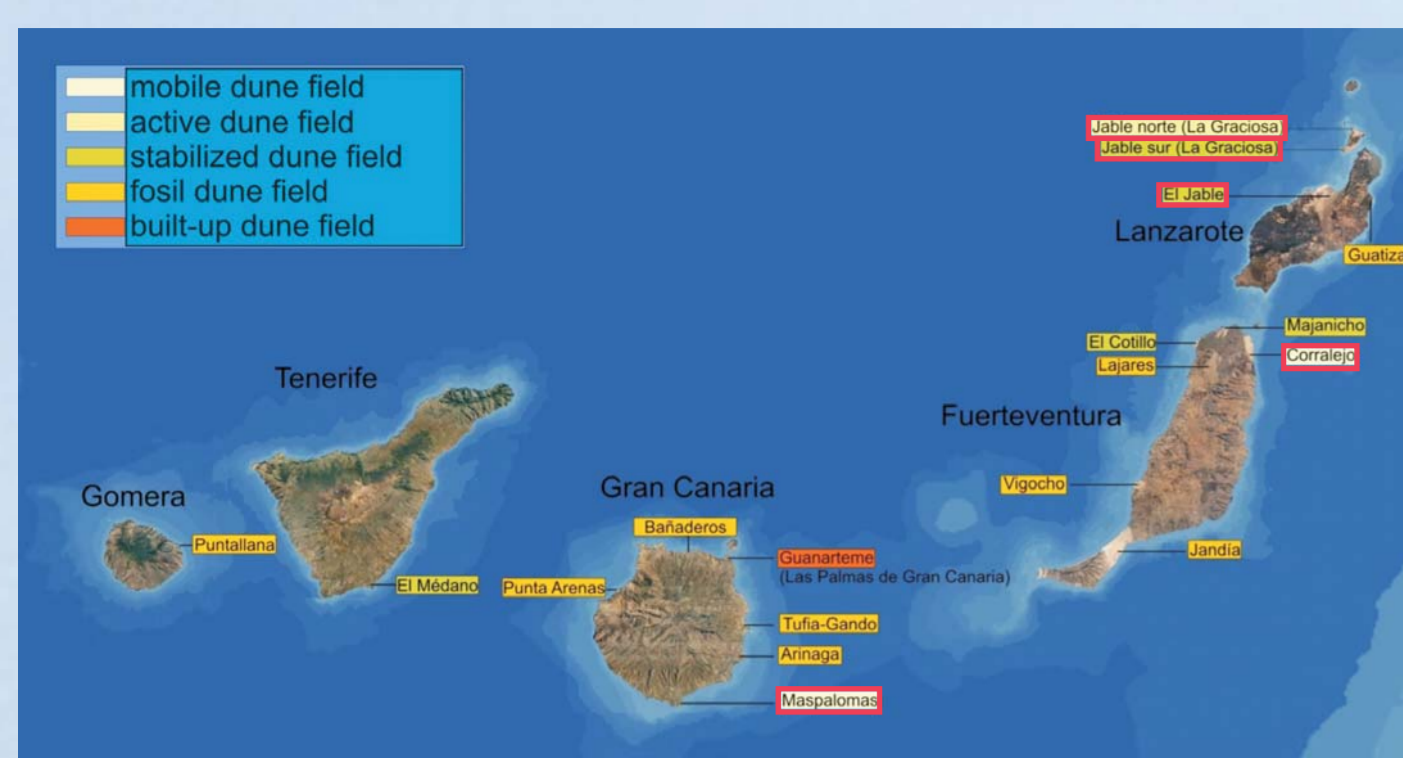
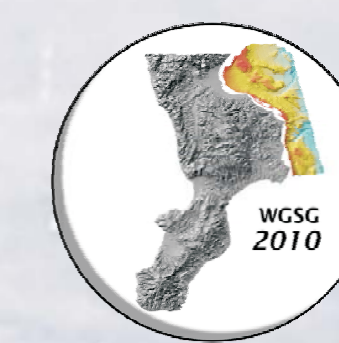


# CHARACTERIZATION OF SANDS IN THE BEACH-DUNE SYSTEMS OF THE EASTERN CANARY ISLANDS (SPAIN)

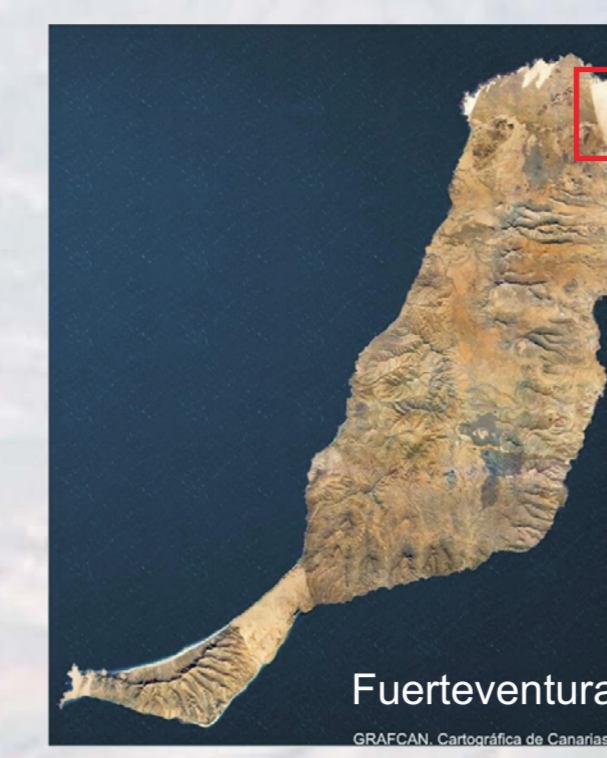
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The Canary archipelago, associated with an oceanic intraplate hot spot, has mainly beach-dune systems in the eastern islands which present a remarkably ecological (protected natural areas) and economical (tourism industry) interest. The work has been carried out in the beach-dune systems of Maspalomas (Gran Canaria Island), Corralejo (Fuerteventura Island), Famara (Lanzarote Island) and La Graciosa Islet.



