

Early diagenesis and sediment-water exchange in the Rhône delta

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Sediment distribution in the Rhône River Delta

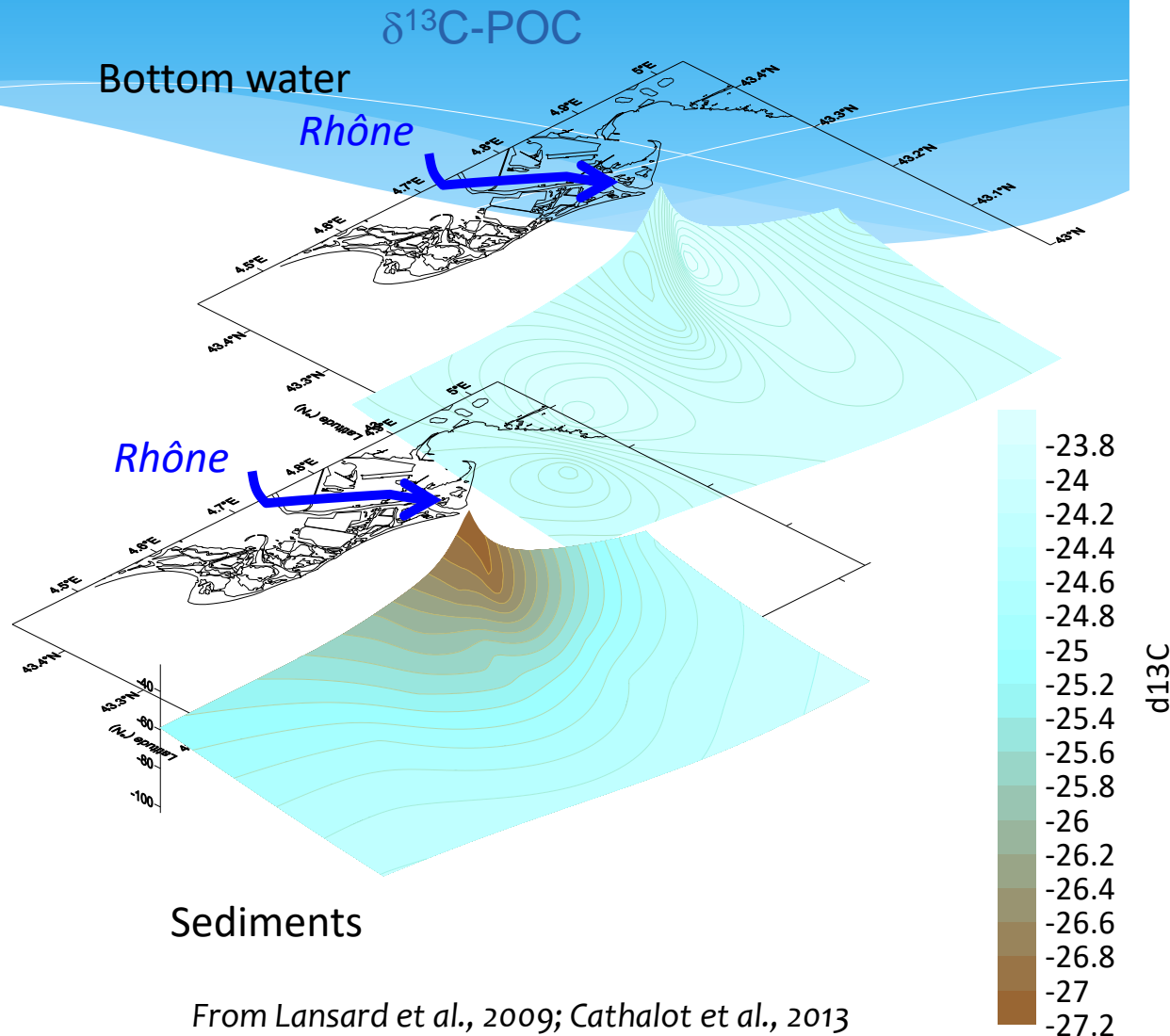
Close to the river mouth:

- Increase of sedimentary Org-C

- Decrease of $\delta^{13}\text{C-POC}$

→ Predominance of terrestrial organic matter close to the Rhône mouth (river -27.5‰)

