



Università
Ca' Foscari
Venezia



QBeach

If *XBeach* and *QG/S* had a child...

Jacob Melly - Cycle 40 PhD in Polar Sciences

Alessia Marchiorello - Ca' Foscari Master in Environmental Science

Supervisors Alessio Rovere and Barbara Stenni

Special thanks to:

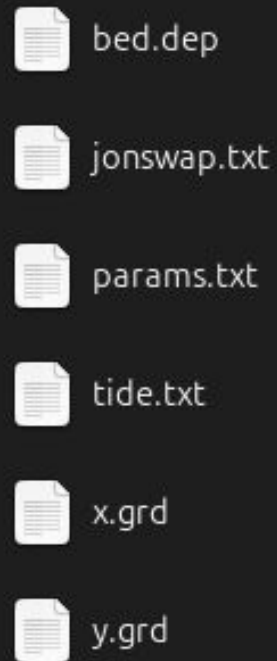
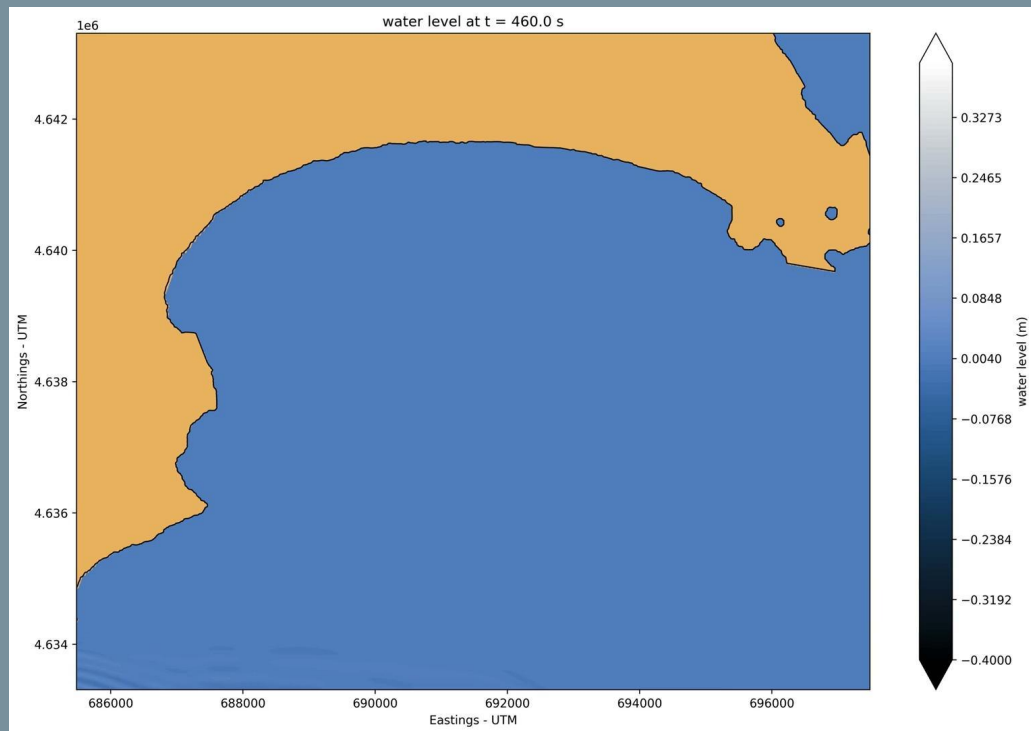
- Agnese Amadei, University of Pisa
- Luca Vidovaldi, University of Pisa
- Professor Matteo Vacchi, University of Pisa

Create *XBeach* models the
pointy-clicky way within a
familiar QG/S workspace.



XBeach!

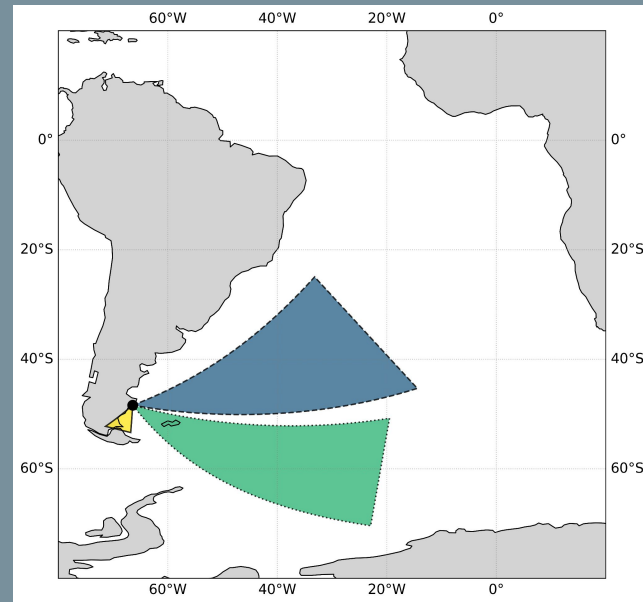
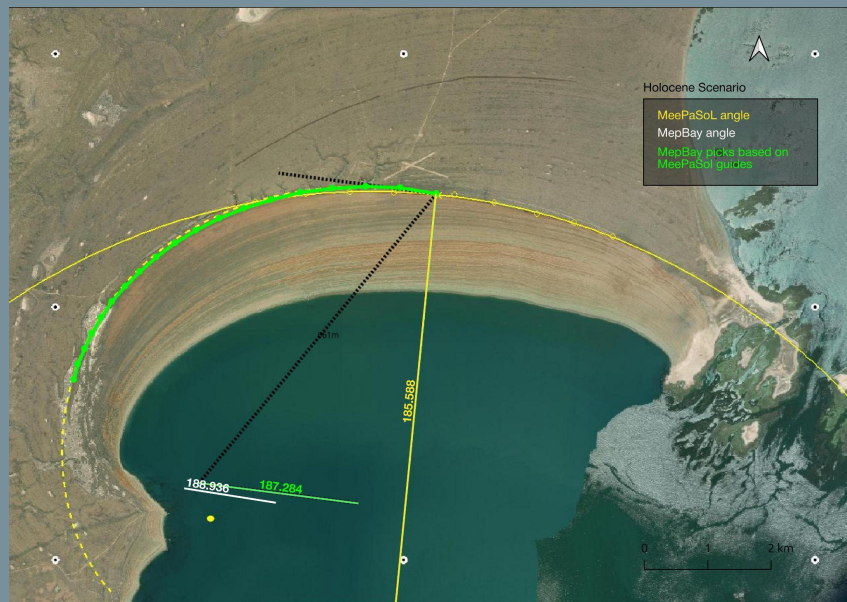
<https://www.deltares.nl/en/software-and-data/products/xbeach>



