Sedimentological and physico-chemical characterization of intertidal zones in the Arade Estuary (Southern Portugal)

A. Gomes, T. Boski, D. Moura, K. Szkornik, A. Witkowski, S. Connor, J. Jacob, S. Gabriel, J. Horta and S. Camacho

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA
CIMA
UAlg UNIVERSIDADE DO ALGARVE
Keele University
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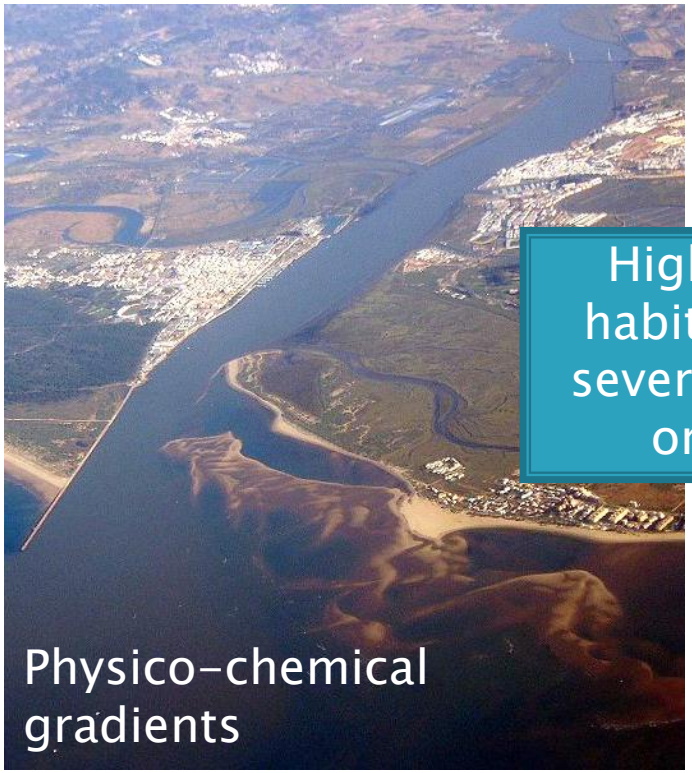
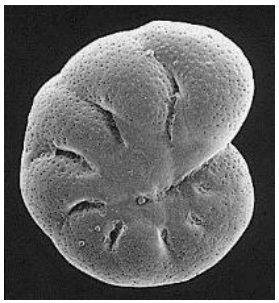
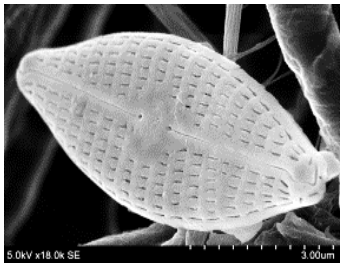
WHY the integrated studies of the estuarine systems are so important?



Highly diverse habitats hosting several groups of organisms





Studies in the estuarine zones

What was made?

Studies on:

- A single or a group of organisms
- Sediment transport
- Gradients along mixing zone
- Metal & organic pollution
- Eutrophication

What needs to be made?

