Breakwater rehabilitation Pointe Noire

2011 Exercise ct 5308 – breakwaters and closure dams

May 2, 2012

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Delft University of Technology

Location of Pointe Noire

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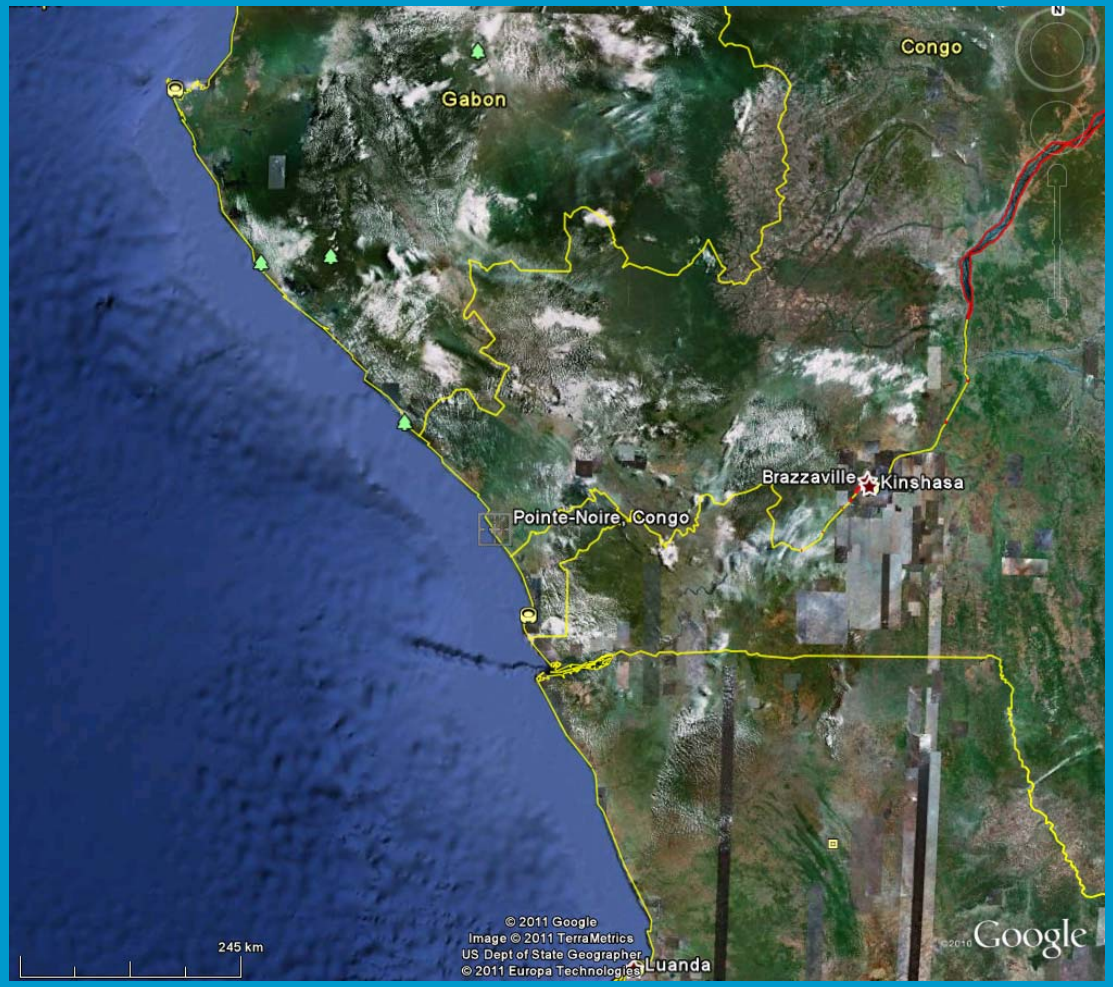
Location (2)



