



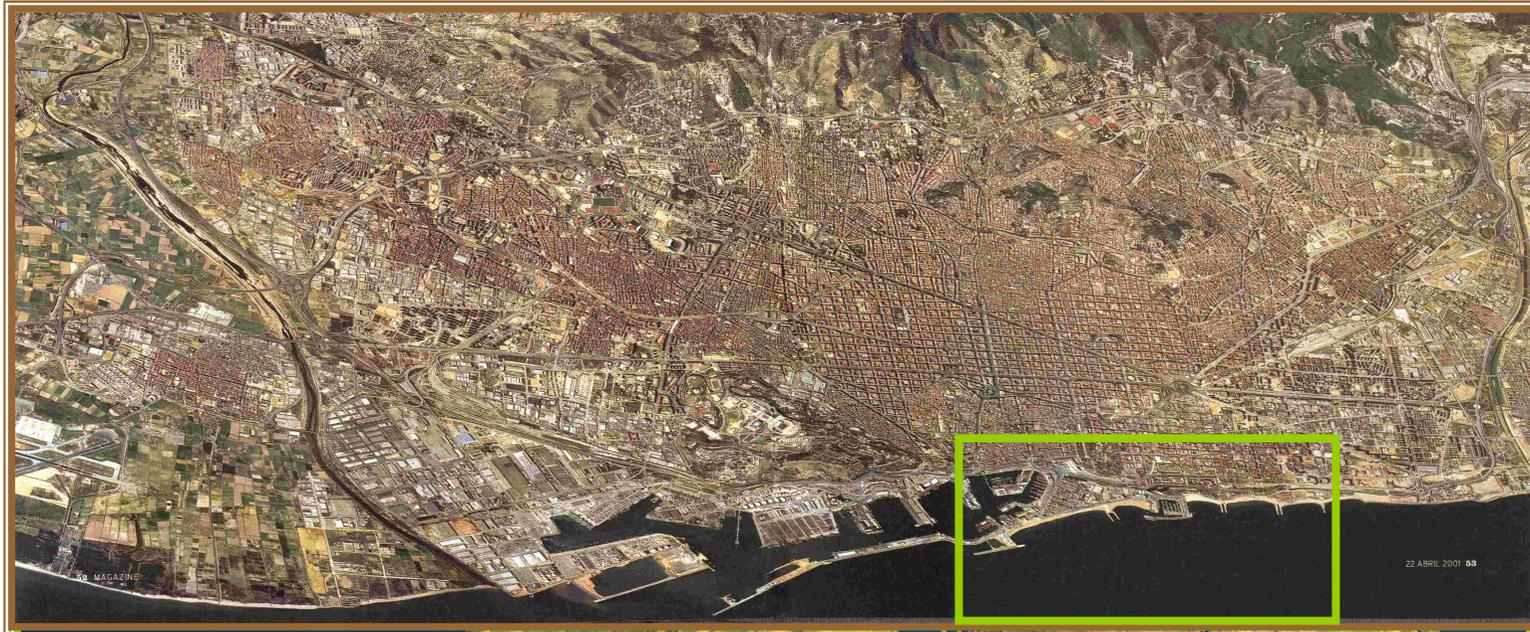
Bar and shoreline coupling in artificial embayed beaches.

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Jorge Guillén
Francesca Ribas

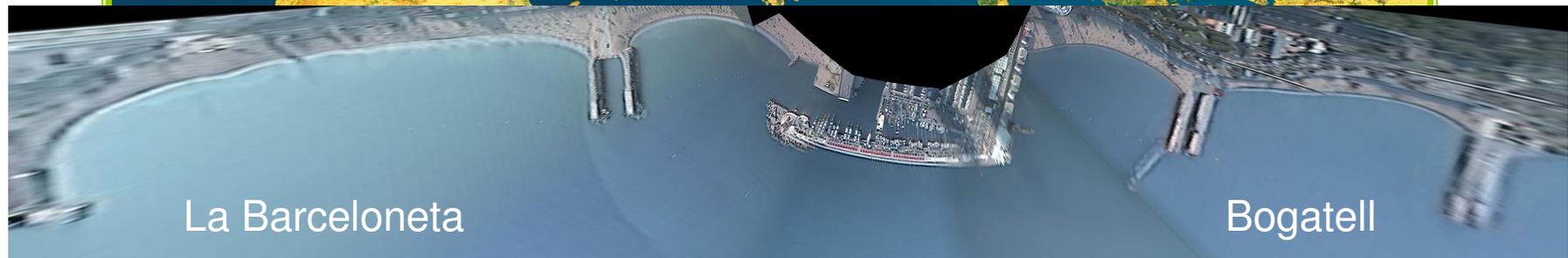


30th International Conference on Coastal Engineering
San Diego, U.S.A.

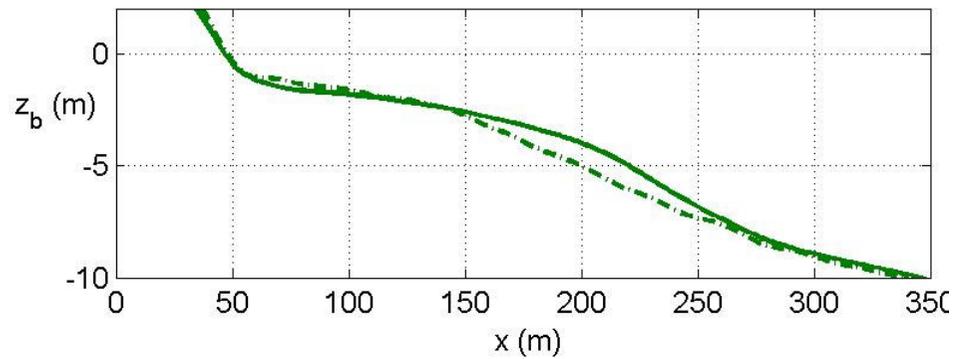
Field Site



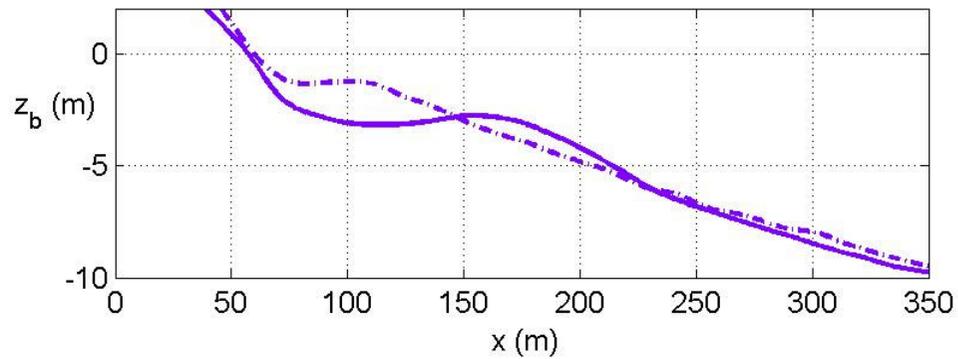
Microtidal region (<20 cm)
Seasonality in the wave climate.



