



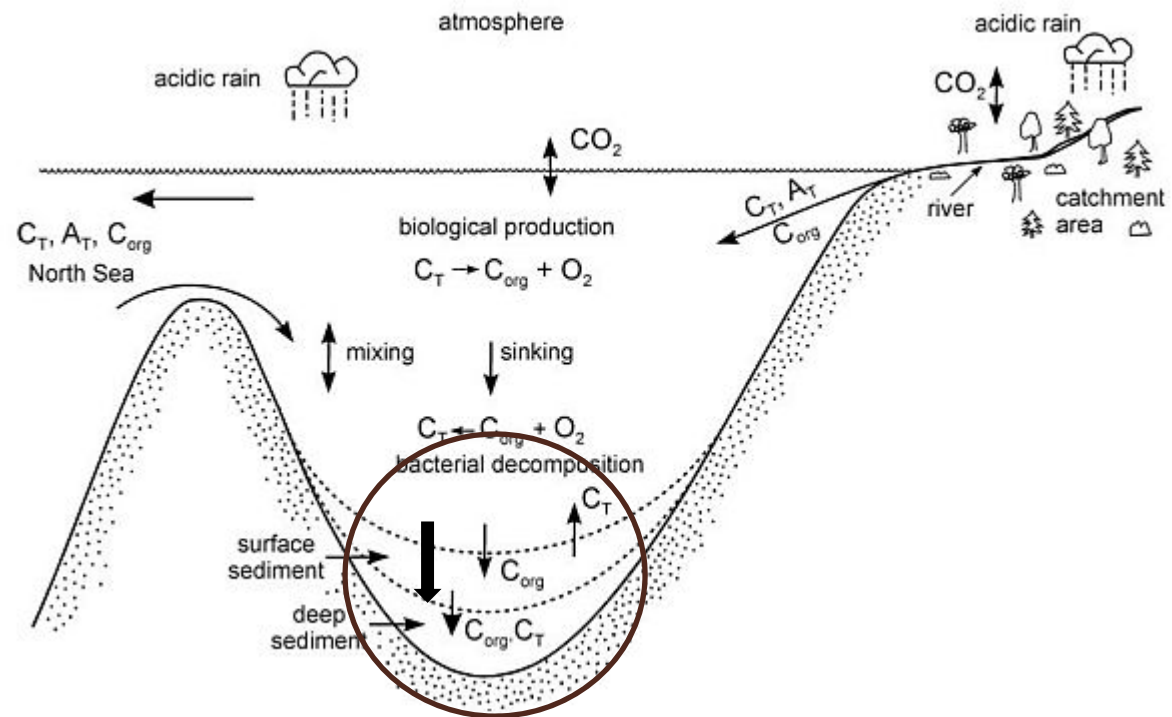
# **Mineralization rates of organic carbon in the Baltic Sea sediments**

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# Introduction



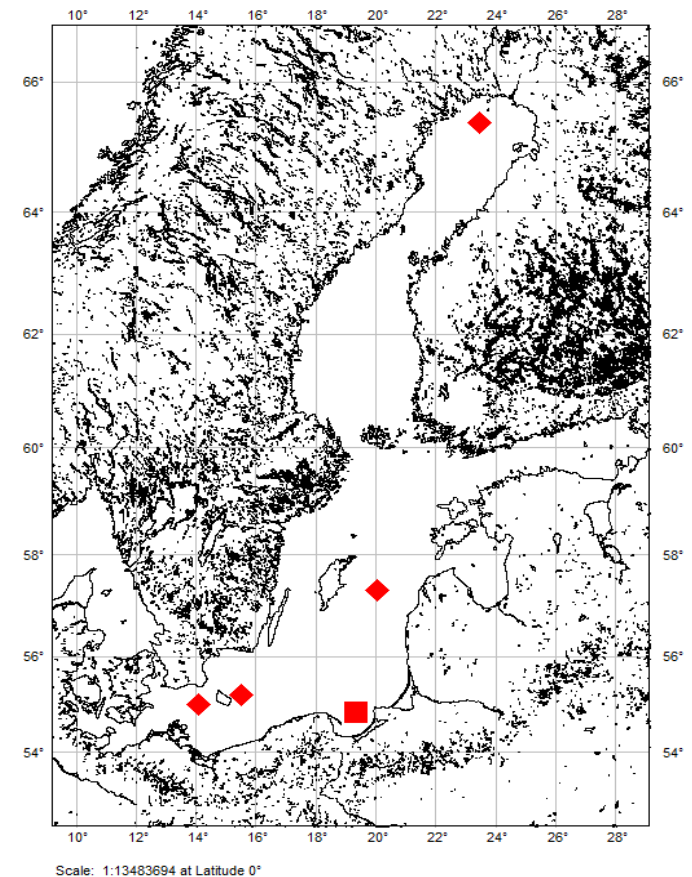
# Methods of the carbon return flux estimation from the bottom sediments

