



Supplement of

Controls on redox-sensitive trace metals in the Mauritanian oxygen minimum zone

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SUPPLEMENTARY MATERIAL

Table S1. Pearson correlations of all data below 50 m water depth for the same parameters as used for the principle component analysis.

	dFe	dMn	dCo	dNi	dCd	dPb	oxy	Γ	depth	turb	PO ₄	NO ₃	AOU	dCu	Si(OH) ₄	temp	sal
dFe	1																
dMn	0.57	1															
dCo	0.60	0.65	1														
dNi	-0.08	-0.62	-0.10	1													
dCd	-0.13	-0.64	-0.06	0.96	1												
dPb	0.09	-0.34	0.01	0.78	0.69	1											
oxy	-0.55	-0.61	-0.58	0.43	0.36	0.42	1										
Γ	0.43	0.78	0.40	-0.67	-0.65	-0.42	-0.52	1									
depth	-0.11	-0.58	-0.11	0.97	0.95	0.79	0.45	-0.61	1								
turb	0.76	0.56	0.41	-0.32	-0.36	-0.27	-0.64	0.53	-0.35	1							
PO ₄	0.23	-0.37	0.15	0.85	0.84	0.68	-0.12	-0.49	0.84	0.00	1						
NO ₃	-0.03	-0.65	-0.09	0.92	0.93	0.63	0.11	-0.68	0.89	-0.22	0.89	1					
AOU	0.29	-0.29	0.30	0.62	0.67	0.39	-0.22	-0.22	0.58	0.08	0.76	0.74	1				
dCu	0.29	-0.02	0.36	0.59	0.51	0.74	0.12	-0.16	0.55	-0.10	0.57	0.44	0.42	1			
Si(OH) ₄	0.17	-0.41	0.11	0.93	0.90	0.77	0.08	-0.50	0.95	-0.09	0.94	0.88	0.71	0.65	1		
temp	0.15	0.70	0.20	-0.97	-0.97	-0.73	-0.45	0.71	-0.96	0.37	-0.85	-0.95	-0.61	-0.50	-0.90	1	
sal	0.06	0.68	0.21	-0.93	-0.92	-0.74	-0.48	0.64	-0.93	0.25	-0.79	-0.89	-0.55	-0.45	-0.86	0.96	1

Table S2. Atmospheric flux of dFe and vertical fluxes of dFe, LpFe and dCo. Atmospheric fluxes are obtained from dAl inventory in the mixed layer. Vertical fluxes are combined diffusive (Diff.) and upwelling (Adv.) fluxes. Minimum and maximum vertical fluxes were calculated using the upper and lower 95% confidence interval of diffusivity measurements (Schafstall et al. 2010) and an error of 50% for the upwelling velocity.

Station	Atmospheric dFe flux ($\mu\text{mol m}^{-2} \text{d}^{-1}$)	Vertical dFe flux ($\mu\text{mol m}^{-2} \text{d}^{-1}$)			Depth interval of vertical fluxes
		Mean (min–max)	Mean (min–max)	Diff.	Adv.
4	0.66 (0.39–2.14)	13.5 (7.1–22.2)	1.56	11.99	23 m to 8 m
7	0.74 (0.44–2.41)	2.3 (1.5–3.2)	1.75	0.56	55 m to 29 m
3A	0.77 (0.46–2.52)	2.3 (1.3–3.7)	1.63	0.68	49 m to 18 m
3B	0.63 (0.37–2.06)	1.4 (0.7–2.2)	0.79	0.57	39 m to 12 m
8A	0.68 (0.40–2.20)	0.95 (0.58–1.42)	0.72	0.22	55 m to 22 m
8B	1.18 (0.70–3.84)	-	-	-	-
9	-	0.08 (0.05–0.12)	0.04	0.04	57 m to 25 m
5	0.87 (0.51–2.83)	1.3 (0.6–2.4)	1.03	0.25	48 m to 16 m
2	1.43 (0.85–4.65)	0.16 (0.09–0.23)	0.05	0.10	89 m to 29 m

Station	Vertical dCo flux ($\text{nmol m}^{-2} \text{d}^{-1}$)		
	Mean (min–max)	Diff.	Adv.
4	113 (60–185)	13.0	100
7	28 (19–40)	21.5	6.9
3A	34 (19–55)	23.8	9.9
3B	10 (6–17)	6.0	4.3
8A	15 (9–22)	11.1	3.5
8B	-	-	-
9	-	-	-
5	3.6 (1.7–6.8)	2.9	0.7
2	1.9 (1.1–2.8)	0.7	1.2

