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Geoarchaeological prospection for Roman waterworks near the late Holocene Rhine-Waal delta bifurcation, the Netherlands

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ABSTRACT

Romans who settled in the Low Countries at the northern margin of their empire were practicing diverse systems of water management to maintain economic and above all strategic stability. In the early Roman period (12 BC–AD 70) they created a shipping route from the Rhine towards the north by digging canals and constructing dams, such as the Dam of Drusus, accompanied by the adjacent Roman fortress of Carvium (Herwen). This dam was situated at the bifurcation point of the Rhine and Waal river branches and was designed to channel more water into the Rhine. All these engineering feats were undertaken in order to control the northern part of Germania via the Wadden Sea and the German rivers Ems, Weser and Elbe. By the middle Roman period (AD 70–270) the Romans had cancelled their efforts to subdue Germania and this is a period when the Rhine is known as the *limes* (Roman state border). The research area described in this paper is situated near Herwen in the eastern part of the Rhine–Meuse delta system. The area has a dynamic late Holocene erosional and depositional history, close to the river system's equilibrium point. In order to reconstruct the former landscape and to investigate whether evidence of Roman waterworks could be detected, geoarchaeological coring campaigns were carried out to gain insight into the sedimentology, chronology, stratigraphy and geoarchaeology of the region.

Results indicate that Pleistocene sediments are only preserved in the western part of the research area, but further east than previously known. Dating of gullies and levees has confirmed Roman and potentially pre-Roman fluvial activity closer to the Roman fortress of Carvium than was previously known. Four newly discovered residual gullies provide a greater insight into the character of the Roman landscape than hitherto known.

The largest of the newly identified gullies may be instrumental in finding the location of the Dam of Drusus, however, much depends on the question as to whether the gully represents an actual former stream channel or simply a crevasse and this cannot be ascertained on the current evidence. Nevertheless the results of this study reinforce the assumption that the Roman *castellum* was situated on the apex of the *Insula Batavorum* and close to the Dam of Drusus at the bifurcation of the Rhine and Waal.

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1. Introduction

The successful administration of the vast Roman Empire was mainly due to the ease of transport and trade. Transport overland was made possible by the construction of a network of good roads. However, much larger quantities of goods and people could be transported over water leading the Romans to construct a network of canals linking to rivers and seas. Canals are known from different parts of the Roman Empire (Smith, 1977; Wikander, 2000; Grewe, 2008). The locations of some of these channels are well known from archaeological research, such as the “antique Suez Canal” (Schörner, 2000), but others such as the Fossa Drusiana (Canal of Drusus) in the Netherlands, have no

known remains. This difference is due to the fact that the Egyptian canal was constructed through a large area without rivers, while the latter channel was dug in the Rhine–Meuse delta and might have been eroded by the actively migrating rivers of this region.

The Roman presence in the Rhine–Meuse delta in the Netherlands and a small part of Germany is archaeologically known from 19 BC when a legionary fortress was built at Nijmegen (Kemmers, 2006, 13–57). During the early Roman period until about AD 40, there was an offensive phase, in which the Romans tried to subdue parts of Germania north of the delta (Van Es, 1981, 28–36; Polak and Kooistra, 2013, 440–447). To this end, they undertook military expeditions with fleet units through the Flevum and the Wadden Sea to the Ems, Weser and Elbe (Fig. 1).

Around AD 40 they abandoned their efforts to subdue the local population and the Rhine became the northern border of the Roman Empire

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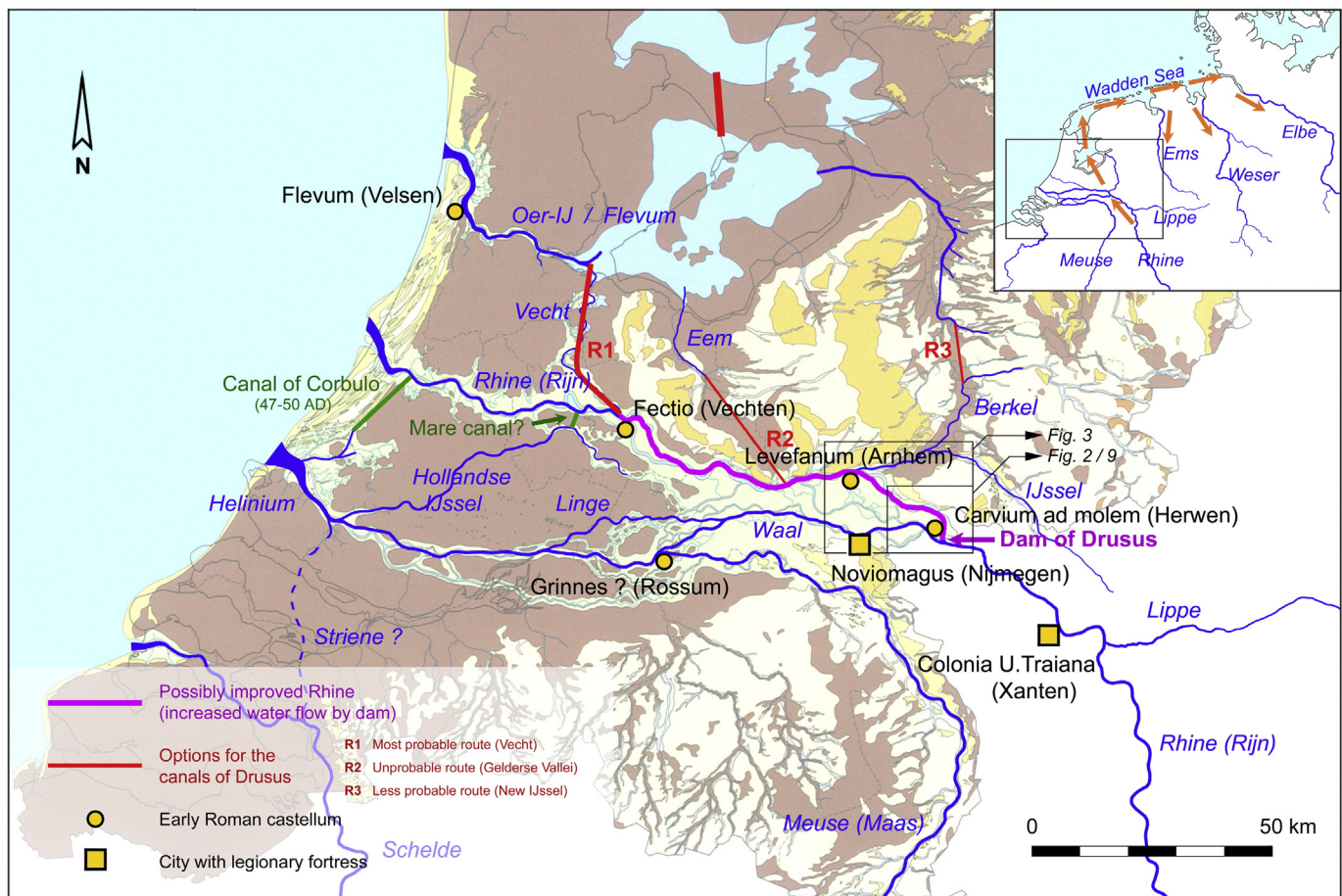