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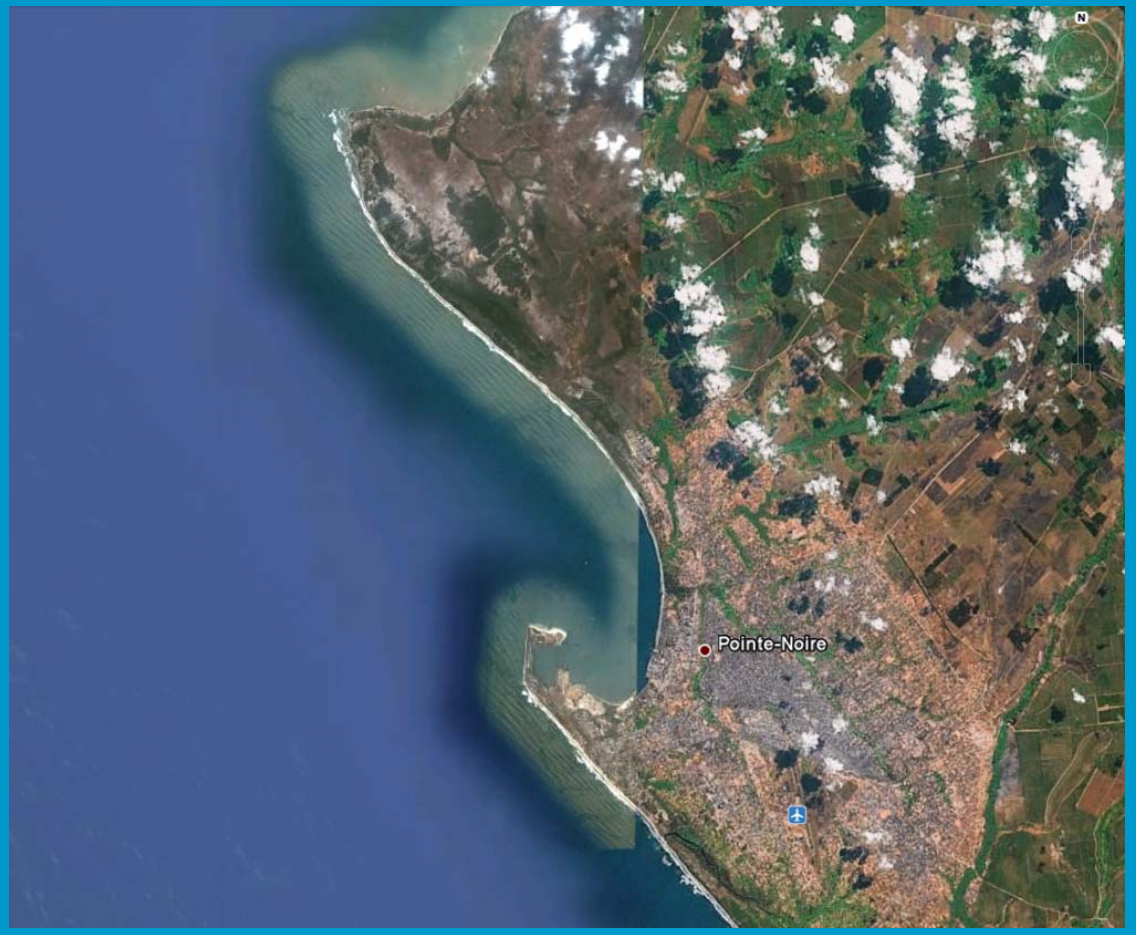
Location (3)



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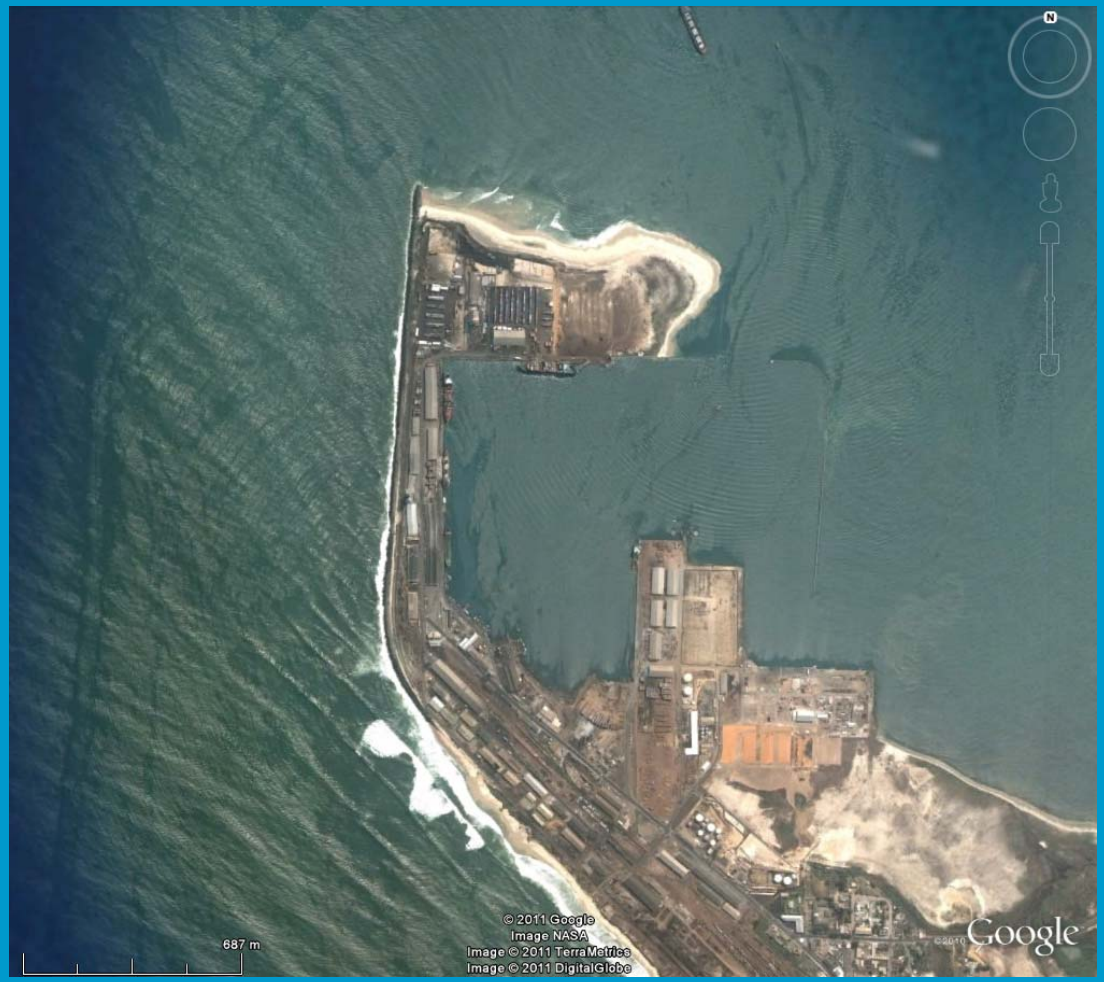
The breakwater