Bogatell



La Barceloneta



Dashed line = 2 Oct 03

Solid line = 2 Nov 03

Planview 15 Oct 03 6h.



Planview 8 Nov 03 14h.



Methodology

Shorelines and bars mapped from Argus images.

Shorelines:

Sampled from oblique *timex* images and later on rectified.

Survey interval: between 1 and 15 days. No stormy days used.

Daily averaged data to minimize sea level variations.

Shorelines referred to a mean shoreline.



Methodology

Mapping bar locations:

Bar crest locations sampled from the rectified images.

Bar detection needs $H_s > 75$ cm.



3 pre-processing steps...

Methodology

Mapping bar locations:

1. BLIM: Bar Line Intensity Maximum (Courtesy of Dr. Ruessink).



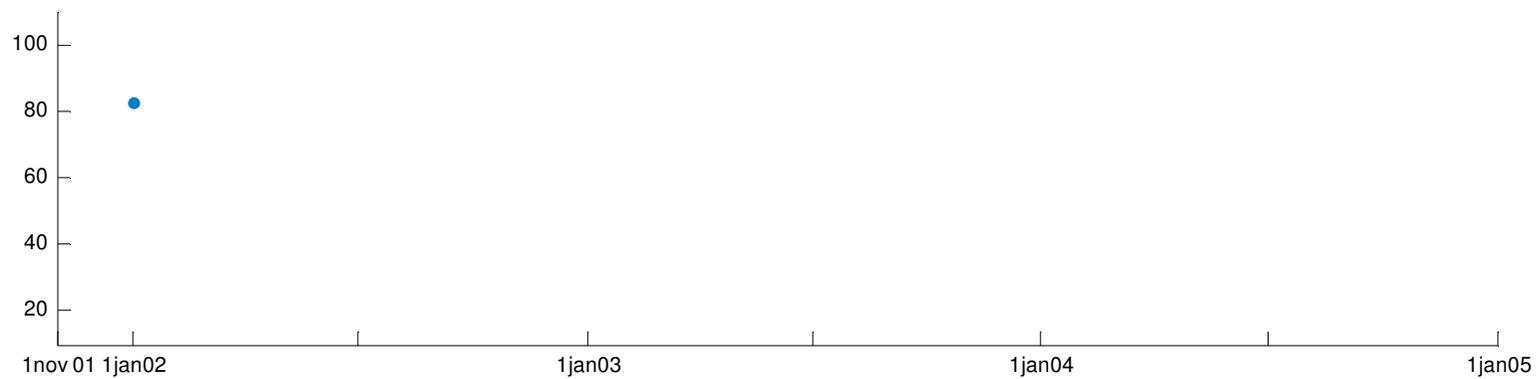
2. Bar lines filtered.