## THE SEDIMENTARY DEFICIT

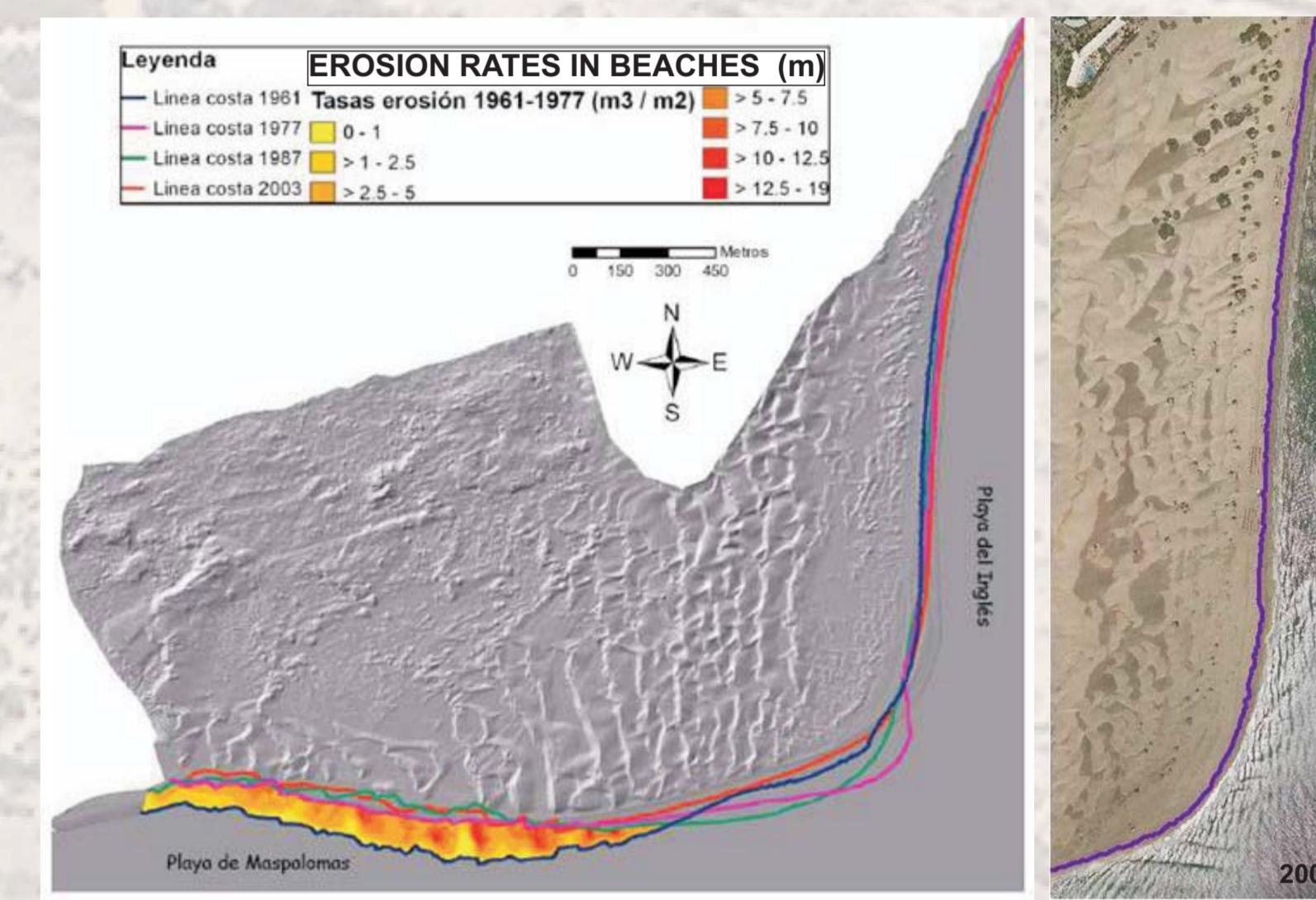
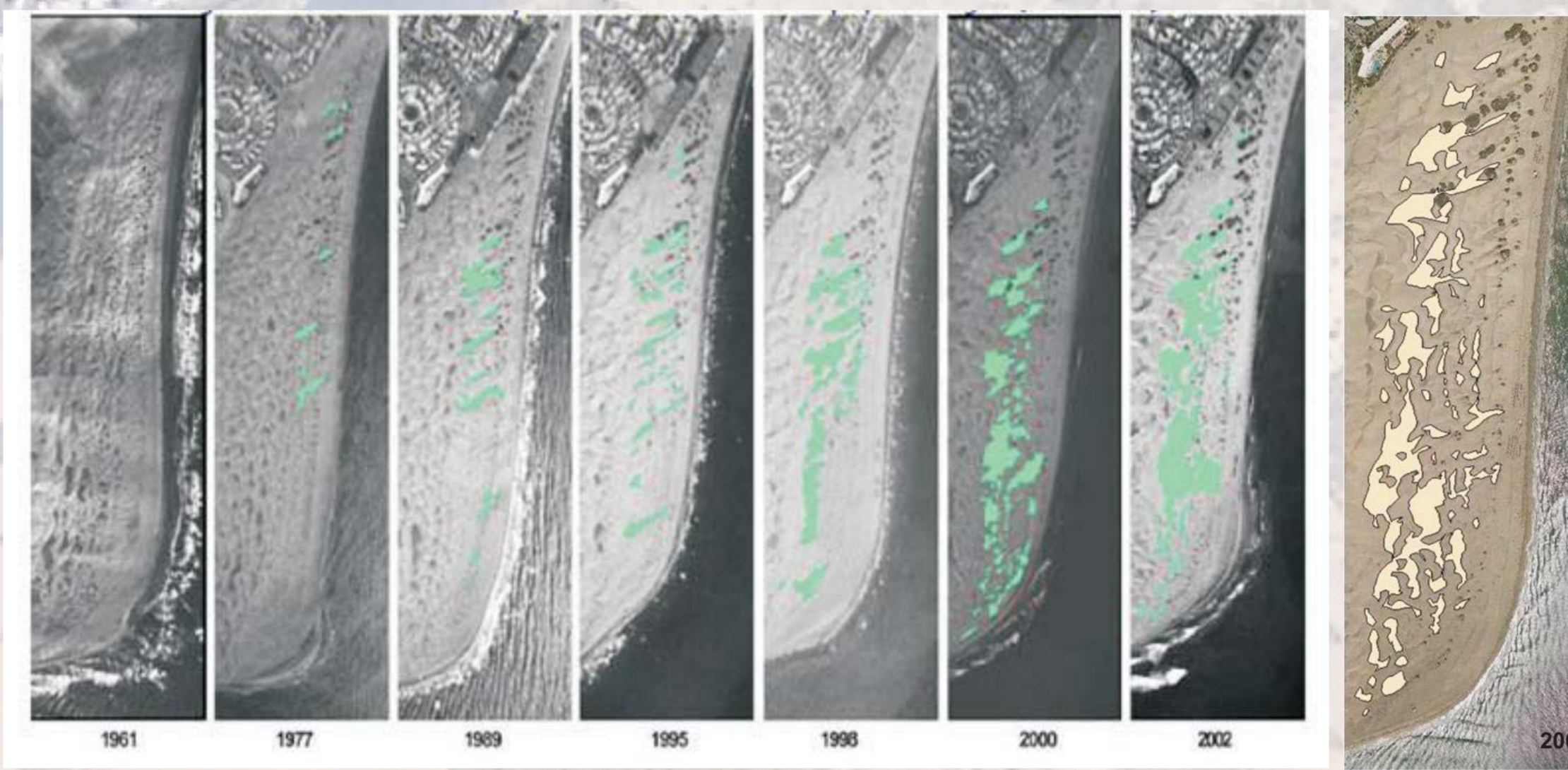
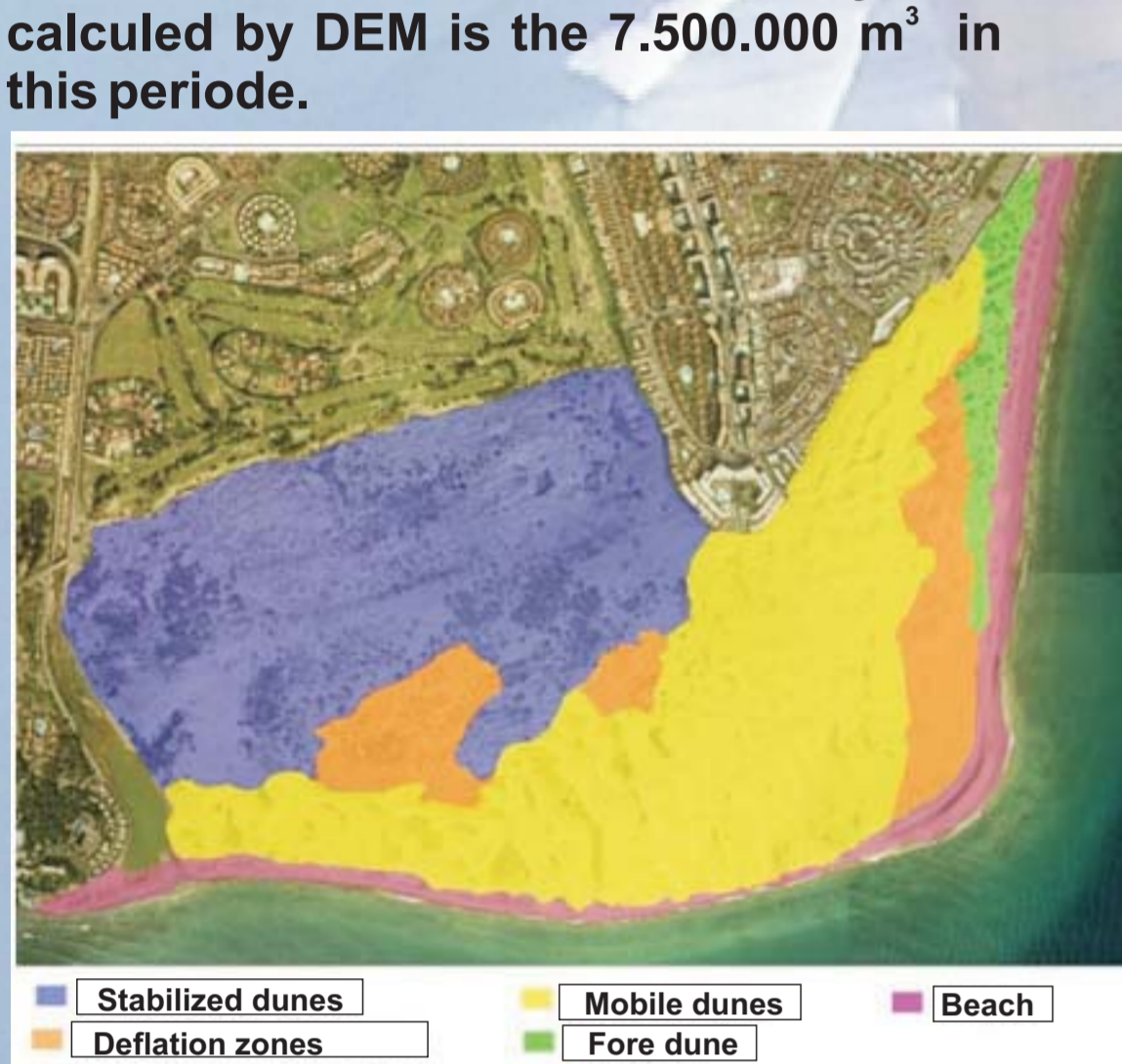
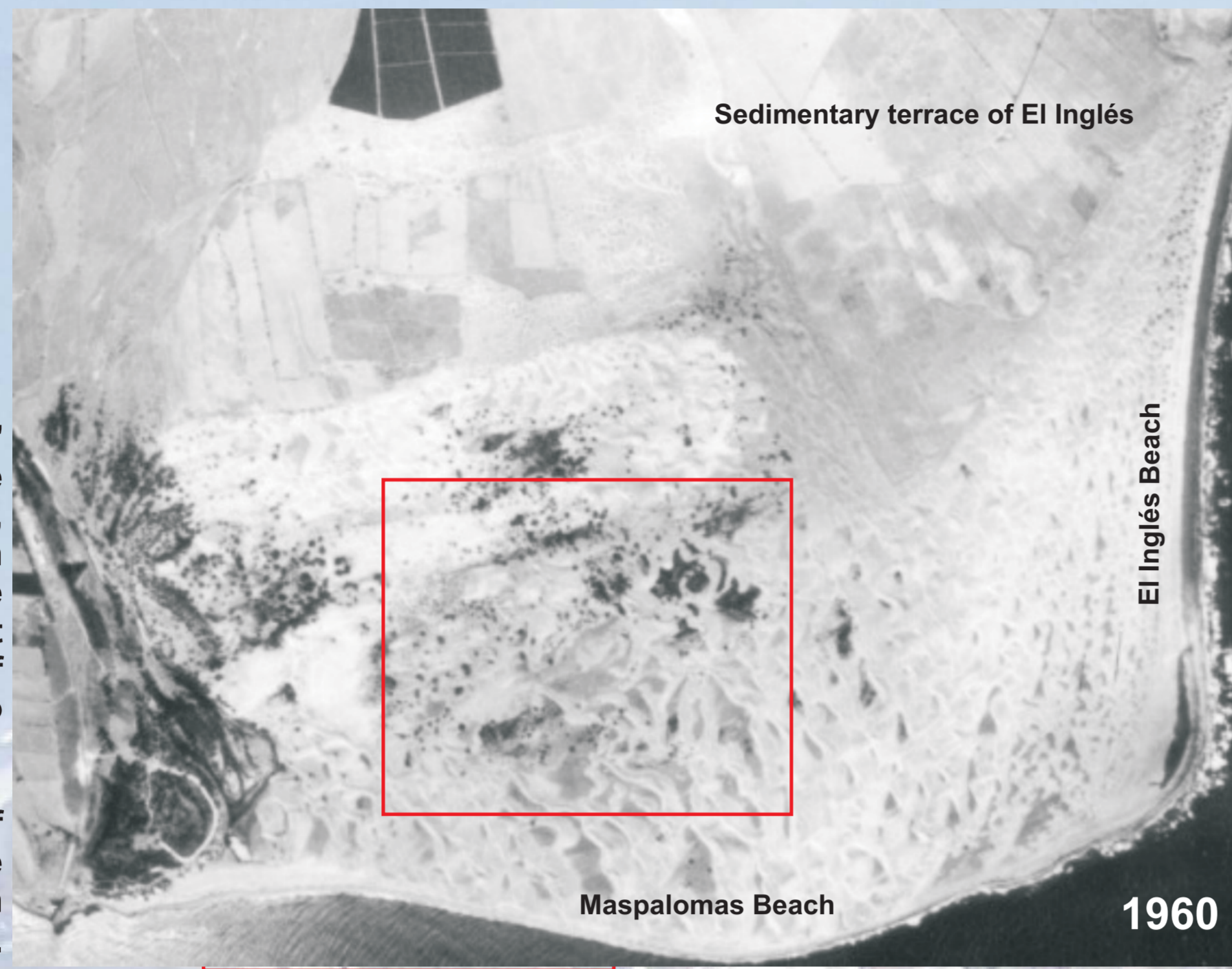
Over the last decades, these coastal systems show evidence of a sedimentary deficit which, in some fields, means the erosion onto beaches and dunes that are essential for the tourist activity. In this context, our research teams are developing several multidisciplinary projects for elaborating a diagnosis on this situation applying a scientific base, for determining the causes of the sedimentary deficit and for proposing different solutions.