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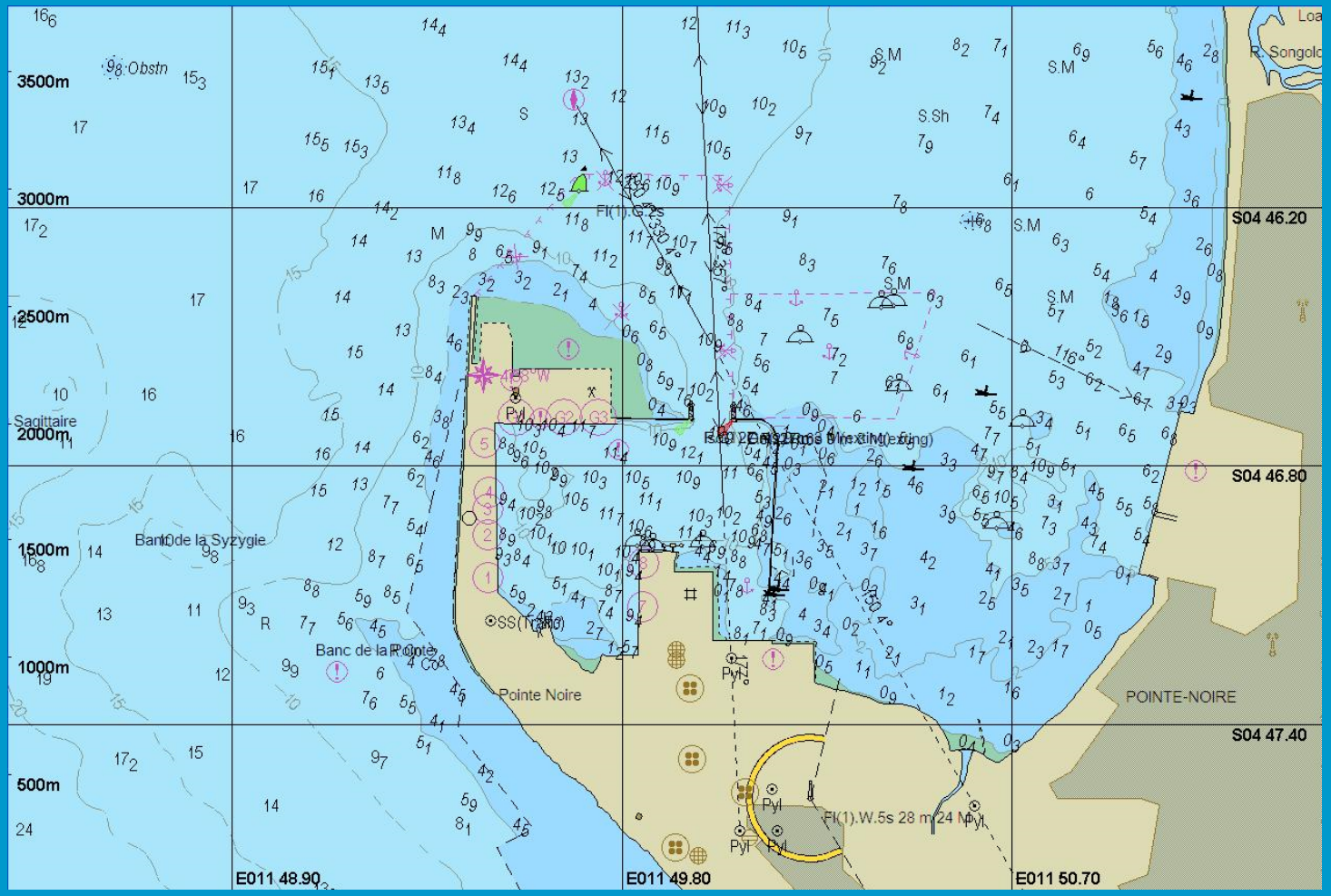
Hydrographic map



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The new terminal

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The assignment

type of breakwater:
- Rock armour
- Antifer cubes
- Core-Loc
- Dolos
- Xbloc
- Berm Breakwater
- Caisson

Location of cross section
- rehab existing part
- extension part

Design life
- 20 years
- 50 years

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Your assignment

The design of the rehabilitation of the breakwater has the following objectives:

- Design a cross section for either the extension or for the part in front of the container terminal
- Describe how you would build this breakwater

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Information

- Hydrographic charts ➔ Map Room
- Tides ➔ Internet sites
- Waves ➔ Argoss and Global Wave Statistics

