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Published in:
29th IAS Meeting of Sedimentology. Schladming, Austria.

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Clemmensen, L. B., Bendixen, M., Hede, M. U., Kroon, A., & Nielsen, L. (2012). Morphological impacts of the 1872 storm flood on a sandy spit system in South-Eastern Denmark. In 29th IAS Meeting of Sedimentology. Schladming, Austria.: Sedimentology in the Heart of the Alps (pp. 242)

Morphological impacts of the 1872 storm flood on a sandy spit system in south-eastern Denmark

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In AD 1872 coastal lowlands in south-eastern Denmark were inundated by sea water during an extreme storm flood event. The morphological impacts of this event are described using a multidisciplinary approach including geomorphologic mapping, historical maps, digital terrain models, ground-penetrating radar profiles, and luminescence dating. The storm flood was the result of north-easterly and easterly winds of storm force that blew across the southern part of the Baltic Sea for almost 18 hours. The eastward part of the sandy spit system Feddet on south-eastern Zealand (Denmark) was inundated during the extreme storm flood event. Sea water reached 2.8 m above mean sea level (amsl) during peak inundation and water levels higher than 2.0 m amsl were maintained for almost 10 hours. The flooding initially caused landward transport of sediment and the formation of an approximately 2 m high and relatively coarse-grained storm-berm. During peak inundation frontal dunes were eroded, and sediment was transported up to 250 m inland. A number of lobate to digitate, perched washover fans were formed. The unvegetated sand of the washover fan was reworked by aeolian processes in the years after the flooding. Relatively high dunes were particularly formed along the margins of the washover fan, where aeolian sand was trapped by existing vegetation. These dunes are between 3 and 4 m high and thereby constitute the highest dunes on Feddet. Washover fans elsewhere in Denmark are also bordered by relatively high dunes and aeolian processes on these barren washover fans are one of several mechanisms that can lead to coastal dune formation.