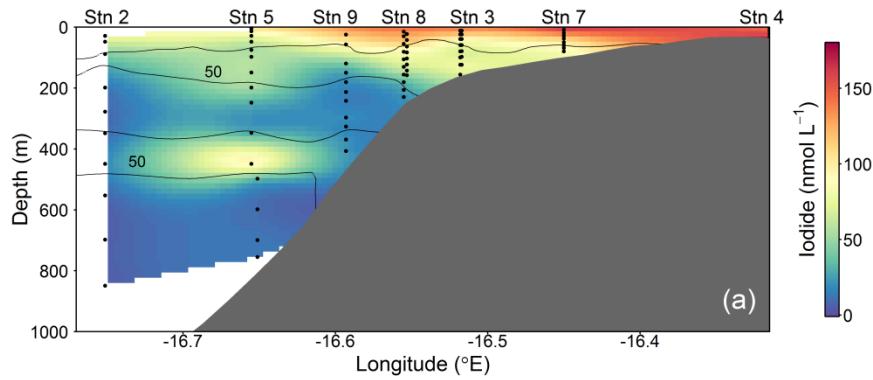


Figure S1. Spatial distributions of Iodide across the Mauritanian shelf at $18^{\circ}20'N$ in June 2014. Each sample location is indicated as black dot and oxygen contours at $50 \mu\text{mol kg}^{-1}$ enclosing the upper and lower OMZ are displayed as black contour lines.

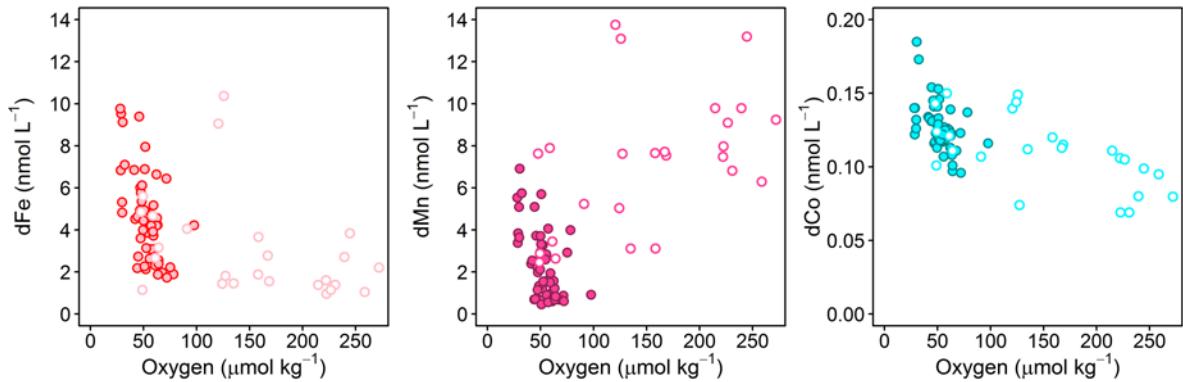


Figure S2. Dissolved TM concentrations against oxygen for Fe (left), Mn (middle) and Co (right). Filled circles display all data points below 50 m depth, open circles at depths shallower than 50 m.

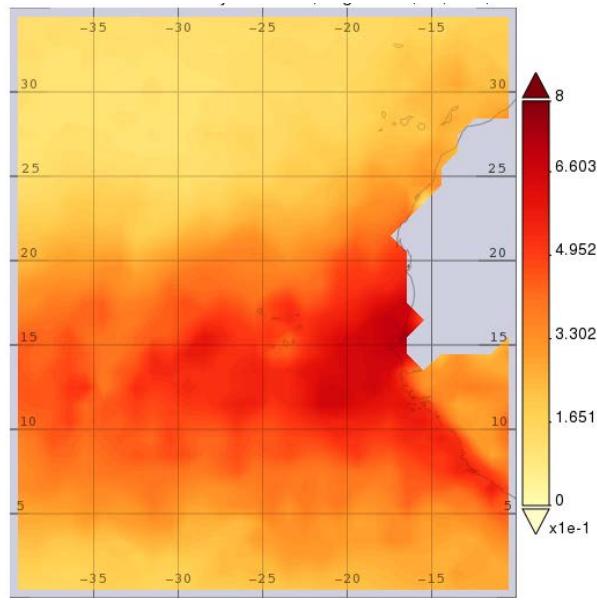


Figure S3. Time averaged map of aerosol optical depth 550 nm (dark target), monthly 1 deg (MODIS-Terra MOD08_M3 v6.1) for the month of June 2014.