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Argoss data

Two websites available:

- Group A to O: http://www. waveclimate.com
- Group P to U: http:// smart4.argoss.nl

Usernames: VerhagenA ..... VerhagenE

Password: DUT2011

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Offshore location 4° 47'S, 11° 50'E Size of area for satellite data 200x200 km
Offshore model point 5° 00'S, 11° 15'E

	Output Type	Variable Input	Type of Display	Data Source
○	**Monthly Statistics**	Select the variable to show. ◉ Wave height ○ Wind speed	For each month you will see ◉ Relative distribution (table) ○ Mean and 90% intervals (plot)	Select the offshore data source. ◉ Wavemodel computations ○ Satellite observations

Select Season

☐ Season selection If this is unchecked, all year will be chosen.	January February March April May June	Season selection will result in ***conditional probabilities on output***. *Hold CTRL on your keyboard to select multiple months.*	☐ 13 x Write all monthly 2D scatter tables at once to one output page (including all year).

	Output Type	Variable Input	Spectrum	Data Source
◉	**Histogram**	Select the variable to show. ◉ Wave height ○ Mean wave period ○ Zero-crossing wave period ○ Wind speed	Select part of the spectrum to use for wave parameters. ○ Total ○ Wind Sea ◉ Swell	Select the offshore data source. ◉ Wavemodel computations ○ Satellite observations
○	**Scatter Table 2D**	Select the pair of variables to process. Sector width and table format can be set as a preference. ○ Wave height vs. direction ◉ Wave height vs. mean period ○ Wave height vs. zero-crossing period ○ Wave height vs. wind speed ○ Wind speed vs direction	Select part of the spectrum to use for wave parameters. ◉ Total ○ Wind Sea ○ Swell	Select the offshore data source. ◉ Wavemodel computations ○ Satellite observations
○	**Scatter Table 3D**	Select the 3 variables to process. Sector width and table format can be set as a preference. ◉ Wave height, mean period, wave direction ○ Wave height, zero-crossing period, wave direction ○ Wave height, wind speed, wind direction ○ Wave height, mean period, wind speed ○ Wave height, zero-crossing period, wind speed	Select part of the spectrum to use for wave parameters. ◉ Total ○ Wind Sea ○ Swell	Select the offshore data source. *Wavemodel computations only available data source*

OK Reset

Nearshore model from Argoss

- Long computational time
- Limited number of users

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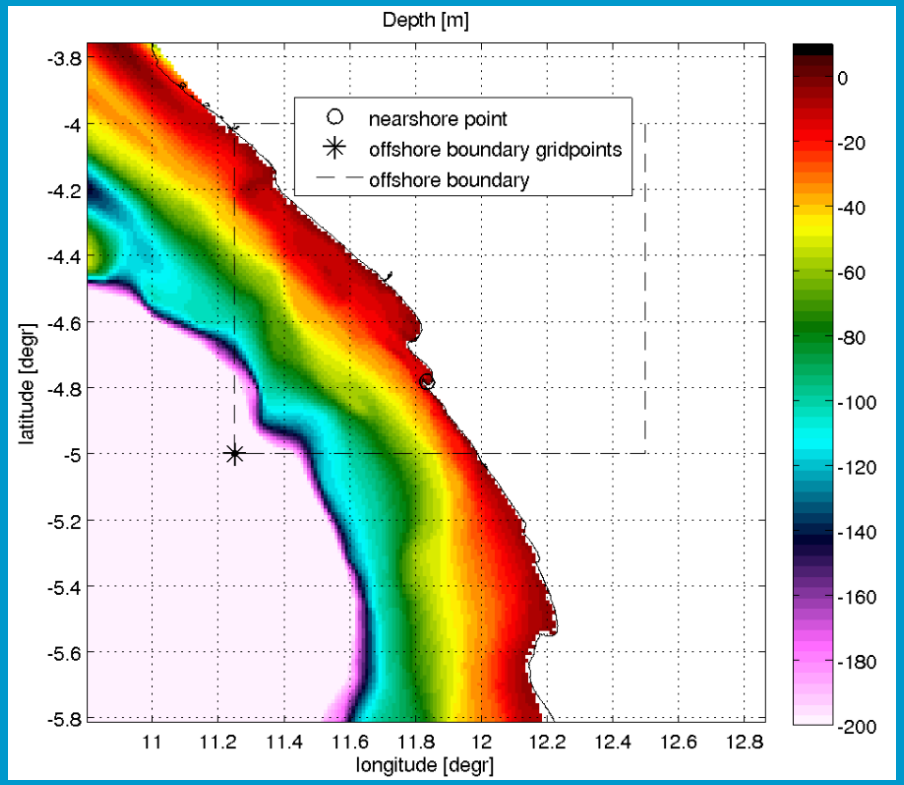
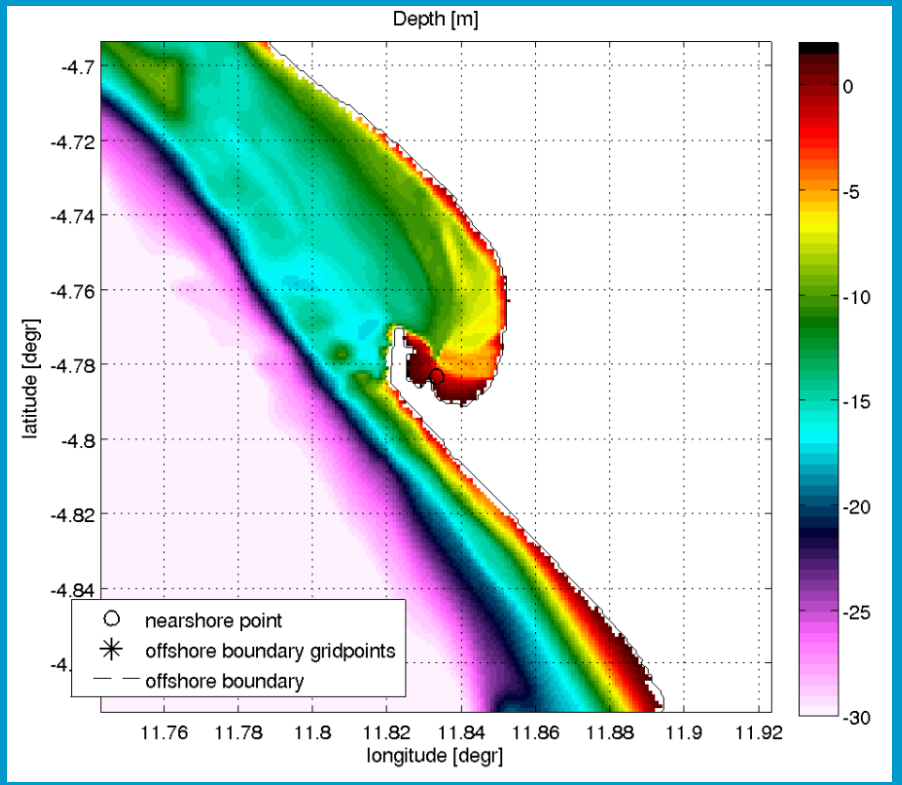
Argoss Bathymetry





