A pocket beach that reaches equilibrium after becoming disconnected from a large system of beaches. Playa Barca (Fuerteventura)

SIMPOSIO INTERNACIONAL DE CIENCIAS DEL MAR

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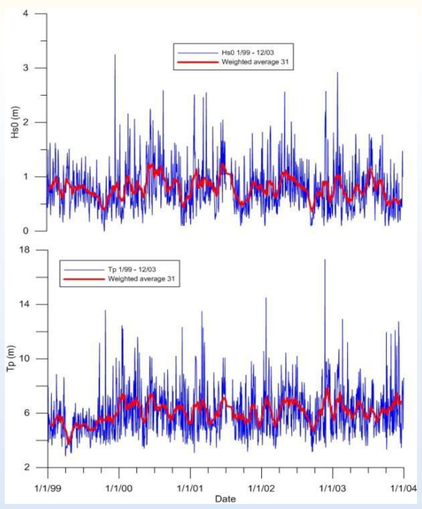
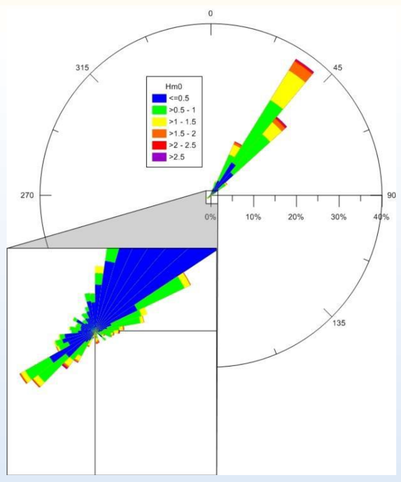
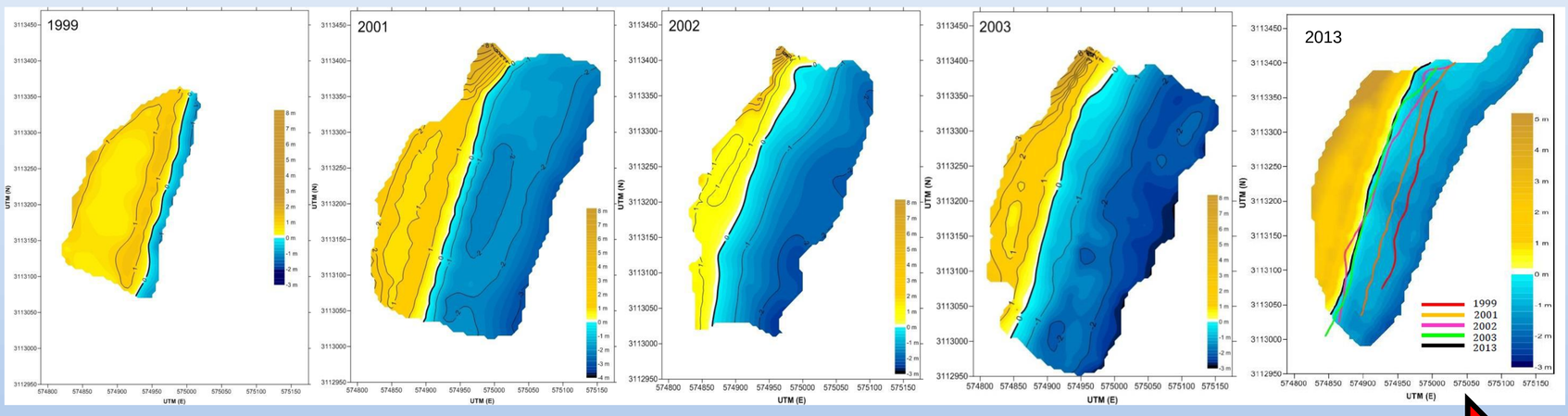
INTRODUCTION

Playa Barca is a 370 m long beach located within the system of the Leeward beaches on the Jandía peninsula, Fuerteventura, one of the major sources of economic income to the island. In the past decades, this area has suffered from a significant and worrying coastline retreat.
In order to look for an explanation to this retreat, five topographic surveys were carried out in October 1999, February 2001, February 2002, February 2003 and February 2013 to track the beach behavior in the last 15 years. Surveys were carried out during low spring tides, so that the outer limit was the furthest possible depending on wave conditions. The inner limit covered part of the dunes in the backshore. From these topographic data both coastline changes and the sedimentary balance have been obtained.