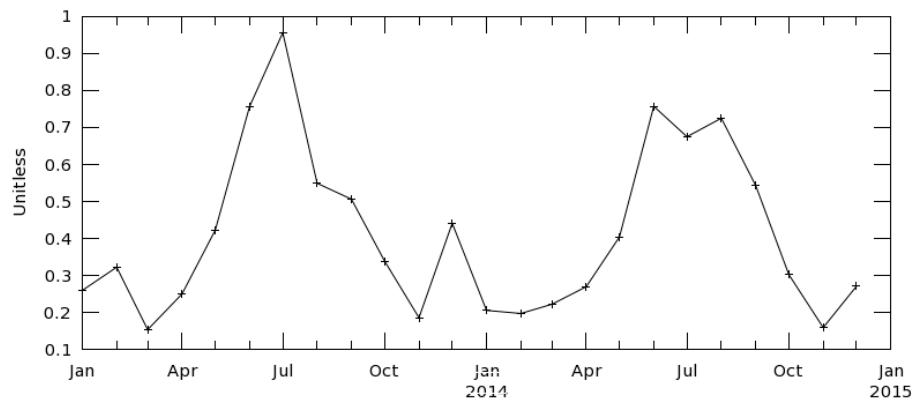


Figure S4. Area-averaged time series of aerosol optical depth 550 nm (dark target), monthly 1 deg (MODIS-Terra MOD08_M3 v6.1). Time series for January 2013 to December 2014 for the region between 19.5W, 17.5N, 16.5W and 18.5N.