1. DIC and DOC concentration in the pore waters

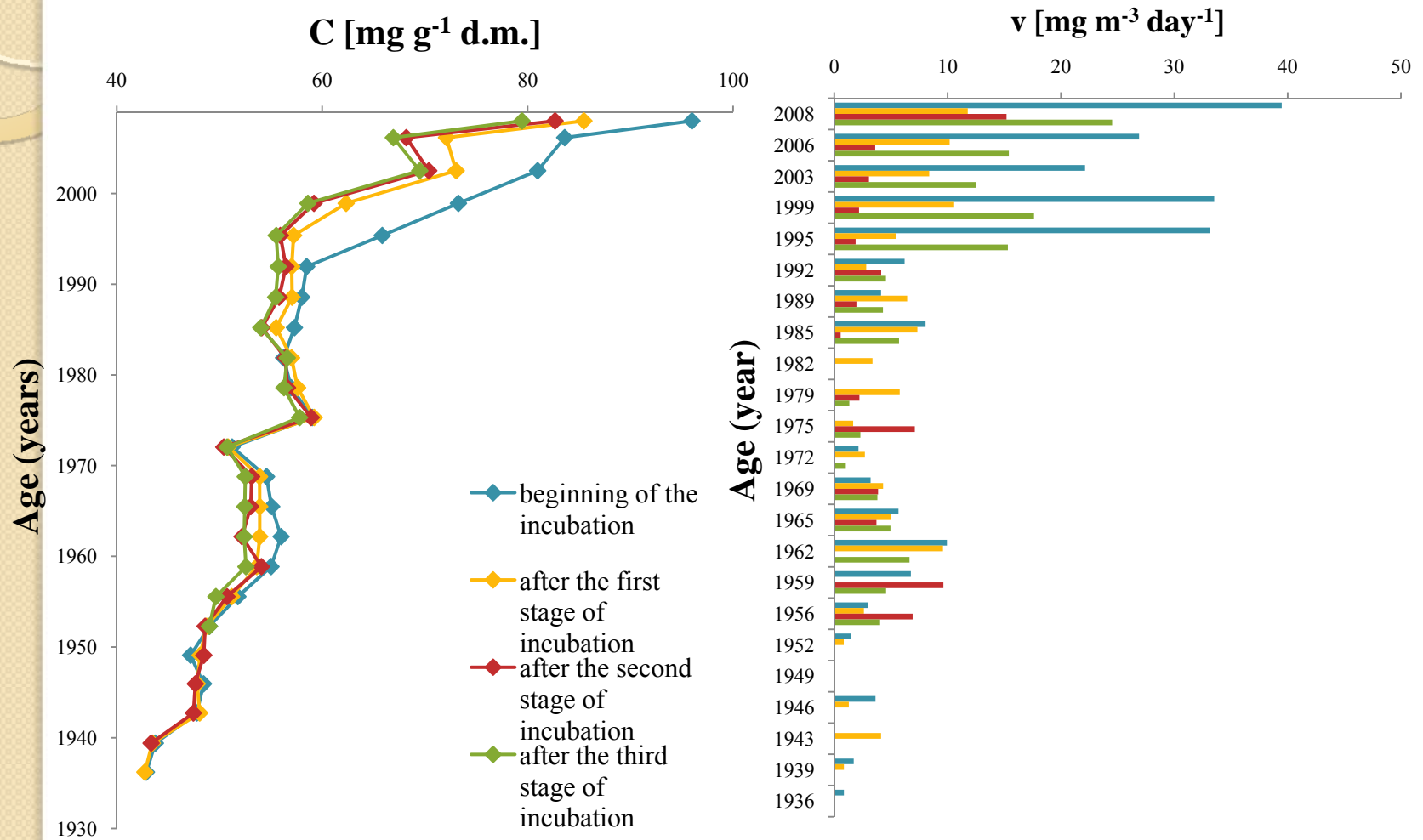
2. „Time Capsule”