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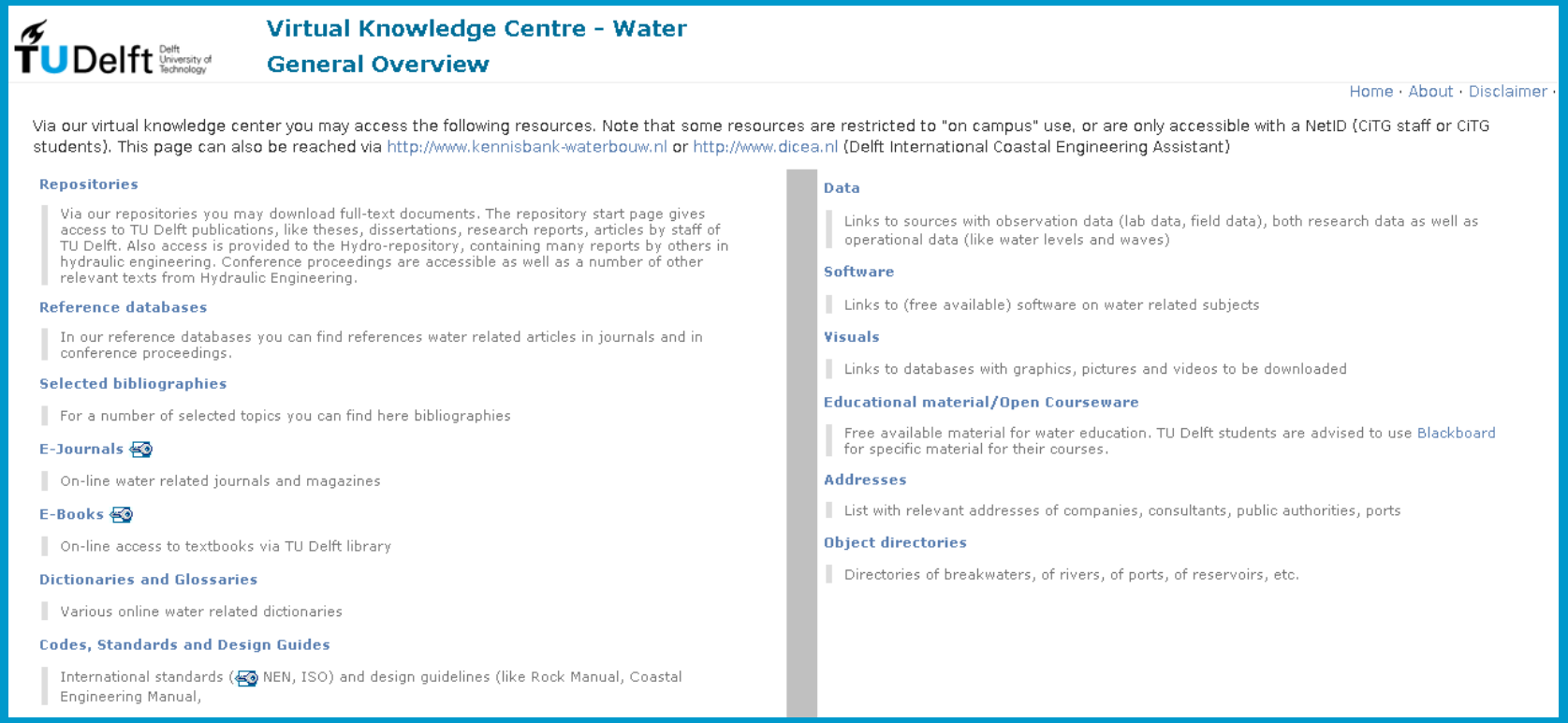
Global wave statistics