PALEO SHORELINES OF PATAGONIA PRESERVE RECORD OF SOUTHERN OCEAN WAVE
CLIMATE

A NON-PEER REVIEWED EARTHARXIV PREPRINT
COMPILED SEPTEMBER 8, 2026

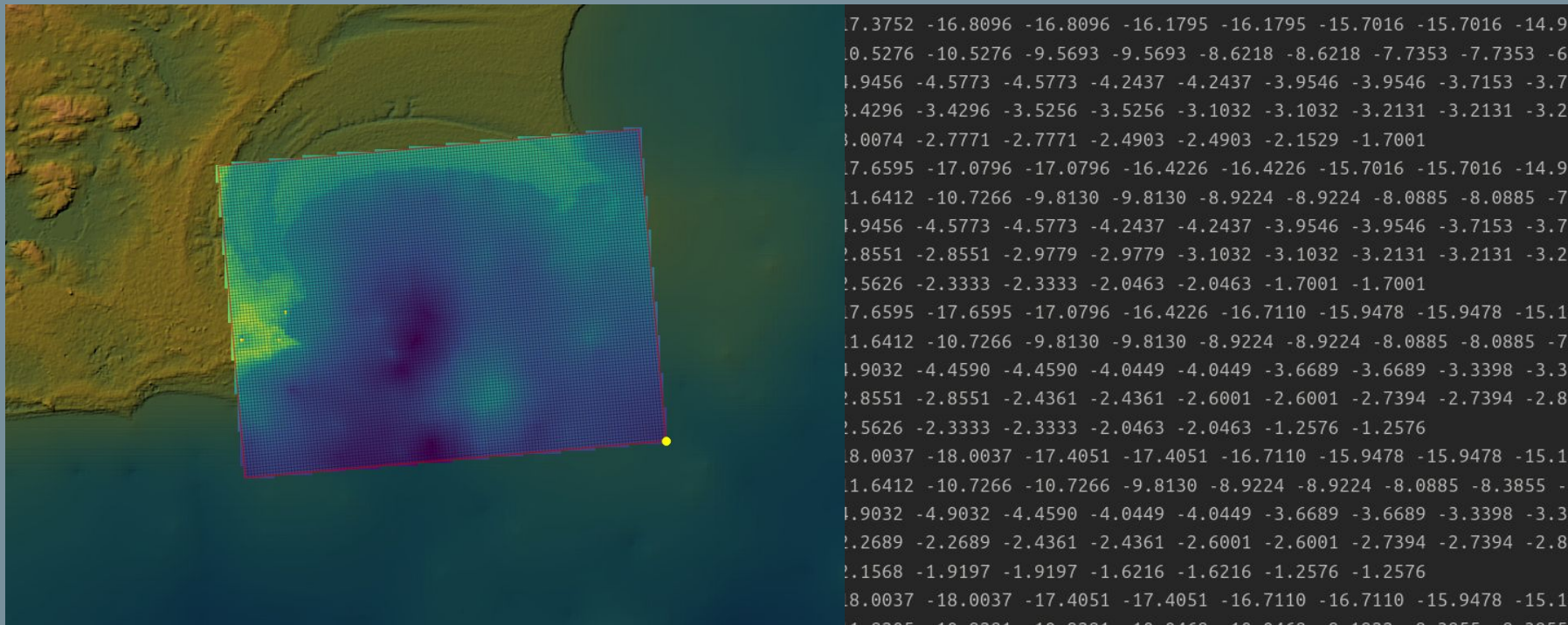
Jacob Melly ^{1,*}, **Ian D. Goodwin** ², **Tobia Lahbi**¹, **Nikos Georgiou** ¹, **Sebastián Richiano** ^{3,4}, **Patricio Ruiz**⁴,
Alejandro Montes ^{5,6}, **Giovanni Scardino** ⁷, **Deirdre D. Ryan** ⁸, **Evan J. Gowan** ⁹, **Giovanni Scicchitano** ¹⁰,
and **Alessio Rovere** ^{1,11}



Simulation files

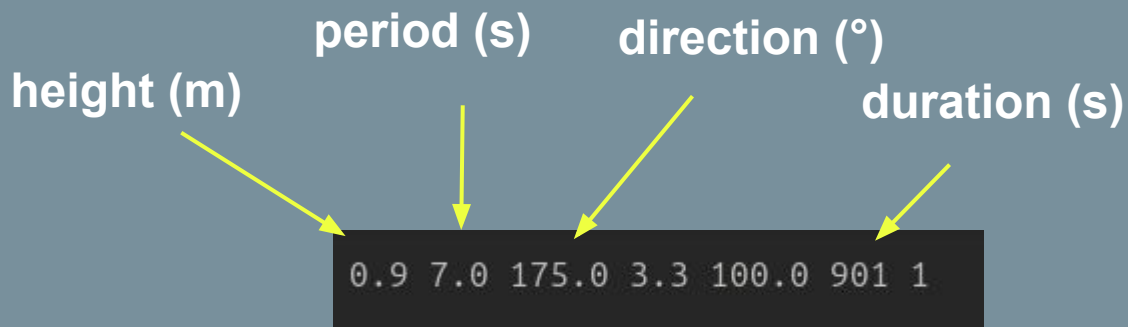
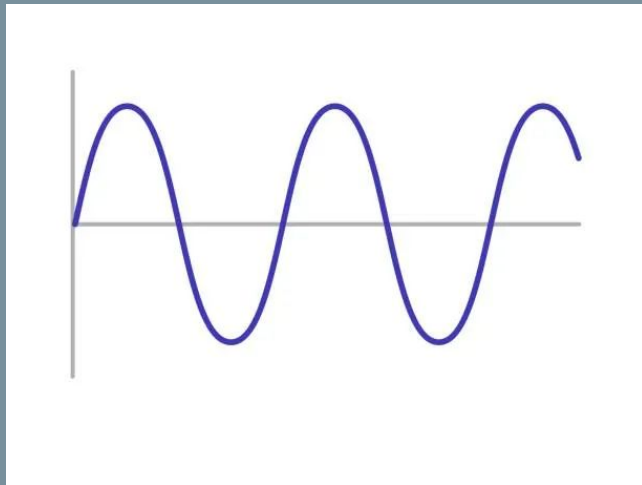
Files