Incubation condition:

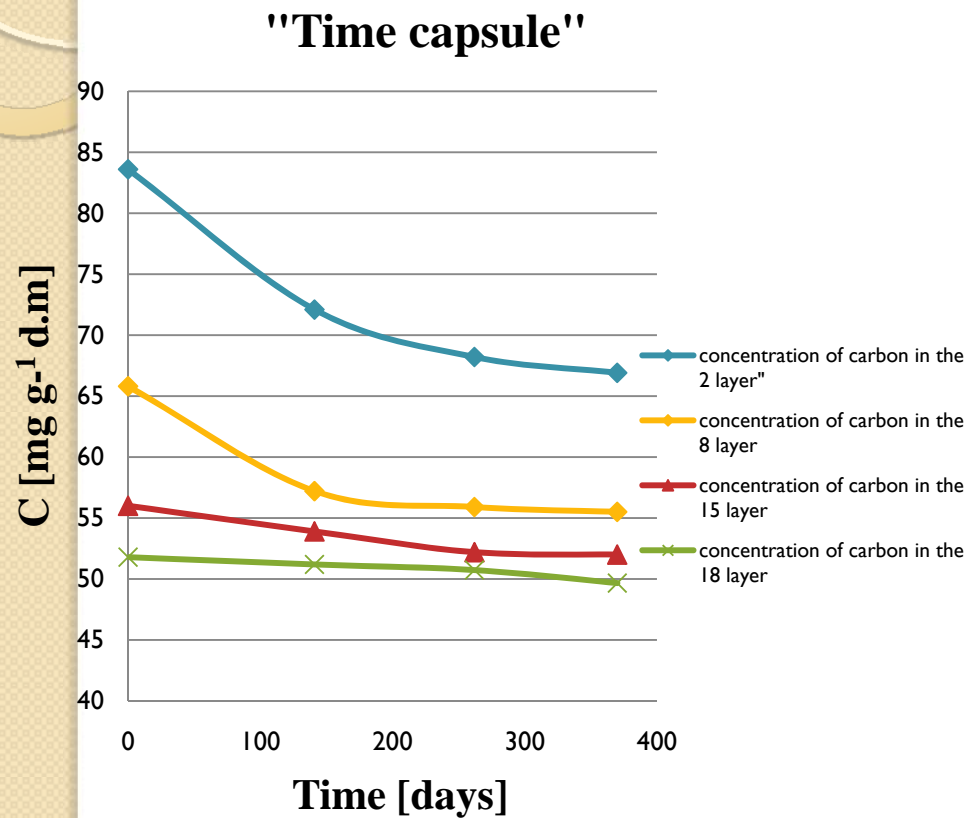
- $19^{\circ}\text{C} \pm 1$
- darkness
- Ar atmosphere



# „Time Capsule”



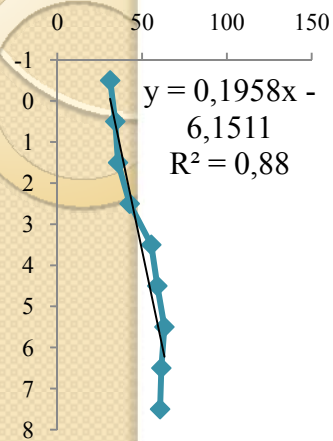
# „Time Capsule”



