

1 **Supporting information**

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3 **Metal fluxes from porewaters and labile sediment phases for predicting metal exposure and**
4 **bioaccumulation in benthic invertebrates.**

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13 Summary of figures and tables:

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23 means with standard deviations (n=8 and 12 for DGT and dissolved metal concentrations, respectively).

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27 at the SWI (± 1 cm), (ii) between 0 and -3 cm depth, (iii) at -3 cm depth, and (iv) 1 cm above the SWI
28 (laboratory and field exposure).

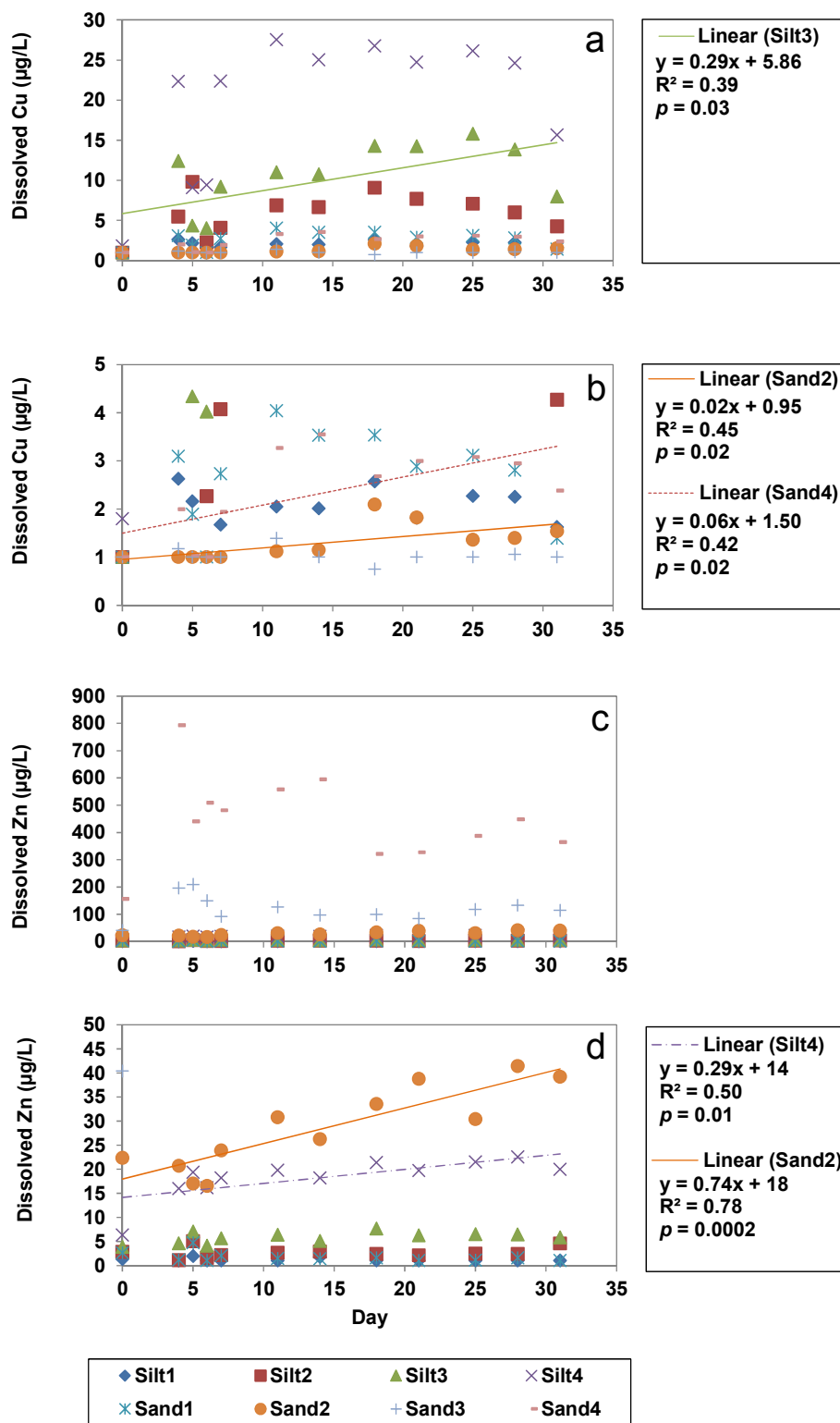
29 Page S9 - **Figure S7**: Relationships between DGT fluxes measured at the SWI (± 1 cm) and AEM
30 concentrations (average of initial and final surface concentrations).