3. Relate bar location to pre-defined mean shoreline.

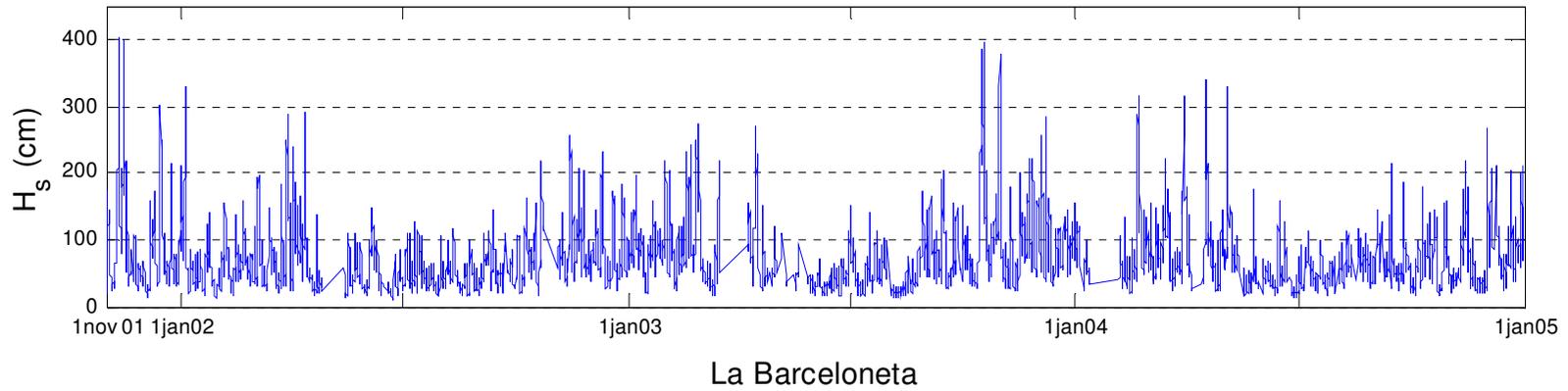


Methodology

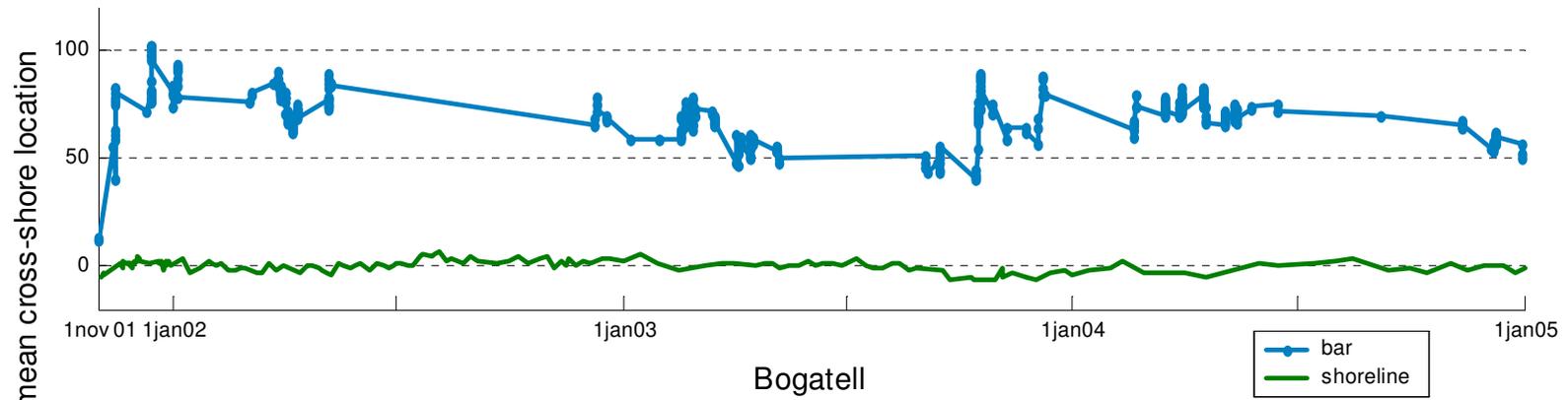


Alongshore uniform behaviour

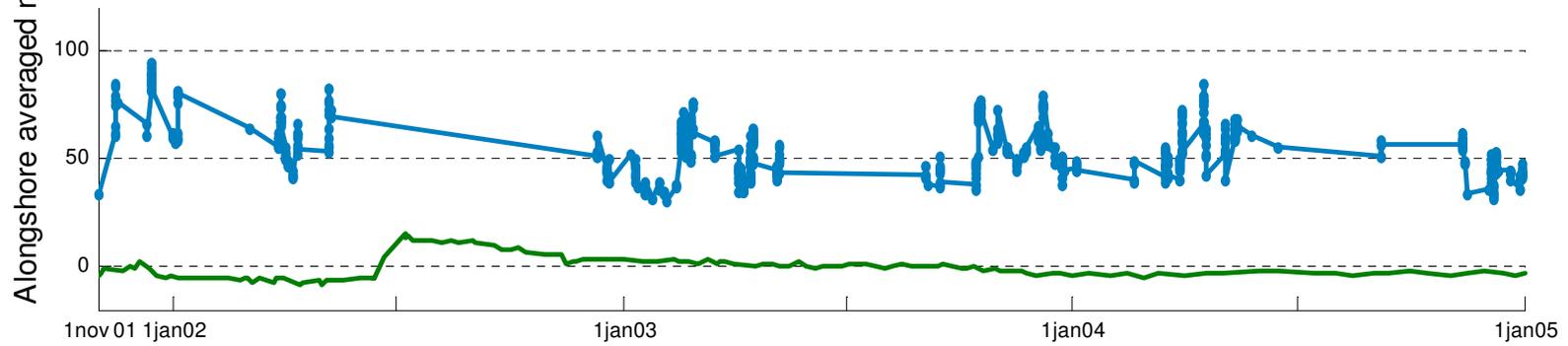
Alongshore averaged mean cross-shore location



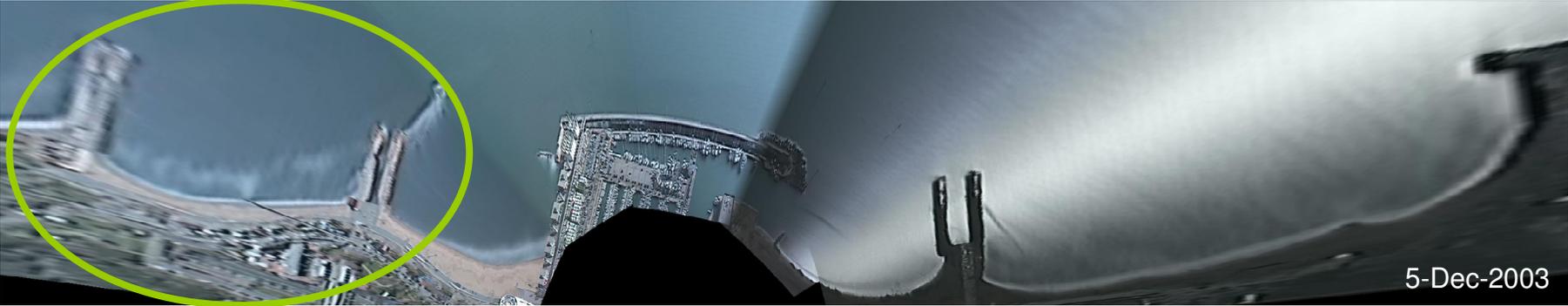
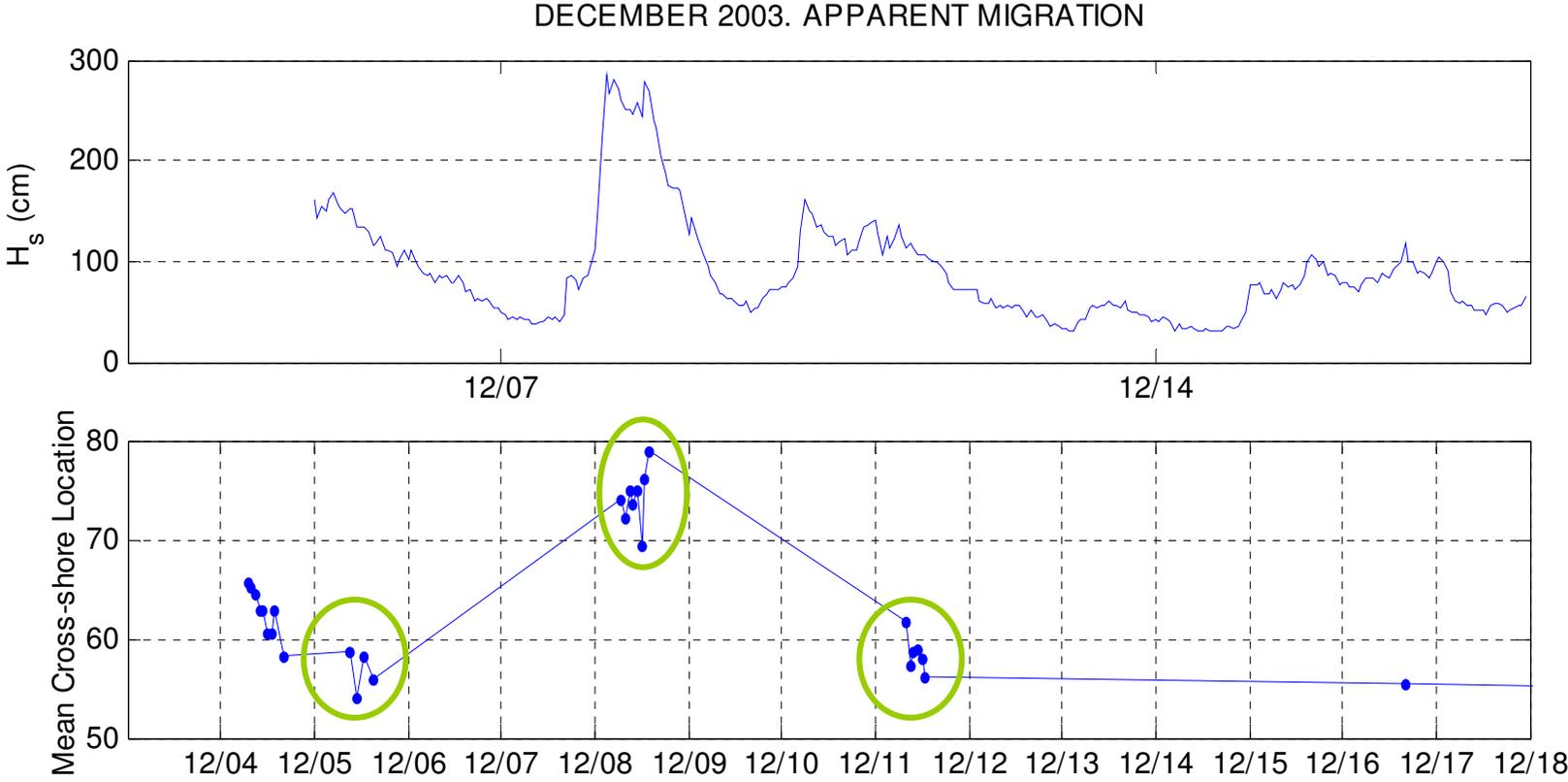
La Barceloneta



