

EaES 350 Laboratory 8: Sedimentary logs

You have just started as a sedimentology consultant, and you have been contacted by a geotechnical company that is interested in your expert knowledge on the sedimentary architecture of floodplains and deltaic plains. In turn, this company has to give advice to the city board of a rapidly growing suburb that is looking for new areas for expansion. The rationale is that thick sand bodies are most suitable for construction, whereas clayey and organic deposits will require expensive foundations. The 7-foot-tall sedimentologist who used to work for the geotechnical company was unexpectedly drafted by the NBA, but the day before he left to play for the Indiana Pacers, he described two cores from the area of interest, which is in the upper deltaic plain of the Rhine-Meuse Delta, The Netherlands, and has been so throughout the Holocene. The two cores are located ~500 m apart, and you have just received the descriptions. You are asked to interpret these cores in terms of processes of deposition and depositional (sub)environments. Your ultimate task is to give advice as to the likelihood of the sand bodies encountered in the two cores to be laterally continuous, or whether additional coring will be necessary.

In order to answer these questions, you have to make a sedimentary log of both cores, using the format of your textbook (Fig. 5.6). If necessary, you can add items not covered by the legend (Fig. 5.7). The Rhine-Meuse system drains a catchment area of ~200,000 km², the present-day mean annual discharge of the Rhine River (the principal feeder of the Rhine-Meuse Delta) is about 2200 m³ s⁻¹, and the maximum depth in present-day Rhine distributary channels is about 8 m.

The core descriptions are as follows:

Core 9002.110

0-80 cm: clay; bioturbated; dark grey A-horizon (paleosol) at 30-50 cm
80-100 cm: silty clay; bioturbated
100-140 cm: sandy clay; bioturbated
140-250 cm: fine sand; 140-200 cm cross-laminated, mean set thickness 2 cm; 200-250 cm cross-bedded, mean set thickness 10 cm
250-600 cm: medium sand; cross-bedded, 250-400 cm: mean set thickness 25 cm, 400-600 cm: mean set thickness 40 cm; reworked peat at 280 and 340 cm
600-700 cm: no recovery; presumably sand

Core 9002.117

0-90 cm: clay; bioturbated
90-140 cm: silty clay; 90-130 cm bioturbated; 130-140 cm horizontally laminated
140-190 cm: sandy clay; horizontally laminated
190-230 cm: silty clay; horizontally laminated
230-240 cm: sandy clay; horizontally laminated
240-250 cm: fine sand; horizontally laminated
250-260 cm: silty clay; horizontally laminated
260-300 cm: fine sand; 260-270 cm horizontally laminated; 270-300 cm cross-laminated, mean set thickness 2 cm
300-350 cm: medium sand; cross-bedded, mean set thickness 10 cm; granules at 310 cm; reworked plant remains at 320 cm; mud clasts at 350 cm
350-360 cm: peat; reed fragments