Table S1. Total recoverable metal concentrations in original sediments in mg/kg, unless specified.

Sediment	Al %	Fe %	Mn	Cu	Pb	Zn	As	Cd	Co	Cr	Ni	Sn	V
Silt1	1.1	2.5	87	35	65	188	19	1.0	4	29	12	3	41
Silt2	1.3	3.3	182	303	248	544	30	0.7	8	47	15	60	57
Silt3	1.4	4.1	275	527	414	828	42	1.5	9	65	18	119	74
Silt4	1.5	5.5	446	1050	747	1480	64	1.8	16	96	25	234	103
Sand1	0.2	0.4	21	10	18	54	5	0.9	1	5	2	1.0	8
Sand2	0.7	1.7	107	265	317	705	13	1.3	5	75	15	69	34
Sand3	0.6	1.2	71	118	198	1550	7	1.1	4	26	11	7	24
Sand4	0.7	1.7	76	94	218	2640	11	1.4	5	34	13	7	27

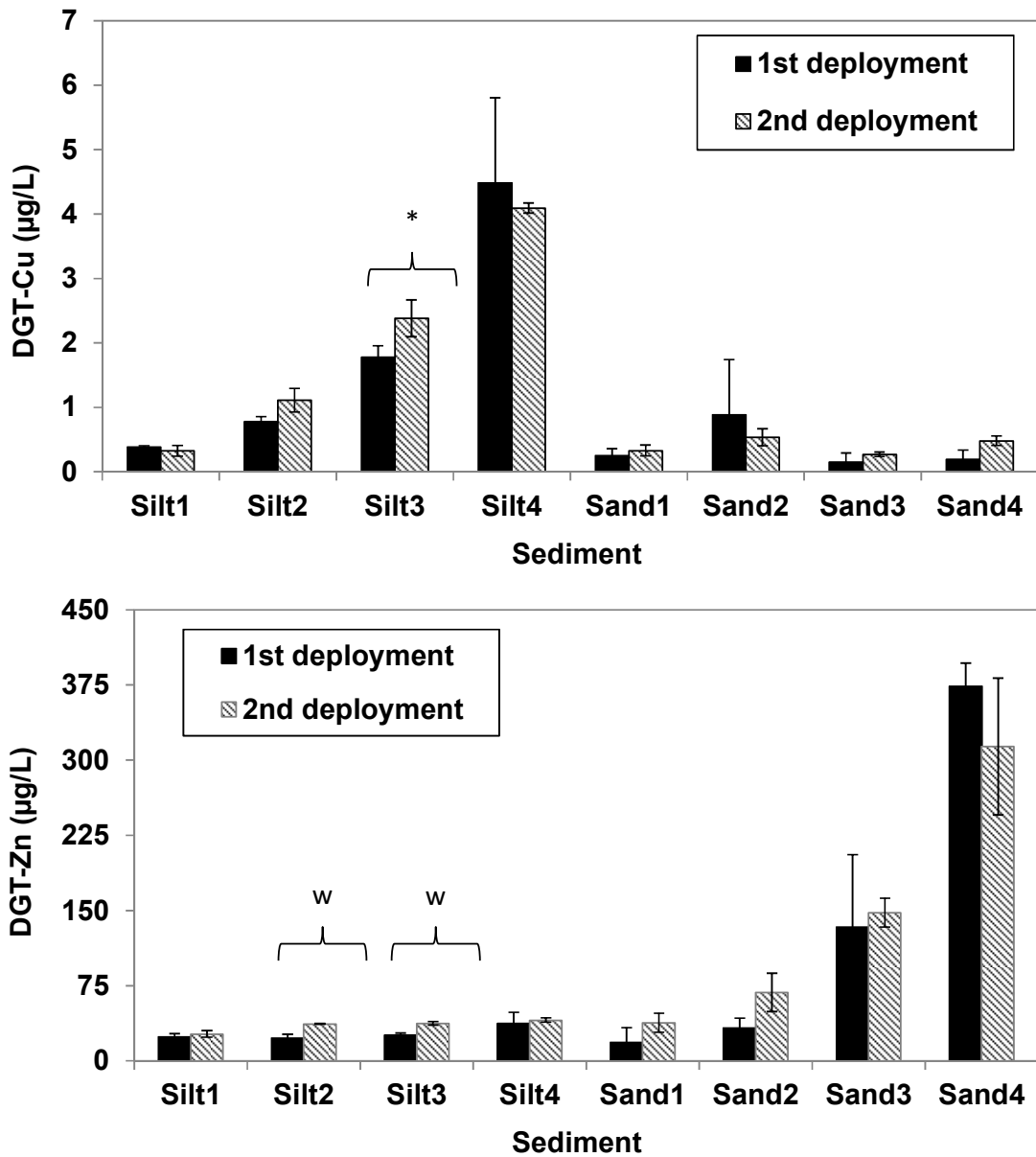
Table S2. Dilute acid-extractable metal concentrations in original sediments (1 M HCl) in mg/kg, unless specified.

