The Zwinproject

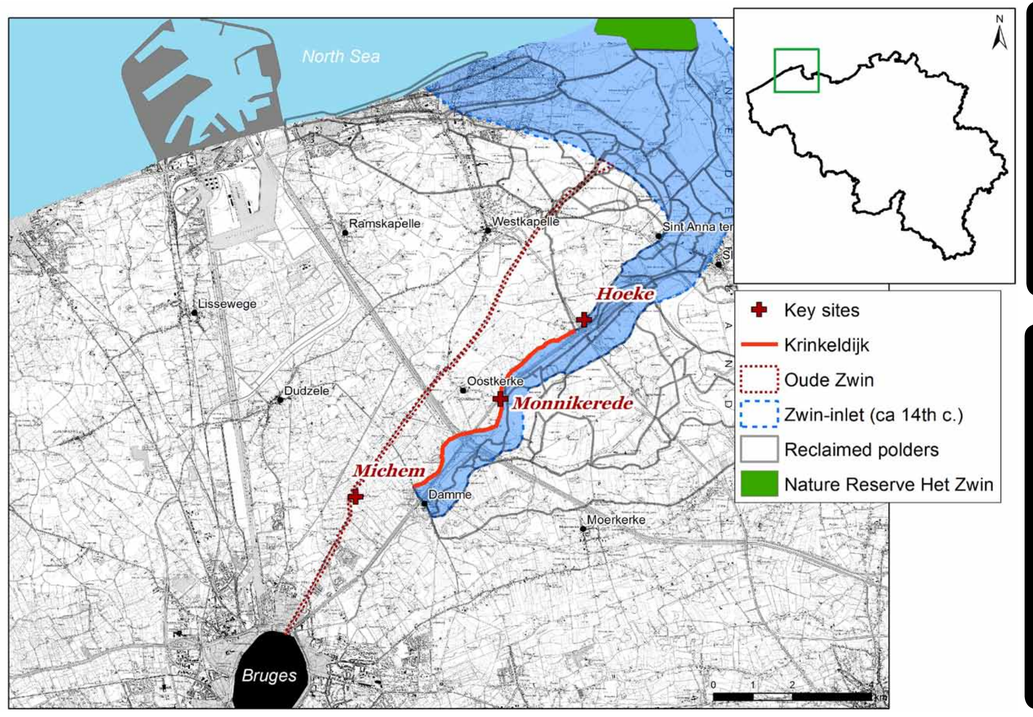
Medieval Bruges and its outer ports. A landscape archaeological contribution to the Zwin-debate

FWO Research Project 2013-2016

Introduction

The medieval port area of 'het Zwin' is a dynamic landscape, influenced for centuries by the interaction between men and nature. The broad sea channel of 'het Zwin' supported the development of a **linear portuary area** with flourishing harbour settlements on its banks and crowned by **Bruges** which grew into an economic and cultural metropolis. After 1500, the economic importance of Bruges and the surrounding areas diminished due to increased **silting** of the tidal inlet. The Zwin area lost its function as a harbour and many **settlements** along it became **deserted**.

For more than a century the debate around Bruges' connection to the sea and the lost villages was dominated by historians and pedologists, while archaeological input was almost nonexistent. In recent years however, **landscape archaeology** demonstrated the potential of **non-invasive prospection techniques**. A combination of traditional and new non-destructive prospection techniques promises to deliver a broader and more valuable archaeological dataset, resulting in a better understanding of the evolution of the Zwin-area.



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Desktop

Acquisition & processing of existing data layers *for the entire Zwin area*

Literature & cartography

All literature (history, toponymy, historical geography, archaeology, ,…) relevant to the region are analysed. The archives from the city of Bruges, abbeys and water boards are searched to gather the necessary documents and maps

Soil & geological data

Existing pedological and geo(morpho)logical data are gathered and confronted with the existing soil map, in order to asses and enhance its quality in this specific region.

Remote sensing

Aerial Photography

Oblique

The **UGent-database** contains more than 1500 oblique aerial photographs for the Zwin-area. After a first assessment, 122 of them were **georectified**. Approximately 1800 potential archaeological features were identified and **mapped**.

The pictures especially reveal **cropmarks** located on higher, **sandy soils**. In addition, the UGent-database contains around 300 aerial photographs of the area taken during WW I.

Orthogonal

Through the Flemish Geographical Information Agency (AGIV) and GISWest, ten different orthographic aerial data layers are available, recorded between 1990 and 2012.

The series taken in December 2008, with low standing sun and rime frost show **shadowmarks** on the lower lying more **clayish meadows**, reveals an ancient system of plots. A valuable addition to those photographs are the data layers available through Google Earth (2007 and 2009) and Bing Maps (2009).

LiDAR

The LiDAR-data consist of ground points with a sample density of at least 1 point/4m² and an average density of 1 point/2m².

In our project area, LiDAR has two major contributions. On a **macro scale**, it gives information on the **geomorphology** of the area and it can be compared with the soil map. On a **smaller scale**, it reveals the **microtopography** thus being complementary with the oblique aerial pictures. These 1st generation data were recorded between 2001 and 2004. The 2nd generation data are to be expected in 2015-2016.