Sedimentological and ***physico-chemical*** characterization of intertidal zones

Important for understanding

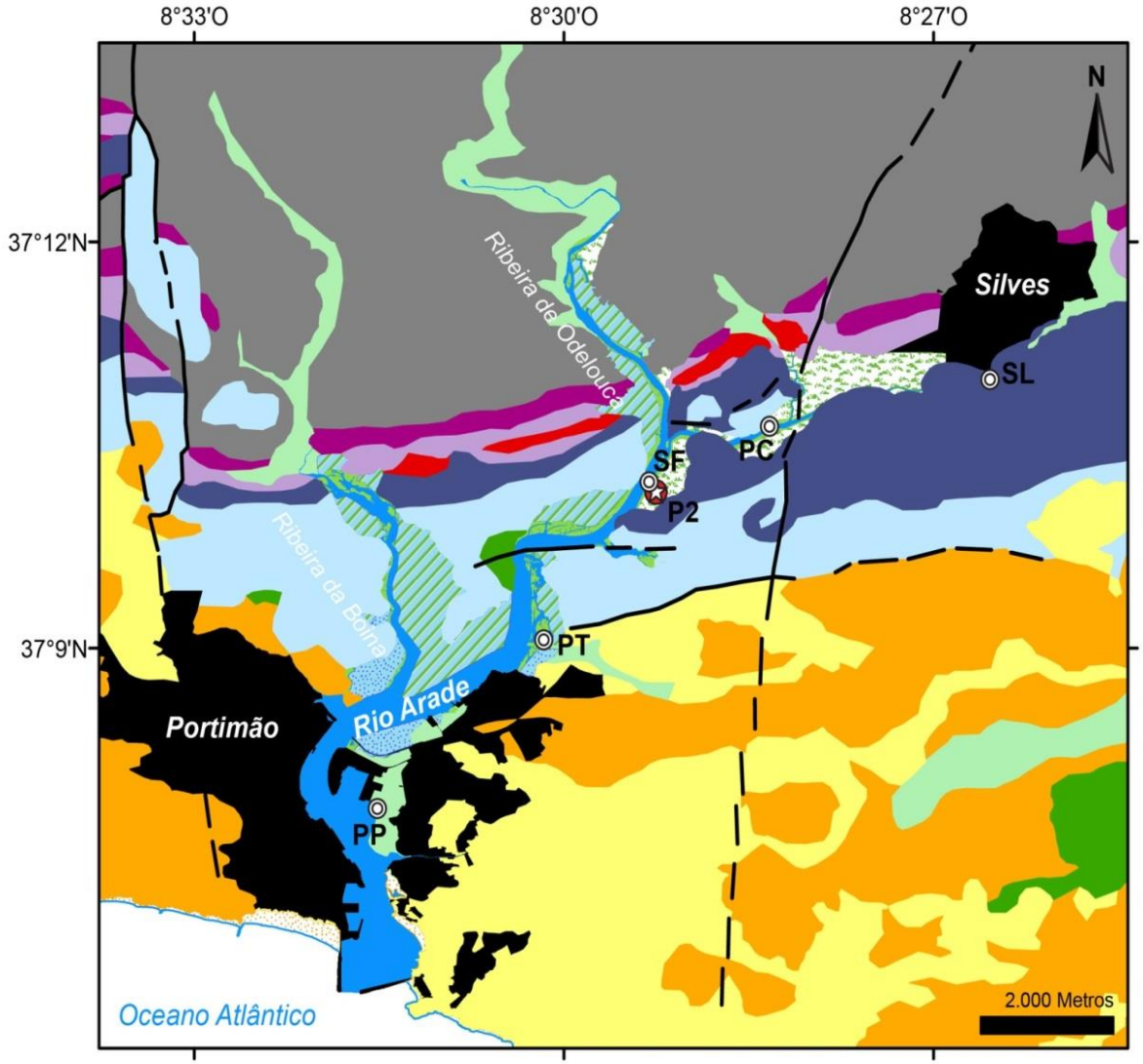
The distribution benthic communities

- **Assessment of the estuarine environmental status**
- **Improve the paleoenvironmental reconstructions in estuarine systems**