Sediment	Al %	Fe %	Mn	Cu	Pb	Zn	As	Cd	Co	Cr	Ni	Sn	V
Silt1	0.2	1.1	47	22	63	166	7	0.1	3.0	11	4	1	22
Silt2	0.3	1.2	85	128	232	387	10	0.4	3.4	19	5	29	29
Silt3	0.4	1.3	121	252	393	585	16	0.5	3.5	29	6	58	35
Silt4	0.5	1.6	196	523	721	999	24	1.0	5.4	50	9	117	48
Sand1	0.1	0.3	17	7	17	48	2	0.0	0.7	3	1	0.4	7
Sand2	0.2	0.6	25	57	242	585	2	1.0	1.5	27	5	26	18
Sand3	0.2	0.4	17	27	140	1479	2	0.9	1.7	7	2	2	9
Sand4	0.2	0.5	21	41	199	2405	3	1.2	2.5	15	4	3	12



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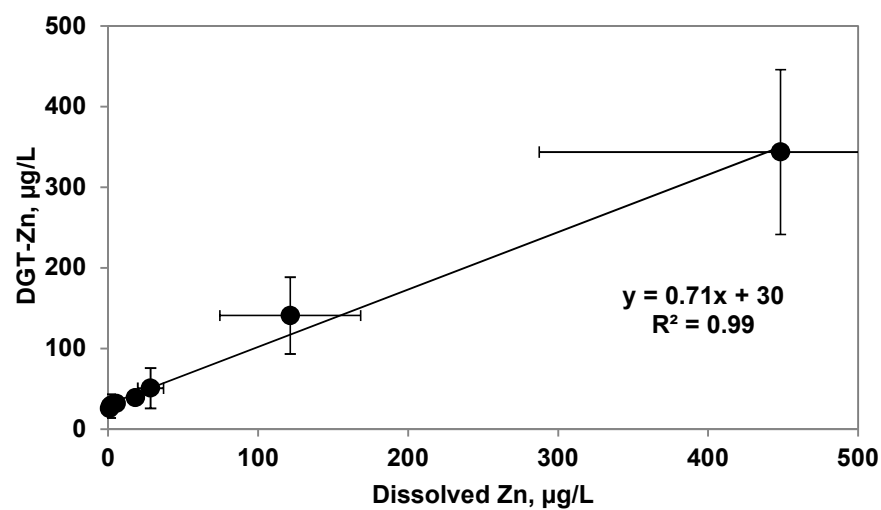
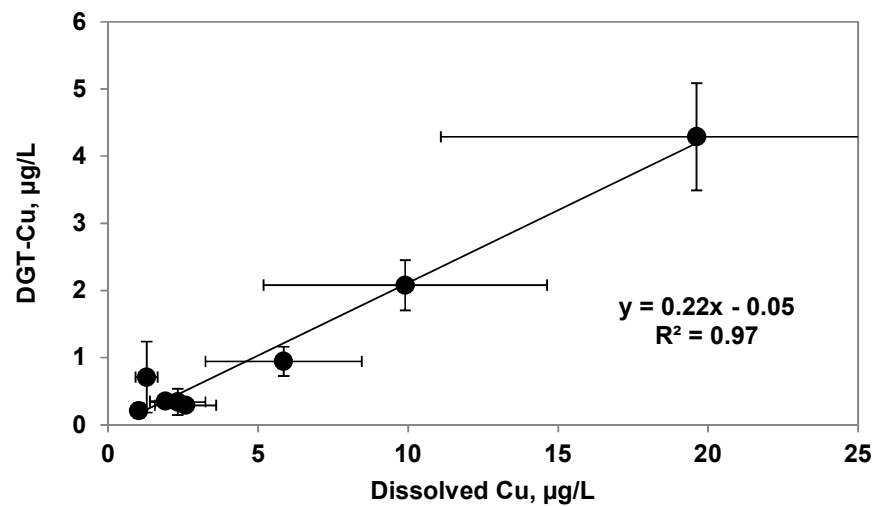
34 Figure S1. Changes in dissolved copper (a and b) and zinc (c and d) concentrations measured in discrete
 35 overlying water samples collected throughout the test. Plots 'a' and 'c' show the full data set for Cu and Zn,
 36 respectively, whereas plots 'b' and 'd' show concentrations lower than 5 and 50 µg/L for Cu and Zn,
 37 respectively. Curves are linear regressions reported for $p < 0.05$.



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39 Figure S2. Comparison between DGT metal concentrations (Cu and Zn) measured in the first (day 5) and
 40 second (day 19) deployment under laboratory conditions (from 0 to 3 cm above the SWI). Data points are
 41 means of four values with standard deviation. * The asterisk indicates significant differences between
 42 deployments (Bonferroni correction: $\alpha=0.05/8$), whereas the letter w indicates weak differences
 43 ($0.006 < p < 0.01$). DGT-Pb concentrations were consistently $< 2 \mu\text{g/L}$.

