

***Holocene avulsions in the Rhine-Meuse delta, The Netherlands*, by Esther Stouthamer. *Nederlandse Geografische Studies / Netherlands Geographical Studies* 283, 210 pp. NLG 51.50.**

This Ph.D. thesis is the result of four year research on the Rhine-Meuse delta. It is a fine product that builds upon the huge amount of borehole data that were gathered by Utrecht University earth scientists over the past decades. With over 200,000 borehole descriptions and over 1150 ¹⁴C dates, the Rhine-Meuse delta is one of the best studied areas in the world. The amount of geological and geomorphological information is therefore overwhelming. The spatial resolution of the study is very high, but the temporal resolution is large as well. Because all the borehole data have been stored in a GIS database, the paleogeography can be studied in great detail.

The development of the Rhine-Meuse delta was obviously partly controlled by local factors, but the author has tried to extract the regional forcing factors (e.g. sea-level rise, tectonics) that determined the delta development. The thesis can therefore be considered to be of great importance for all those working in delta areas. In addition, the research methodology, absolute and relative dating principles and the methods for paleogeographical reconstructions are certainly applicable in other delta areas.

Chapter 1 gives a general introduction to, and literature review of avulsion, including definitions, factors controlling avulsion and avulsion processes and deposits.

In chapter 2, the Late Weichselian and Holocene paleogeography of the Rhine-Meuse delta is discussed. The results are strongly based on the decades of fieldwork performed by Utrecht University in the delta area. The general development of the delta is presented and the main factors controlling the paleogeographic evolution are discussed. Although the study area has its local elements, several of the factors mentioned are without doubt important in other delta regions as well. Amongst other topics, the morphology of the pre-existing Weichselian paleovalley, sea-level rise, neotectonics and discharge variations are discussed.

Chapter 3 focuses on the role of channel avulsion during the Holocene development of the delta. It appears that 91 avulsions occurred over the past 10,000 years. The location of avulsion points and the shifting of avulsion sites in time and space are related to several factors. In the first part of the Holocene, the zone with prominent avulsion sites shifted eastward as a consequence of sea-level rise. According to the author, neotectonics is an important factor for channel avulsion in the second part of the Holocene, but she underestimates that it is ongoing sea-level rise that forces the avulsion zone over the faulting area. The author ascribes the increased avulsion frequency during the late Holocene, since 2800 BP, to increased discharge and/or channel sedimentation.

Chapters 4, 5 and 6 are of somewhat more local significance. Chapter 4 deals with the avulsion frequency, the avulsion duration and the inter-avulsion period of the Holocene channel belts. Chapter 5 reconstructs in detail three avulsion sites in the Rhine- Meuse delta and deals also with the delta architecture. Chapter 6 discusses the importance of reoccupation of former river channels following avulsion. Some 25% of the avulsions in the Rhine-Meuse delta appear to follow pre-existing courses. Particularly after 4500 BP, the reoccupation frequency increased, which is interpreted as a consequence of the diminishing sea-level rise, the decreasing aggradation rate, and a changing coastal area with a decreasing number of tidal inlets.

The thesis, published as a book in a reputed series, contains many well-drawn figures in black and white; in addition, a full-color geological/morphological map of the Rhine-Meuse delta has been included.

The price is low for such a high-quality and well printed book. However, most of the chapters have already been published (or they were submitted when the book was in print) as articles in international journals. This implies that the book does not contain much new material for those who have access to libraries or electronic journals, and who keep abreast of the developments in the field of delta research.

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