### BEACH-DUNE SYSTEM OF MASPALOMAS (GRAN CANARIA ISLAND)

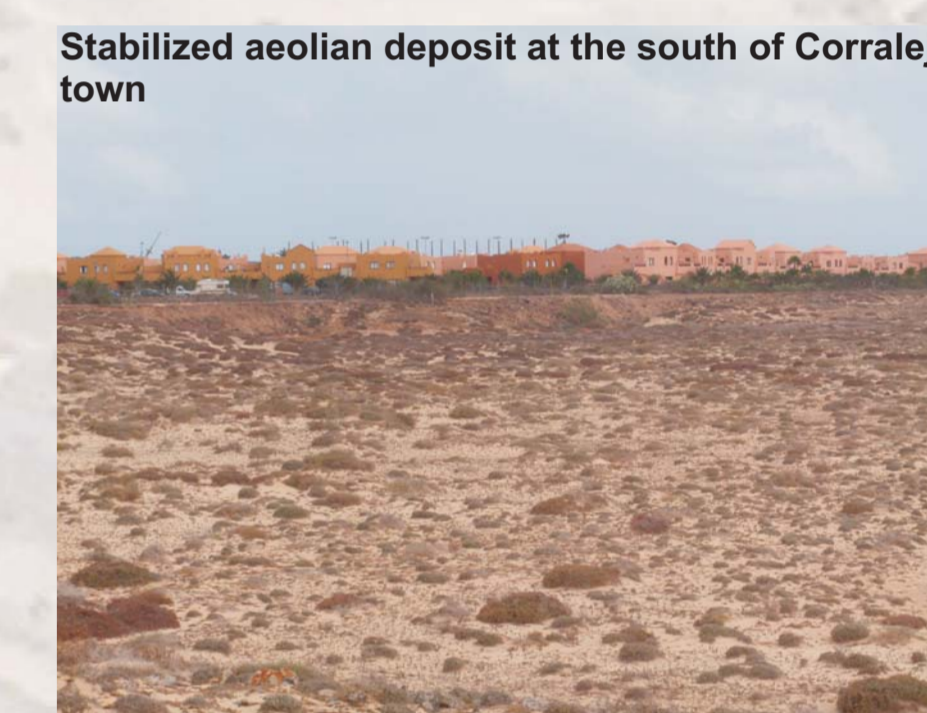
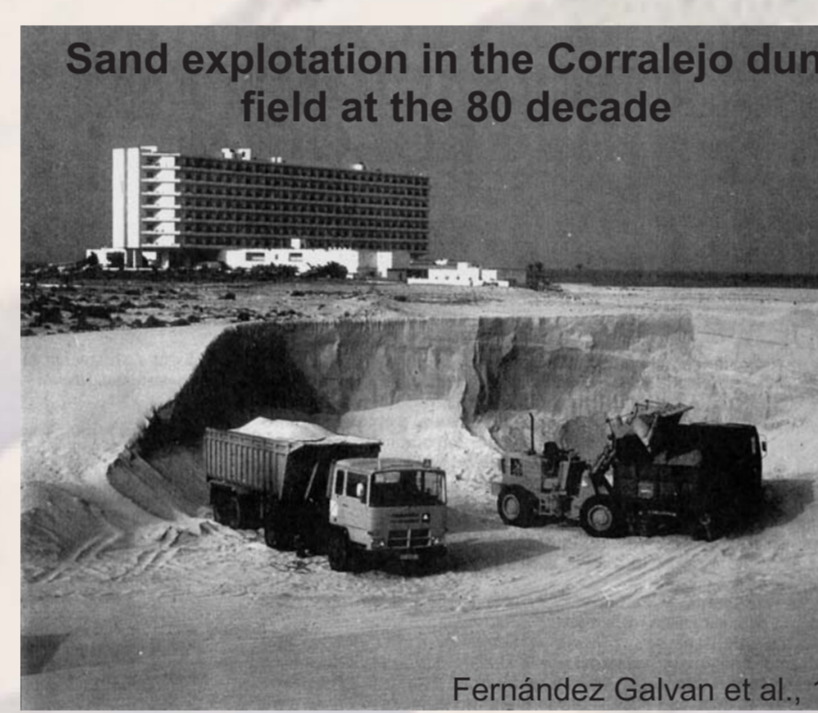
The development of the tourism in the neighbourhood of the protected area Las Dunas de Maspalomas has been progressive from the Sixties of 20th Century to nowadays (3 millions tourists/year).

