

## Reconstruction of the old river landscape off Katwijk, The Netherlands

Vanhooren Lore<sup>1</sup> and Missiaen Tine<sup>2</sup>

<sup>1</sup> Vakgroep Geologie, Universiteit Gent (UGent), Krijgslaan 281, 9000 Gent, Belgium  
E-mail: [lorvhoor.vanhooren@ugent.be](mailto:lorvhoor.vanhooren@ugent.be)

<sup>2</sup> Flanders Marine Institute (VLIZ), InnovOcean site, Wandelaarkaai 7, 8400 Oostende, Belgium

The northwestern border of the Roman empire, called the Lower Germanic *Limes*, was a defense front consisting of a sequence of military settlements built on the South bank of the Rhine river. The Brittenburg was the most western of these fortresses. Due to its unique location at the mouth of the Rhine river it played an important role in the expansion and defense of the Roman Empire (Van Dinter, 2013). Unfortunately, due to coastal erosion the fortress disappeared below the sea. Current knowledge concerning the Brittenburg is limited. It is indicated on Roman maps, and up to 1960 traces of the fortress could sporadically be observed on the beach near Katwijk. However, its exact location is hitherto unknown (Buijtendorp, 2018). The first step to locate the Brittenburg is reconstructing the location of the Rhine river in Roman times and in particular its South bank.

Due to its high archeological value, the area has to be studied using a non-destructive method to prevent possible damage to any remains. High resolution seismic prospection is the preferred method to visualize the shallow subseafloor (Missiaen et al., 2018). In 2018 an area of 2500 x 900 m off the coast of Katwijk was surveyed. This area coincides with the (supposed) location of the Roman Rhine on land (ARCADIS, 2012). A grid of 58 seismic profiles was recorded using a parametric echosounder (*SES-2000 Quattro*). It has a narrow beamwidth resulting in a high horizontal and vertical resolution, and the possibility to work in very shallow waters, which is not possible using classic seismic sources (Missiaen et al., 2018; Wunderlich et al., 2005).

Detailed analysis of the seismic profiles resulted in the identification of five buried channels and three erosional surfaces. Due to the structural relations a relative age determination could be made. The offshore continuation of the Roman Rhine was determined based on location, width, depth, top level and structural context. The channel has a straight morphology that can be extrapolated to the location on land and is 200 meters wide, but the depth can not be precisely determined due to the presence of a seafloor echo.

Keywords: Brittenburg; paleo-geographic reconstruction; High resolution shallow seismics; Parametric echosounder

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