



Ministry of Infrastructure  
and Water Management



# Wave measurements in the Netherlands



Peter Verburgh, Pieter Haaring, Robert Slomp,  
Rijkswaterstaat

December 2nd, 2021



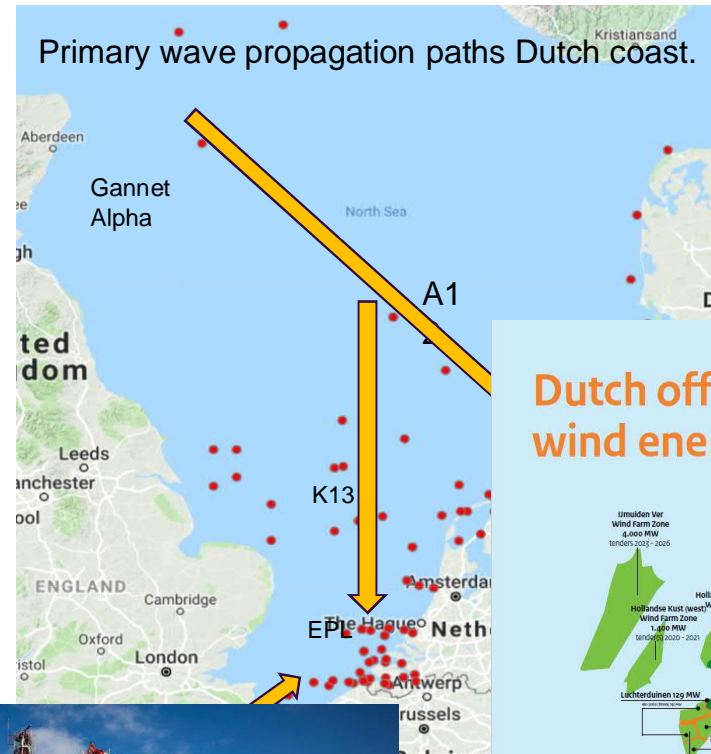
# An overview

- > Where we measure
- > How we measure, process and register
- > Special project networks
- > Dissemination
- > Current main issues





- > Operational wave measurement network 24x7x365
  - Purposes: shippings, offshore activities flood defences (forecasts, design and assessments)
  - Stations: buoys, poles and oil&gas and windpark substation platforms





# Detailed wave measurement networks for special purposes

- > the sea
- > estuaries
- > and large lakes



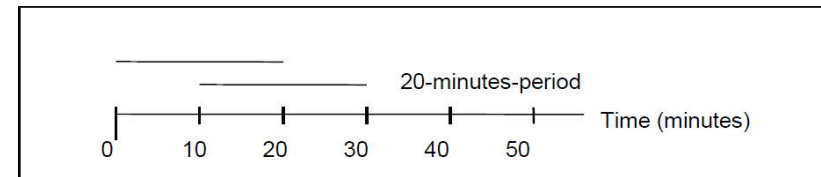


# PROCESSING: RMI SWAP library

(Rijkswaterstaat Measurement Infrastructure Standard Wave Analysis Package)

- › “Real-time” processing of wave data
- › Wave Height
  - Wave height time series parameters on level 1 and 2
  - Wave height time series parameters on level 2 and 2
  - Wave height long wave parameters (Seiches)
  - Wave height long wave quality parameters (Seiches)
- › Wave direction
  - Wave direction spectrum parameters on level 1
  - Wave direction spectrum parameters on level 2
  - Wave direction parameters in the wide bands at level 2

