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Geomorphological and sedimentological characteristics of cyclone-generated landforms and washover deposits along the coasts of NW Australia

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Palaeotempestology, the study of prehistoric storms, uses sedimentary evidence to enlarge the temporal frame of storm occurrence patterns given by historical records. Different sedimentary archives storing traces of tropical cyclone impact (washover fans and sediments, beach ridge systems) were investigated along the coasts of the Exmouth Gulf and the NW Cape(W Australia) in order to evaluate their use for palaeotempestological research. (1) Along the W coast of the Exmouth Gulf, distinct lobate washover fans exhibit washover terraces, channel systems and delta-type sedimentation patterns. Their stratigraphy consists of shell debris layers, sand, coarse coral fragments and entire shells. Multiple reactivation of the washover fans is inferred from their complex pattern of accumulation and incision and a minimum of three palaeosols, each of them indicating one depositional event and a subsequent period of geomorphologic stability. (2) In Giralia Bay, S Exmouth Gulf, sandy chenier-like beach ridges characterize the landward boundary of extensive mud flats. Their geomorphology and stratigraphical architecture reflect the influence of intermittent phases of morphodynamic activity due to littoral-type processes and are assumed to record recurring cyclone impact. (3) Along the W coast of the NW Cape, subrecent tsunami sediments detected in back-barrier archives contain reworked foraminifers from the shelf and the littoral zone and are most likely related to the 1994 Java Tsunami. Below, several thin clastic sand layers intercalate carbonate mud sediments. In contrast to the mud units, most of the sandy layers are reflected by increased mean grain size and contain reworked foraminifers from the shelf and littoral zone. Underlying mud sediments and mangrove remains reflect coastal and palaeoenvironmental changes on Holocene time scales. Our preliminary findings suggest that the investigated sedimentary archives have a high potential for improving extreme wave histories (tsunamis, cyclone landfalls) of W Australia. Main challenges include dating (14C, OSL) and distinguishing between event and non-event processes, and between event types, based on sedimentology, microfauna, and shell taphonomy.