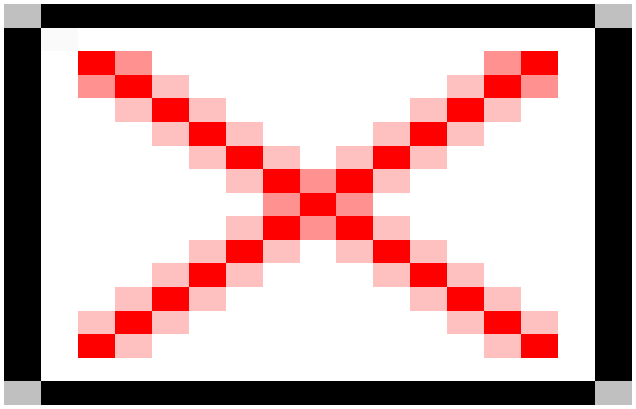
IMDC
Hydrodynamic and morphologic studies
Location:
Belgium
Client:
Flanders Hydraulics Research



Project Contact Information

For more information, contact:

coast@imdc.be

Comparison of the Dutch and Belgian wave forecasting systems in shallow water
Extension: Extreme wave climate in the Belgian harbours

Introduction

IMDC was contracted by Flanders Hydraulics Research to determine the wave climate in shallow water along the Dutch-Belgian coast (until the Westerschelde). An extension of the project includes the determination of the (extreme) wave climate in the Belgian coastal ports.

Wave climate in shallow water

This part of the assignment consists of:

1. Preparation of time series with boundary conditions: gathering of all available data (waves, wind, water levels), determination of relations between time series of different sources, completing time series with gaps, separation of spectra to swell and wind wave components.
2. Validation of the existing transformation matrix model (put up with SWAN simulations): visual validation, quality control, comparisons with direct SWAN simulations.
3. Development of the post-processing tools in Matlab: central GUI, broad range of wave climate tools.
4. Technical scientific assistance: improvement of the transformation matrix model.Reporting of the year-averaged wave climate

Extreme wave climate in the Belgian coastal harbours

The assignment was extended to determine the wave climate in each Belgian coastal harbour (Oostende, Blankenberge, Zeebrugge and Nieuwpoort) during a superstorm with return period of 1000 years.

This part of the assignment consists of:

1. A literature study to determine which wave models are best suited for this problem.
2. Short- and long wave modelling with phase-resolving models to model the wave penetration and resonance with Mike 21 BW (Boussinesq model) and MILDwave (Mild Slope Equations model).

Comparison of the results of these models.

3. Calibration and validation of wave models with in situ wave measurements and/or physical model results (if available).
4. Wave modelling with the phase-averaged wave model SWAN to determine the local wave growth due to extreme wind speeds during the superstorm.

The result is a set of hydrodynamic boundary conditions along all sea defence structures of each Belgian coastal harbour for a superstorm (RP = 1000yrs).