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Modelling random wave transformation and wave-induced currents in the nearshore

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Outline

Overall Objective

Model Description

Model Validation

Concluding Remarks

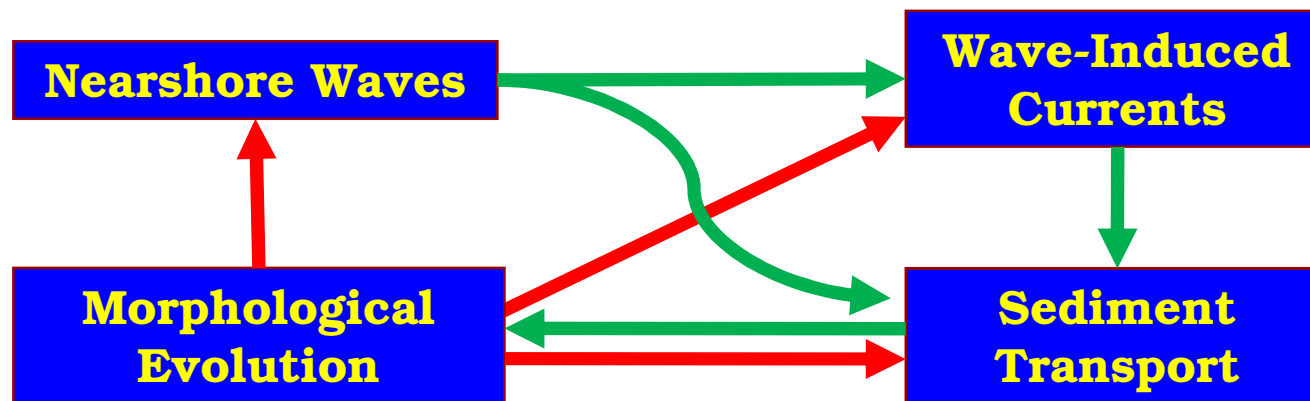


Overall Objective

To develop a robust and reliable 2D numerical model of:

- Nearshore Waves,
- Wave-Induced Currents,

for calculating sediment transport and morphological evolution



Model Description

Nearshore Waves Model

based on the Energy Balance Equation

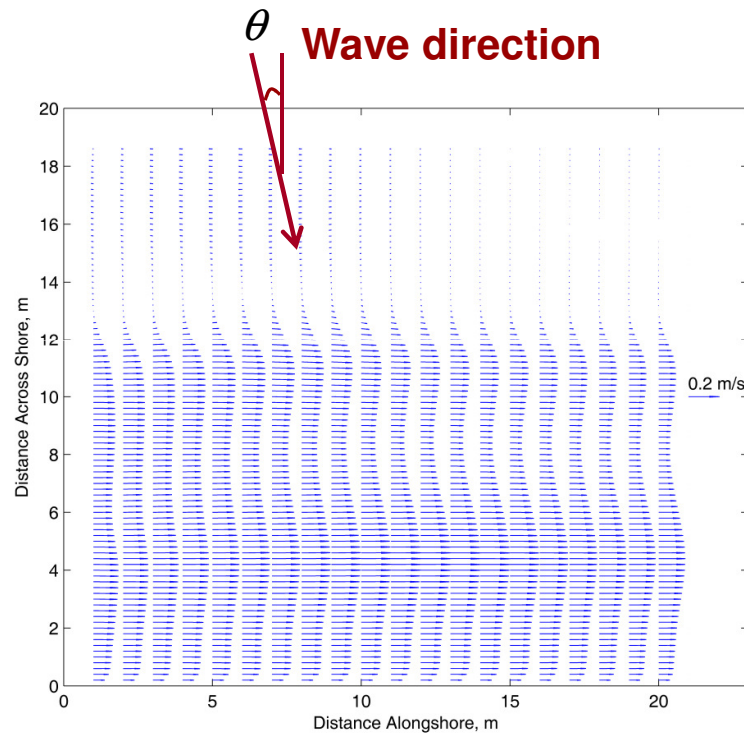
(Mase, 2001; Nam *et al.*, 2009)



- ✓ Refraction
- ✓ Diffraction
- ✓ Shoaling
- ✓ Wave Breaking
- ✓ Wave Reforming

Model Description

Wave-Induced Current Model



based on the Continuity & Momentum Eqs.