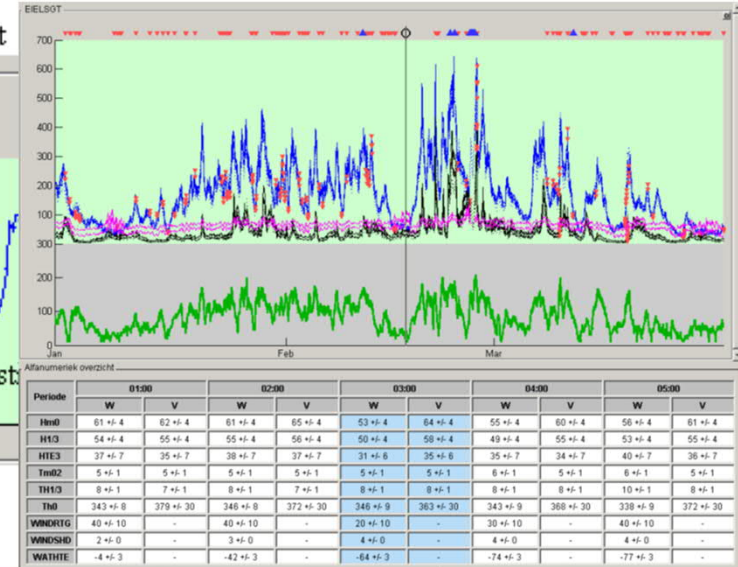
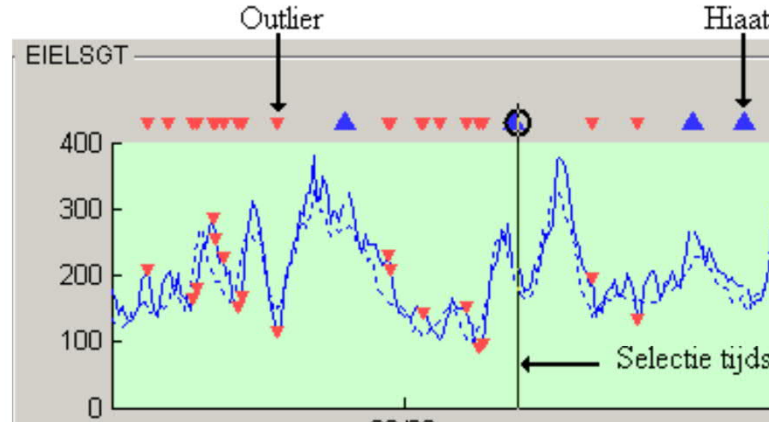
The timestamp that is assigned to the 20-minutes period has been defined as the average of the start time and the end time in MET.



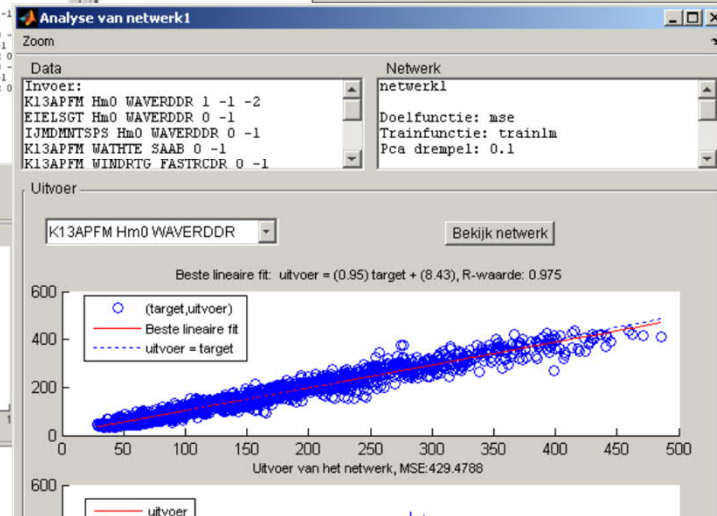
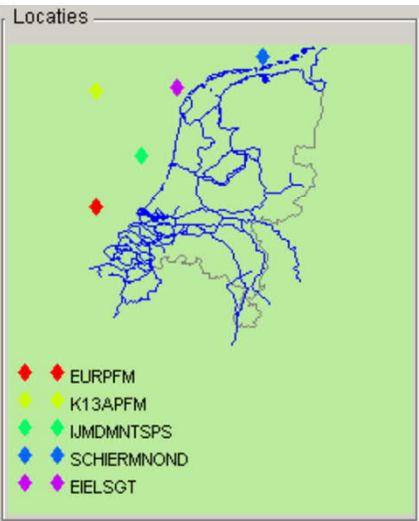


# Software WAVIX

Neural network based offline validation tool



Netwerkbeheer interface showing a list of networks and their parameters. The 'Inhoud' field shows the network configuration for 'netwerk1'.