→ $\delta^{13}\text{C}$ of lignin indicates dominance of C3 plants (-29 to -30‰)

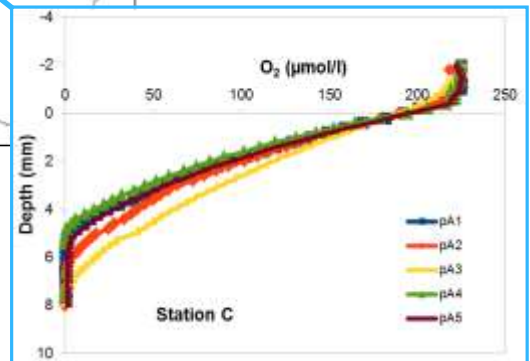
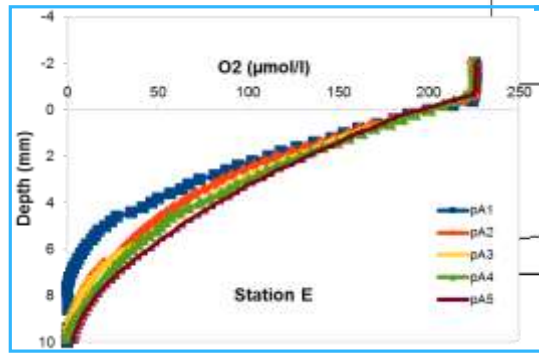
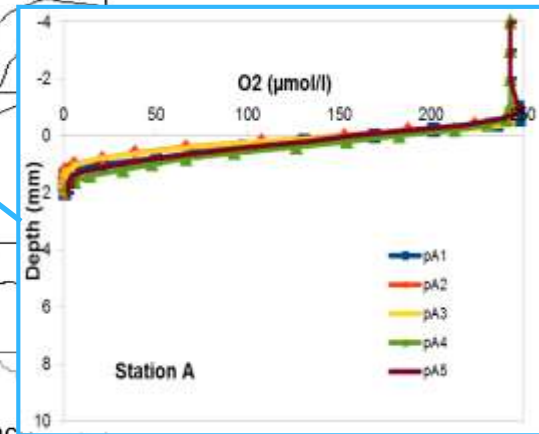
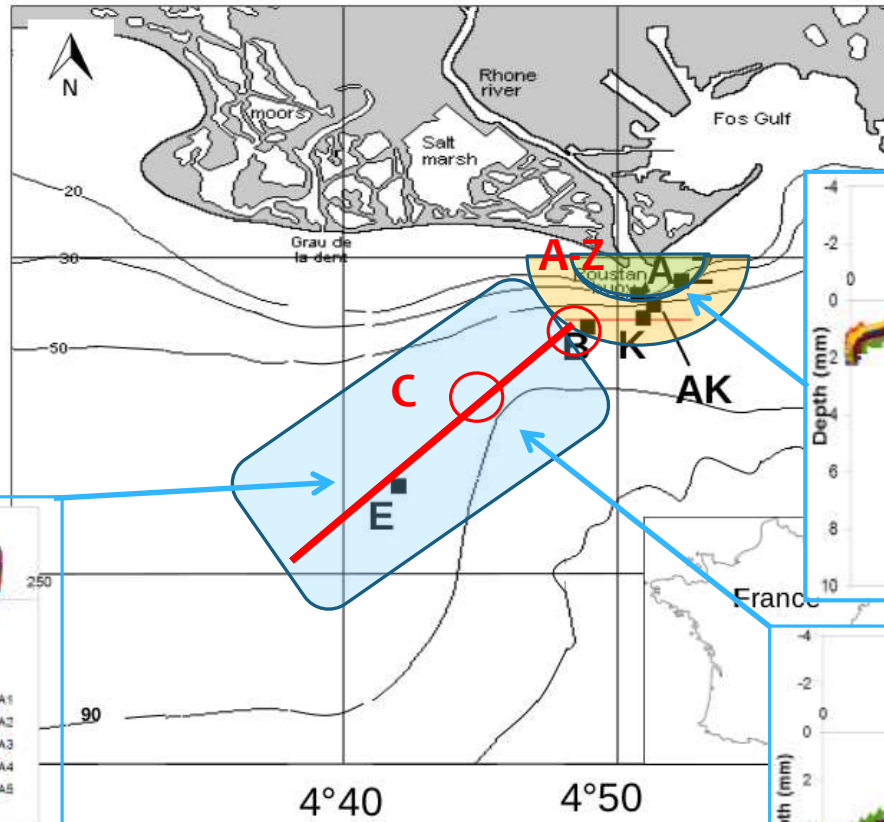