(Militello *et al.*, 2004; Svendsen, 1984)

- ✓ Surface Roller
- ✓ Longshore Current
- ✓ Cross-shore Current
- ✓ Wave Setup

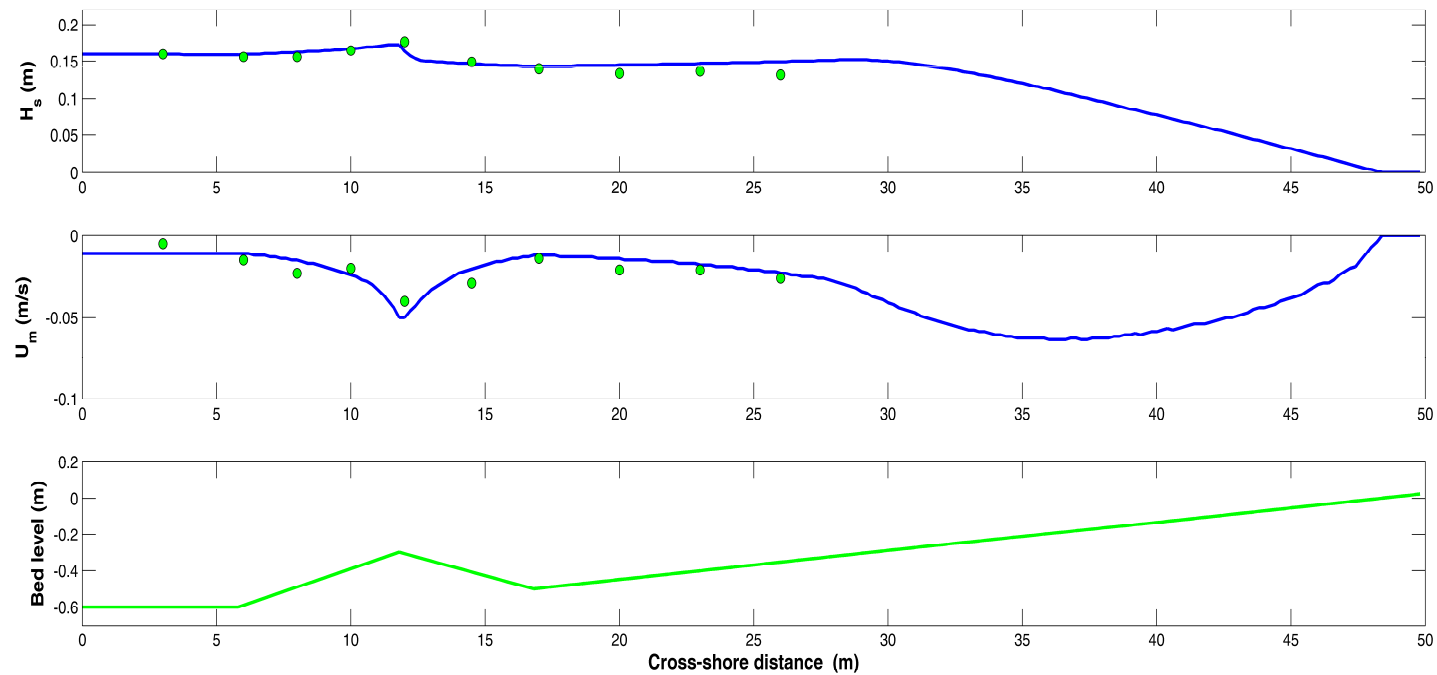
Model Validation



Wave flume at Delft University of Technology
(Grasmeijer and van Rijn, 1999)