Archaeological data

The archaeological basis for this project lies in the **field-survey** of Oostkerke, conducted by Bieke **Hillewaert** in the early 80's. Nearly 20% of the archaeological sites in the Zwin-area (#1075) registered in the **Central Archaeological Inventory** (CAI) were found in this authoritative study.

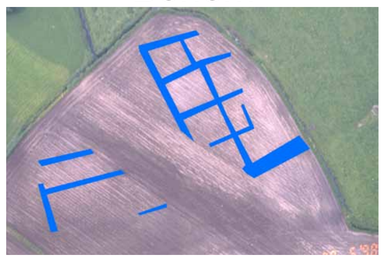
Moreover, there still remain '**unknown**' datasets such as the **Tilleman collection** , originating from the site at Hoeke and various anonymous collections of metal objects, found by **detectorists**.

Desktop objectives

- State of the art of the Zwin-debate, embedded in its broader geographical, historical and geomorphological framework
- Retrogressive integration of the multi-proxi data in a historical GIS
- Delimitation of test-regions

The sites

Bonem

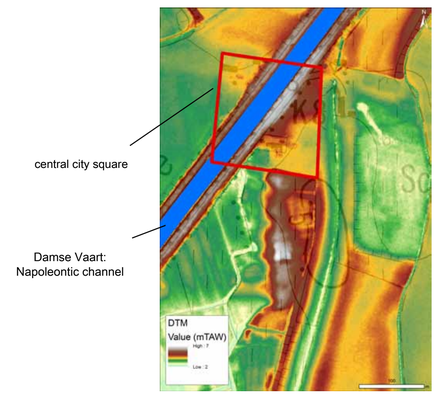


Sint-Adriaans

Michem

Field survey by Hillewaert and oblique photographs have proven the archaeological potential of this site. **Finds** dating back to the **9th c**. **AD** combined with **cropmarks** and specific landscape setting on a **sandy ridge**, hint at this region being one of the **first outports** of Bruges.

Monnikerede



Monnikerede was situated on the **left outer dike** of the Zwin-inlet and functioned as one of Bruges' **outports** from the 13th c. onward. As Bruges economy and the Zwin-inlet both regressed, Monnikerede disappeared. Arable land strewn with **pottery** and the microtopographical variations visible on the **DTM** state the value of this site.

Hoeke

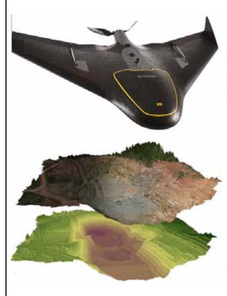
The history of Hoeke is comparable with that from Monnikerede: it was probably founded on the **left bank** of the Zwin-inlet in the early 13th c. and it sailed along with the economical tides of Bruges. However, the **post-depositional** process was different. The port did not disappear but **shrank** to a hamlet in which only the political centre remained. The **commercial area** was embanked and is today used as **arable land**. A very 'fertile' land, in terms of archaeological finds, as can be seen in the Tilleman collection.

Fieldwork

High-resolution scan and developing new data layers *on the selected sites*

Non-invasive

UAV



The **Trimble UX5** is a remote sensing prospection tool bridging the gap between terrestrial surveying and photogrammetry. The remotely controlled airplane takes abundant and overlapping frame images which can be processed into a **highly detailed** and accurate **DSM**.

This technique will be tested on the site of **Monnikerede**, where the archaeological features are most traceable in its microtopography.

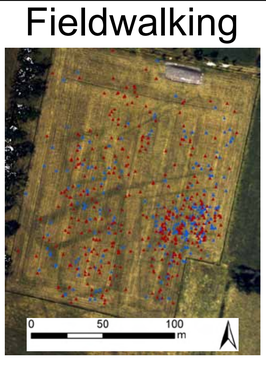
Geophysical Survey

The subsoil of the test-sites will be surveyed simultaneously deploying two geophysical soils sensors They are complementary in scope, in order to reach the best results over different types of soil and archaeological features.

a) 4-receiver coil **EMI**-sensor, measuring simultaneously the electoral conductivity and the magnetic susceptibility.

b) stepped-frequency continuous wave **GPR** operating over a frequency range from 100 to 3000MHz.

Fieldwalking



The artefacts found during fieldwalking will be recorded by **DGPS** which allows for an accurate positioning. After determination, these **surface-finds** will be analysed using **spatial analysis** techniques in orde to statistically discern potential historical relevant patterning amongst their spatial distribution.

Invasive

The objective in this 'final' stage is to validate the before mentioned prospection techniques. There are three invasive options that can be used:

Augering in specific areas where archaeological or geomorphological anomalies were detected.

Limited test-pits, depending on specific questions relating to nature and date of features detected in the surveys or aimed at assessing quality of preservations.

Large scale infrastructural developments that make a cross section of our project area will be follow-up closely: Simon Stevin & A11

Research outcomes

- Detecting the location, morphology and quality of preservation of the lost Zwinports
- Cross-disciplinary study of the historical and landscape evolution in the area between Bruges and the Zwin-inlet
- Further developing and evaluating an integrated methodology to study submerged landscapes