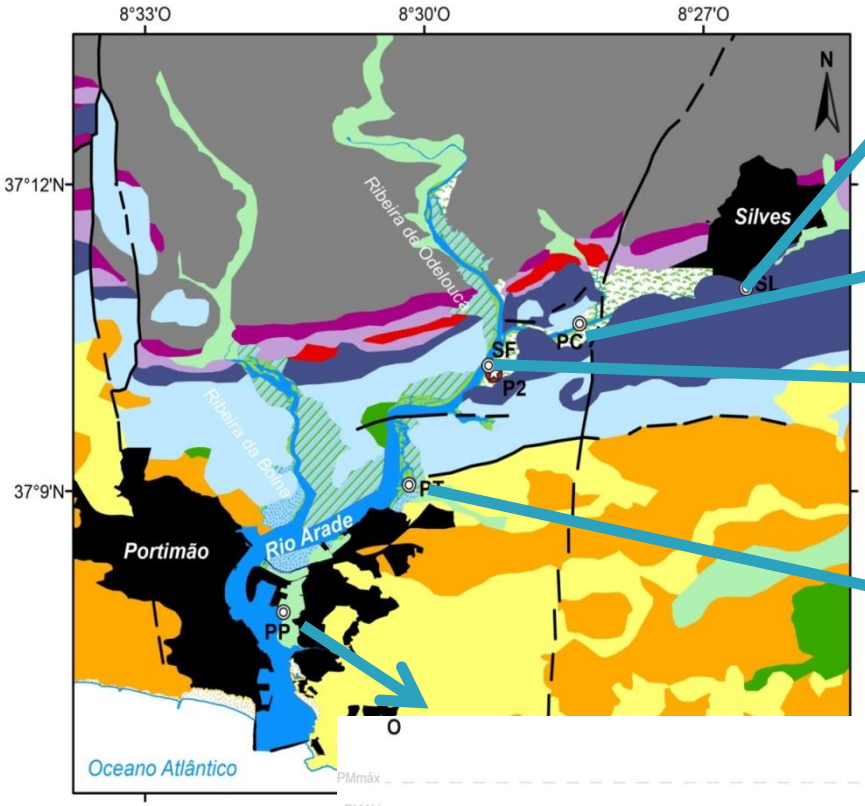
Study area

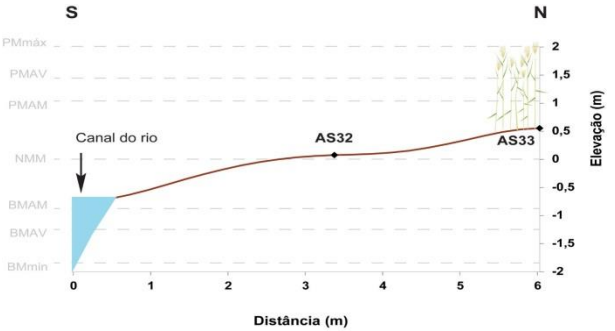

10° O
5° O
0°
N
40° N
Oceano Atlântico
Espanha
Portugal
Rio Guadiana
Rio Arade
Mar Mediterrâneo

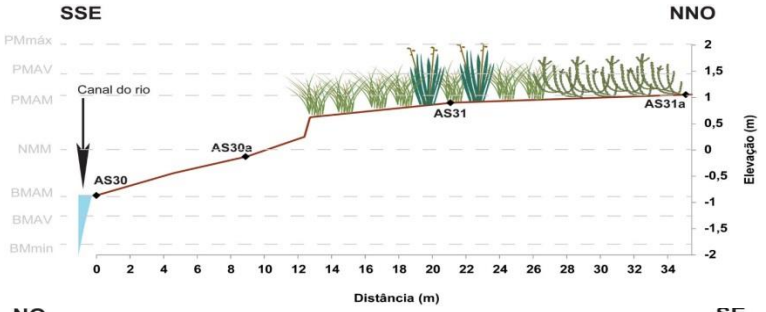
Study area

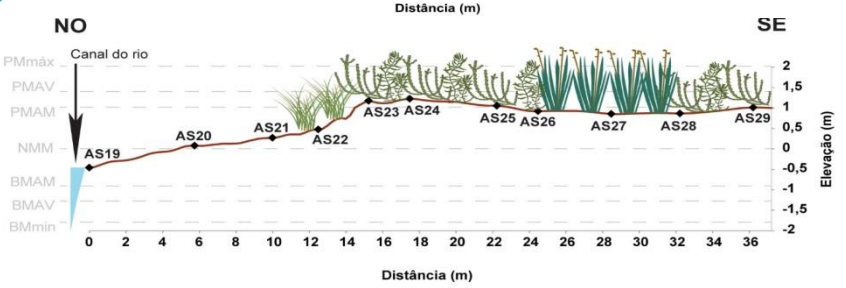

8°33'O
8°30'O
8°27'O
N
37°12'N
37°9'N
Ribeira de Odelouca
Ribeira da Boina
Silves
SL
PC
SF
P2
PT
Portimão
Rio Arade
PP
Oceano Atlântico
2.000 Metros