1. bed.dep 2. jonswap.txt 3. params.txt 4. tide.txt 5. x.grd / y.grd



Files

1. bed.dep 2. jonswap.txt 3. params.txt 4. tide.txt 5. x.grd / y.grd



Files

1. bed.dep 2. jonswap.txt 3. params.txt 4. tide.txt 5. x.grd / y.grd

```
Basic XBeach parameters file
Generated by QBeach on 2026-04-07
Modify as needed: https://xbeach.readthedocs.io
```

```
  /_  \  /_  )_  _  _  _  /_  /_
 / / / / /_  \_  \_  /_  /_  \_
 / / / / /_  \_  /_  /_  /_  /_
 \_  \_  \_  \_  \_  \_  \_  /_  /_
```

```
# Model #####
wavemodel = 1
```

```
# Time #####
tstart = 0
tstop = 901
tintg = 90
tintm = 900
```

```
# Grid #####
gridform = xbeach
depfile = bed.dep
xfile = x.grd
yfile = y.grd
nx = 80
ny = 160
xori = 0
yori = 0
vardx = 1
alfa = 0
posdwn = -1
front = abs_2d
back = abs_2d
```

```
# Sedimentation/erosion #####
morphology = 0
sedtrans = 0
```

```
# Tide #####
tideloc = 1
zs0file = tide.txt
```

```
# Waves #####
wbctype = jonstable
bcfile = jonswap.txt
dtheta = 10
dtheta_s = 10
thetanaut = 1
thetamin = 85.0
thetamax = 265.0
```

```
# Output format #####
outputformat = netcdf
```

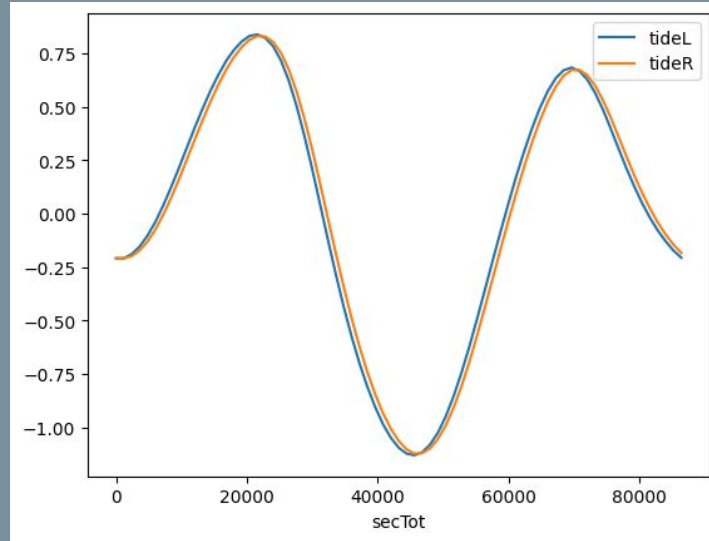
```
# Output variables: https://xbeach.readthedocs.io
nglobalvar = 5
zb
zs
H
u
v

nmeanvar = 3
H
u
v
```



Files

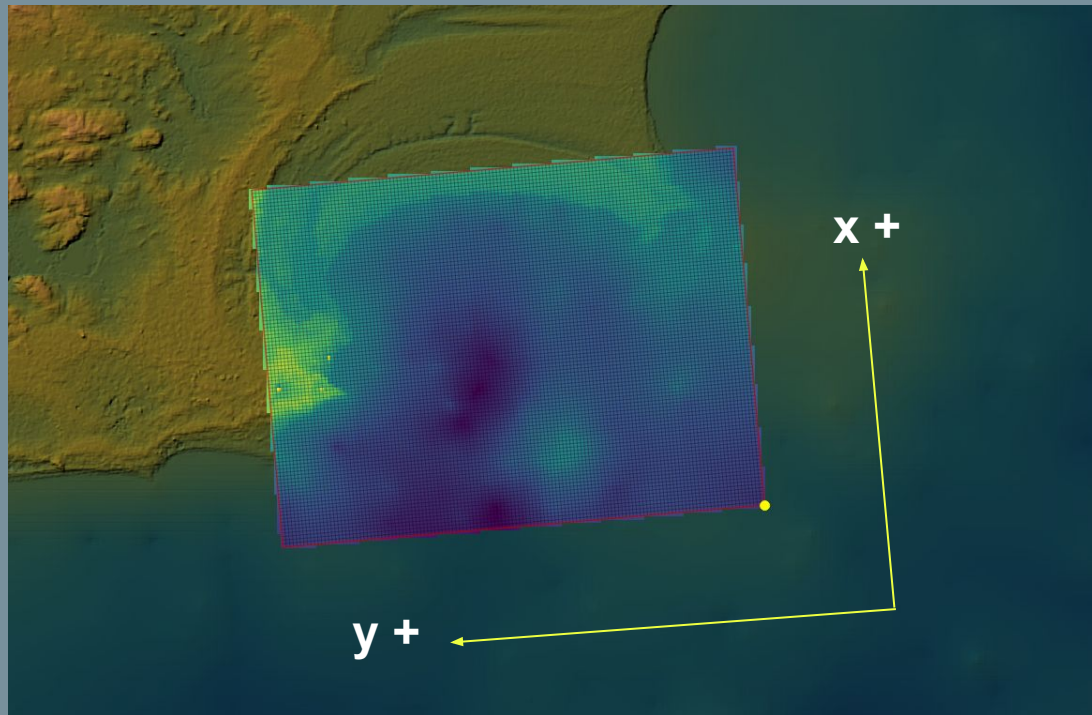
1. bed.dep 2. jonswap.txt 3. params.txt 4. tide.txt 5. x.grd / y.grd



```
0 0.2  
901 0.2
```

