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# Combining drone-derived digital elevation models and single grain luminescence data of modern analogue deposits to reveal sediment transport pathways and geomorphic change in washover fans

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The chronostratigraphy of coastal sedimentary records such as washover fans or beach-ridge sequences may be used to reconstruct storm chronologies on centennial to millennial time scales. However, modern analogues are crucial for interpretations of depositional processes and for reducing uncertainty in evaluating the typically complex chronostratigraphic architecture of these landforms. Such a modern analogue was provided by category 3 tropical cyclone (TC) Olwyn in 2015, which caused a significant storm surge in the Gulf of Exmouth, Western Australia, and which activated large washover fans located in the southwestern part of the Gulf. Pre- and post-TC Olwyn geomorphological surveys and high-resolution drone-derived topographical data of one of these washover fans document a detailed history of erosion and deposition during the event. The modern analogue deposits provided an excellent opportunity to evaluate the use of luminescence-based proxies (luminescence inventories) including quartz single-grain age distributions and associated remnant ages, as well as quartz and feldspar luminescence signal comparisons for tracing event-related sediment source environments and understanding transport processes (May et al., 2020). Sediments deposited during Olwyn show a systematic relationship between luminescence characteristics and washover fan position. Seaward and central washover sections are indicated by well-bleached deposits due to the beach as the dominant source and/or long transport distances across the fan. Lateral washover deposits, in contrast, are characterised by rather local source areas and short transport distances, resulting in higher remnant ages of 70-140 a. This data shows that the combination of sediment source environments and sediment transport length across the fan represents the main control in resetting the luminescence signal and enabling reliable depositional ages to be calculated. It documents the benefit of investigating luminescence inventories when establishing chronologies from complex sedimentary records, thereby demanding a careful consideration of local processes and source areas when interpreting sedimentary TC records.

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