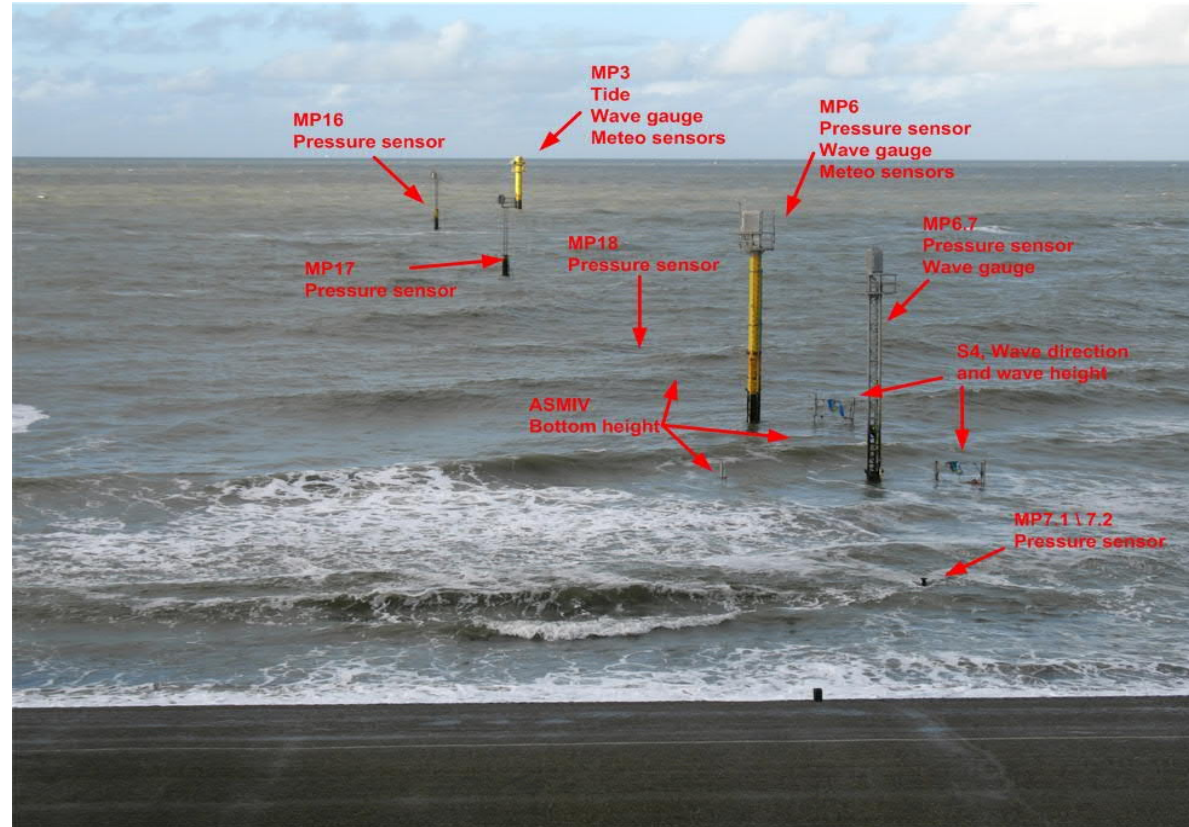


# Special projects: Petten, 1995-2013



- › Measuring waves and run-up
  - buoys out at sea
  - Poles with instruments in the breaker zone
  - Wave run-up