- http:// studoc.tudelft.nl
  ➔ vkc-water ➔ www. kennisbank-waterbouw.nl



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General Overview

Home · About · Disclaimer ·

Via our virtual knowledge center you may access the following resources. Note that some resources are restricted to "on campus" use, or are only accessible with a NetID (CiTG staff or CiTG students). This page can also be reached via http://www.kennisbank-waterbouw.nl or http://www.dicea.nl (Delft International Coastal Engineering Assistant)

Repositories

Via our repositories you may download full-text documents. The repository start page gives access to TU Delft publications, like theses, dissertations, research reports, articles by staff of TU Delft. Also access is provided to the Hydro-repository, containing many reports by others in hydraulic engineering. Conference proceedings are accessible as well as a number of other relevant texts from Hydraulic Engineering.

Reference databases

In our reference databases you can find references water related articles in journals and in conference proceedings.

Selected bibliographies

For a number of selected topics you can find here bibliographies

E-Journals

On-line water related journals and magazines

E-Books

On-line access to textbooks via TU Delft library

Dictionaries and Glossaries

Various online water related dictionaries

Codes, Standards and Design Guides

International standards (NEN, ISO) and design guidelines (like Rock Manual, Coastal Engineering Manual,

Data

Links to sources with observation data (lab data, field data), both research data as well as operational data (like water levels and waves)

Software

Links to (free available) software on water related subjects

Visuals

Links to databases with graphics, pictures and videos to be downloaded

Educational material/Open Courseware

Free available material for water education. TU Delft students are advised to use Blackboard for specific material for their courses.

Addresses

List with relevant addresses of companies, consultants, public authorities, ports

Object directories

Directories of breakwaters, of rivers, of ports, of reservoirs, etc.

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Global wave statistics

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Global wave statistics

A number of areas has been scanned, and is available as pdf-file.
Available areas at this moment: 9, 10, 11, 16, 17, 26, 27, 36, 37, 38, 40, 46, 50, 51, 58, 59, 60, 61, 62, 68, 69, 74, 75, 85, 90