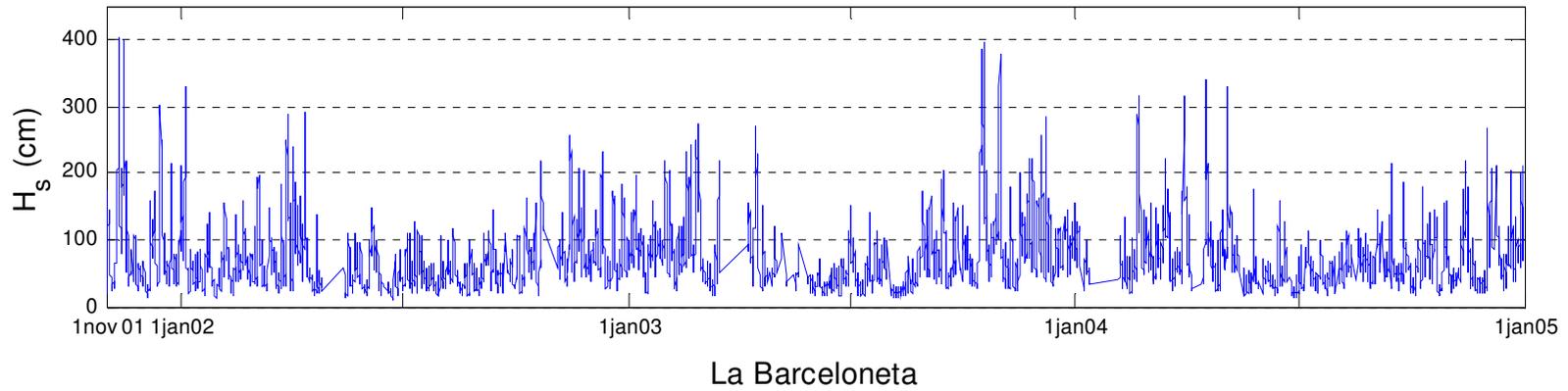
Bogatell



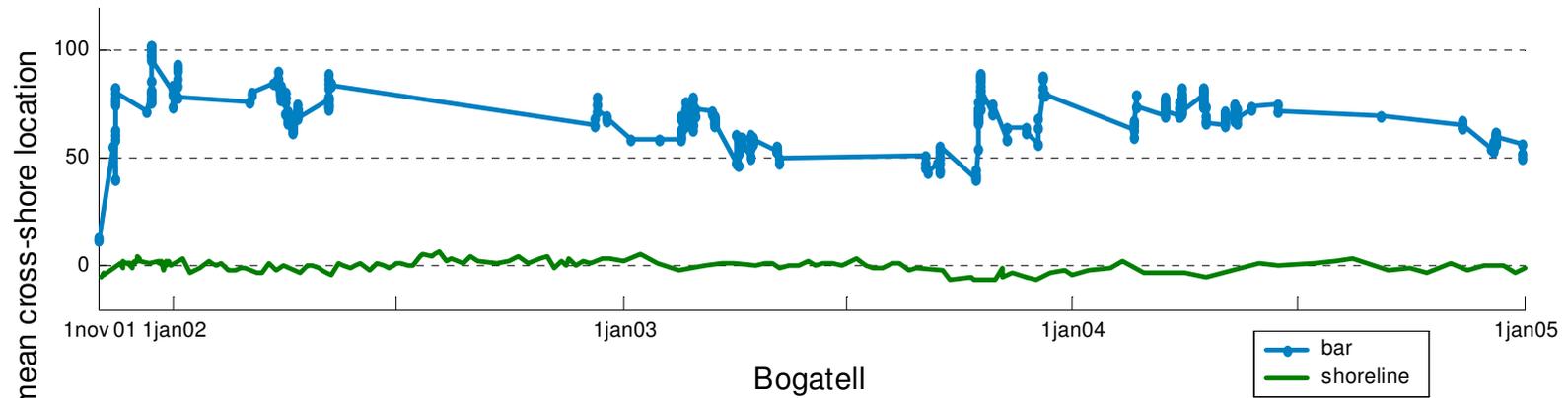
Apparent migration



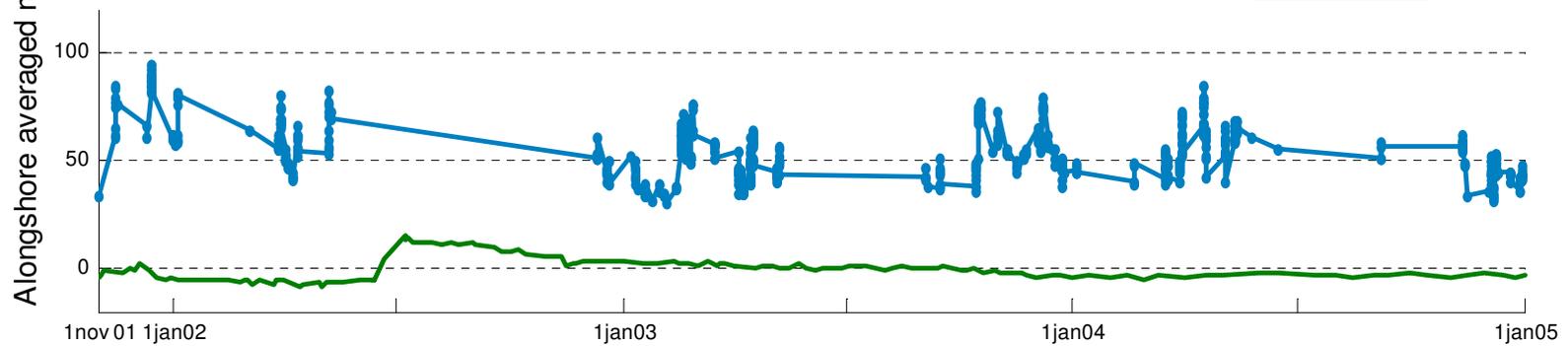
Alongshore averaged mean cross-shore location



