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**Seasonal deposition and post-depositional modification under semi-arid conditions of the Tertiary, low-gradient Cubango Megafan, northern Namibia**

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The 350-km long, 300-km wide Cubango Megafan forms part of the thick Kalahari fill of the intracontinental Kalahari Basin of Central and Southern Africa. Drilling for potable groundwater by the Federal Institute for Geosciences and Natural Resources (BGR) of Germany intersected two fresh, subsurface aquifers at depths of 39-99 m and 181-260 m, respectively, in the uppermost stratigraphic unit, the 260-m thick Andoni Formation. The latest cored borehole is a 400-m deep and has only 7 % core loss. The Andoni Formation consists largely of unbedded, fine-grained, unsorted, clayey to silty sands, fine-grained well-sorted and unconsolidated aquifer sands, and minor aquitard clays. Most of these sediments have been extensively modified by post-depositional bioturbation. The only discernable bedding planes are those bounding the clay layers. Evidence of later meteoric and phreatic fluid flow is revealed, respectively, by cementing in local pedogenic calcretes and by growth of scattered calcrete and dolocrete nodules between 1 mm and 40 cm in diameter.

Characteristically, the fine-grained, unsorted bioturbated sands contain scattered granules and coarse-grained sand grains. Deposition took place under seasonal, semi-arid conditions on a symmetrical, avulsing megafan with a gradient of only 1:0.00029 (a fall of 1 m in 3.5 km), one of the lowest in the geological record [1]. A bioturbation sequence and pedogenesis [2] took place during subaerial exposure in the new sediment cover and followed the decrease in soil moisture. This continued through time after successive depositional events. The dominant trace fossils are assigned to *Naktodemasis bowni*, which are meniscate backfilled burrows likely produced by beetle and moth larvae and soil bug nymphs in the A, B, and C soil horizons (e.g. [3]). *Planolites* is abundant and may also represent passively filled burrows of a variety of arthropods and annelids, or poorly preserved meniscate backfilled burrows. Other trace fossils include rhizoliths and rhizocretions. These traces and other pedogenic processes to depths of >1 m produced the poor sediment sorting through upward and downward advective and diffusive sediment distribution [4, 5]. As climate became drier, these features were overprinted by pedogenic and phreatic carbonate.

Varying climatic conditions are suggested. The unsorted clayey and silty sands suggest weak depositional currents. The well-sorted aquifer sands, although fine grained, suggest wetter conditions with greater runoff. The pedogenic calcretes point to limited annual rainfall (<550 mm – [6]) and an extremely stable land surface upon which no new sediment was deposited for centuries or even millennia. The only available dates are provided by 6 Ma fossils within 2 m of the top of the Andoni Formation and 4 Ma fossils at the top of the formation [7] when fluvial accumulation finally ceased as Africa became ever drier [8] and dunes of the Kalahari began to form [9].

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