Files

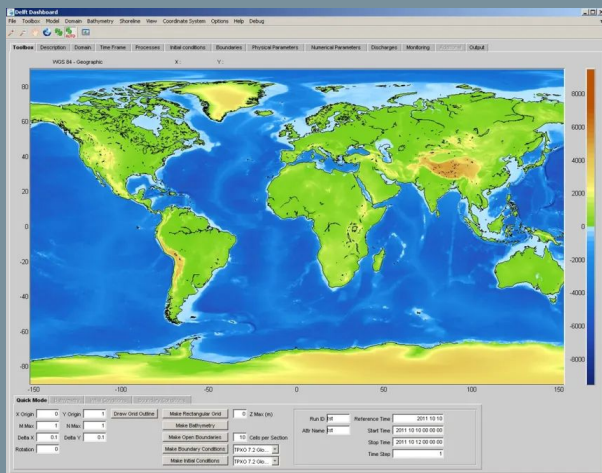
1. bed.dep 2. jonswap.txt 3. params.txt 4. tide.txt 5. x.grd / y.grd



```
686000.0000 685997.8211 685995.6422 685993.4633 685991.2844 685989.1055
685967.3166 685965.1377 685962.9588 685960.7799 685958.6010 685956.4221
685934.6332 685932.4543 685930.2754 685928.0965 685925.9176 685923.7387
685901.9498 685899.7709 685897.5920 685895.4131 685893.2342 685891.0553
685869.2664 685867.0875 685864.9086 685862.7297 685860.5508 685858.3719
685836.5830 685834.4041 685832.2252 685830.0463 685827.8674 685825.6885
685975.0951 685972.9162 685970.7373 685968.5585 685966.3796 685964.2007
685942.4117 685940.2328 685938.0539 685935.8750 685933.6962 685931.5173
685909.7283 685907.5494 685905.3705 685903.1916 685901.0128 685898.8339
685877.0449 685874.8660 685872.6871 685870.5082 685868.3293 685866.1505
685844.3615 685842.1826 685840.0037 685837.8248 685835.6459 685833.4671
685811.6781 685809.4992 685807.3203 685805.1414 685802.9625 685800.7836
685950.1903 685948.0114 685945.8325 685943.6536 685941.4747 685939.2958
685917.5069 685915.3280 685913.1491 685910.9702 685908.7913 685906.6124
685884.8235 685882.6446 685880.4657 685878.2868 685876.1079 685873.9290
685852.1401 685849.9612 685847.7823 685845.6034 685843.4245 685841.2456
685819.4567 685817.2778 685815.0989 685812.9200 685810.7411 685808.5622
685786.7732 685784.5944 685782.4155 685780.2366 685778.0577 685775.8788
685925.2854 685923.1065 685920.9276 685918.7487 685916.5698 685914.3909
685892.6020 685890.4231 685888.2442 685886.0653 685883.8864 685881.7075
685859.9186 685857.7397 685855.5608 685853.3819 685851.2030 685849.0241
685827.2352 685825.0563 685822.8774 685820.6985 685818.5196 685816.3407
685794.5518 685792.3729 685790.1940 685788.0151 685785.8362 685783.6573
685761.8684 685759.6895 685757.5106 685755.3317 685753.1528 685750.9739
685900.3805 685898.2016 685896.0227 685893.8438 685891.6650 685889.4861
685867.6971 685865.5182 685863.3393 685861.1604 685858.9816 685856.8027
685835.0137 685832.8348 685830.6559 685828.4770 685826.2981 685824.1193
685802.3303 685800.1514 685797.9725 685795.7936 685793.6147 685791.4359
```

Setup options

Delft Dashboard (classic)



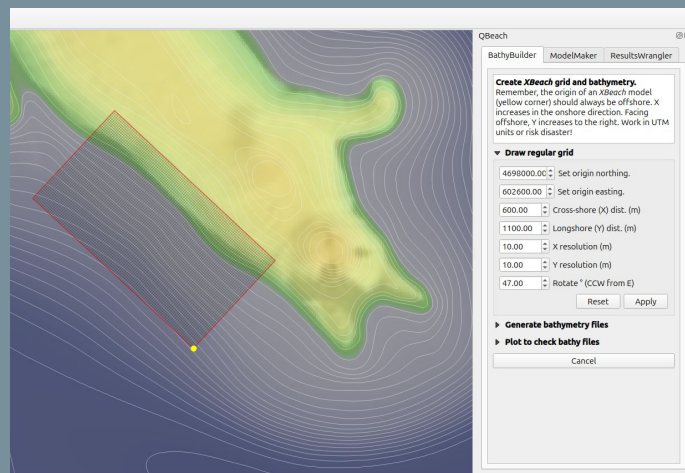
<https://publicwiki.deltares.nl/spaces/DDB/pages/77234207/Download>

Custom Python scripts

The screenshot shows the README page for CaorleCruscotto. The title is 'CaorleCruscotto'. Below the title, it says 'Make XBeach models with Python.' There is a small image of a car. Below the image, it says 'This collection of scripts attempts to mimic some of Delft Dashboard's XBeach bathymetry and functionality. A use case might involve creating model bathymetry from a gridded elevation extending model bathymetry offshore past depth of closure (if needed), and creating non-er Manning coefficient grids matching the bed.dep depth grid dimensions. For less typical case comparing and interacting with many model outputs, try XBeach-utils. Inspired by Alerover Hydrodynamics repository and OpenEarth's xbeach-toolbox.'