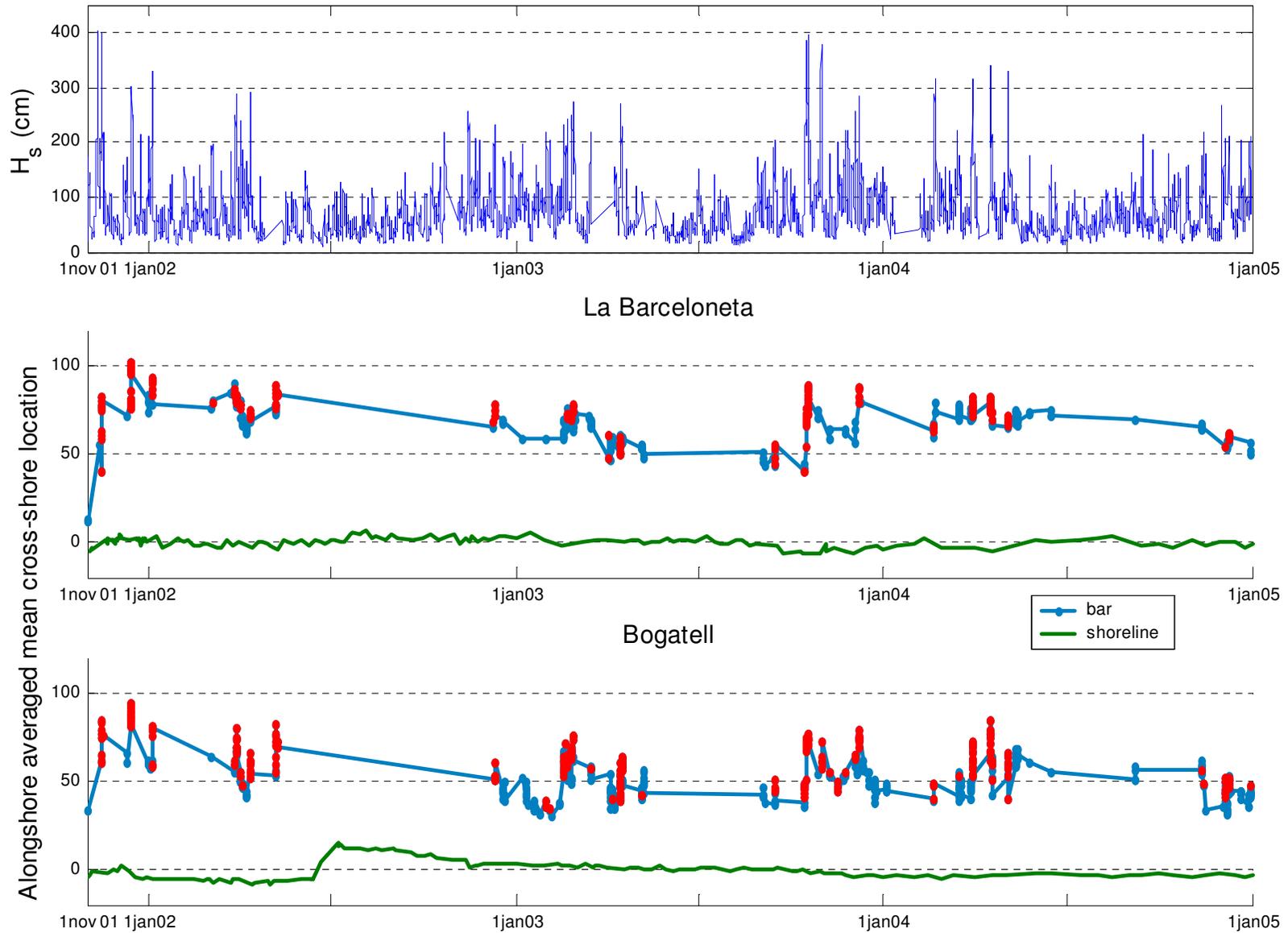
La Barceloneta



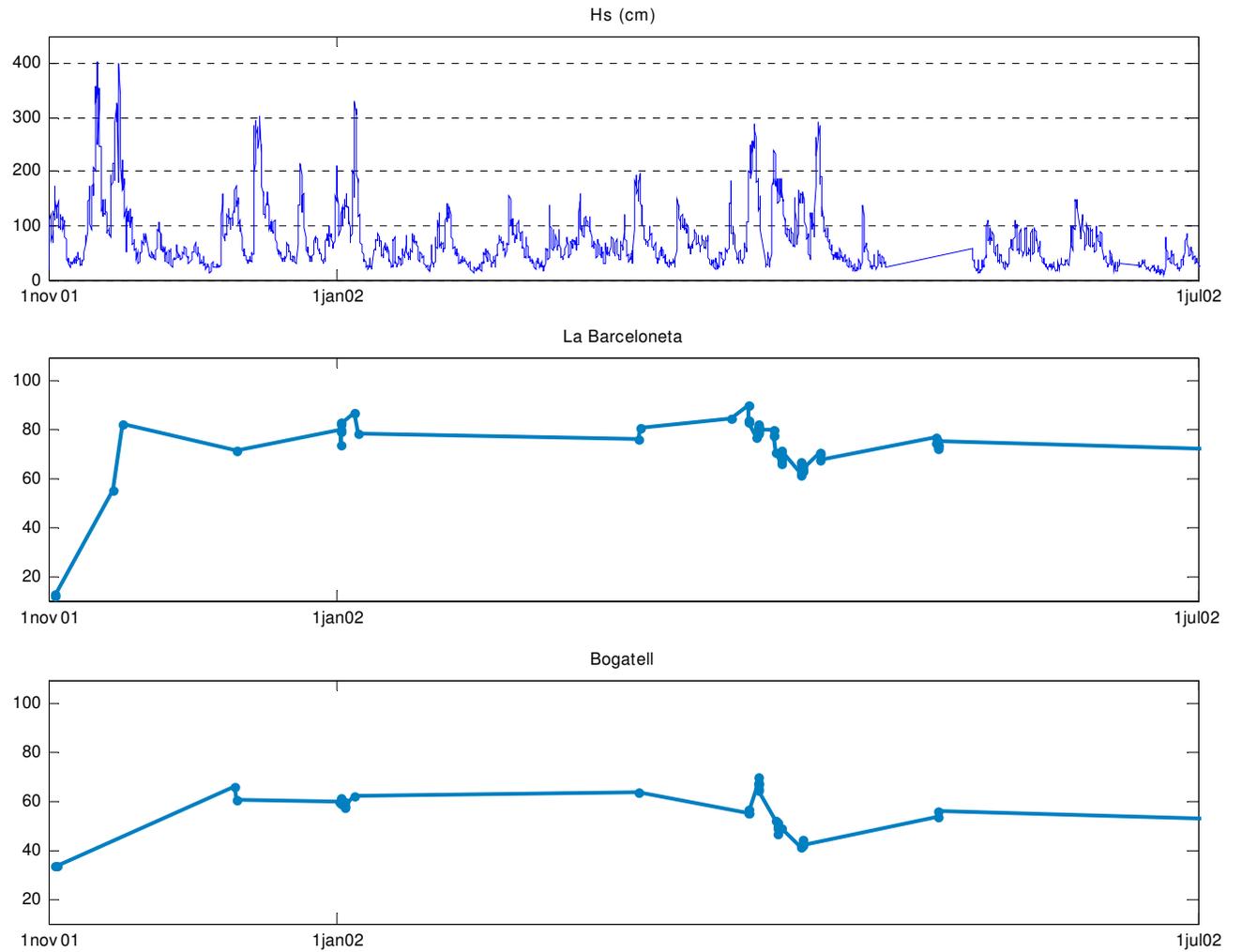
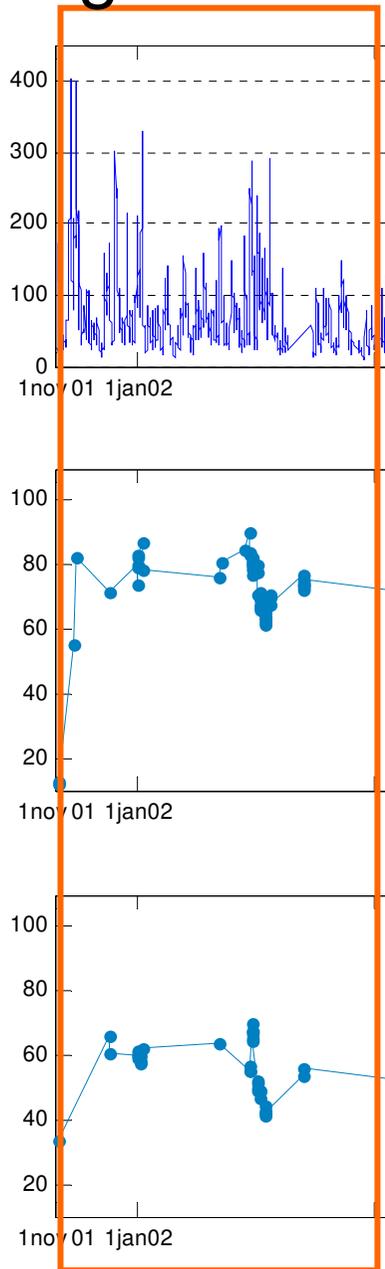
Bogatell