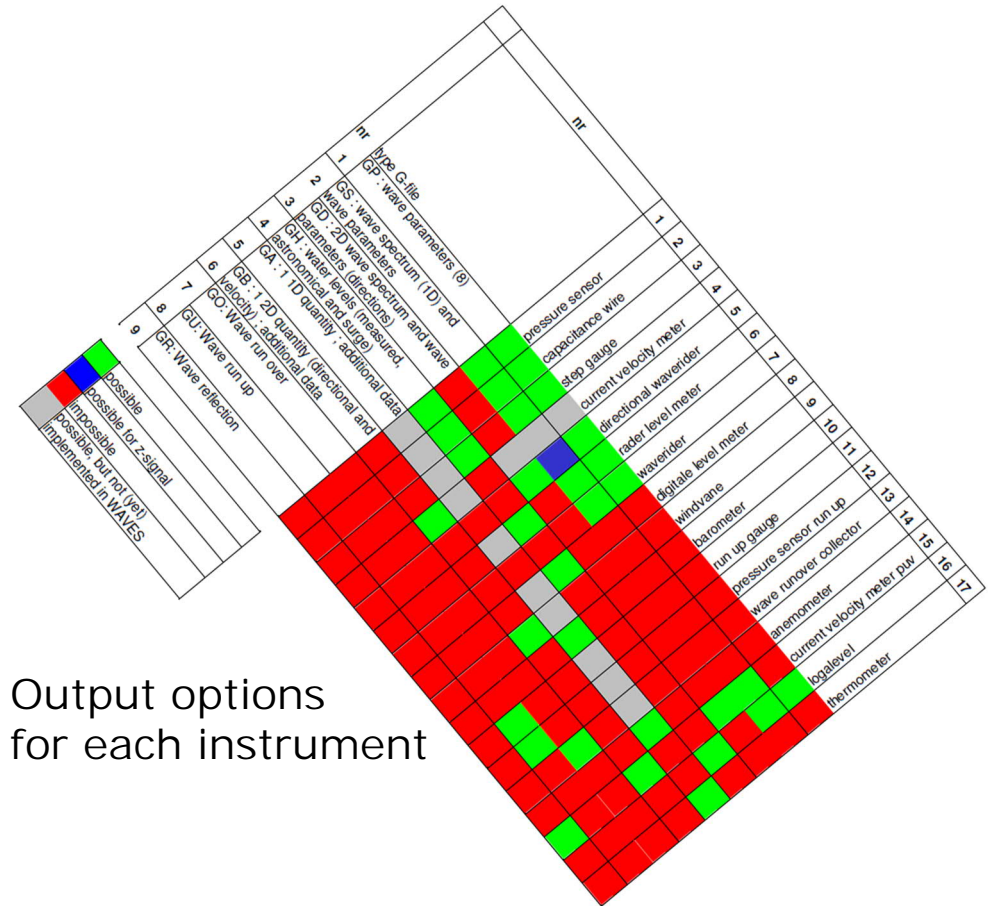
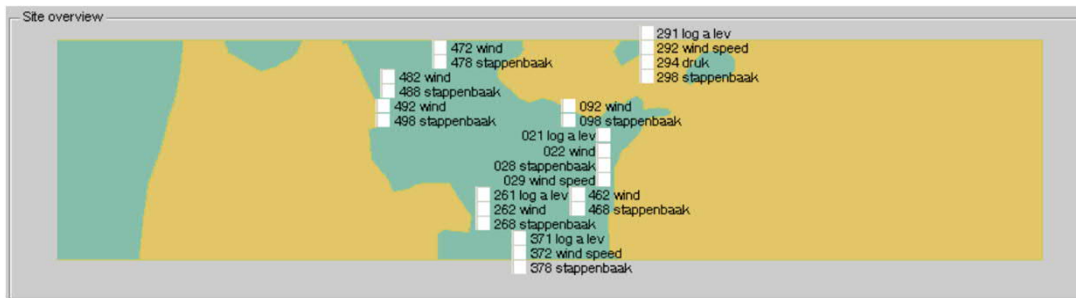
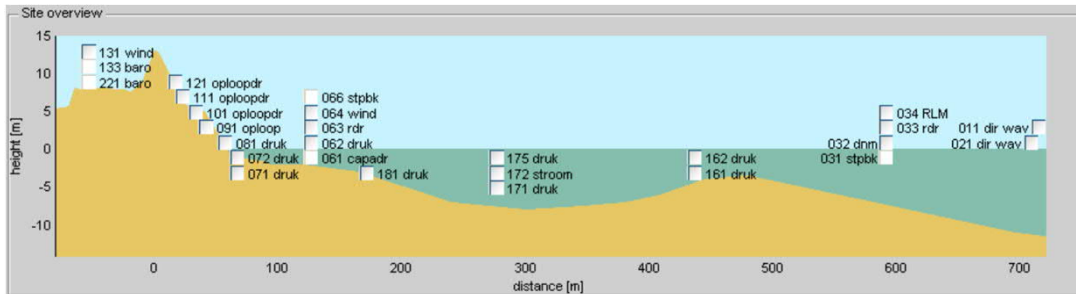
Wave measurements for  
flood defences