From Lansard et al., 2009; Cathalot et al., 2013

Oxygen *in situ* microprofiles



43°20

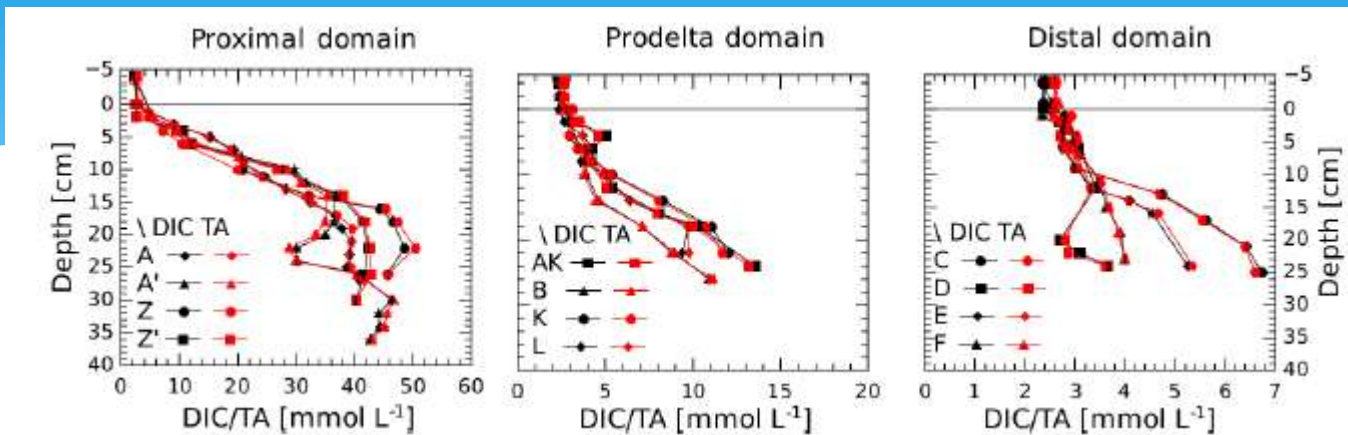


Calculation of Diffusive Oxygen Uptake (DOU)

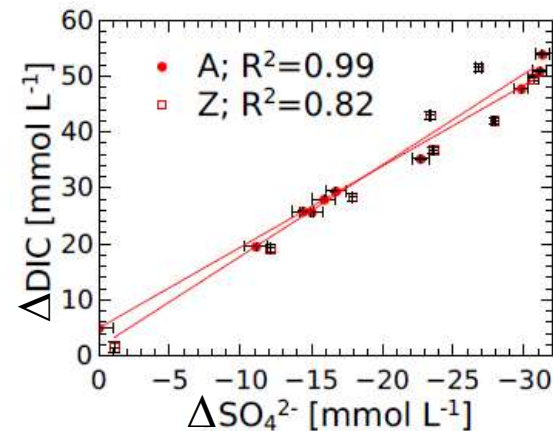
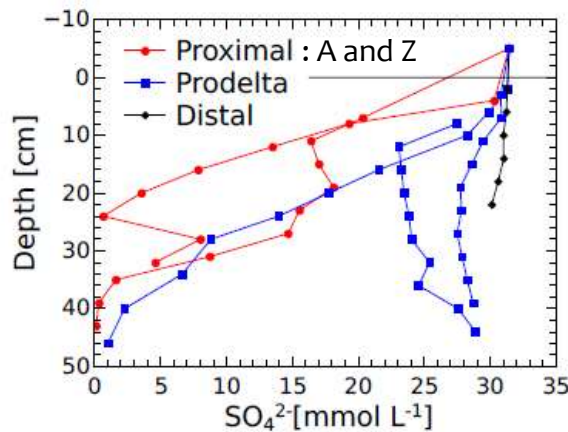
$$DOU = F_{O_2} = - \Phi * D_s * (dO_2/dz)_{z=0}$$

