

THE USE OF DIGITAL MAPPING IN MARITIME AND COASTAL RELATED PROJECTS

Paul De Candt

Aquaterra NV
IJzerweglaan 48, 9050 Gent
E-mail: paul.decandt@aquaterra.be

From GIS to map production

For more than 15 years, Aquaterra has been involved in projects related to digital mapping, cartography and photogrammetry. In these GIS-related activities the main effort was the production of geo-information and combining data of several GIS-formats (e.g. Esri, MapInfo, Intergraph, AutoCAD, etc.).

In the early nineties, Aquaterra developed the necessary know-how and software capabilities to bring GIS-data into the map-printing environment. At that time GIS-systems were used for map creation and screen display; output was limited to plotting or printing to computer connected peripherals.

Bringing the map results to a real cartographic layout and output was very difficult and nearly impossible. Offset printing could only be achieved through long and painful conversion of data or through some very expensive raster based products.

In 1987 the Apple-Macintosh computer was the first personal computer environment providing a solution for desktop publishing helped by Adobe's postscript language. This revolutionised the world of publishing and printing and would be the breakthrough for most of today's printing capabilities. Today no printing is possible without the use of a postscript RIP.

In desktop publishing, a RIP or Raster Image Processing is the process and the means of turning vector digital information such as a PostScript file into a high-resolution raster image. The RIP takes the digital information about fonts and graphics that describes the appearance of the file and translates it into an image composed of individual dots that the imaging device (or printer) can output.

The RIP is the translator between the computer data and the printer solution. In today's offset printing industry the graphic layout is no longer written to film but directly to the printing plates in the four CMYK color components.

Fifteen years ago this procedure was unthinkable; the printing of a GIS-based map was impossible without very dedicated file translation. It was in this domain that Aquaterra developed know-how and tools to bring GIS-data to postscript. Once the map conversion finished, they could go to offset printing and publishing.

Today a great variety of tools and procedures are needed to bring digital maps into the clients' approved layout and representation. Digital cartography requires a permanent research to satisfy the ever-increasing quality requirements and to maintain cost control.

Aquaterra has been involved in many map productions for a wide variety of projects in tourism, mobility, urban planning, environment, real estate, ecology, photogrammetry, etc.

In the maritime and coastal environment Aquaterra had the opportunity to do a number of mapping projects. In each of them different methods and production schemes were used. We will discuss a few examples based on our experience in these fields.

The Coastal Atlas of Belgium ('De Kustatlas')

The Atlas was initiated by the Coordination Cell for Coastal Management ('Coördinatiepunt voor Geïntegreerd Beheer van Kustgebieden').

It was aimed at bringing an inventory of the coastal aspects in areas such as:

- physical environment (hydrography, climate, tides and waves, etc.)
- nature
- tourism
- industry
- fishery
- culture
- architecture
- coastal defense and management

The Atlas was aimed at a large public distribution; in this way a great number of maps, graphics and tables should bring the many aspects of the coastal area to a clear overview.

The Atlas synthesizes the results of many researches and survey activities initiated by coastal and maritime organisations, universities, and government institutes.

Initial data for this project was provided in digital (photos, GIS-data, maps, graphics) as well as analogue (maps, reports, sheets, etc.) form. Some new maps had to be digitised and geo-referenced to combine them with other sources. Existing GIS-data needed re-projection to new map-projections for publishing.