Click on area for link to scanned area

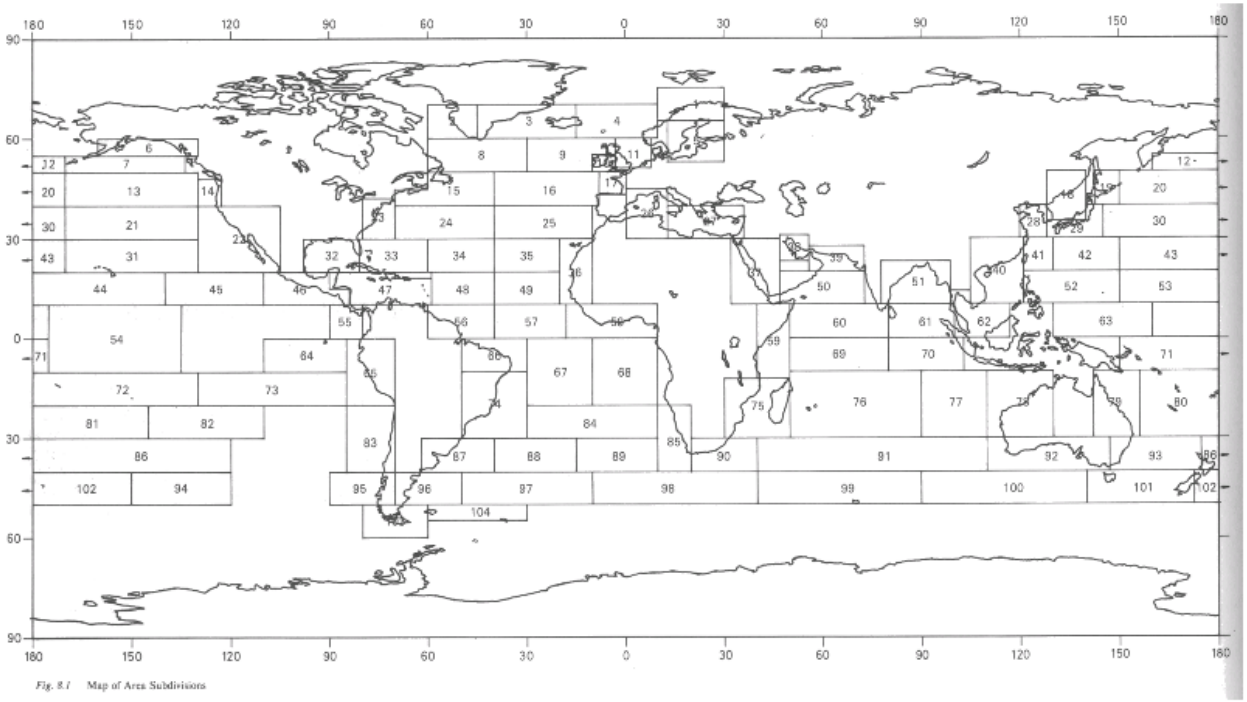


Fig. 8.1 Map of Area Subdivisions

Cover page of the book

Part 1: Table of Contents and Introduction

Part 2: How to use the Data

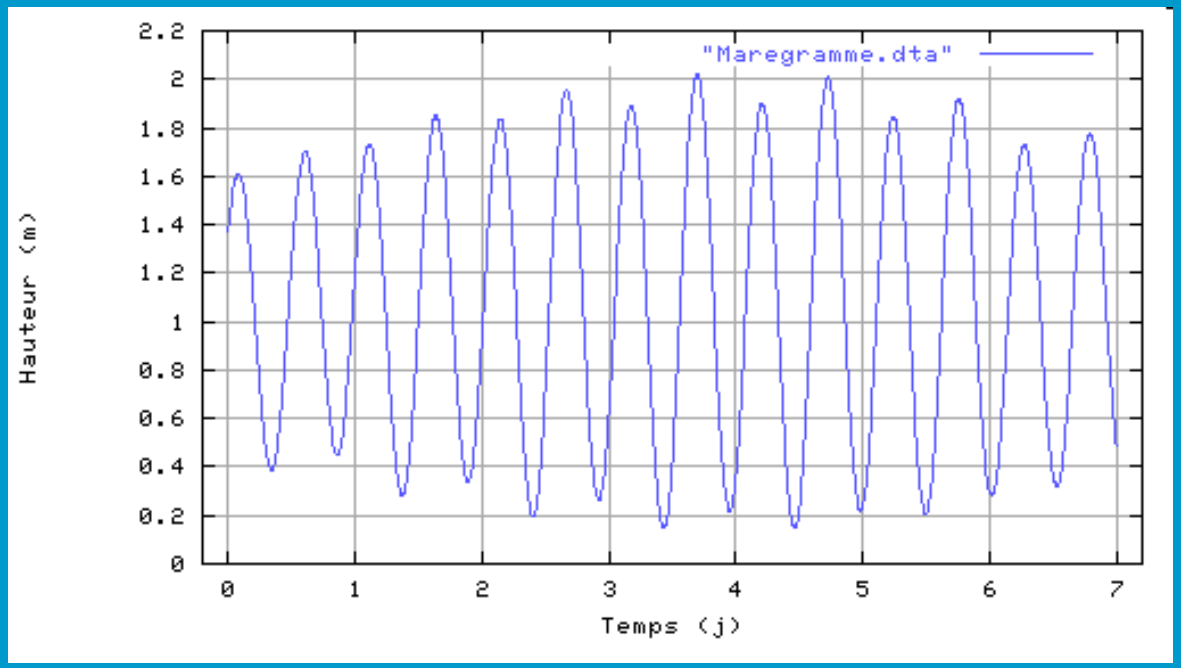
Part 3: The data (click on map above to select the area of interest)

Part 4: References and appendices

Source:
Hogben, N, Dacunha, N.M.C., Olliver, G.F. [1986] Global wave statistics, Unwin Brothers Ltd, UK, ISBN 0 946653 38 0

Tidal information

- http://www.shom.fr



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your assignment

- Design a breakwater cross section (A or B)
- With the given material (rock, Xblock, etc)
- For a maintenance free breakwater
- With a life time of 20 years or 50 years

- Determine armour unit size
- Determine overall sizes of cross section (e.g. crest height)
- Make a drawing good enough for a cost estimate
- Design toe, etc.

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Type of calculation

- Determine near shore boundary data with SwanOne
- Use classical approach, and preferably also PIANC approach and probabilistic approach
- Use Breakwat and/or Cress for calculations
- Make a short report (5 pages of text) including some info on the execution method