The urbanization of the El Inglés' sedimentary terrace has modified the aeolian sedimentary dynamics, generating the stabilization of the aeolian deposits in insides areas, the appearance of geological materials that constitute the underlying basement of the dunes area and the erosion onto dunes and beaches.

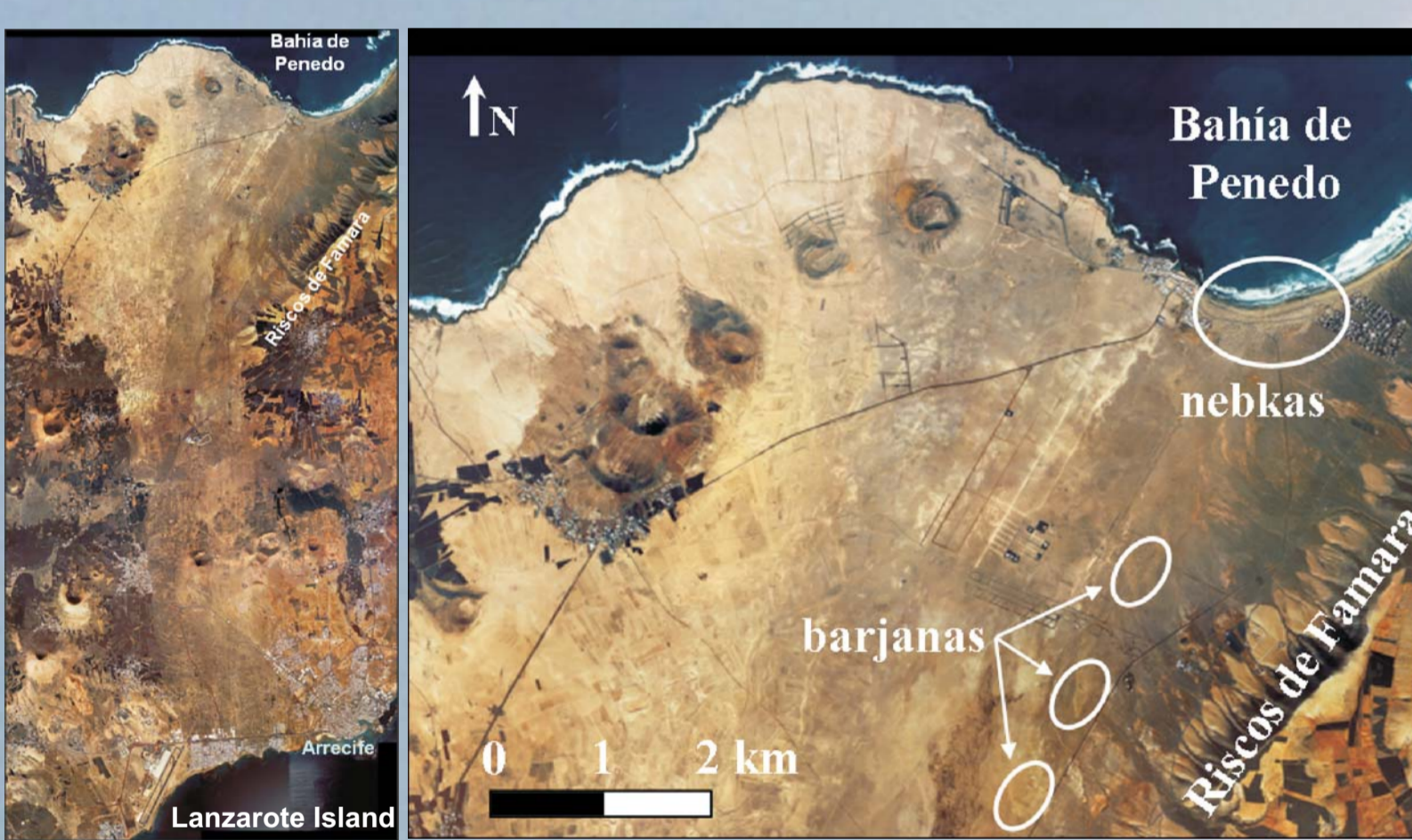
The analysis of aerial photographs of last decades shows an increase in the exhumed surfaces of this basement from 70.000 m<sup>2</sup> in 1960, to 170.000 m<sup>2</sup> in 2003. The lost sand of the dune system calculated by DEM is the 7.500.000 m<sup>3</sup> in this periode.