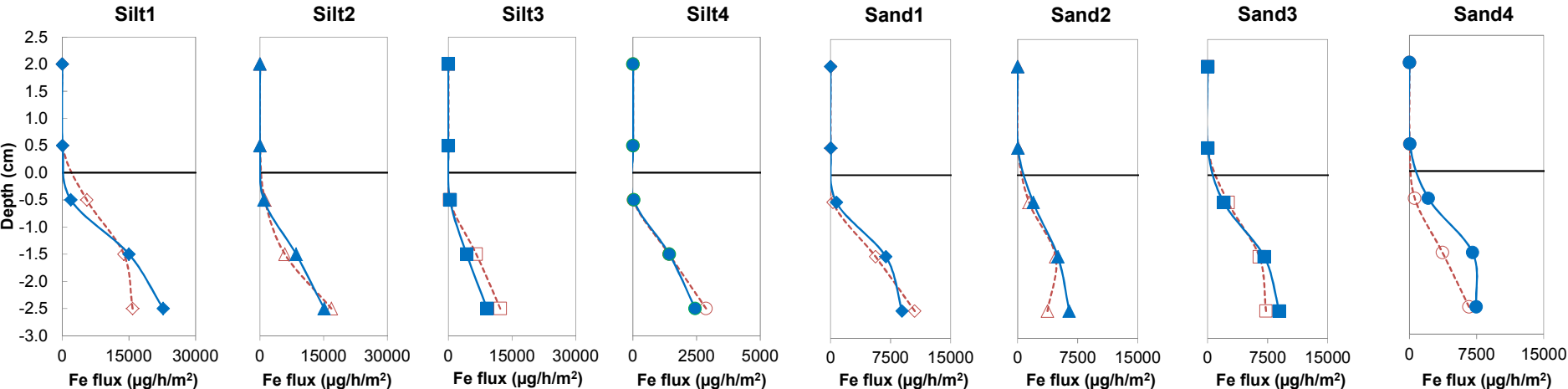
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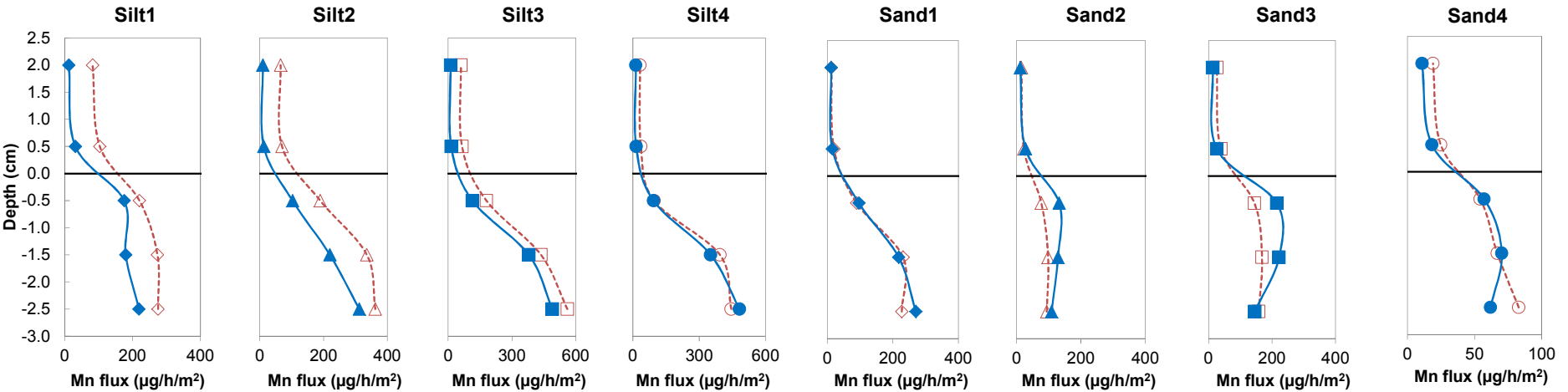
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46 Figure S3. Relationships between DGT and dissolved metal concentrations. Data points are means with
 47 standard deviations (n=8 and 12 for DGT and dissolved metal concentrations, respectively).

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50 Figure S4. DGT-Fe and -Mn fluxes measured in laboratory and field deployments (data points represent average values of first and second deployment and 2
51 replicates (n=4), standard errors were on average 26 (±13) and 29 (±16) % of mean values for iron and manganese, respectively). Continuous and dashed lines
52 represent field and laboratory deployments, respectively. The lines connecting the measurements for each individual DGT profile are for visual aid only.