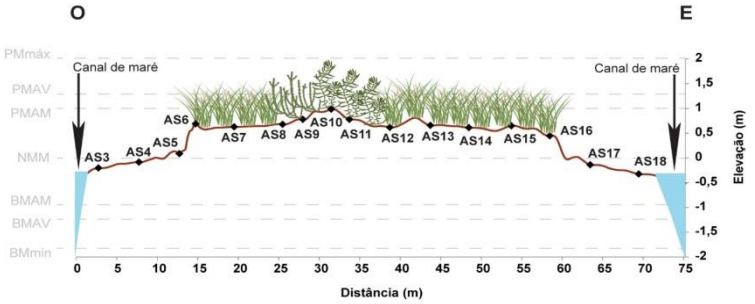
Methods

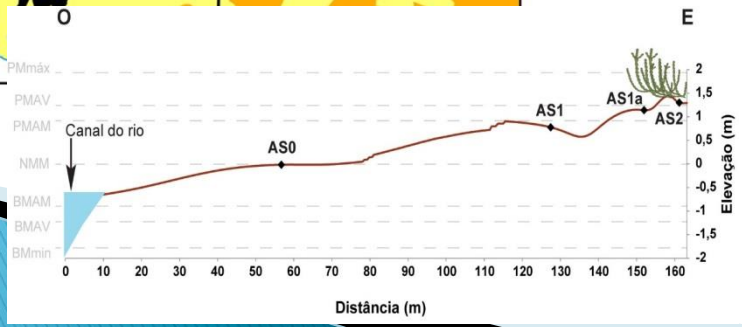

8°33'O
8°30'O
8°27'O
37°12'N
37°9'N
N
Ribeira da Odelouca
Silves
SL
PC
SF
P2
Ribeira de Boina
PT
Portimão
Rio Arade
PP
Oceano Atlântico


S
N
Canal do rio
AS32
AS33
PMmáx
PMAV
PMAM
NMM
BMAM
BMAV
BMmin
Elevação (m)
Distância (m)


SSE
NNO
Canal do rio
AS30
AS30a
AS31
AS31a
Elevação (m)
Distância (m)


NO
SE
Canal do rio
AS19
AS20
AS21
AS22
AS23
AS24
AS25
AS26
AS27
AS28
AS29
Elevação (m)
Distância (m)


O
E
Canal de maré
Canal de maré
AS3
AS4
AS5
AS6
AS7
AS8
AS9
AS10
AS11
AS12
AS13
AS14
AS15
AS16
AS17
AS18
Elevação (m)
Distância (m)


O
E
Canal do rio
AS0
AS1
AS1a
AS2
Elevação (m)
Distância (m)

Methods

Field

Measurements of salinity and pH of the pore water

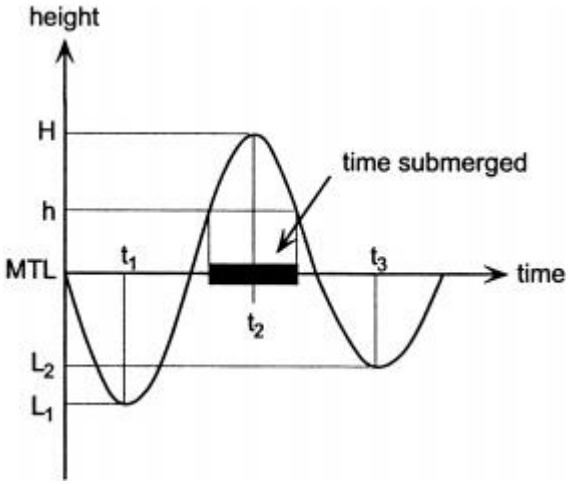
Laboratory

Textural analysis

Determination of the Organic Matter

Methods

$$T = \frac{(t_2 - t_1)\left\{\frac{1}{2}\pi - \arcsin\left[2\left(\frac{h - L_1}{H - L_1}\right) - 1\right]\right\} + (t_3 - t_2)\left\{\arccos\left[2\left(\frac{h - L_2}{H - L_2}\right) - 1\right]\right\}}{\pi}$$



(Gehrels et al., 2001)