Fig. 1. Possible sailing routes to the north, created under the leadership of Drusus. Map background: Vos et al., 2011, p. 59 (late Iron Age). Inset: Present-day NW European river network with routes of the fleet campaigns of Drusus, Tiberius and Germanicus between 12 BC and AD 16 over the Flevum and Wadden Sea to the estuaries of the Ems, Weser and Elbe in Germania.

(Van Es, 1981, 36–37). This border area, known as the *limes*, is considered not only as a controlled boundary with Germania, but also as an especially designed and secured transport infrastructure corridor (Whittaker, 1994; Roymans and Derks, 2011, 16–19). From that time onwards, there is a consolidation phase of the Roman presence in the lowlands, after the Batavian revolt (AD 69–70) marked by increasing prosperity and development, a phase also known as the “Pax Romana”. From the last quarter of the 2nd century the military and political tide began to turn and there were alternating losses and recovery of Roman power until in the 5th century AD, after which the Roman Empire collapsed in this area (Van Es, 1981, 44–59).

According to written records, the first Roman waterworks built in the Netherlands were those of Drusus, consisting of a dam (Tacitus, *Annals* XIII, 53) and one or more canals, the latter being “a work of unprecedented proportions” (Suetonius, *Vita divi Claudii*, I, 2–4). It is generally assumed that these works played a crucial role in the Roman military campaigns in northern Germania. In this way the Roman troops from the Rhine region could reach the northern estuaries of the Ems, Weser and Elbe on their ships via the Flevum (Lake Flevo) and Wadden Sea, without sailing across the North Sea.

From the 16th century, when interest in the classics revived, until the 1990’s a number of archaeological theories were proposed for the location of a canal (Fossa Drusiana) but none could provide any physical evidence (cf. Vollgraaf, 1938; Willems, 1980; idem 1981/1984; Ritterling, 1906; Norlind, 1912; Harbers and Mulder, 1981; Holwerda, 1925; Huisman, 1995). Therefore, the question remained as to where in the Rhine–Meuse delta did the Romans dig the Drusus canal(s)? As we will see below, the position of the former Moles Drusiana (Dam of Drusus) is fairly well known, at the bifurcation point of the Rhine and

Waal. Because it is supposed that there has been a relationship between the Dam and the Canal(s) of Drusus, both serving the aim to provide a water transport route, our approach was to choose our (first) geoarchaeological research area near the location of the dam.

The Fossa Corbulonis (Canal of Corbulo) in the western Netherlands was built according to tradition in or shortly after 47 BC, “in order to avoid the uncertainty of a trip across the sea” (Tacitus, *Annals* XI, 20). Remnants of this canal, which connected the Rhine at Leiden and the Helinium (Maas–Waal estuary, south of Naaldwijk), have been recorded at various locations (De Kort, 2013), revealing a 9 to 14 m wide canal, which was partly lined with wood. This wood has been dated by dendrochronology with a felling date of AD 50 (Jansma, 1995, 129).

2. Background

The need to create an artificial shipping route by Drusus was driven by the character of the natural fluvial topography at the end of prehistory. Over the past few decades palaeogeographical research of the Rhine–Meuse delta has made considerable progress in providing a good chronological overview of the development of the various river branches of the delta (Cohen et al., 2012). This corpus of palaeoenvironmental information has allowed many older theories about the location of the Drusus canal(s) to be examined and refuted.

Records of classical authors do not describe the purpose of the waterworks of Drusus directly, but this can be deduced. Their role was to provide a shipping connection of the Rhine to the Wadden Sea, in order to allow fleets to sail to northern Germania without having to go across the North Sea (Tacitus, *Annales* II, 8). Such a trip into the

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