From Lansard et al., 2008&2009; Cathalot et al., 2010

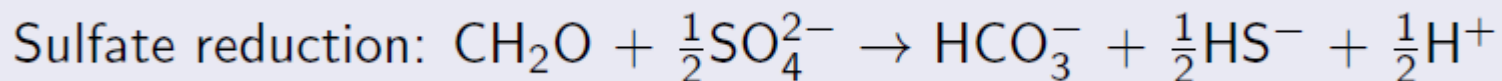
Dissolved inorganic carbon (DIC) distributions



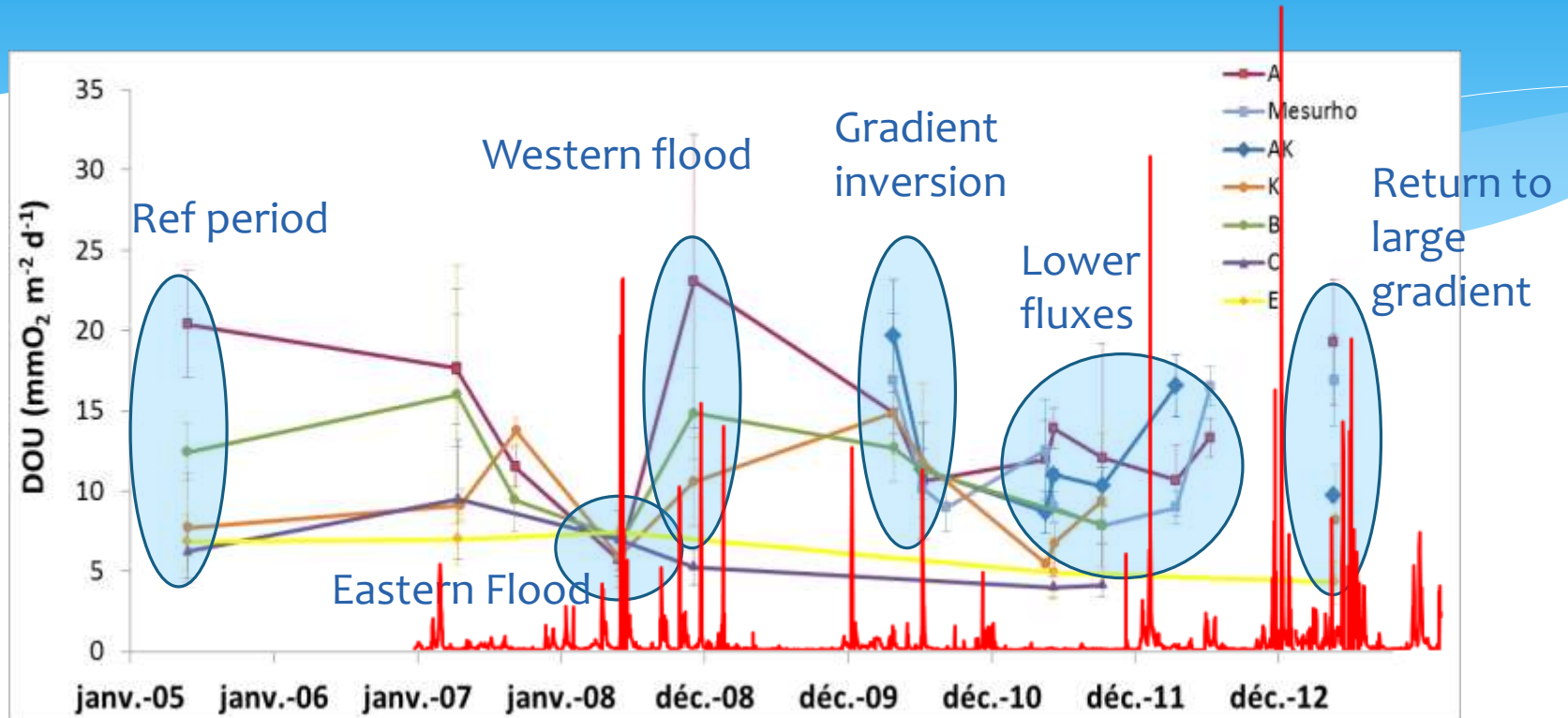
- * Large variation (factor of 10) between the river mouth and the shelf region, related to sulfate reduction intensity