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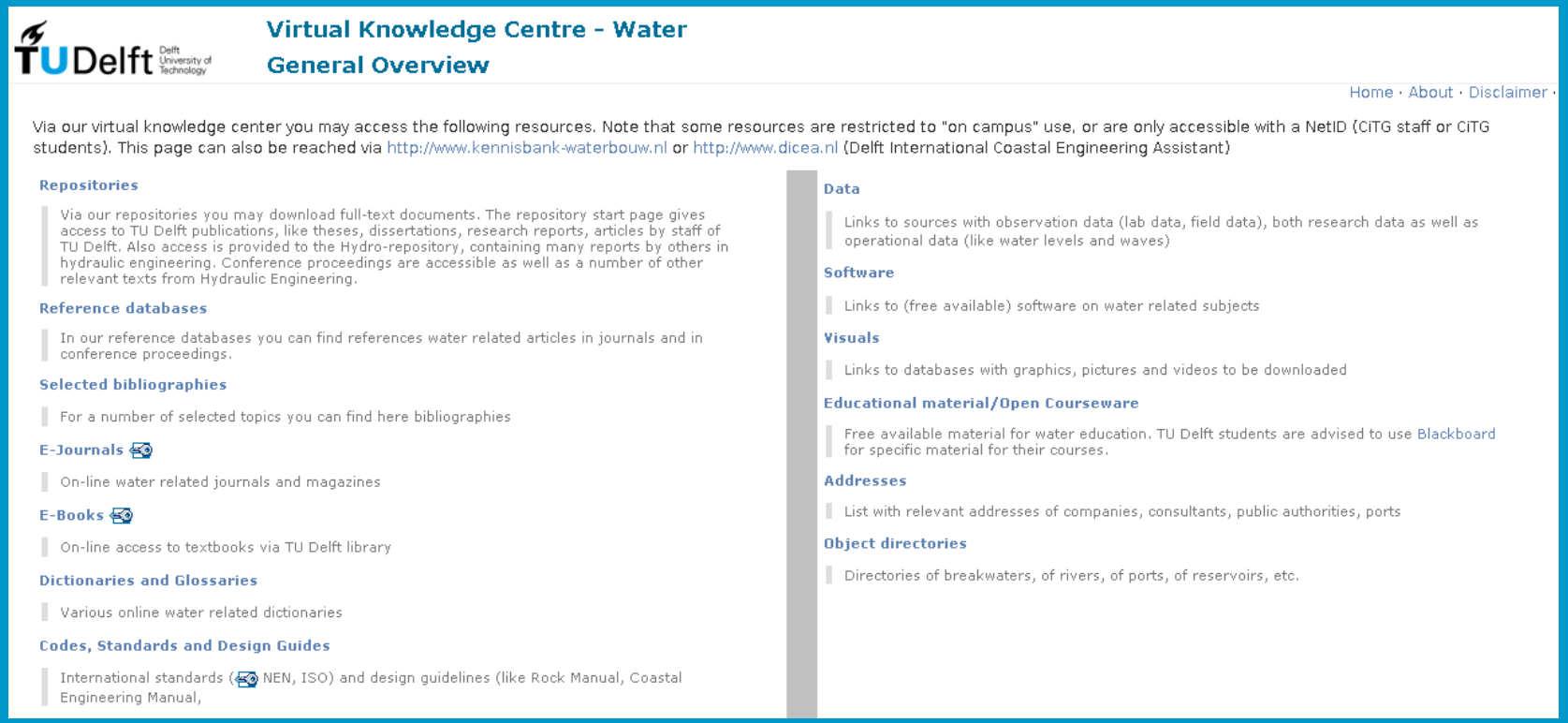
Source of PIANC reports

- http:// studoc.tudelft.nl
  ➔ vkc-water ➔ www. kennisbank-waterbouw.nl



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PIANC reports in repository

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Repositories

This portal gives links to full text versions. The majority of links refer to the repository of the TU Library. This repository contains full text versions (pdf) of all kinc of TU Delft. This portal generates automatic searches in the repository of TU Delft and some other full-text repositories.

Contents:

- **European projects**
  Full text versions of reports of some European projects in hydraulic Engineering:
  - ComCoast
    A European Interreg project (2004-2008; Belgium, The Netherlands, Germany, UK)) with focus on multifunctional use of coastal protection, with a special focus studies the transition from a single line of sea defence to a multifunctional zone.
  - Floodsite
    FLOODsite is an "Integrated Project" in the Global Change and Ecosystems priority of the Sixth Framework Programme of the European Commission. It comm consortium includes 37 of Europe's leading institutes and universities and the project involves managers, researchers and practitioners from a range of gover specialising in aspects of flood risk management.
  - See also in the project list of the Repository (open the tag "European Projects")

- **Hydraulic Engineering Classics**
  A collection of classical papers in Hydraulic Engineering, both international as well as Dutch papers.

- **Books and reports** (CiTGt NetID and password required)
  - interesting articles from magazines, not available as digital journals
  - CIRIA Books
  - PIANC reports
  - Reference books
  - Some other books

- **Conference proceedings** (CiTG NetID and password required)
  - Conference Proceedings in hydraulic engineering

Presentation

- Give a presentation of approx. 10 minutes next week; also 5 minutes are available for questions per group
- Do not present obvious information (everyone will know where Pointe Noire is)
- Morning groups start at 8:30
- Afternoon groups start at 13:00
- You have to be present either in the morning, or in the afternoon (thus not the whole day)

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Your assignment

Armour	Design life 20 years		Design life 50 years	
	Existing breakwater	New breakwater	Existing breakwater	New breakwater
Natural rock	A	G	N	T
Antifer cubes	B	H	O	U
CoreLoc	C	I	P	V
Dolos	D	J	Q	W
X-bloc	E	K	R	X
Berm breakwater	F	L	S	Y
Monolithic caissons		M		Z

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Your mark

- depends on the quality of the report
- depends on the quality of your presentation
- depends on the quality of the questions you ask to other groups

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Good Luck !!

a recent, uninvited beach visitor in Pointe Noire (7 m long)

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