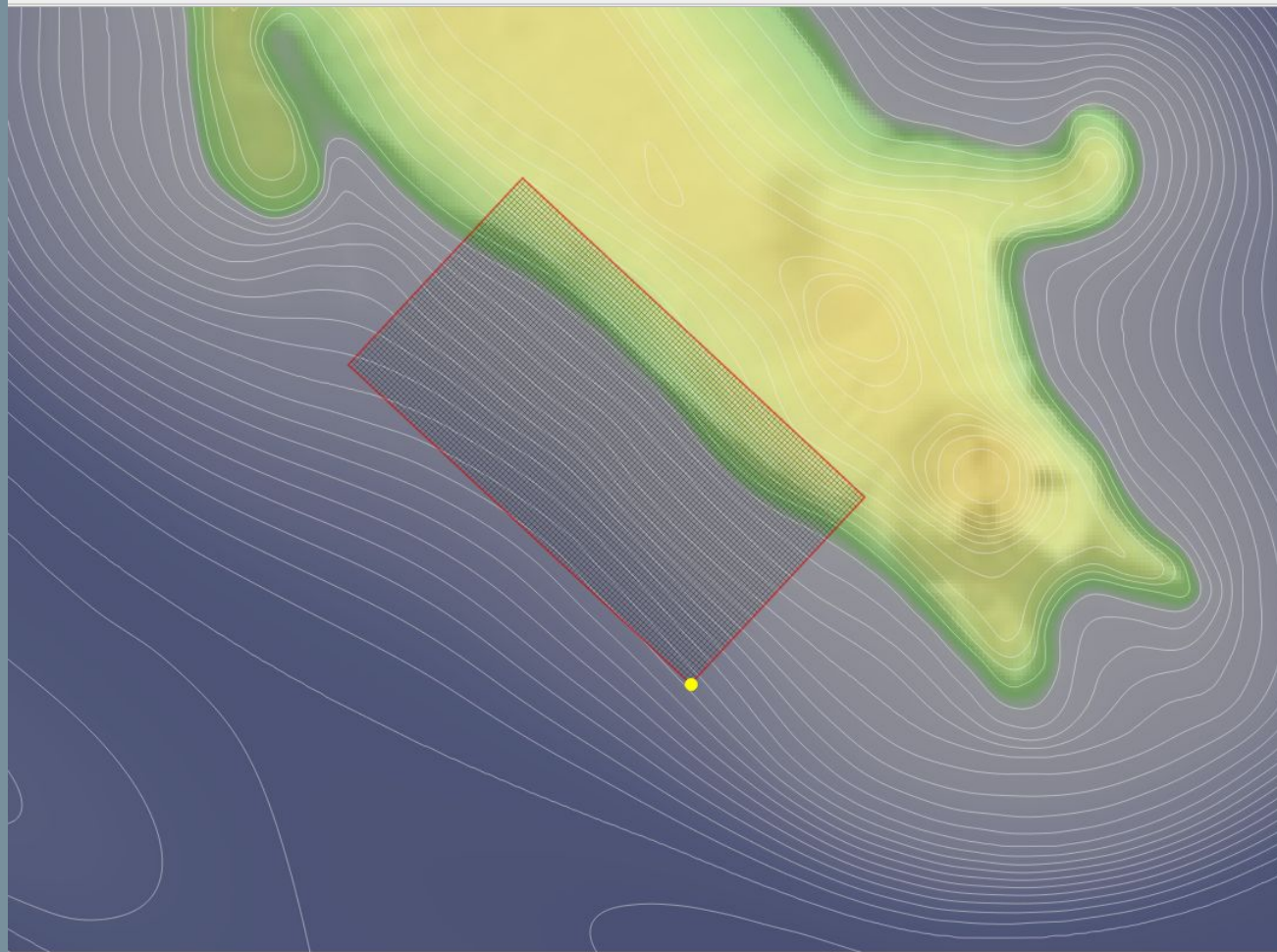
github.com/JTMelly/CaorleCruscotto

QBeach (new but basic)



github.com/JTMelly/QBeach

QBeach



QBeach



BathyBuilder

ModelMaker

ResultsWrangler

Create XBeach grid and bathymetry.

Remember, the origin of an XBeach model (yellow corner) should always be offshore. X increases in the onshore direction. Facing offshore, Y increases to the right. Work in UTM units or risk disaster!

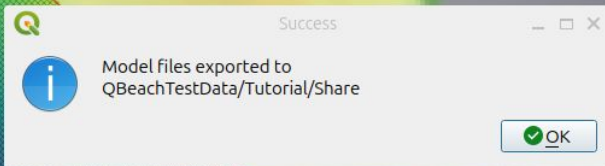
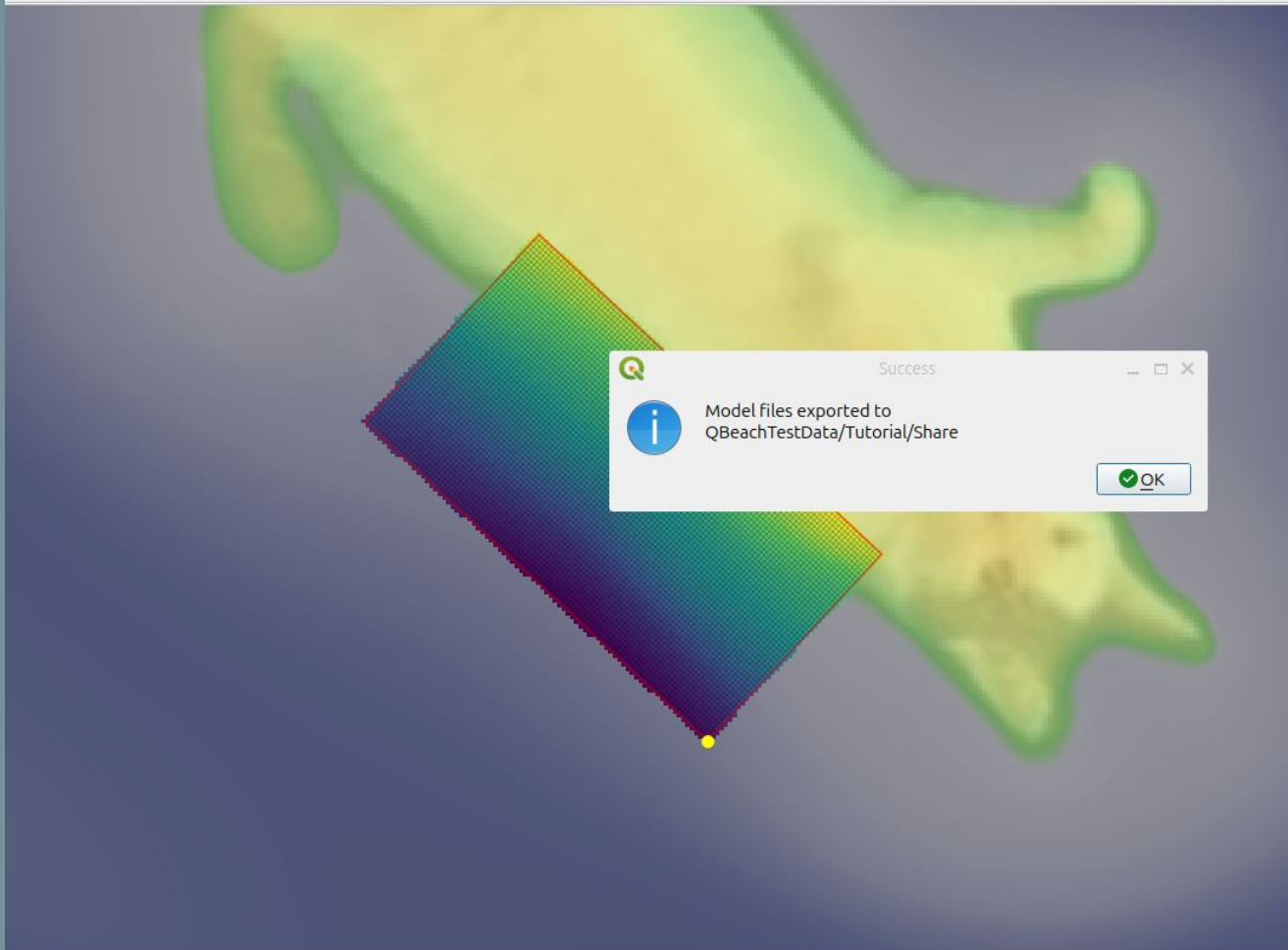
▼ Draw regular grid Set origin northing. Set origin easting. Cross-shore (X) dist. (m) Longshore (Y) dist. (m) X resolution (m) Y resolution (m) Rotate ° (CCW from E)

Reset

Apply

► Generate bathymetry files**► Plot to check bathy files**

Cancel



QBeach

BathyBuilder ModelMaker ResultsWrangler

Create XBeach model.
Generate simple *jonswap.txt*, *params.txt*, and *tide.txt* files.