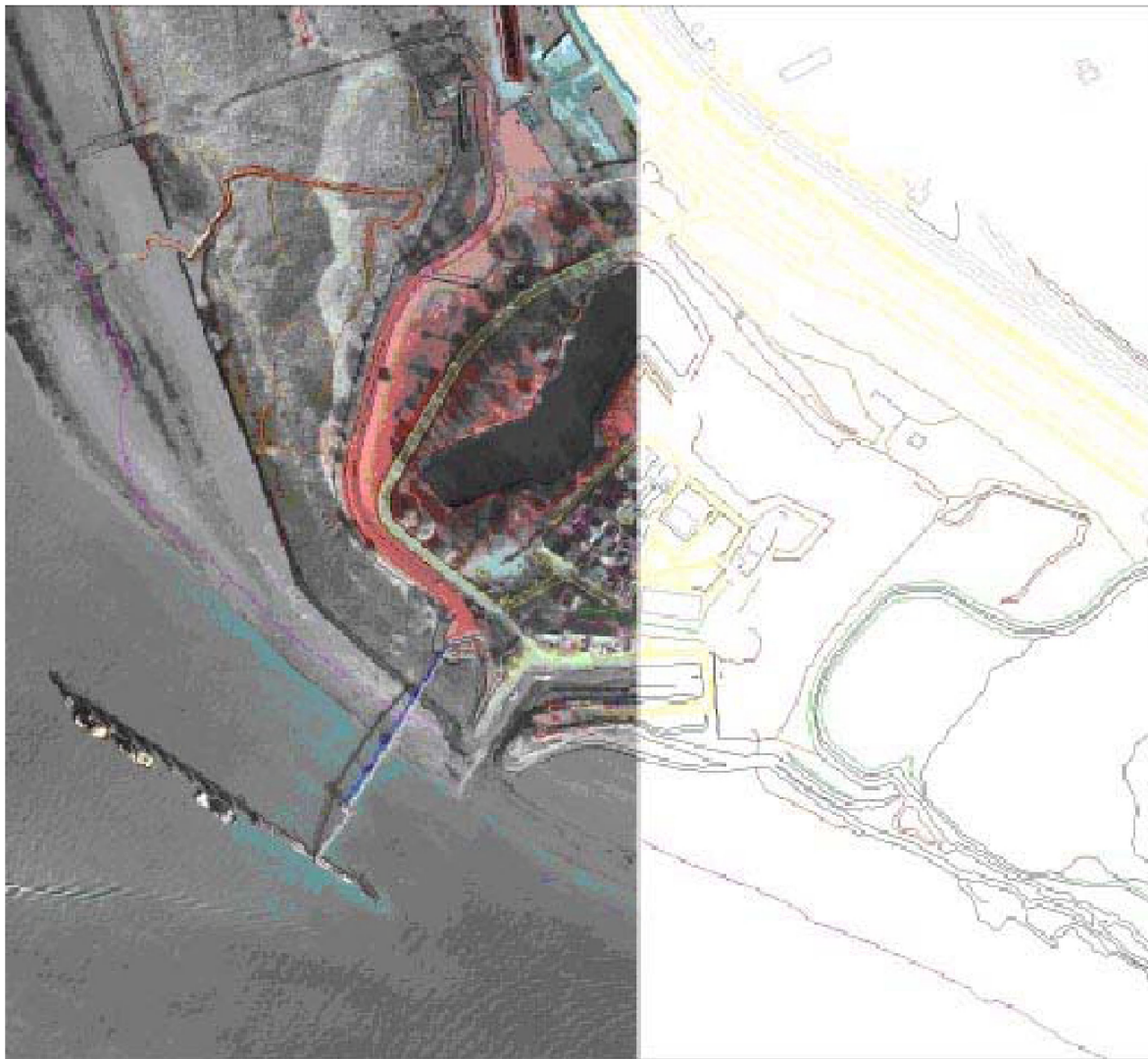
The overall layout as well as the layout for each chapter had to be discussed in detail. Each coastal field needed a specific approach to its content and characteristics. All maps and graphics had to be accompanied by text that was both synoptic and technically accurate.

The Atlas production was done fully digital and would also enable a web-version that was created afterwards. It proved to be a great success to the general public as well as the expert readers in these fields.

Mapping of the Schelde Estuary

In 2003 the Western Schelde Maritime Services (AWZ- Dienst Zeeschelde) needed monitoring the vegetation along the dikes, embankments and shoals of the Schelde River between the city of Gent and the Belgian-Dutch frontier; this also included the Rivers Durme and Rupel .

In order to monitor such vast tidal river embankment it was decided to create orthophotos of infrared aerial photography of the total river bank at different time intervals. Infrared (IR) photos allow a much better observation and differentiation of vegetation classes than (RGB) colour photos. Orthophotos are photomaps that allow accurate measurements and extraction of data on the images itself. A normal (aerial) photograph generates a conical projection of the image area and is only accurate near the photo-centre. 'Draping' the image over the terrain relief (or DTM) produces the orthos. Aerial photographs were taken at a (flight) scale of 1/5000 and on different time intervals (winter/summer) to observe vegetation changes.



Photogrammetric restitution of the stereo images (60/30% overlap) allowed the DTM creation. The digital processes needed a lot of data control in order to comply with quality criteria of both the DTM and the orthos. The orthos were subject to further radiometric corrections in order to make a homogeneous image representation of the river.

The result was an IR coverage of approximately 170km of riverbanks with photo-tiles of 1x1km and a ground resolution of 25cm per pixel image. The data was now used for vegetation mapping in a GIS-environment. Finally the images were combined into atlases of the whole River Schelde providing a practical working instrument for the government authorities.

Photo atlas of the Belgian coastline

The Belgian coastline is only 65km long but it represents a major economic factor and tourist attraction. With an average of more than 17 million tourists per year this small stretch of coastline has created a great variety of beach and recreation activities, hotel accommodation, restaurants and shopping areas. In summertime the beaches top more than 240.000 visitors per day!

The Belgian coast also generated an important real estate market; it varies from small apartments and holiday homes to very wealthy residential areas such as in Knokke-Zoute. To visualise this important coastal area, Aquaterra decided to create an atlas of aerial photography covering the 65km of coastline from to beach up to 2km inland. This area really represents the major coastal residences and activities.

The photographs were taken with one of the first digital cameras for aerial photography. The high resolution digital photographs allowed the production of orthophotos with a ground resolution of 20cm/pixel.

An astonishing bird's-eye overview of the entire coastline was created in a page layout representing both 1x1km images and corresponding city maps.



The atlas also enabled the production of a virtual fly-over of the Belgian coast with some dedicated computer software. The great interest for this product by both private and local authorities as well as the coastal residents proved the necessity of such photographic inventory.

These projects were the result of synergy in different fields of digital mapping technologies.

References

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