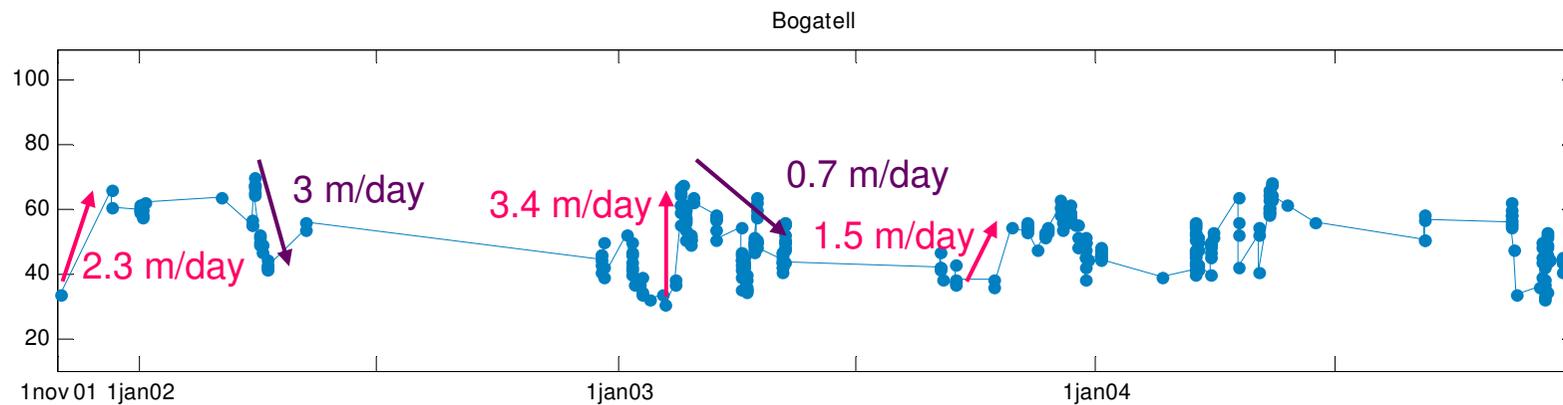
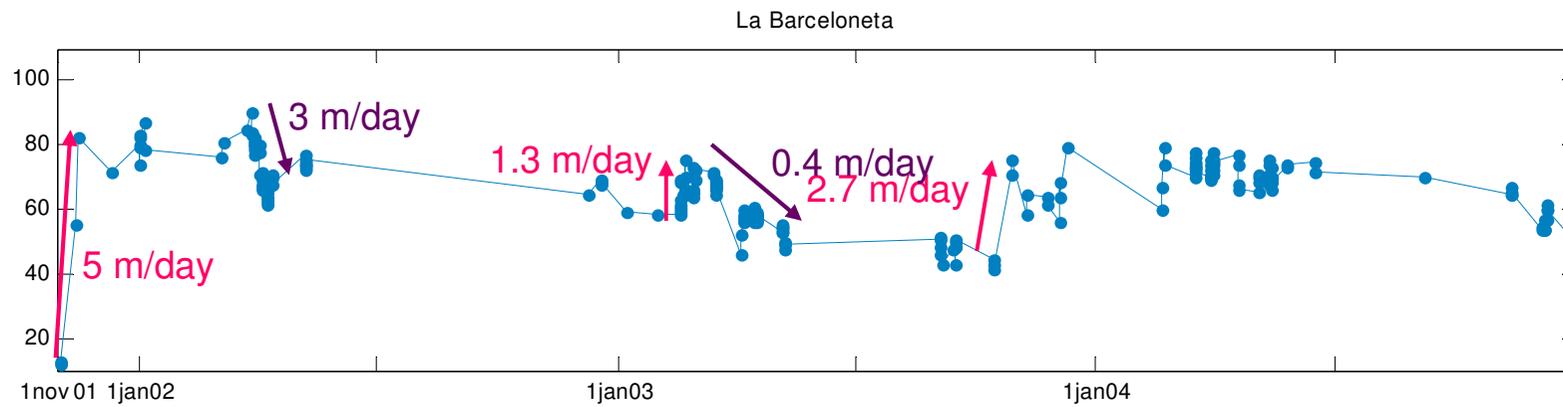
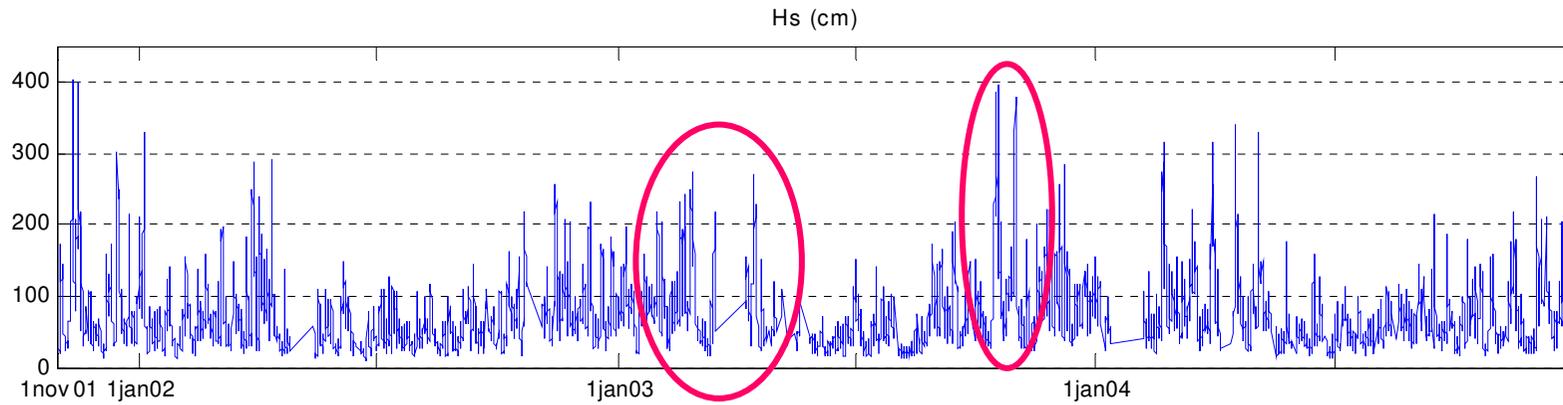
Alongshore averaged mean cross-shore location