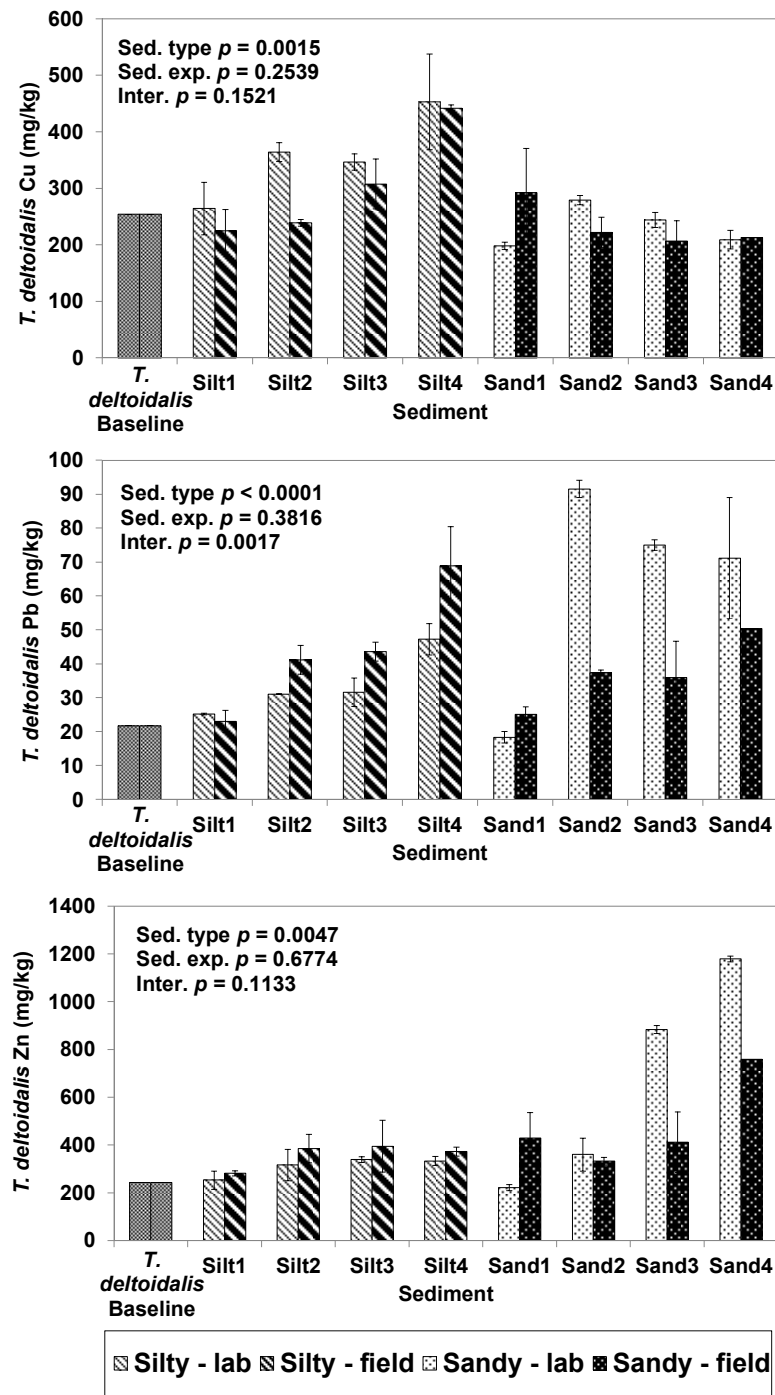


Figure S5. Lead, zinc and copper bioaccumulation in laboratory and field-exposed bivalves. Soft tissue concentrations are mean $\pm$ standard errors ($n = 2$). For sediment Sand4, only one replicate was available for the field experiment. *T. deltoidalis* baseline is the metal concentrations measured in non-exposed biota (as described in the methods). Metal concentrations (dry weight) in organisms exposed to different sediment types (Sed. type = sandy and silty) and exposure conditions (Sed. exp = laboratory and field) were tested for statistical differences. Interaction effects (Inter.) between sediment types and exposures were also tested for statistical significance.