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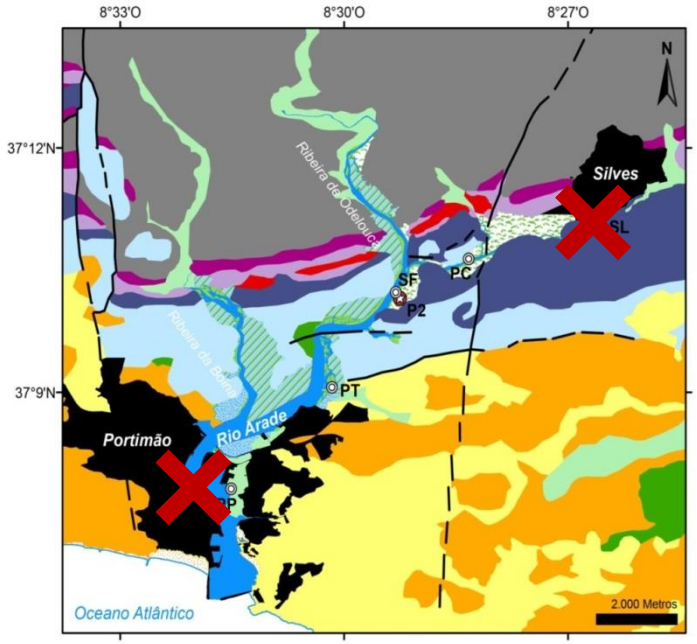
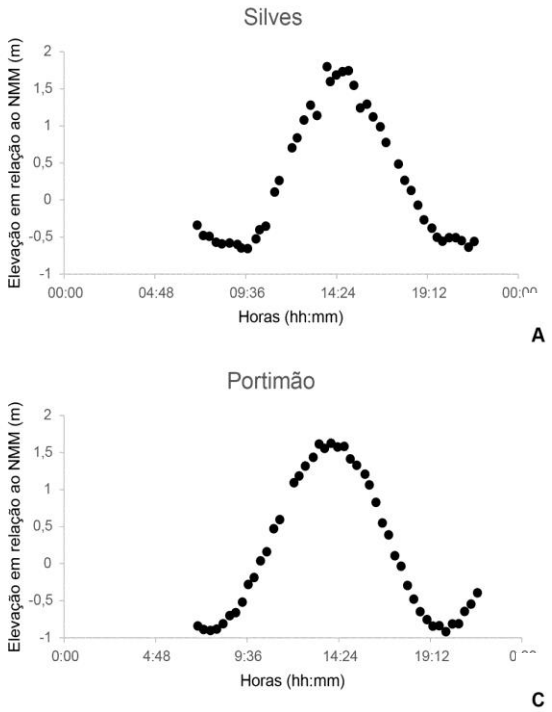
Correction for the distance to the mouth of the river

