

# Coastal erosion: the case of the beaches of Vila Nova de Gaia. Consequences of the waste-water outlet (Gaia litoral)



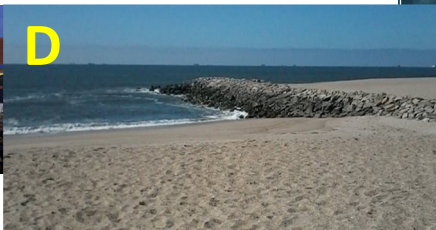
A

Before the waste-water outlet construction (1978)



**ETAR de Gaia Litoral**

... uma das maiores e mais sofisticadas da Europa



The waste-water outlet of the Treatment Plant, "Gaia Litoral", was inaugurated in 2003. It has an underwater extension of 2.5 km, with its final effluent discharged into the sea at a depth of 30 meters.

The block protection to the effluent outlet initiated a strong beach erosion to the south of Madalena beach, and even before the inauguration of waste water plan, in 31/December 1998, a restaurant called Titanic, 3700 meters to the south of the waste-water outlet was partially destroyed at Francelos beach (C).

The morphology of the coastline was severely affected (D: from North to south.) The Google Earth pics (E-F) shows a beach retreat of at least 80m.

Because of this, some pleistocene deposits (G) situated under the actual beach sands appeared.

As a **conclusion**: the combined effect of dam sediment retention and anthropogenic works interfering in littoral drift seems much more important than the sea level rise that is quite small - if existent - in this area of Portuguese coastline.

Viriato Silva  
[viriams80@gmail.com](mailto:viriams80@gmail.com)  
 Maria da Assunção Araújo  
[asaraujo@letras.up.pt](mailto:asaraujo@letras.up.pt)



E

After the waste-water outlet construction (March 2016). The yellow pins mark the location of the sewage outlet and the "Titanic" restaurant.



Coastline retreat south of the sewage outlet (80m)



Drone image (2014) of an Eemien beach and soliflucic deposits (near old "Titanic" restaurant)