▼ **Model input parameters**

600 Simulation duration (s)

0.10 Tide level (m)

1.00 Wave height (m)

7.00 Wave period (s)

220.00 Wave from direction (°)

100.00 Directional spreading

3.30 Peak enhancement factor

Reset

▼ **Use .grd and .dep files**

tutorial/Share/x.grd ... Select x.grd

tutorial/Share/y.grd ... Select y.grd

tutorial/Share/bed.dep ... Select bed.dep

▼ **Generate model files**

Select output path:
s/QBeachTestData/Tutorial/Share ...

Export

Cancel

Recall from earlier?



bed.dep



jonswap.txt



params.txt



tide.txt



x.grd



y.grd

Go run the model and bring back a NetCDF file!

Windows

	Length	Name
→	55638	bed.dep
	2736640	hdf5.dll
	416256	hdf5_cpp.dll
	138752	hdf5_f90cstub.dll
	164352	hdf5_fortran.dll
	139776	hdf5_hl.dll
	25088	hdf5_hl_cpp.dll
	59392	hdf5_hl_f90cstub.dll
	61440	hdf5_hl_fortran.dll
	235008	hdf5_tools.dll
→	29	jonswap.txt
	26530	LICENSE
	608080	msvcpl100.dll
	829264	msvcr100.dll
	394752	netcdf.dll
→	1325	params.txt
→	70656	szip.dll
→	13	tide.txt
→	81252	x.grd
	10085888	XBeach.BMI.dll
	10145792	xbeach.exe
	9597440	XBeach.Library.dll
	74	XBeachModel.bat
→	88023	y.grd
	108032	zlib.dll

Run

Unix

1. Compile XB from source (no big deal)

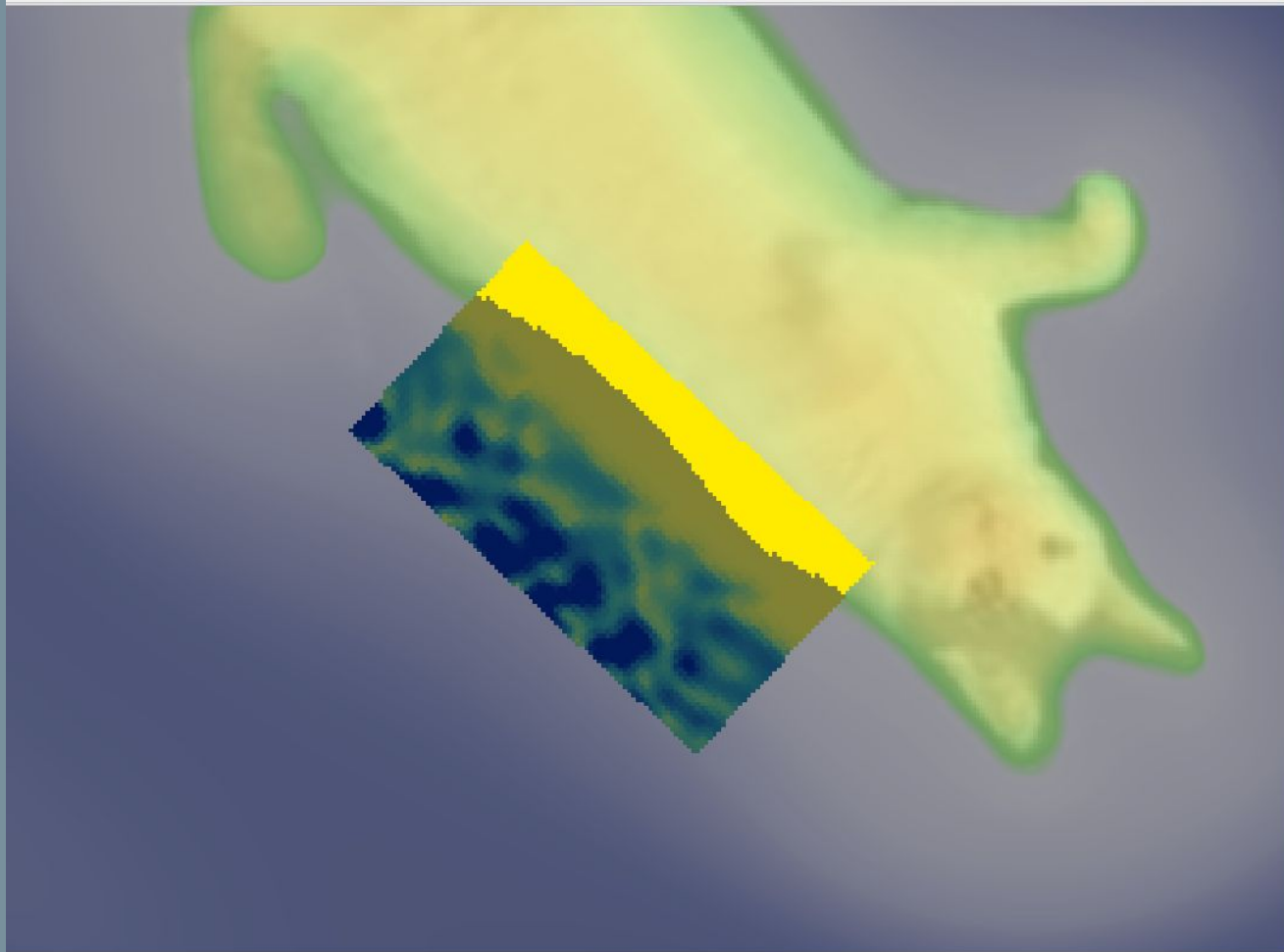
<https://codeberg.org/jtmel/xBeachVenice>

2. Navigate to model

```
cd /path/to/model/files
```

3. Run XBeach

```
/home/user/Documents/XBeach/xbeach/src/xbeach/xbeach
```



QBeach



BathyBuilder

ModelMaker

ResultsWrangler

Explore XBeach model results.