### BEACH-DUNE SYSTEM OF CORRALEJO NATURAL PARK (LANZAROTE ISLAND)



Urban development at Corralejo area (Fuerteventura Island) between 1969 and today has modified the aeolian dynamics cutting the entry of marine sediments in the direction of dune field. These processes have produced a sediment deficit in the Corralejo Natural Park, with erosion onto beaches (beachrock and lava flow outcrops) and stabilization of aeolian sand deposits.



### BEACH-DUNE SYSTEMS OF THE ARCHIPIELAGO CHINIJO NATURAL PARK (LANZAROTE ISLAND AND LA GRACIOSA ISLET)

The beach-dune systems of Bahia de Penedo (Lanzarote) and Caleta del Sebo-El Salado (La Graciosa) show a sedimentary deficit with the disappearance of mobile dunes, nebkas, aeolian deposits stabilized, and the beach erosion with the appearance of beachrocks and volcanic lava flows.



Environmental changes in Bahia de Penedo (Caleta de Famara town, Lanzarote Island) from 1955 to 2008



Temporal evolution of urban development at Caleta del Sebo (La Graciosa Islet) from 1977 to 2009



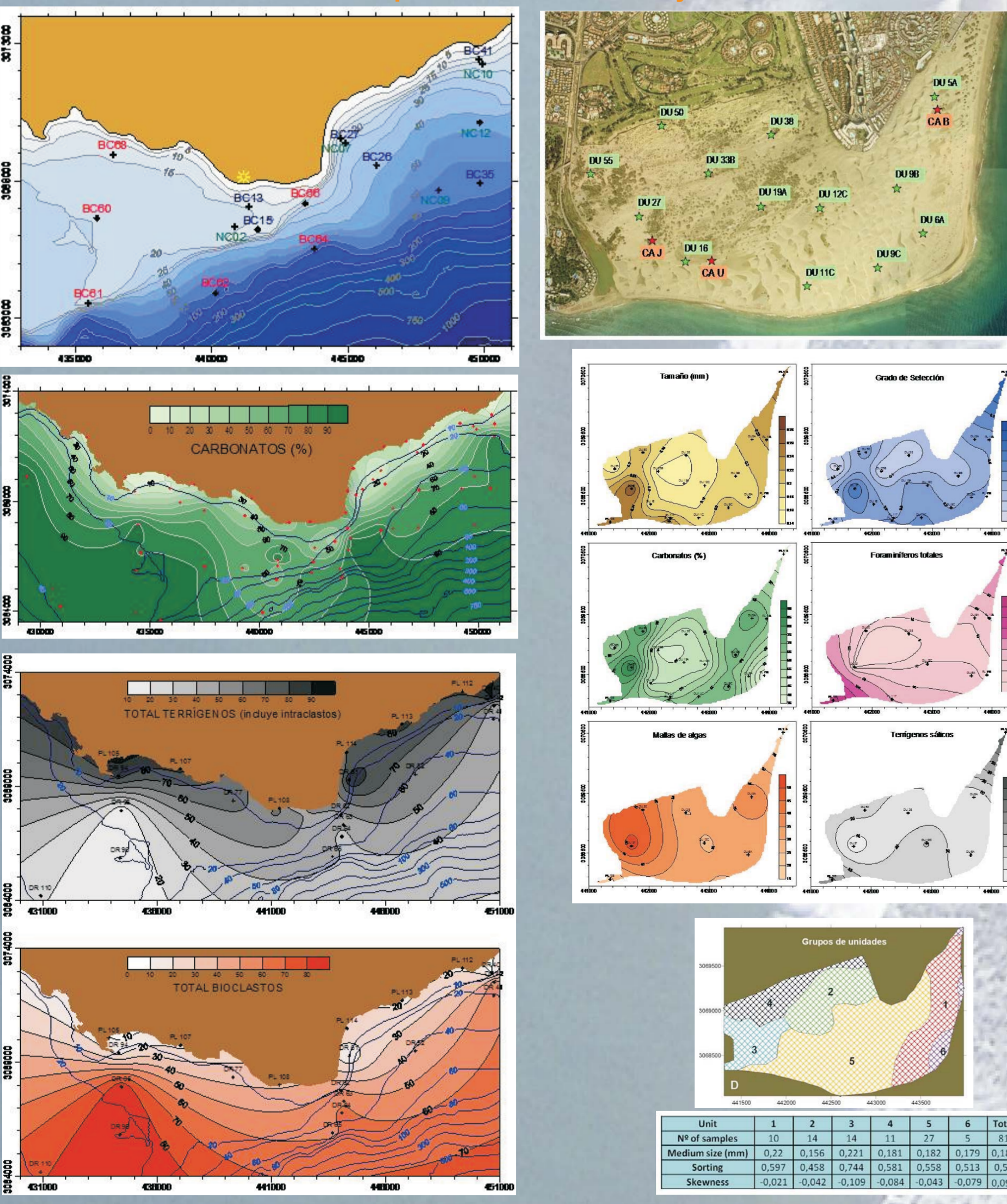
## GEOLOGICAL CHARACTERISTICS OF SANDS IN THE BEACH-DUNE SYSTEMS AND DIAGNOSIS

It is important, among other things, to characterize the sands to determine the area source of these sediments, with the purpose of studying the causes of this sedimentary deficit in depth. This is an aim of the research, whose methodology is based on the sedimentologic and petrographic studies of sand samples, which have been selected from environmental units to focus on the ecological features of the sedimentary systems studied.