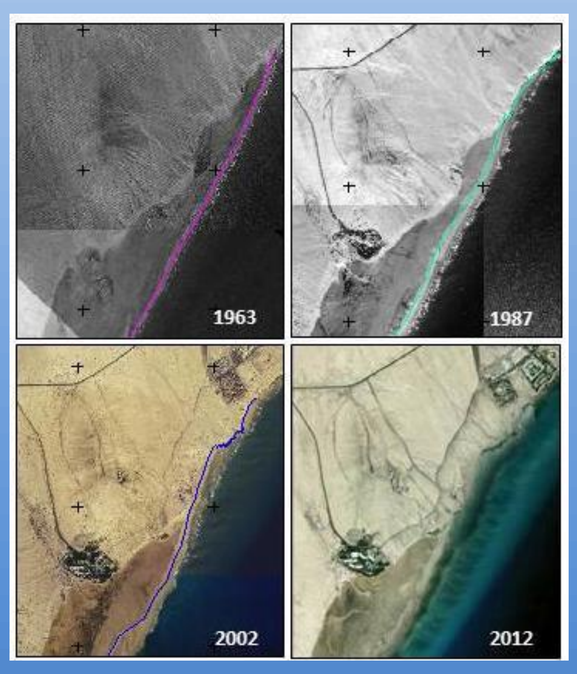


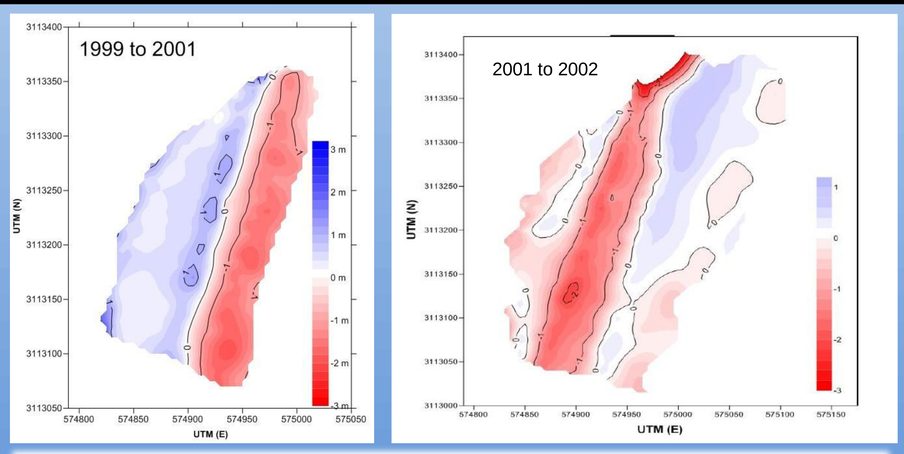
To determine the causes responsible of the measured coastal retreat climatological data were used. Wave data were provided by Puertos del Estado (www.puertos.es) corresponding to WANA 1024012 point, the closest to the study area. The data set included Hs, Tp and approaching wave direction, covering a 5 years period from January 1999 to December 2003, with one data every 3 hours.

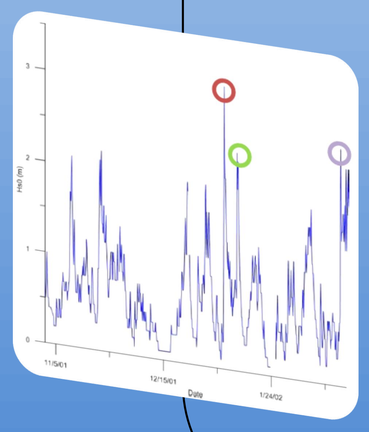




As the years progress the outside of the beach gets eroded and this has as a main consequence the retreat of the coastline an disappearance of the sand bar.







RESULTS

-Between October 1999 and February 2001 the beach suffered a very important erosion in the outer part of the beach, while the inner one showed accretion. The net balance was an erosion of 6.700 m³, which represents a coastline retreat of 13.6 m/year.

-Between February 2001 and February 2002, the shoreline retreat increased to 32.5 m/year, resulting from a net erosion that reached 25.000 m³ just in one year.

-From February 2002 to February 2003, the loss of material measured was 6.600 m3. At this stage the beach had became a pocket beach bounded by two rocky outcrops, the erosion rate become constant and virtually nil reaching 0.25 m/year,

-Finally, from February 2003 to February 2013 there was a net accumulation of 15.200 m³, which mostly took place along the inner limit of the area. Due to the lack of intermediate data between 2003 and 2013 it is not possible to know if this accumulation was regular during the 10 year interval, or associated to a punctual phenomenon that added this new material.

Considering the whole period, the beach loss 23.100 m³ of sediment, and suffered an average coastal retreat of 51 m. These numbers represents the total disappearance of the sandy barrier and the inner lagoon.
-Two main reasons to explain this erosion:

-First :general southward long shore drift that characterized the Leeward beaches system. According to Alonso *et al* (2006), it becomes clear that the measured erosion is related to long shore transport processes, the sediment outputs are not being replaced by new inputs, due to the depletion of sediments in the source area and the construction of physical barriers such as roads.
- Second: This general erosive pattern was accelerated by several unusual stormy events that took place at the beginning of 2002, These events were characterized by easterly and southerly high waves, to which, due to its orientation, Playa Barca is completely exposed:

CONCLUSIONS

Only in between 1999-2002 playa Barca has experienced a decline of 51m in the position of its coastline, and 62% of that retreat took place between Feb 2001 and the beginning of 2002, with the consequent loss of beach surface. Since then the coastline has been nearly stable, with regression rate of 0.25 m/year.
Nowadays the beach is bounded between two rocky outcrops that once were part of the inner zone of the beach and today define the north and south extremes of it, completely interrupting the long-shore drift.
Even though Playa Barca has completely lost the bar-lagoon system, and the beach width has been reduced by more than hundred meters, it can be said that nowadays Playa Barca has reached a state of sedimentary equilibrium

Playa Barca in 2013, enclosed between tow rocky outcrops

REFERENCES:
Alonso, I., Jiménez, J.A., y Valdemoro, H.I. (2006): Estudio del estado actual de los sistemas dunares de Corralejo y Jandía (Fuerteventura). Identificación de problemas y propuestas de actuación. ***DGC-MMA, Technical report CorJan Vol II.***