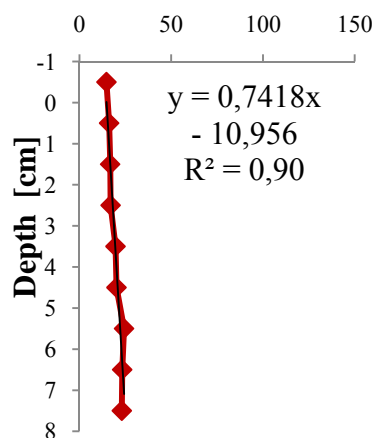
| Layers [cm] | Labile organic matter [%] |
|-------------|---------------------------|
| 1-2         | 19,95                     |
| 2-3         | 14,16                     |
| 3-4         | 19,99                     |
| 4-5         | 15,67                     |
| 5-6         | 4,73                      |
| 6-7         | 4,38                      |
| 7-8         | 5,71                      |
| 9-10        | 1,22                      |
| 10-11       | 2,1                       |
| 11-12       | 0,95                      |
| 12-13       | 3,79                      |
| 13-14       | 4,75                      |
| 14-15       | 6,42                      |
| 15-16       | 4,43                      |
| 16-17       | 4,12                      |

# Profiles of DOC and DIC concentration in the pore waters

**DIC [mg dm<sup>-3</sup>]**

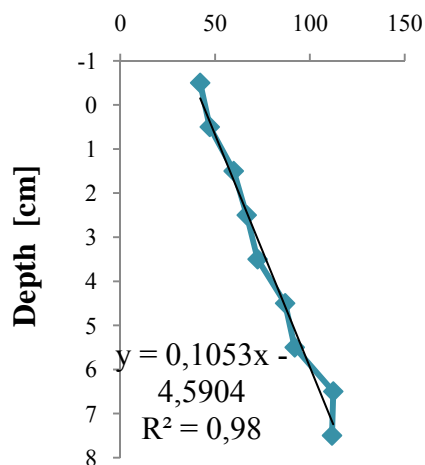


**DOC [mg dm<sup>-3</sup>]**

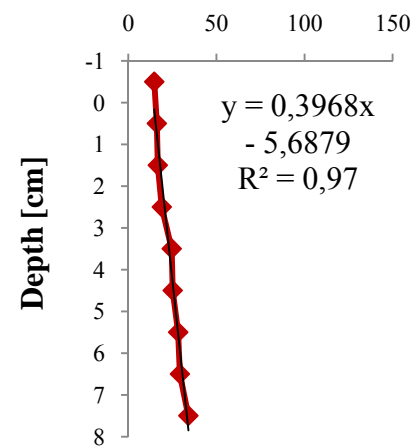


**Arcona Basin**

**DIC [mg dm<sup>-3</sup>]**

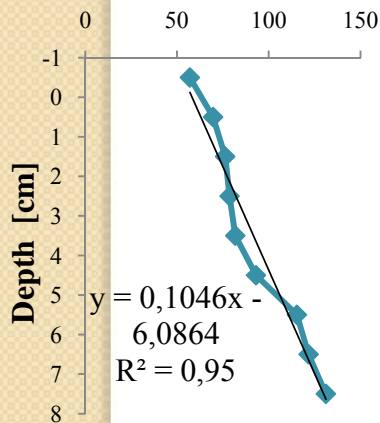


**DOC [mg dm<sup>-3</sup>]**

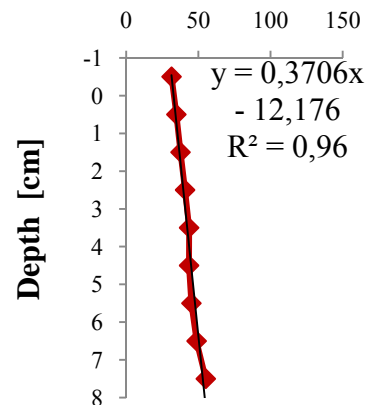


**Bornholm Deep**

**DIC [mg dm<sup>-3</sup>]**

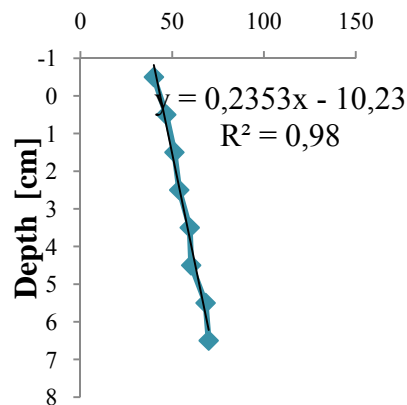


**DOC [mg dm<sup>-3</sup>]**

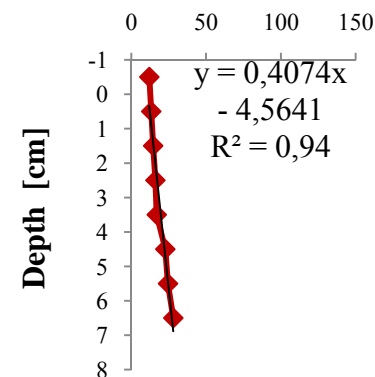


**Gdansk Deep**

**DIC [mg dm<sup>-3</sup>]**



**DOC [mg dm<sup>-3</sup>]**



**Gotland Deep**

## DOC and DIC return flux from the pore waters

| Area of deposition     | Area [km <sup>2</sup> ] | Specific carbon return flux from the sediments [g C m <sup>-2</sup> year <sup>-1</sup> ] |     | Carbon return flux from the sediments [Tg year <sup>-1</sup> ] |              |              |
|------------------------|-------------------------|--|-----|--|--------------|--------------|
|                        |                         | DIC  | DOC | DIC  | DOC          | Sum          |
| <b>Arcona Basin</b>    | 3200 <sup>a</sup>       | 9,7  | 0,5 | 0,031  | 0,002        | 0,033        |
| <b>Bornholm Deep</b>   | 13170 <sup>a</sup>      | 18,0   | 0,9 | 0,237  | 0,012        | 0,249        |