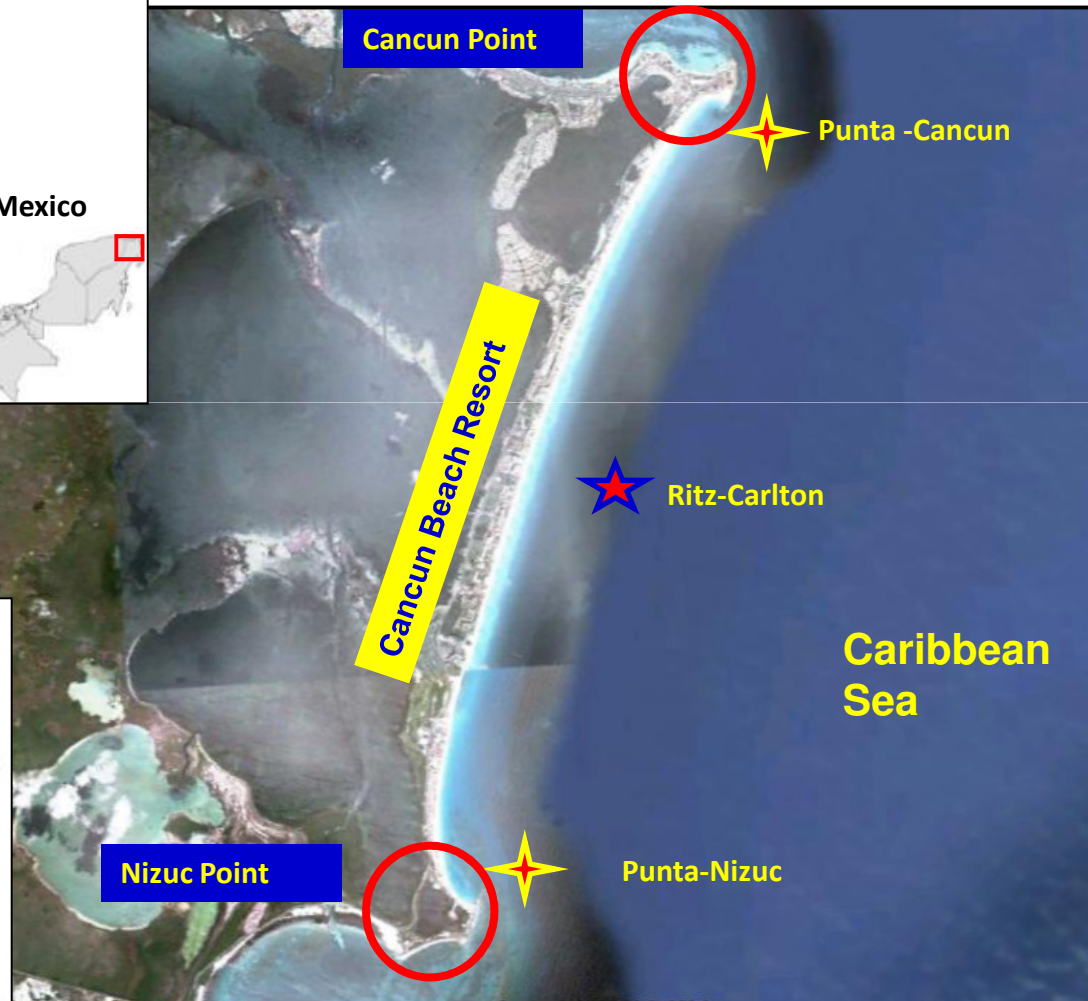
Test B1

$H_o = 0.16$ m, $T_p = 2.3$ s, $Teta = 0$ deg.

