phase aeolian deposits are distinguished that rest disconformably over fluvio-aeolian and calcretised colluvio-fluvial sedimentations units in the eastern parts and over a thick pile of polycyclic fluvio-lacustrine sedimentation package in the northern parts of the Thar.

Study of space imageries (TM-FCC and IRS black and white and FCC ) covering western parts of India reveal that the stabilized parabolic dunes in the Thar desert occur spread from near the northern margin of the Rann of Kachchh in the southwest to far-inland in broadly linear NE oriented belt covering over 500 km. length, over 150 km. wide in the south, tapering to about 50 km. northeast wards. Based on dune morphometry, it is feasible to infer a hierarchical system of aeolian bedforms in the Thar Desert. It is remarkable that the parabolic dunes formed in down-wind areas close to the coastal sabkha tidal environment of the Rann of Kachchh occur mostly in poorly organised clusters of single units lying in discernible rows astride the dominant south-westerly winds and separated by in arrays of transverse sandy flats or inter-dune depressions.

Oldest TL/OSL dated aeolian sand deposits in Thar Desert are: ca. 200 -150 ka. It is inferred that dominant spurts of aeolian dynamism / dune formation took place during: 160 -186 ka; 90 -105 ka, 55 - 60 ka, 25-30 k and 14-10 ka respectively. Older aeolian deposits [Chamu Formation] having dates between 90 and 25 ka are associated with large massive stabilized crescent shaped bedforms and vast thick sand sheets that have been reworked into compound parabolic bedforms by later rejuvenated aeolian dynamism of post-Last Glacial Maxima 14-10 ka period. It is remarkable that the occurrence of such clearly delineated stabilised megabarchanoids with well defined interdune spaces is prominently discerned in a terrain with rocky substrata whereas the sandy interdune/ sand sheets support abundance of over-riding and superimposed dunes that show exceptional dune reliefs, as is witnessed in the middle sectors of central Thar.

It is observed that in a well developed complex parabolic, the central blown-out hollow opens with narrow curvilinear windward passage, gradually flaring laterally and reaching a maximum width span in the middle before narrowing again towards the north-easterly downwind parts. Broadly rounded (convex) to angular (hair-pin) nose closures are noticed spatially disposed in parabolic forms and intense deflation at places has resulted in completely blowing out of the nose parts thus forming a funnel like opening. These parabolic dunes have been subject to aeolian reworking that has carved linear and barchans shaped dunes of younger generation. The paper attempts to elaborate on influence of the

underlying geology of both the Quaternary and pre-Quaternary rocks on deposition and evolution of aeolian bedforms in the Great Indian Thar Desert.