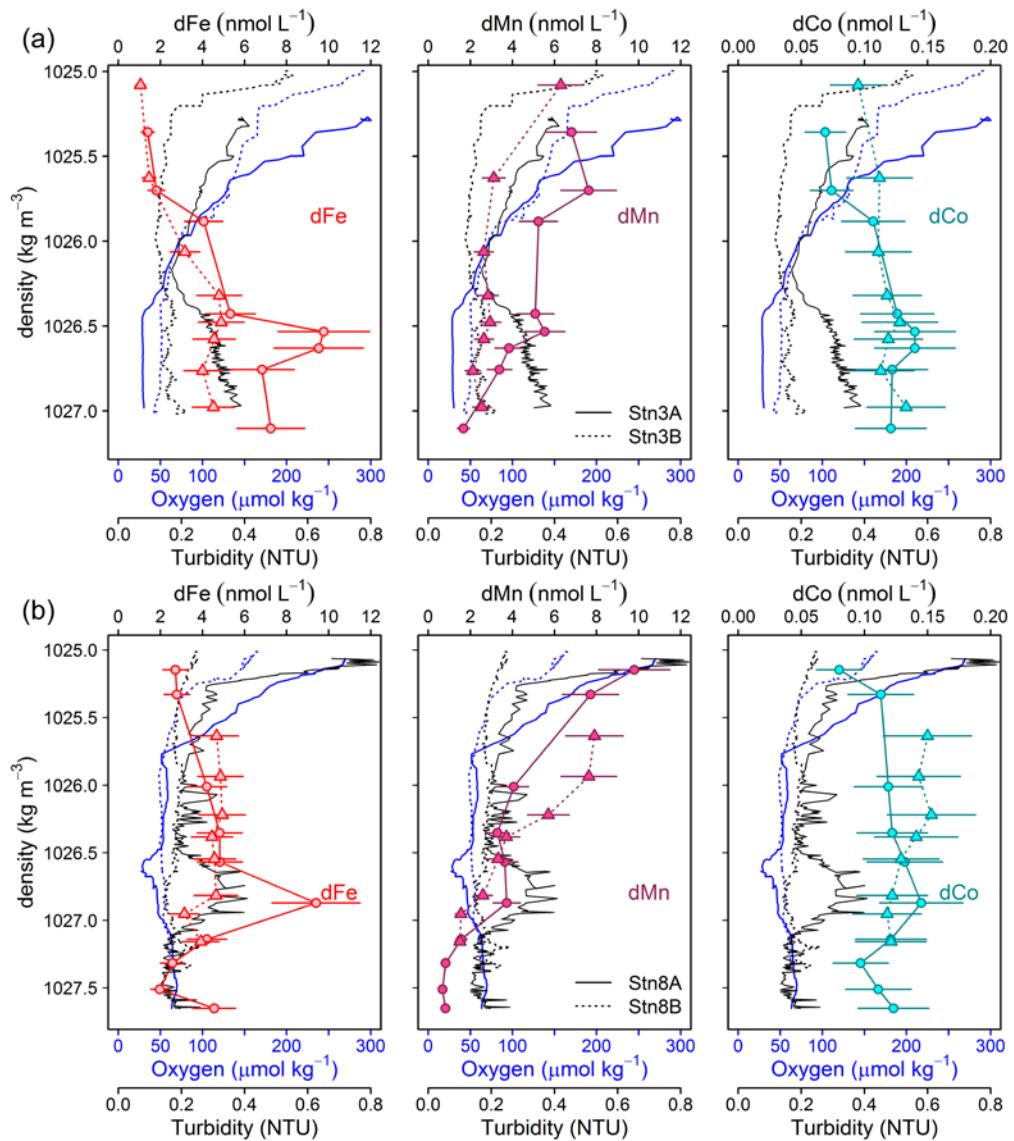


Figure S5. Density plots for oxygen concentration, turbidity and dissolved trace metals (Fe, Mn and Co) for repeated profiles. First deployment displayed as solid line and second deployment displayed as dashed line. (a) Station 3 (18.23°N, 16.52°W, 170 m water depth, 9 days between deployments). (b) Station 8 (18.22°N, 16.55°N, 189–238 m water depth, 2 days between deployments).

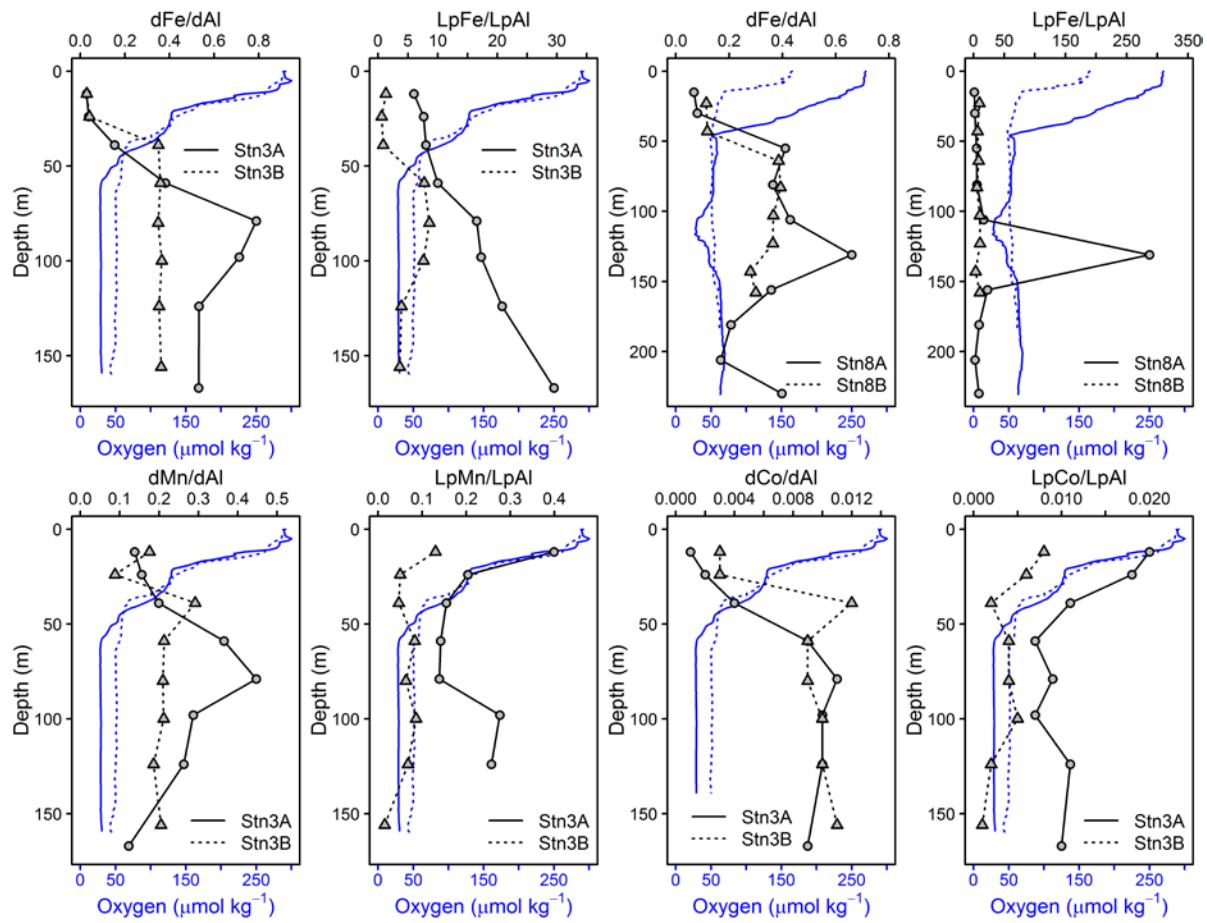


Figure S6. Dissolved and leachable particulate Fe to Al ratios for repeat profiles at station 3 (A+B) and station 8 (A+B) and dissolved and leachable particulate Co and Mn to Al ratios for repeated profiles at station 3 (A+B).