Rassmann et al.,
2016, BG

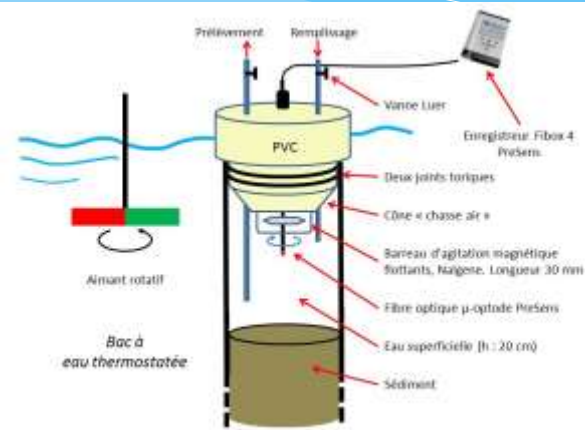


Interannual variation of diffusive oxygen fluxes in Rhone delta sediments



A clear relation exists between variations of organic matter recycling in delta sediments and POC input from the River over the decadal scale

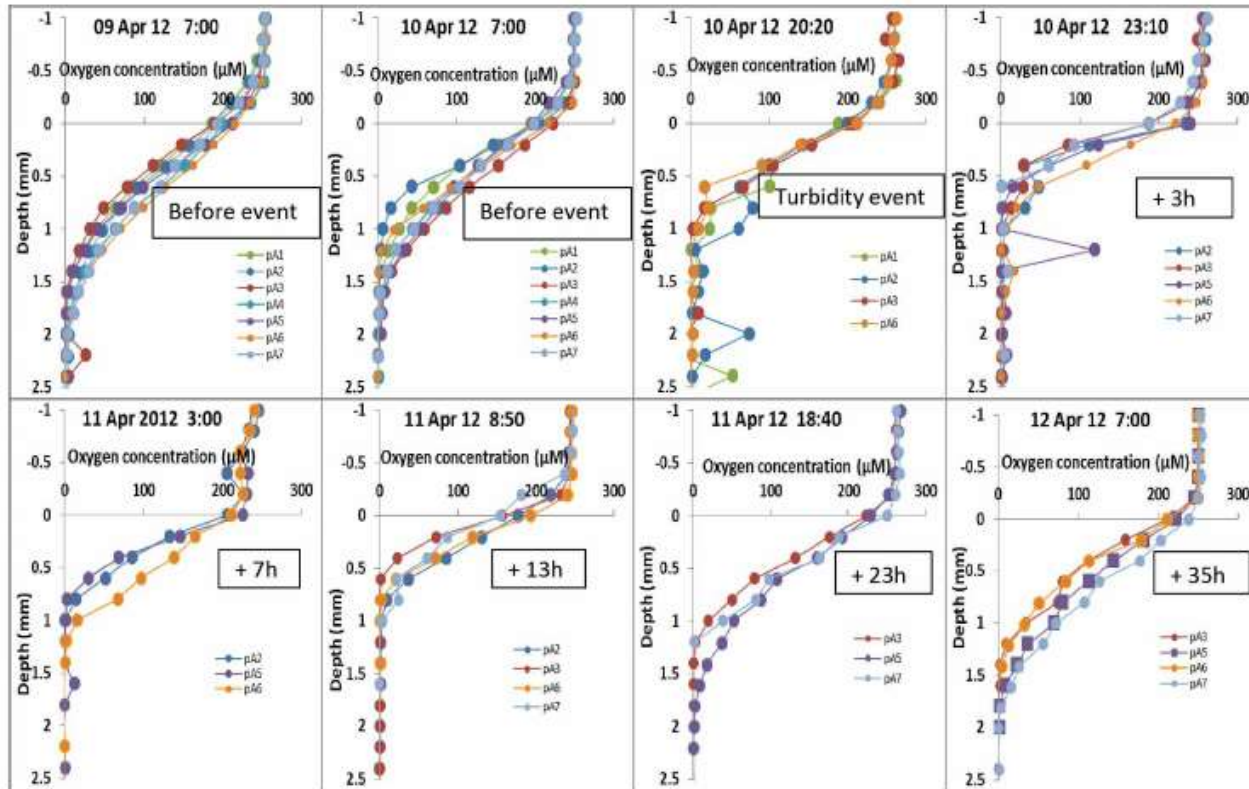
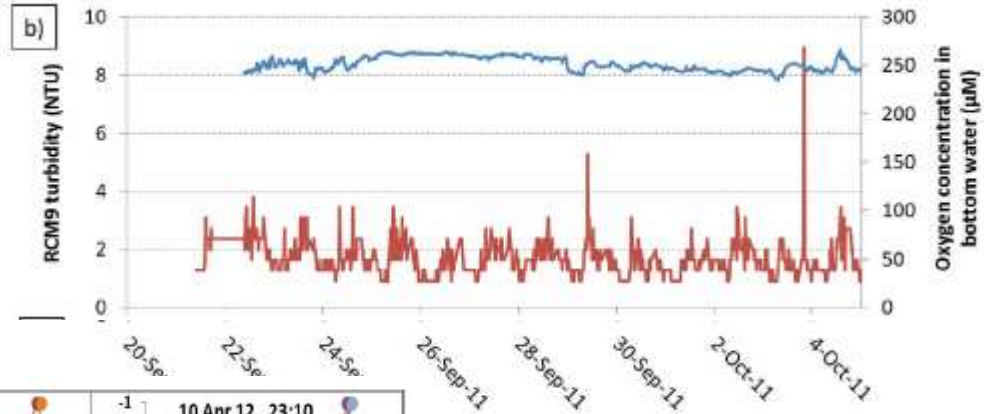
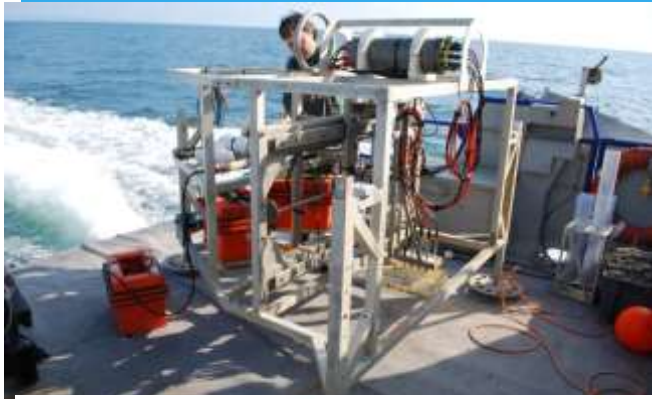
Sediment-water exchange



Site	Lat. (°N)	Long. (°E)	Depth (m)	Dist (km)	T_{low} (°C)	S	O_{low} (μ M)	TOU ($mmol\ m^{-2}\ d^{-1}$)
A	43°18'8	4°51'1	24	1.9	14.9	38.0	259	156 ± 5.0
B	43°18'2	4°50'1	57	3.0	14.8	38.0	248	15.9 ± 3.6
K	43°18'1	4°51'5	62	3.3	14.7	37.8	234	10.2 ± 2.2
L	43°18'3	4°52'9	61	4.0	14.3	37.7	251	11.8 ± 9.8
N	43°17'5	4°48'0	65	5.5	14.5	37.6	-	11.4 ± 2.6
I	43°16'0	4°53'0	89	7.7	14.2	37.7	231	10.1 ± 0.9
C	43°16'3	4°46'6	76	8.6	14.5	37.7	243	7.8 ± 0.6
J	43°16'1	4°58'1	86	12.1	14.2	37.9	243	9.6 ± 2.0
F	43°10'0	4°42'0	78	21.6	14.2	37.7	256	7.0 ± 2.0

Pastor et al., 2011 (CSR)

Time series of BW O₂ and sediment profiling



Time series in the
Rhone River delta
– Mesurho Buoy

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