

# ESTUARINE PROCESSES INVOLVING ORGANIC CARBON AT DIFFERENT TIDE CONDITIONS



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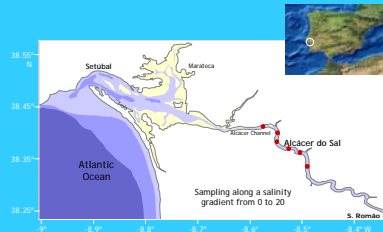
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Coasts and Coastal People-Scenarios of Change and Responses  
LOICZ II Inaugural Open Science Meeting  
2 / 29 June 2006  
Egmond aan Zee, Netherlands

## Introduction

Dissolved organic carbon (DOC) has been measured in Sado estuary since 1997. Studies revealed that this fraction of organic carbon behaves non-conservatively, and as an outcome an internal production of DOC has always been observed, specially along the salinity gradient between 0 and 20 (Nogueira, 2003).



## Sado Estuary Characteristics

- 2<sup>nd</sup> largest estuary in Portugal with an area of 7460 km<sup>2</sup>
- Mesotidal lagoon - type estuary

## Study site

- Alcácer Channel
- Depth 1.5 - 6 m
- Water residence time: 2 - 3 months

## Specific Objectives

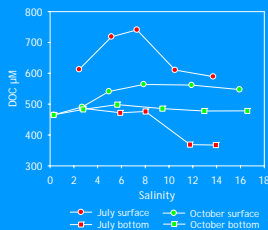
To understand DOC behaviour at different tide conditions by:

- 1) quantifying DOC internal net flux;
- 2) identifying the major mechanisms involving DOC production

## Tools:

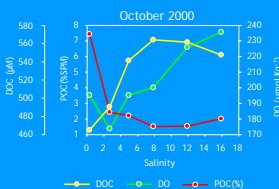
- Measurements (salinity, DO, DOC, POC, SPM) during two contrasting river flow sampling periods (October 2000 and July 2001)
- Use of mixing curves of DOC along a salinity gradient from 0 to 17
- Calculations of Net fluxes according to Kaul and Froelich (1984)

## EBB



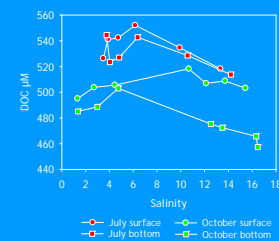
DOC Net flux	October 2000 (x 10 <sup>6</sup> mmolC d <sup>-1</sup> )	July 2001 (x 10 <sup>6</sup> mmolC d <sup>-1</sup> )
EBB		
Surface	26.4	17.1
Bottom	7.94	5.31

	River Flow (m <sup>3</sup> s <sup>-1</sup> )
October 2000	1.3
July 2001	0.4



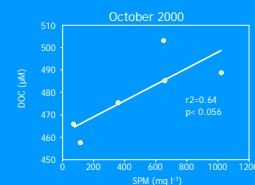
Highest DOC net fluxes calculated at surface waters and the simultaneous sharp decrease of particulate organic carbon (POC) and dissolved oxygen (DO) suggest mineralization of POC to be the major process involved in DOC production during ebb tide.

## FLOOD



DOC net flux	October 2000 (x 10 <sup>6</sup> mmolC d <sup>-1</sup> )	July 2001 (x 10 <sup>6</sup> mmolC d <sup>-1</sup> )
FLOOD		
Surface	7.92	5.17
Bottom	9.63	2.70

	River Flow (m <sup>3</sup> s <sup>-1</sup> )
October 2000	1.3
July 2001	0.4



DOC net fluxes and suspended particulate matter (SPM), in particular for October bottom waters (when SPM is > 1000 mg l<sup>-1</sup>) suggest occurrence of desorption processes. Fluid mud resuspensions, mainly induced by the opposite forces acting between surface river waters and saline waters flowing at bottom may result in DOC release to the water column.

## CONCLUSIONS

The following processes have been identified involved in DOC production in Sado estuary

- 1) POC mineralization, which is more noticeable at ebb conditions in surface waters
- 2) Particles desorption, more present at flood conditions.

## References

- Nogueira, M., 2003. O comportamento do carbono orgânico no estuário do Sado. Dissertação para acesso à categoria de Assistente de Investigação. 39p.
- Kaul, L.W., Froelich, Jr., 1984. Modelling estuarine nutrient geochemistry in a simple system. Geochimica et Cosmochimica Acta. 48: 1417-1433