Alongshore averaged mean cross-shore location



Cross-shore migration rates



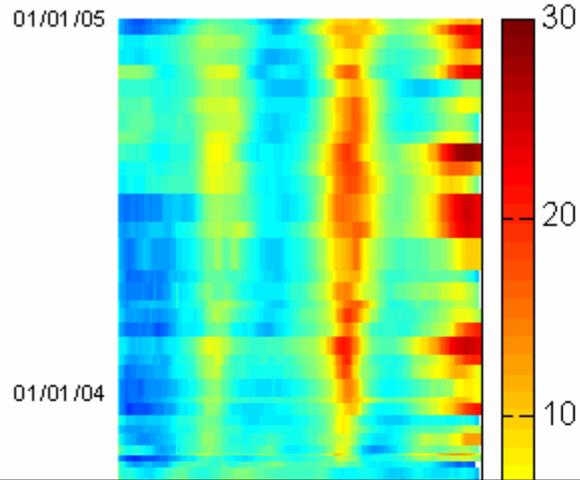
Cross-shore migration rates

- Maxima migration rates underestimated.
- Removal of apparent migration (by selecting waves within a range of 1m) may have masked responses of the bar to individual storm events.
- Maxima cross-shore migration values:
 - Offshore migration: 5 m/day
 - Onshore migration: 3 m/day
- Values comparable to those observed in other sites.

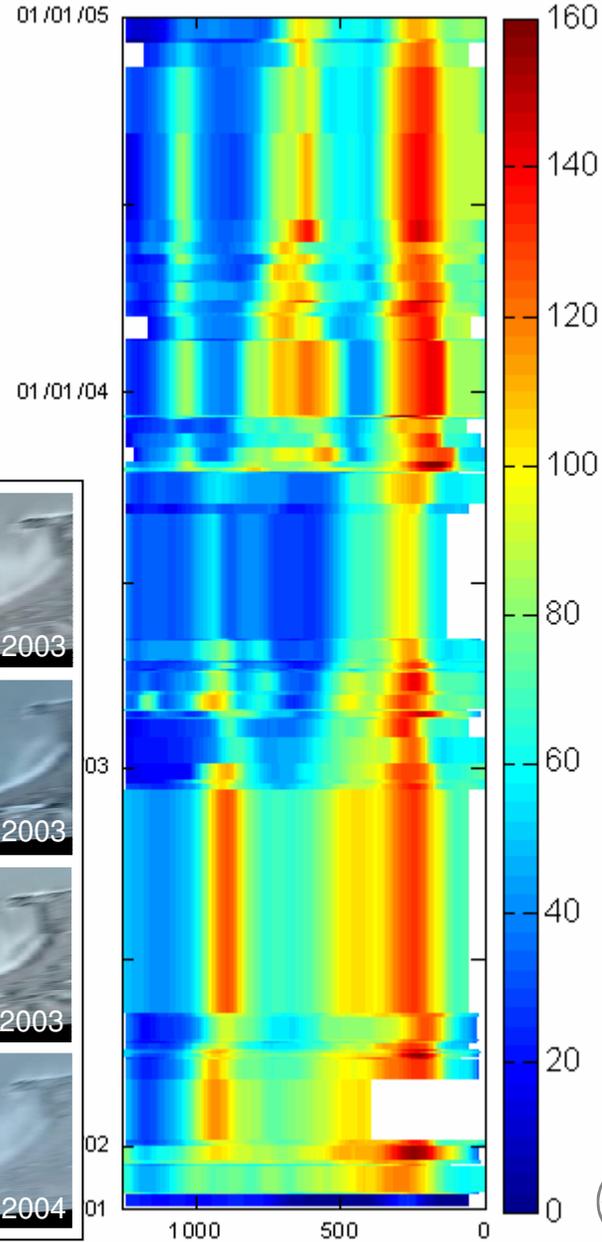
Alongshore non-uniform behaviour

3D Behaviour – La Barceloneta

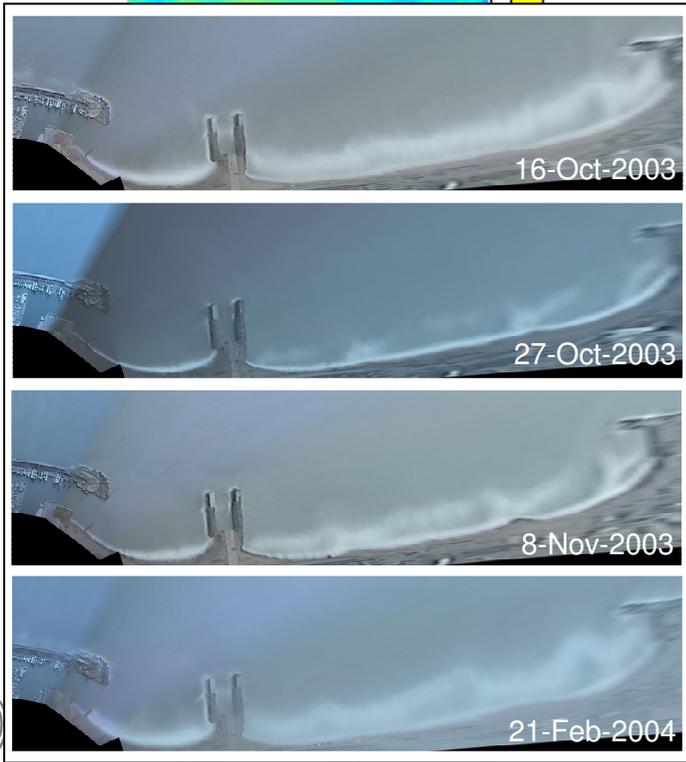
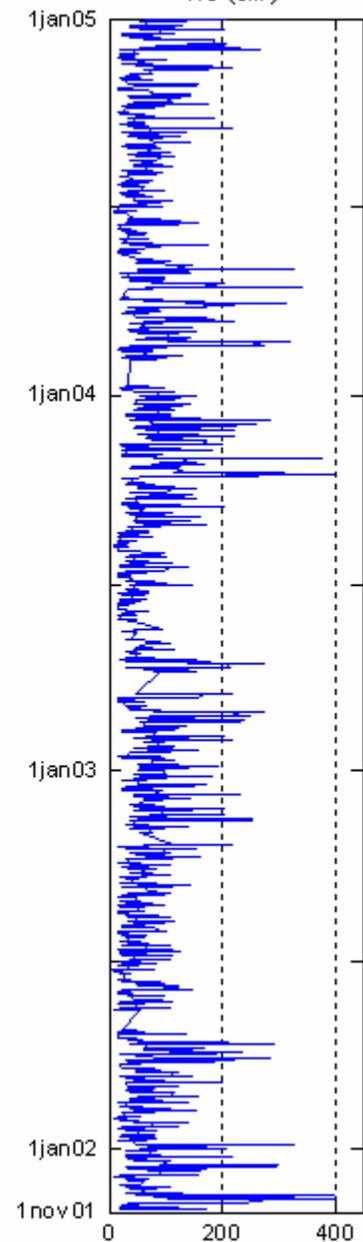
Shoreline