# Software WAVES: Offline processing of wavedata

Intended for processing more extensive, very specialised wave measurements. Its more flexibel fit for specific projects/site profiles



Output options for each instrument

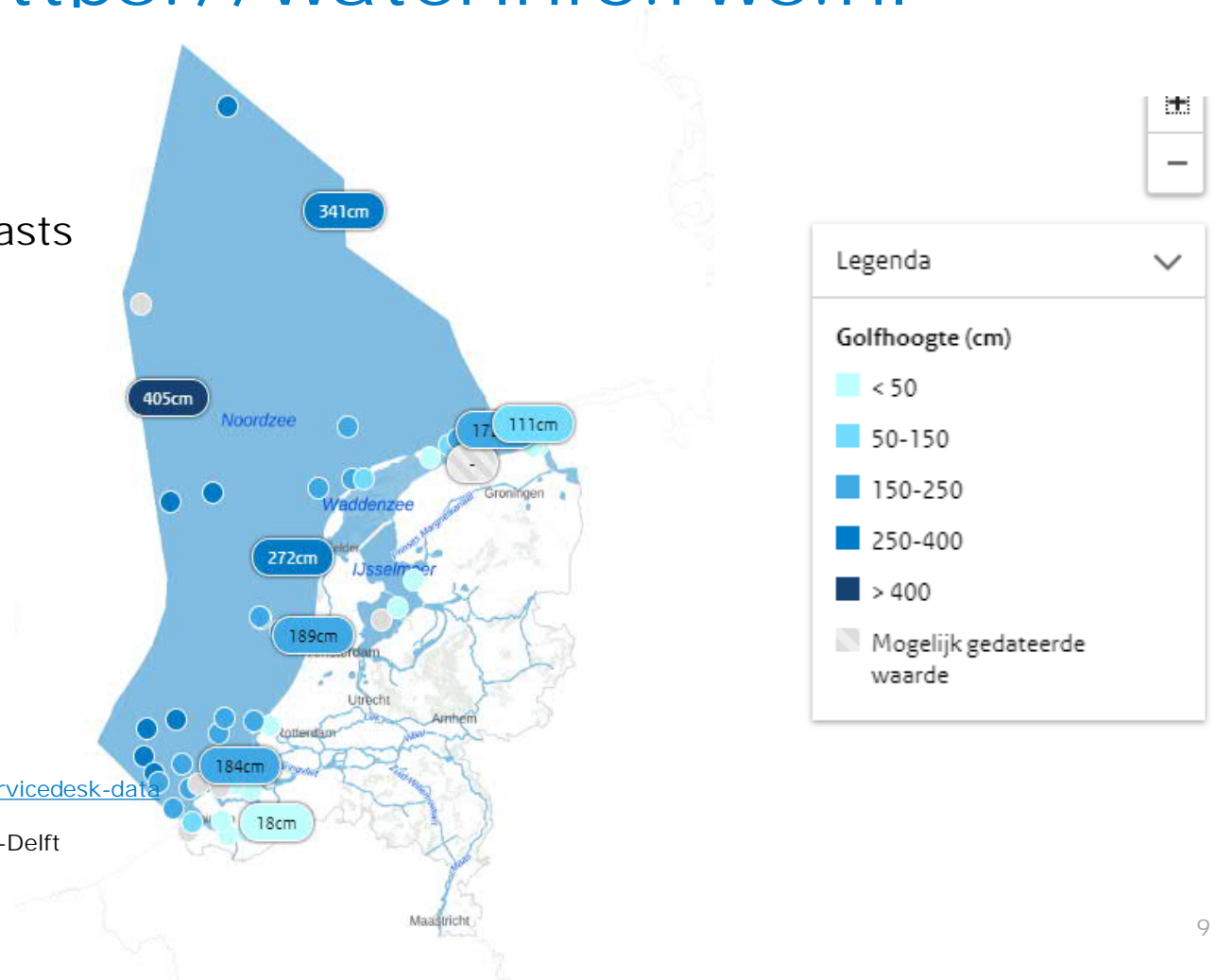
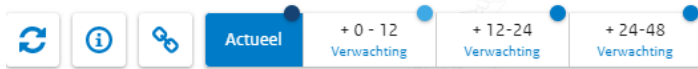




