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NCK - Days 2015

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March 18 - 20, 2015

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Space-time beach variability in an exposed barrier island: the case of Ilha Comprida (SP), Brazil.

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1. Introduction

The aim of this study is to evaluate the space-time variations of wave processes along the beach system of Ilha Comprida (SP). These results are then related to morpho-sedimentary characteristics and variability. Hence, potential longshore drift estimates, as well as wave power and elevation data were used to evaluate the beach system.

2. Methodology:

2.1 Wave data and numerical modelling:

The MIKE21 SW wave propagation model was applied to provide nearshore wave characteristics for the potential longshore drift and wave power estimates. Due to the lack of long-term wave data, the 30 year wave reanalysis database from the global wave generation model WAVEWATCH III (NOAA/NCEP) was used to define specific wave scenarios (wave occurrence above 5%) to be defined as boundary conditions. From each simulated wave, its nearshore characteristics have been extracted at depths of around 5 m. The potential longshore drift has been estimated using the approach exposed in Bittencourt et al (2005), whilst the wave power has been estimated through linear wave theory

2.2 Field data

Morpho-sedimentary characteristics were surveyed at five locations (Figure 1). During one year, five repeated elevation surveys were conducted at each location using a DGPS system, followed by sediment sample collection. These data were used for beach volume estimates, altimetry maps and assessment of grain size variation and distribution.

3. Results

In a long-term perspective, the longshore drift estimates show a transport trend towards NE. Moreover, it presents two positive gradient spots, located on the central-southern and northern portions. During the most energetic periods, the central-southern spot becomes bigger and reach more southern regions, whilst the northern spot maintains its position throughout the year. High values of wave power have been found approximately at the same positive spots

(Figure 1). These results are consistent with observed trends in the field, where the positive gradient spots were located at regions which experience erosion problems. The presence of the Bom Abrigo Island and the azimuth variation could give insights about both the transport trends and the wave power distribution.

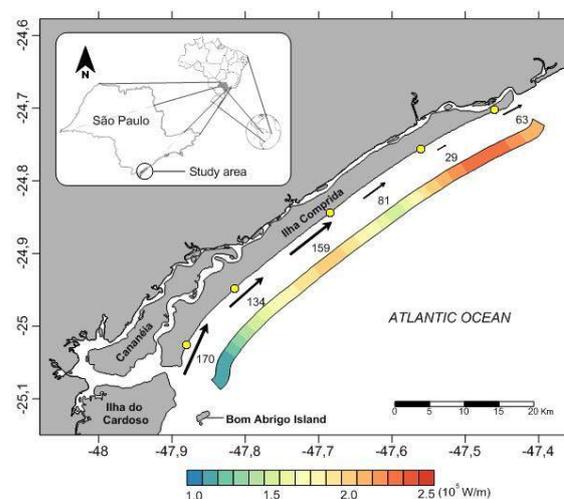


Figure 1: Study area location, the transport trends and the wave power distribution. The yellow circles represent the locations of the elevation surveys.

4. Conclusions

Along this wide open stretch of coastline, exposed to the same offshore wave regime, the local bathymetry and the presence of natural features induce a nearshore varying wave regime, resulting in areas with either negative or positive sediment balance at different locations throughout the same period.

Acknowledgments

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References

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