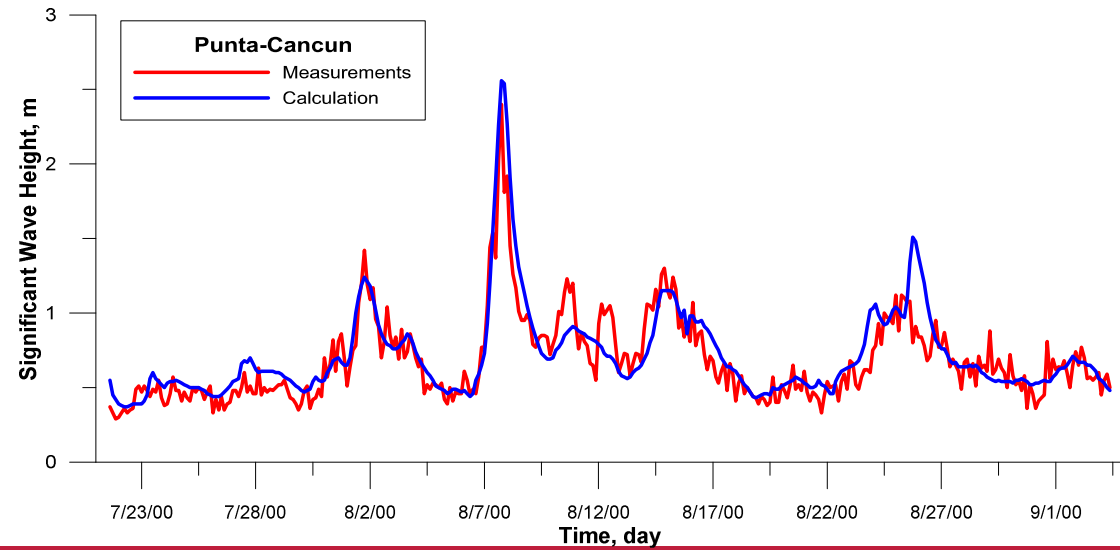
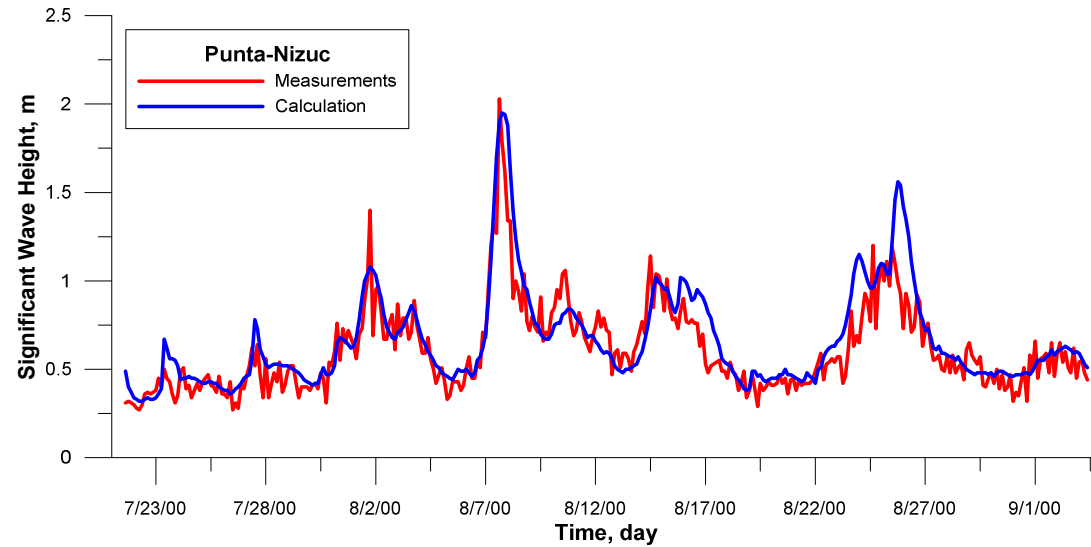


Model Validation

Cancun Beach (Villatoro, 2012)



Model Validation



Concluding Remarks

- ❖ A robust and reliable numerical model of nearshore wave transformation and wave-induced currents was developed and validated
- ❖ Good agreements between calculations and measurements were obtained for nearshore waves and undertow
- ❖ Calculations for Cancun beach have been continuously carried out in order to simulate the beach morphological evolution in this area

An aerial photograph of Ha Long Bay, Vietnam. The water is a vibrant turquoise color, reflecting the sky. Several large, steep limestone karsts rise from the water, covered in lush green vegetation. In the foreground, two large wooden boats are docked at a small pier on the left. Numerous smaller boats are scattered throughout the bay. The sky is blue with some white clouds.

Ha Long Bay, Vietnam

Vielen Dank!