| <b>Gdansk Deep</b>     | 12150 <sup>a</sup>      | 18,1   | 1,0 | 0,220  | 0,012        | 0,232        |
| <b>Gotland Deep</b>    | 28240 <sup>a,b</sup>    | 8,6  | 0,9 | 0,243  | 0,025        | 0,268        |
| <b>Gulf of Riga</b>    | 890 <sup>a</sup>        | 8,6  | 0,9 | 0,008  | 0,001        | 0,009        |
| <b>Gulf of Finland</b> | 940 <sup>a</sup>        | 8,6  | 0,9 | 0,008  | 0,001        | 0,009        |
| <b>Gulf of Bothnia</b> | 42440 <sup>c</sup>      | 7,0  | 1,0 | 0,297  | 0,042        | 0,339        |
| <b>Sum</b>             | <b>101030</b>           | -  | -   | <b>1,044</b>   | <b>0,095</b> | <b>1,139</b> |

<sup>a</sup> Błaszczyszyn, 1982

<sup>b</sup> Emeis et al., 2000

<sup>c</sup> Algesten et al., 2006

## Summary

| Area of deposition     | Carbon return flux<br>from the sediments<br>[g C m <sup>-2</sup> year <sup>-1</sup> ] |                   | Return flux<br>% of<br>deposition | Labile<br>carbon<br>[%] |
|------------------------|---|-------------------|-----------------------------------|-------------------------|
|                        | DIC and DOC<br>profiles   | „Time<br>Capsule” | DOC/DIC<br>profiles               | „Time<br>Capsule”       |
| <b>Arcona Basin</b>    | 10,2  | -                 | 51,0                              |                         |
| <b>Bornholm Deep</b>   | 18,9  | -                 | 32,0                              |                         |
| <b>Gdansk Deep</b>     | 19,1  | 35,5              | 32,0                              | 19,9                    |
| <b>Gotland Deep</b>    | 9,5   | -                 | 25,0                              |                         |
| <b>Gulf of Riga</b>    | 9,5   | -                 | 25,0                              |                         |
| <b>Gulf of Finland</b> | 9,5   | -                 | 25,0                              |                         |
| <b>Gulf of Bothnia</b> | 8,0   | -                 | 33,0                              |                         |





**Thank you**