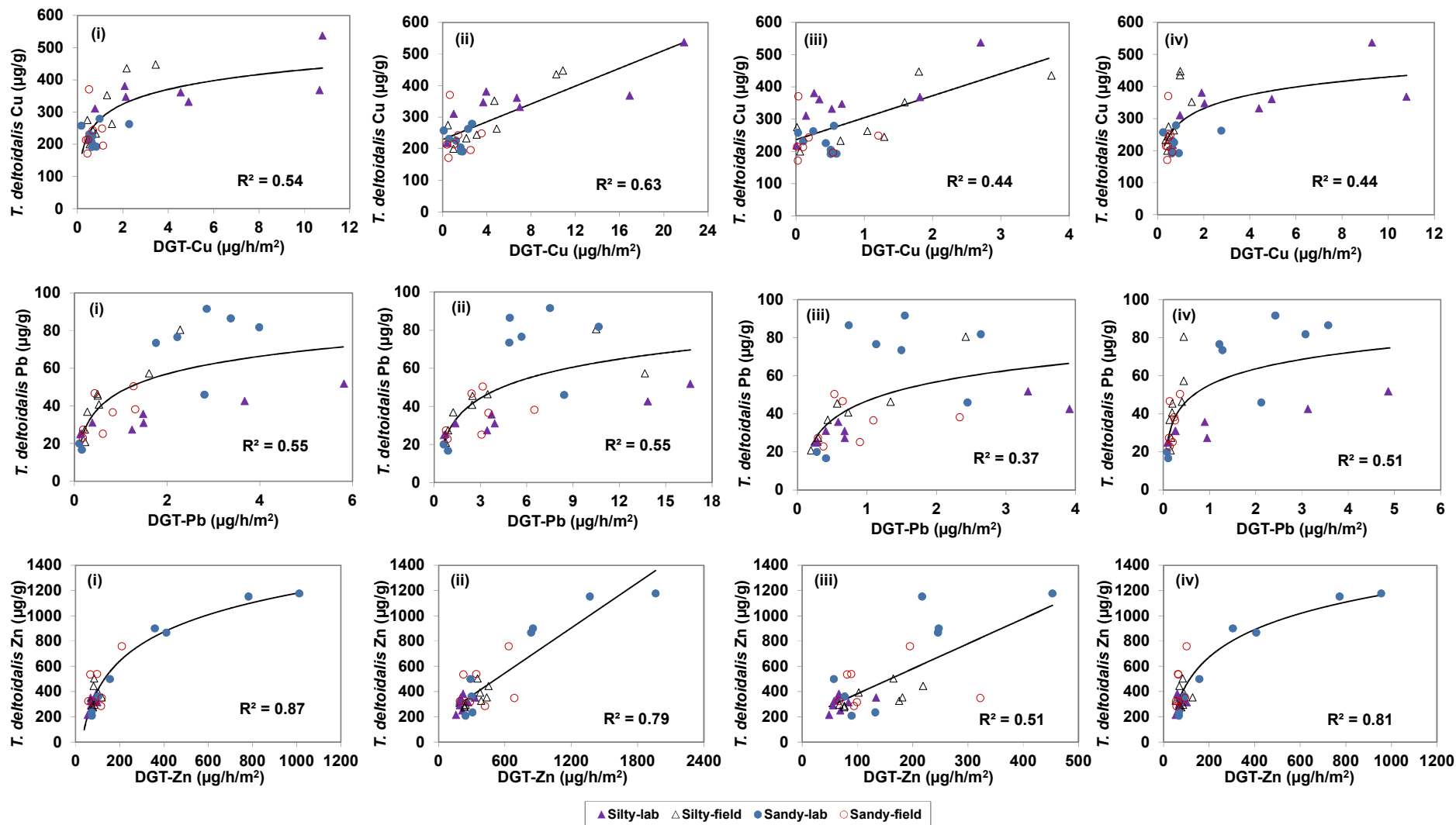


Figure S6. Relationships between Cu, Pb and Zn bioaccumulation and DGT fluxes measured (i) at the SWI (± 1 cm), (ii) between 0 and -3 cm depth, (iii) at -3 cm depth, and (iv) 1 cm above the SWI (laboratory and field exposure).