Open an *xboutput.nc* file and plot variables at various time steps.

▼ Model output

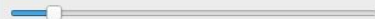
Select .nc file

  ...

Choose variable

 ▼

Time step: 2 (of 11)



Plot

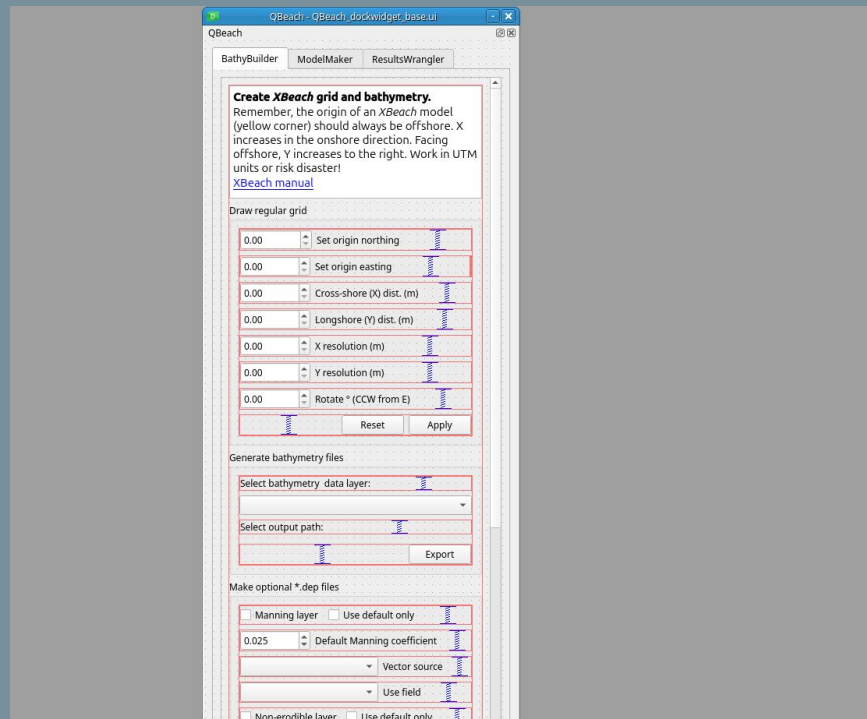
Cancel

Lessons and barriers

Qt5 → Qt6

```
4 from qgis.core import Qgis
5
6 try:
7     QGIS_INFO = Qgis.MessageLevel.Info
8     QGIS_SUCCESS = Qgis.MessageLevel.Success
9     QGIS_WARNING = Qgis.MessageLevel.Warning
10 except AttributeError:
11     QGIS_INFO = Qgis.Info
12     QGIS_SUCCESS = Qgis.Success
13     QGIS_WARNING = Qgis.Warning
14
15
16 def load_ui_type(ui_path):
17     """Load a .ui file with Qt5/Qt6 enum compatibility.
18
19     Qt6 Designer saves scoped enum syntax (e.g. Qt::Orientation::Horizontal)
20     which PyQt5's ``uic`` cannot parse. This function converts scoped enums
21     to the flat Qt5 form when running under Qt5 / QGIS 3.x.
22
23     Args:
24         ui_path (str): Absolute or relative path to the ``.ui`` file.
25
26     Returns:
27         tuple: ``(form_class, base_class)`` as returned by
28             :func:`uic.loadUiType`.
29     """
30     from qgis.PyQt import uic
31     from qgis.PyQt.QtCore import QT_VERSION_STR
32
33     if QT_VERSION_STR.startswith('5.'):
34         with open(ui_path, encoding='utf-8') as f:
35             content = f.read()
36             content = re.sub(r'Qt::(\w+):(\w+)', r'Qt::\2', content)
37             return uic.loadUiType(StringIO(content))
38
39     return uic.loadUiType(ui_path)
```

Designer 6



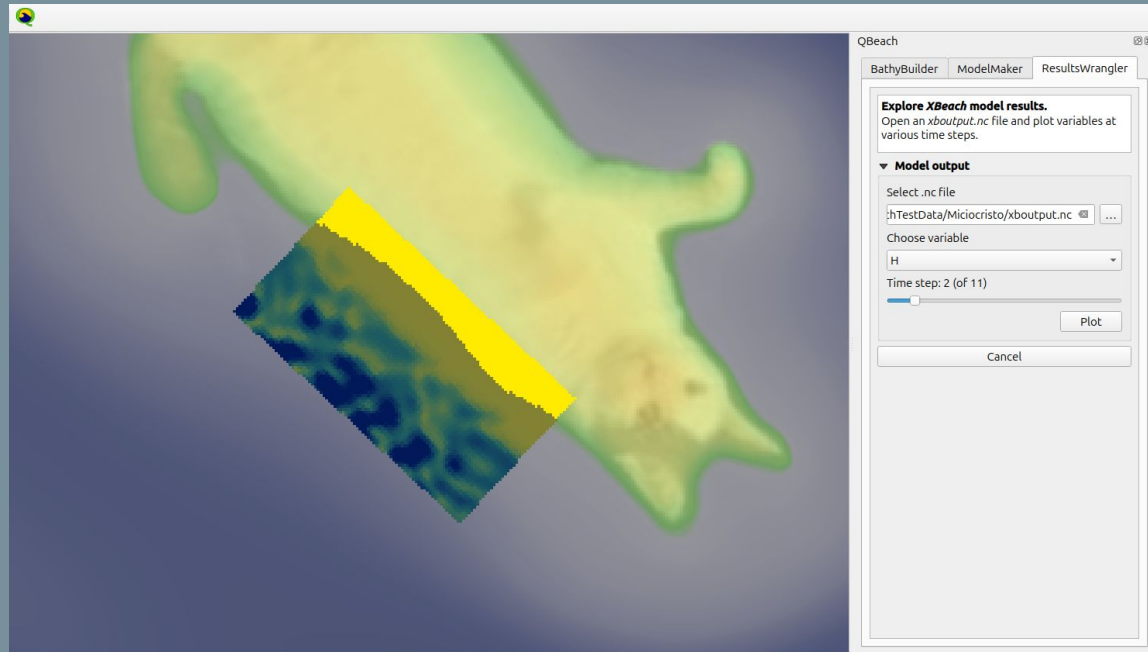
Base libraries only!

```
import os
import datetime
import numpy as np
from .config import DEFAULT_SETTINGS

from qgis.PyQt import QtWidgets
from qgis.PyQt.QtCore import pyqtSignal, QTimer
from qgis.gui import QgsFileWidget
from qgis.core import (QgsRasterLayer, Qgs,
                        QgsMapLayerProxyModel, QgsProject)

from .core.grid import calculate_grid, GridVisualizer
from .core.raster import sample_raster_at_grid, sample_vector_at_grid, create_temp_raster, apply_viridis_renderer, HAS_GDAL
from .core.export import export_xbeach_model, load_grid_files
from .core.netcdf import get_netcdf_info, read_netcdf_variable
from .core.compat import QGIS_INFO, QGIS_SUCCESS, load_ui_type
```