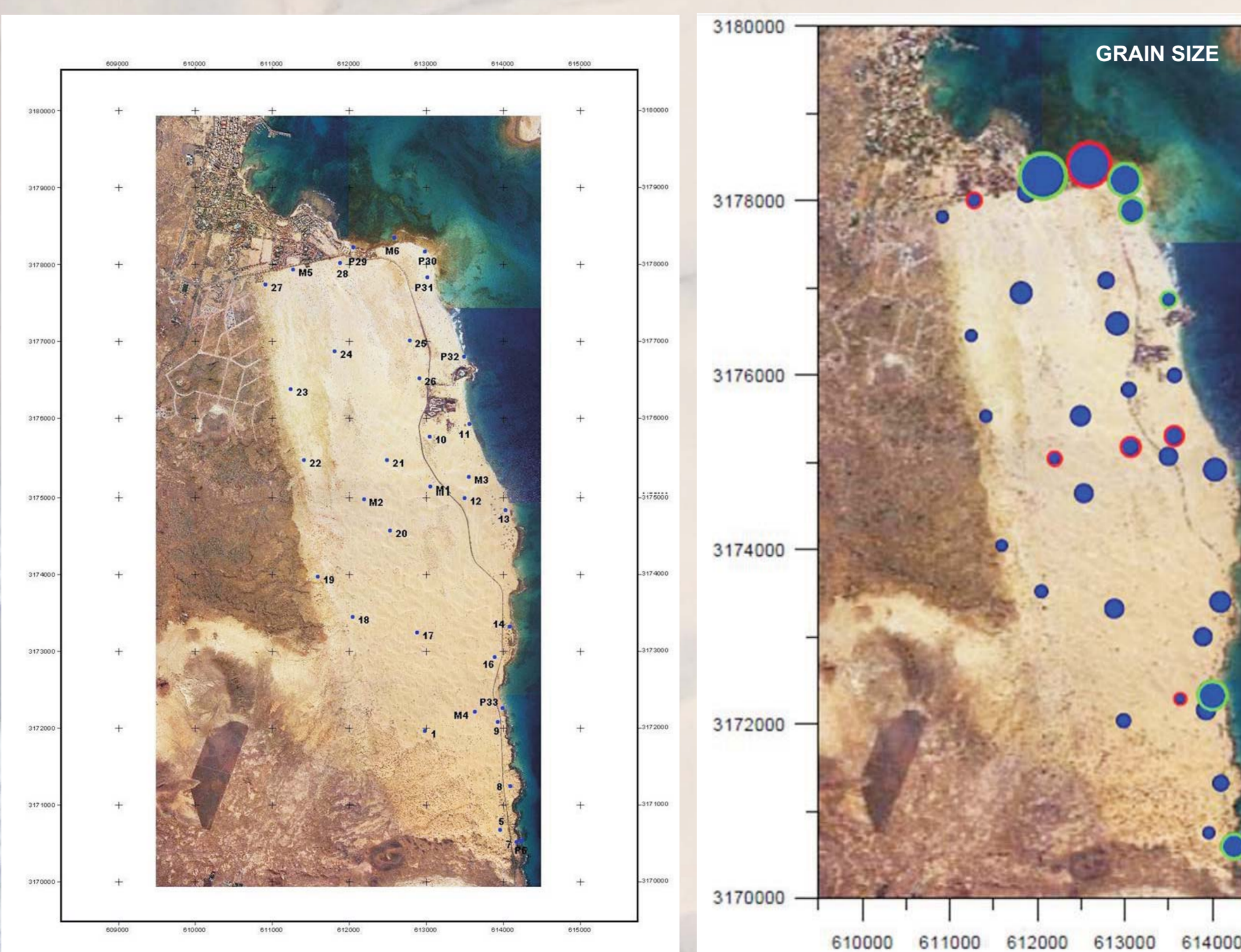
These beach-dune systems show composition and texture diversity due to the source areas of the sands are different and the environmental conditions are variable. In general, the bioclasts studied (essentially seaweed meshes and mollusks) come from coastal environments and/or from shallow platform, and lithoclasts (volcanic rock and mineral fragments, with absence of quartz) originated by the fluvial or marine erosion of the volcanic and sedimentary materials which appear in the surroundings of every beach-dune system.

The causes of sedimentary deficit can be natural (less of bioclasts and lithoclasts due to changes of oceanographic factors) and antropogenic (urban development modifies aeolian and marine dynamic, and environmental conditions).

#### Granulometric and petrographic studies of onshore and offshore sand samples from Maspalomas beach-dune system



#### Granulometric and petrographic studies of sand samples from Corralejo beach-dune system



#### Granulometric and petrographic studies of sand samples from Archipiélago Chinijo Natural Park beach-dune systems (Lanzarote y La Graciosa)