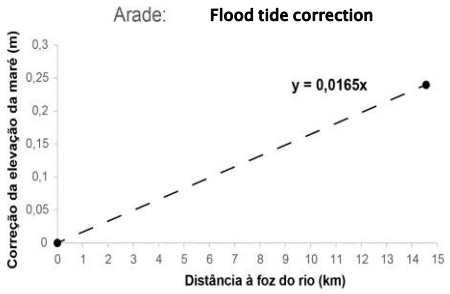
Methods

At 20-minute sampling intervals



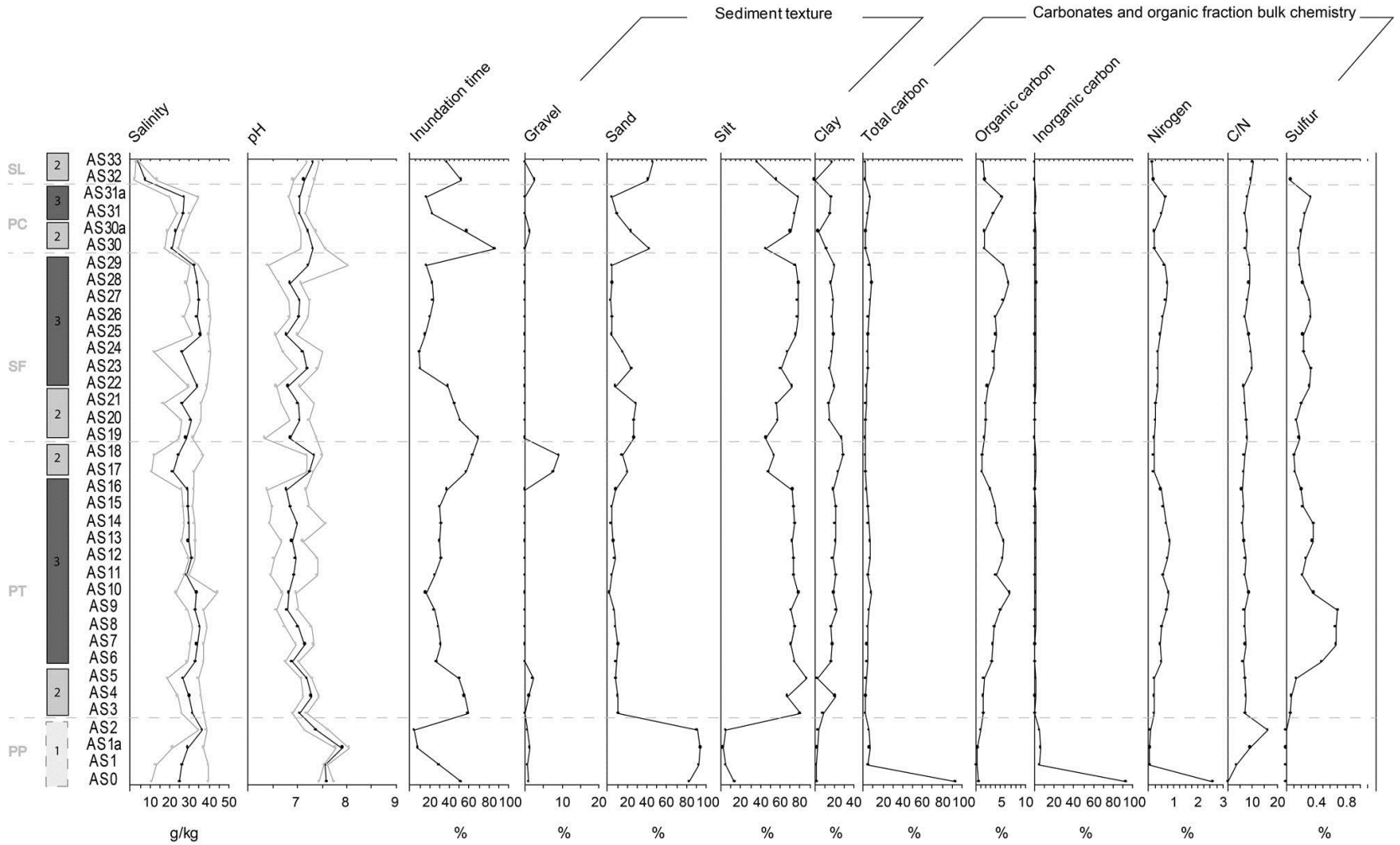


	PP	PT	SF	PC	SL
Distance to the mouth of the river (km)	0	6,48	9,85	11,7	14,56
Flood tide correction (m)	0	0,11	0,16	0,19	0,24
Ebb tide correction (m)	0	0	0	0	0



Arade: Ebb tide correction = 0 m

Results and Discussion



Conclusion

- In the Arade Estuary's intertidal zones, variations in the analyzed ***sedimentological and physico-chemical parameters*** revealed that they are ***closely related*** with ***distance to the river mouth***, ***hydrodynamics*** and especially with the elevation of the sampling points, i.e. the ***duration of tidal inundation***.

- Salinity, which varies inversely with the distance to the river mouth, showed that the ***Arade Estuary is quite influenced by tidal propagation*** and little influenced by river flow until ca. 15 km from the mouth.

Conclusion

- The *samples' sand content quickly decreases* with the *distance to the river mouth* and indicates the *marine source* of the coarse fraction.

- In the salt marsh zones, the *inundation time* and the presence of *vascular plants* promote the *deposition of silty sediments*. These *sediments trap the organic matter* that decomposes rapidly, leading to a *decrease in pH*.

- *Inorganic carbon content* is *influenced by* the *proximity of the river mouth* and the presence of *bivalves and gastropods*.

Thank you very much for your attention!

Muito obrigada pela vossa atenção!