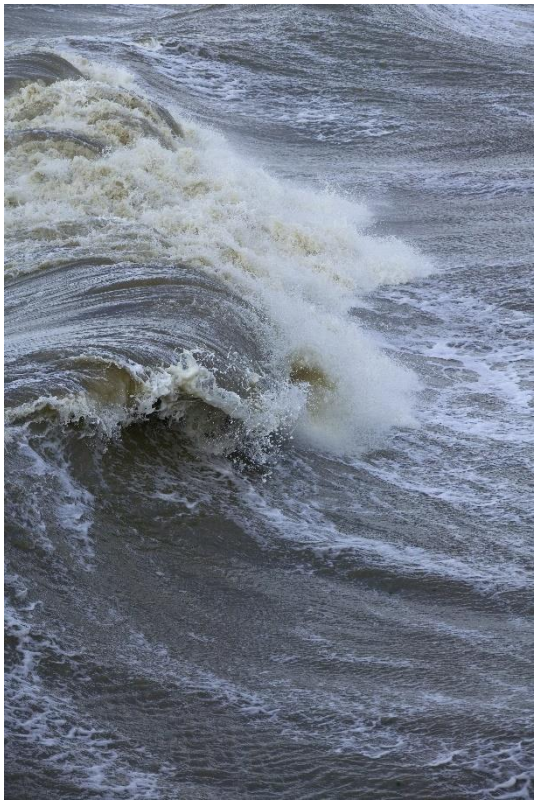
Determination of the sea surface roughness from SWAN wave model results

Msc. Thesis

Introduction



The wave model SWAN is often used to model waves in coastal waters. In most applications the model is driven with surface winds from uncoupled and generally global atmospheric models. Currently, however, regional and local downscaling of the global atmospheric results is often carried out in both climate change and offshore wind energy studies using atmospheric models covering the same region as the SWAN models. In order to determine the surface winds the atmospheric models need the information on the surface roughness. Although the surface roughness depends on the wave conditions, these models estimate the surface roughness solely based on their local wind speed data and eventually other atmospheric data. In order to improve the quality of the atmospheric model surface winds and resulting waves, the input of the actual sea surface roughness fully considering the waves conditions to the atmospheric model is paramount. Unfortunately, SWAN is not yet able to output the sea surface roughness that corresponds to their output wave conditions. A step forward in the accuracy of the modeling of coastal waves by SWAN would, therefore, be the addition of sea surface roughness to the SWAN output.

Research Objective

Development of sea surface roughness output from SWAN

Approach

- Literature study to identify the possible approaches to determine the sea surface roughness suing wave models and directly from 2D wave spectra
- Implement a number of ways to determine sea surface roughness using SWAN
- Quantify the uncertainties in sea surface roughness due to uncertainties in which formulation to use in its determination

Interested? Please contact Sofia Caires (sofia.caires@deltares.nl) and Marcel Zijlema (M.Zijlema@tudelft.nl) and include your CV, grade list and brief motivation

Deltares
Enabling Delta Life

TU Delft Delft University of Technology