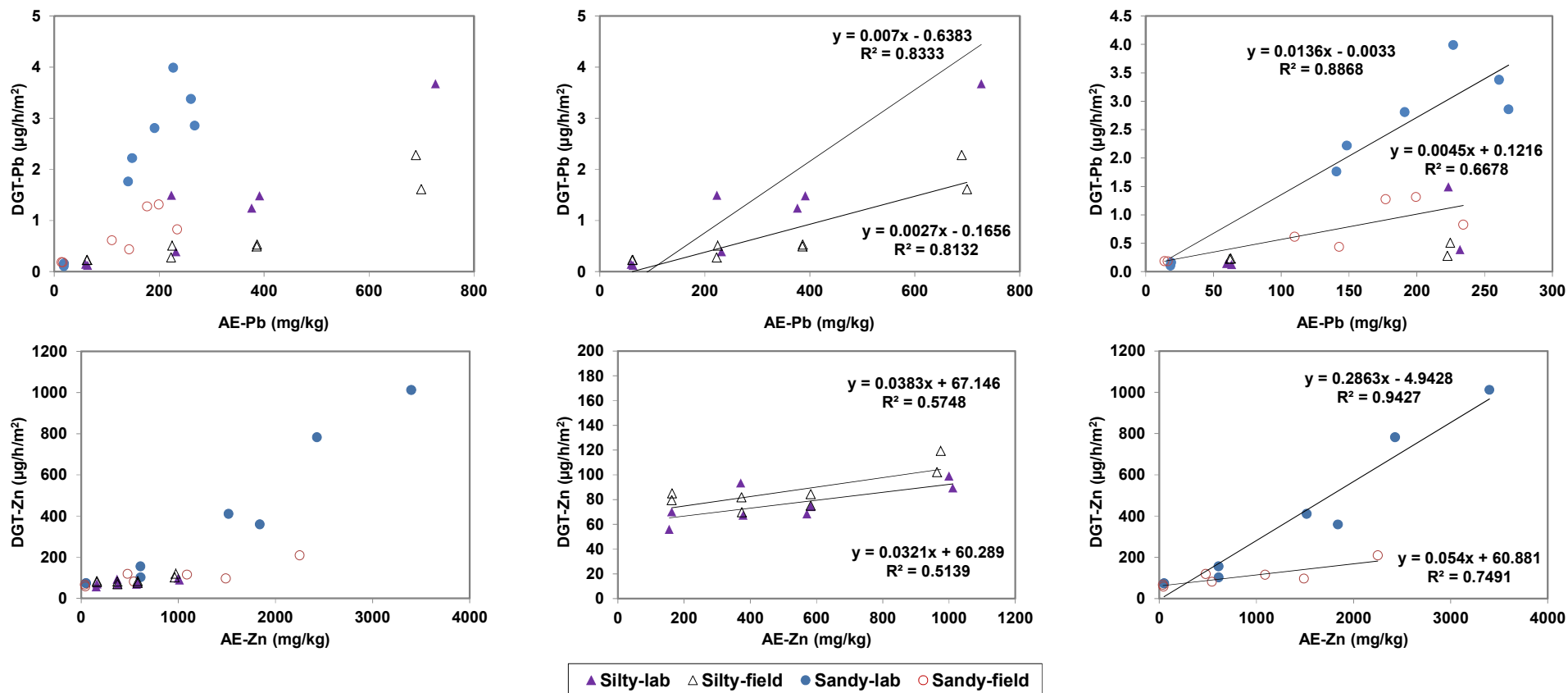


Figure S7. Relationships between DGT fluxes measured at the SWI (± 1 cm) and AEM concentrations (average of initial and final surface concentrations).