# Dissemination: <https://waterinfo.rws.nl>

Wave height (Nov 27<sup>th</sup> 2021)

Historical, actual values and forecasts



Extra data:

<https://www.rijkswaterstaat.nl/formulieren/contactformulier-servicedesk-data>

For calibrating SWAN and IG waves extra repositories at the TU-Delft



# Current main issues

## Current main issues

- › Operational:
  - decommissioning oil & gas platforms Northsea
- › Special projects:
  - Long term funding



# Questions?

Websites:

<https://waterinfo.rws.nl>

Extra data:

<https://www.rijkswaterstaat.nl/formulieren/contactformulier-servicedesk-data>

SWAN (TU Delft)

<https://www.tudelft.nl/citg/over-faculteit/afdelingen/hydraulic-engineering/sections/environmental-fluid-mechanics/research/swan>

Our email address for correspondence:

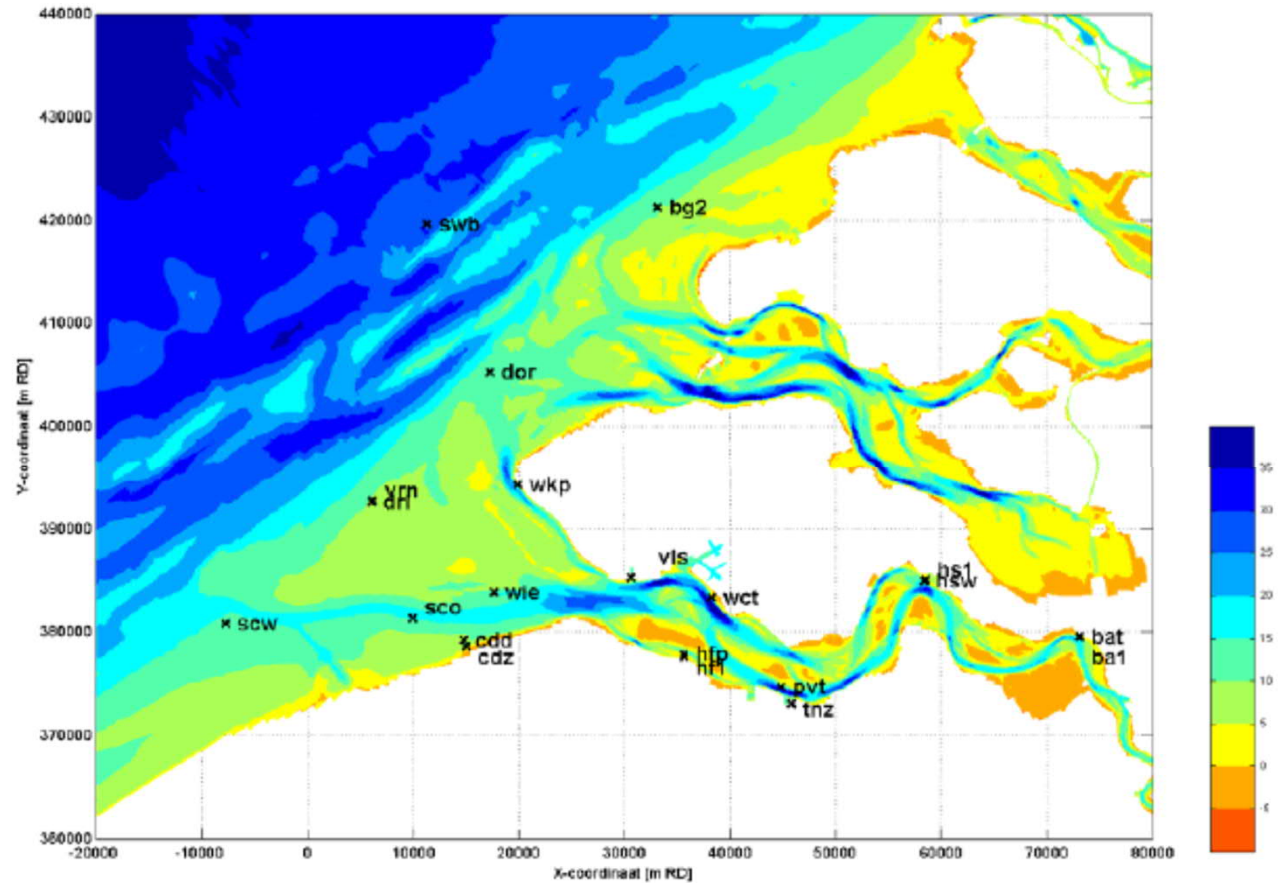
<https://www.helpdeskwater.nl/secundaire-navigatie/english/>