Better way to view NetCDF timestep/variable slices?



Launch model from QGIS?

```
Length Name
-----
55638 bed.dep
2736640 hdf5.dll
416256 hdf5_cpp.dll
138752 hdf5_f90cstub.dll
164352 hdf5_fortran.dll
139776 hdf5_hl.dll
25088 hdf5_hl_cpp.dll
59392 hdf5_hl_f90cstub.dll
61440 hdf5_hl_fortran.dll
235008 hdf5_tools.dll
29 jonswap.txt
26530 LICENSE
608080 msvcp100.dll
829264 msucr100.dll
394752 netcdf.dll
1325 params.txt
70656 szip.dll
13 tide.txt
81252 x.grd
1008588 XBeach.BMT.dll
1014576 xbeach.exe
9597440 XBeach.Library.dll
74 XBeachModel.bat
88023 y.grd
108032 zlib.dll
```

RIP Gemini CLI

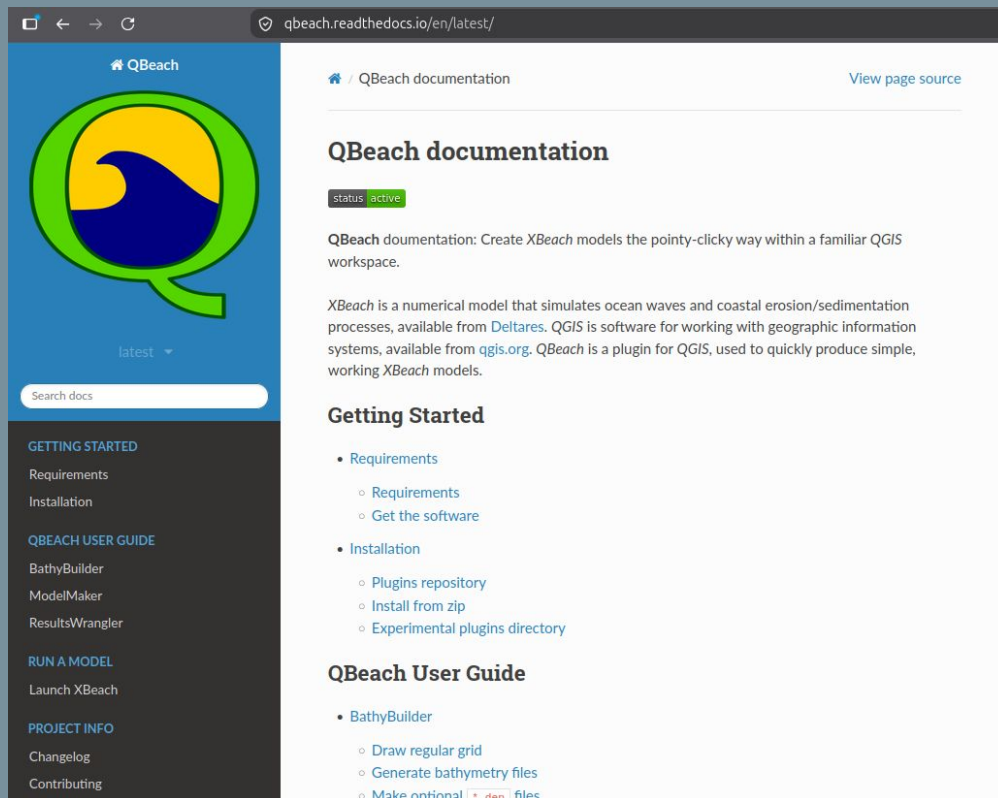
opencode

My code broken. What's up?

Plan · MiMo V2.5 Free OpenCode Zen

tab agents ctrl+p commands

New documentation!



The screenshot shows a web browser displaying the QBeach documentation page. The browser's address bar shows the URL `qbeach.readthedocs.io/en/latest/`. The page has a dark blue sidebar on the left with the QBeach logo (a stylized 'Q' with a yellow sun and blue wave) and a search bar. The main content area is white and features the title 'QBeach documentation' with a 'View page source' link. Below the title, there is a status indicator 'status active' and a paragraph describing QBeach as a plugin for QGIS. A 'Getting Started' section follows, listing 'Requirements' and 'Installation' with sub-links. Finally, a 'QBeach User Guide' section lists 'BathyBuilder' with sub-links.

QBeach

latest

Search docs

GETTING STARTED

- Requirements
- Installation

QBEACH USER GUIDE

- BathyBuilder
- ModelMaker
- ResultsWrangler

RUN A MODEL

- Launch XBeach

PROJECT INFO

- Changelog
- Contributing

QBeach documentation [View page source](#)

QBeach documentation

status active

QBeach documentation: Create *XBeach* models the pointy-clicky way within a familiar QGIS workspace.

XBeach is a numerical model that simulates ocean waves and coastal erosion/sedimentation processes, available from [Deltares](#). QGIS is software for working with geographic information systems, available from [qgis.org](#). *QBeach* is a plugin for *QGIS*, used to quickly produce simple, working *XBeach* models.

Getting Started

- Requirements
 - [Requirements](#)
 - [Get the software](#)
- Installation
 - [Plugins repository](#)
 - [Install from zip](#)
 - [Experimental plugins directory](#)

QBeach User Guide

- BathyBuilder
 - [Draw regular grid](#)
 - [Generate bathymetry files](#)
 - [Make optional](#) [*.dep](#) files

Thank you!

- jacobtristan.melly@unive.it
- qbeach.readthedocs.io
- github.com/JTMelly/QBeach