Bar

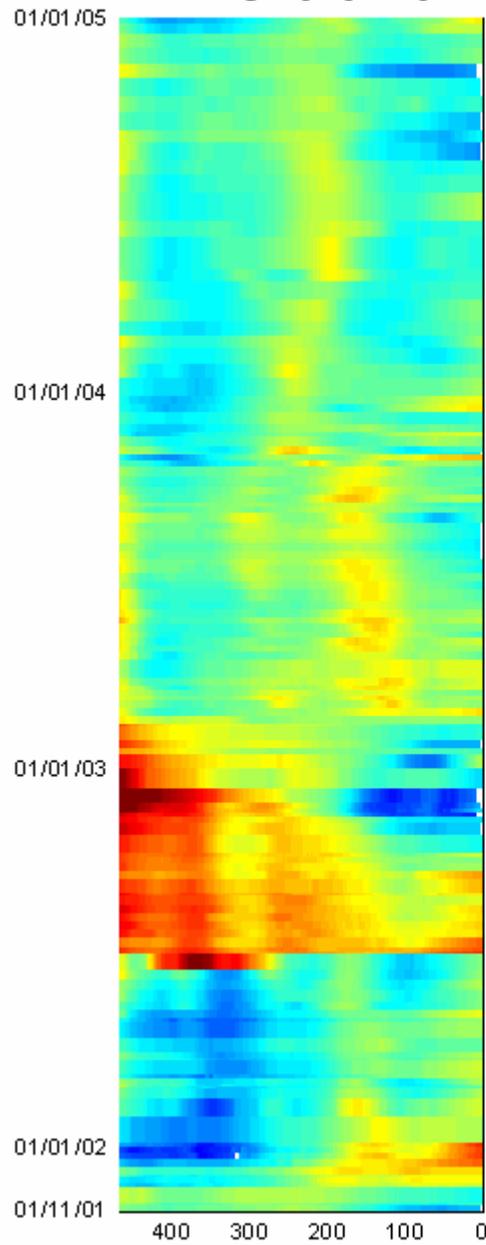


Hs (cm)

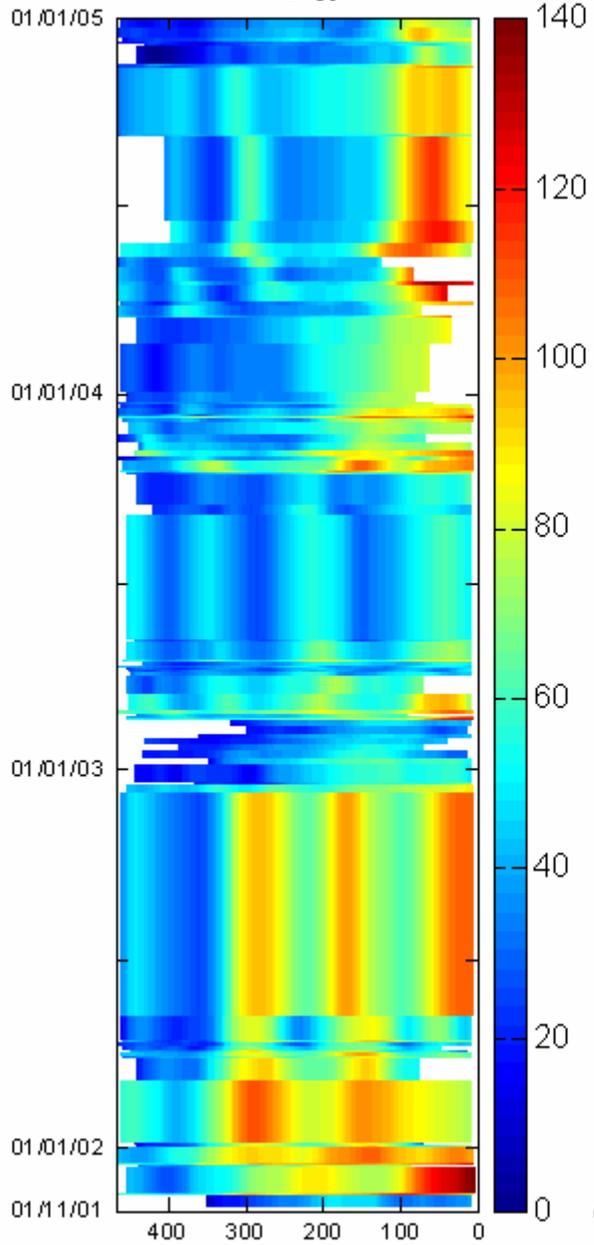


3D Behaviour – Bogatell

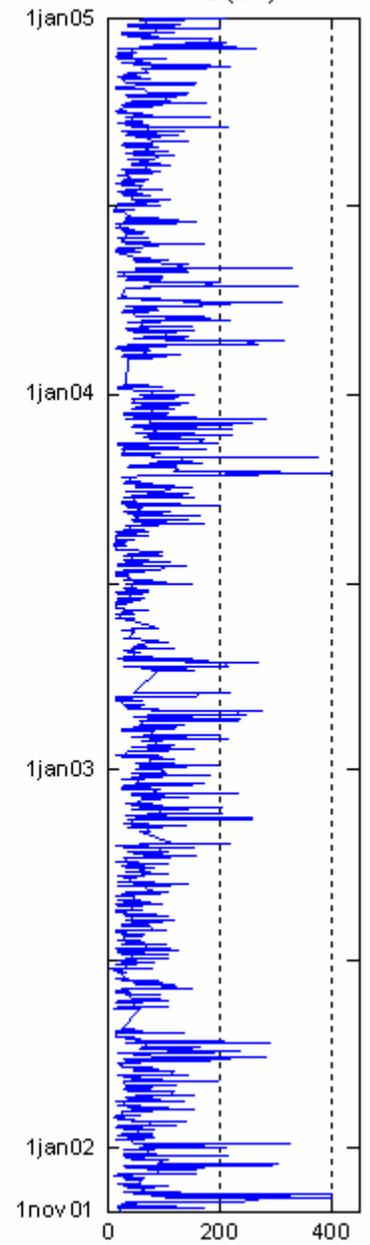
Shoreline



Bar



H s (cm)



Concluding remarks

- Bar behaviour in artificial beaches is similar to the natural ones.
- Three different bar morphologies have been observed: linear, highly crescentic and merging to shoreline. 3D morphologies are more frequent.
- Crescentic bars present typical wave lengths of 400 m in La Barceloneta and 175 m in Bogatell.
- Coupling between shoreline megacusps and crescentic bars has been observed in La Barceloneta beach.
- Maxima cross-shore migrations rates of 5m/day in the offshore direction and 3m/day in the onshore direction.
- Main modifications of the bars are associated to the artificial nourishments and to severe storms ($H_s > 3.5$ m in La Barceloneta and > 2.5 m in Bogatell).
- Man-made structures influences bar morphology. L-shape groin in southern La Barceloneta favours the presence of a quasi-permanent crescentic feature.