Just mention our name with your question.



# Special projects: Western Scheldt 2003-2005

Wave measurements for  
flood defences



Figuur 2.1: Alle meetlocaties (kleur is diepte in m t.o.v. NAP).



# Special projects: Noorderzijlvest: 2019-2031

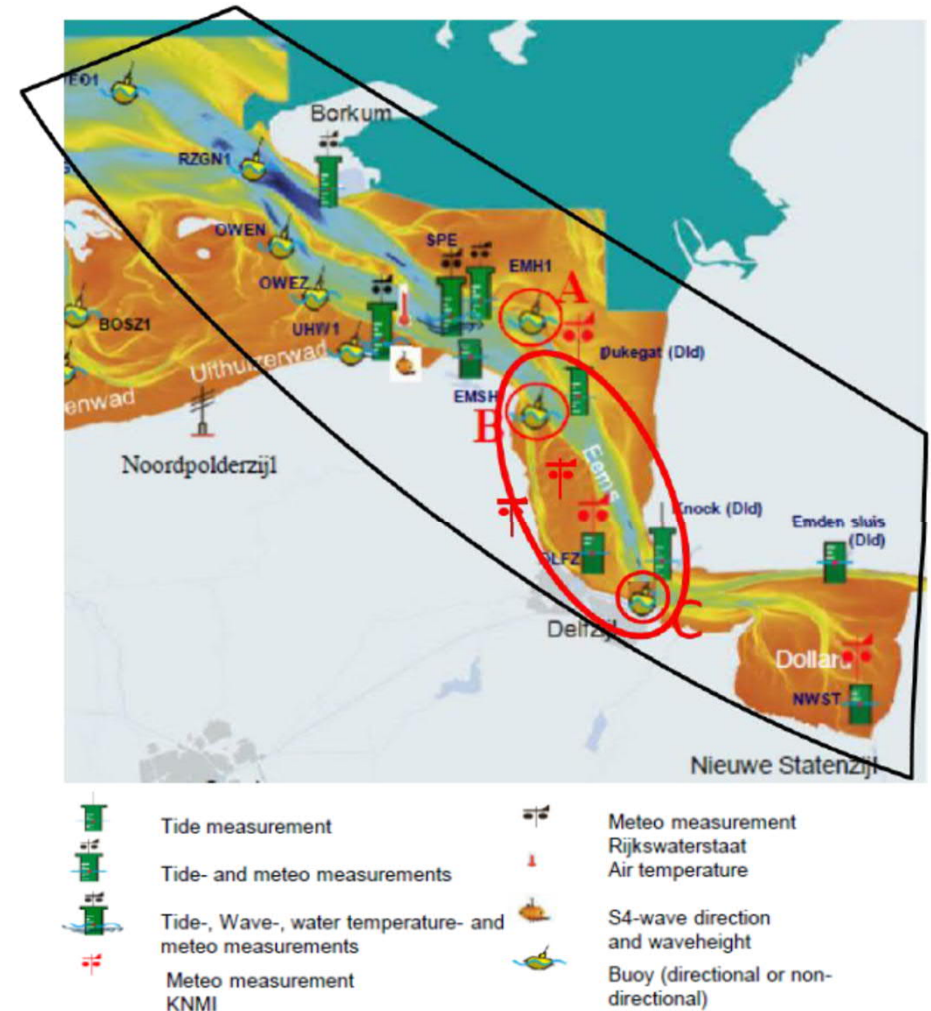
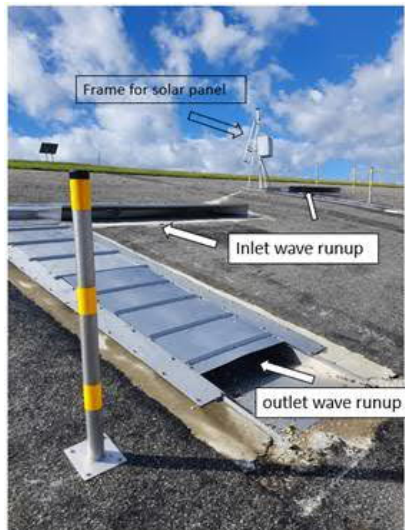


<https://www.noorderzijlvest.nl/project-meerjarige-veldmetingen>

Wadden Sea: On the border with Germany

Wave measurements and run-up measurements  
for flood defences

4 PHD students just finished in 2021





# Real-Dune, Reflex, with the TU-Delft

- > Dune erosion using real size artificial dunes
- > Wave measurements at sea and near the dune including infragravity waves
- > Marion Tissier (associate professor): TU delft
- > <https://www.tudelft.nl/citg/over-faculteit/afdelingen/hydraulic-engineering/sections/coastal-engineering/research/realdune>

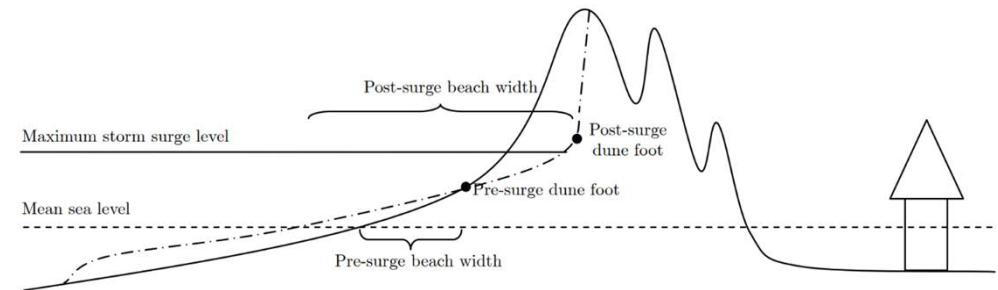


Figure 1.1 Profile evolution during a storm along the Dutch dune coast.



# Caribbean: Saba and St Eustacius)



The screenshot shows the OBSCAPE website interface. On the left, there is a sidebar with the OBSCAPE logo and a list of navigation options: Map, Data, GPS tracking, Devices, Monitor, Log, Project settings, Satellite communication, Compass calibration, Support, and Administrator. The main content area is titled "GPS tracking" and displays a map of the Caribbean region. The map shows various islands and countries, including Cuba, Haiti, Santo Domingo, the British Virgin Islands, Antigua and Barbuda, Montserrat, Dominica, Saint Lucia, Saint Vincent and the Grenadines, Grenada, Trinidad and Tobago, and Venezuela. A yellow location pin is placed on the island of Saba. To the right, there is a zoomed-in view of Saba and St. Eustacius. This view shows Saba National Park, Zions Hill, Windwardside, Golden Rock, Oranjestad, and Marine Park Reserve. The zoomed-in view also includes a red location pin on St. Eustacius. The bottom right corner of the map area shows the number "16".



# Caribbean





▼ Legend

-  Weather
-  Wave

📍 Stations Menu ▼

Name	Type	Status ▼
Saba haven		✓
Saba Black Rock; We...		✗

▼ Legend

-  Weather
-  Wavebuoy

📍 Stations Menu ▼

Name	Type	Status ▼
Oranjestad baai		✓
Weather station		✗

## My Devices



SPOT-1133

New data received an hour ago

0.8 m @ 4.6 s 4.4 m/s

WAVE HEIGHT	DIRECTION		PERIOD	SPREAD
	MEAN			
0.8 m	MEAN	133°	3.8 s	51°
	PEAK	141°	4.6 s	44°

WIND SPEED	DIRECTION	SURFACE
4.4 m/s	120°	glassy

17.464267°, -62.985667°

12/05/2021 15:05:01 CET



SETTINGS



HISTORICAL DATA

Caribbean: St Eustacius,  
Spotter wave buoy