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Corrigendum to "Sedimentary alkalinity generation and long-term alkalinity development in the Baltic Sea" published in Biogeosciences, 16, 437–456, 2019

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In "Sedimentary alkalinity generation and long-term alkalinity development in the Baltic Sea", an error in the computations of internal total alkalinity (TA) source and sink terms resulted in an overestimated net internal TA generation in the BALTSEM model. The model already includes a term denoted "unresolved sources minus sinks" – calibrated net TA sources (that could be a result of missing internal processes or unaccounted riverine or groundwater sources) needed to reproduce observed TA in the Baltic Sea. The corrected model version produces less TA internally, but this reduced internal source is compensated by an enhanced unresolved TA source instead. This means that the difference between the original and the corrected model versions is the partitioning of TA sources between resolved and unresolved fractions.

In the corrected model version, the unresolved source for the entire Baltic Sea amounts to $340 \pm 0\,\mathrm{Gmol\,yr^{-1}}$ (instead of $260 \pm 0\,\mathrm{Gmol\,yr^{-1}}$) and the total resolved pelagic and benthic TA sources minus sinks amount to $41 \pm 25\,\mathrm{Gmol\,yr^{-1}}$ (instead of $120 \pm 47\,\mathrm{Gmol\,yr^{-1}}$). In particular, the unresolved source in the Baltic Proper amounts to $240 \pm 0\,\mathrm{Gmol\,yr^{-1}}$ (instead of $170 \pm 0\,\mathrm{Gmol\,yr^{-1}}$) which means that the TA generation coupled to iron sulfide burial (that was computed using another independent model) can account for 18 % of the missing TA source in the Baltic Proper (instead of 26 %). The BALTSEM model validation (illustrated in Figs. 5 and 6 of the original article) is only very marginally affected since the overall TA source is the same in the original and corrected model simulations. However, Table 5 and also Fig. 7 must be corrected since the TA source partitioning has been modified. The incorrect internal TA source in the original model version furthermore resulted in an exaggerated difference in TA and also pH between the business-as-usual (BAU) and Baltic Sea Action Plan (BSAP) scenarios, respectively (Sect. 4.5 of the original article). Surface water TA towards the end of the BAU scenario exceeds that in the BSAP scenario by $\sim 20\,\mu\mathrm{mol\,kg^{-1}}$ (instead of $\sim 150\,\mu\mathrm{mol\,kg^{-1}}$), and surface water pH in the BAU scenario exceeds that in the BSAP scenario by ~ 0.05 units (instead of ~ 0.1) (Fig. 9).

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Table 5. Average resolved and unresolved TA sources minus sinks (SMS) and river loads with standard deviations (Gmol yr^{-1}) in 1970–2014 according to the BALTSEM calculations in this study. Subbasins according to Fig. 1.

Subbasins	1–3 (KT)	4–6 (DS)	7–9 (BP)	10 (BS)	11 (BB)	12 (GR)	13 (GF)	1–13 (EBS)
Resolved pelagic SMS	5.9 ± 1.0	5.6 ± 0.9	-18 ± 43	8.0 ± 2.4	-0.3 ± 0.4	6.7 ± 2.0	5.1 ± 3.4	13 ± 43
Resolved benthic SMS	-2.8 ± 1.0	-2.5 ± 0.6	44 ± 42	-4.6 ± 0.9	-1.0 ± 0.1	-3.1 ± 0.5	-2.6 ± 3.0	28 ± 43
Total resolved SMS	3.1 ± 0.9	3.1 ± 0.9	27 ± 24	3.4 ± 1.9	-1.3 ± 0.4	3.5 ± 0.6	2.5 ± 1.5	41 ± 25
Unresolved SMS	–	–	240 ± 0	25 ± 0	6.6 ± 0	28 ± 0	40 ± 0	340 ± 0
Total SMS	3.1 ± 0.9	3.1 ± 0.9	270 ± 24	28 ± 1.9	5.3 ± 0.4	32 ± 0.6	42 ± 1.5	380 ± 25
River load	21 ± 4.1	13 ± 3.5	220 ± 38	26 ± 3.9	17 ± 2.7	96 ± 21	80 ± 11	470 ± 62

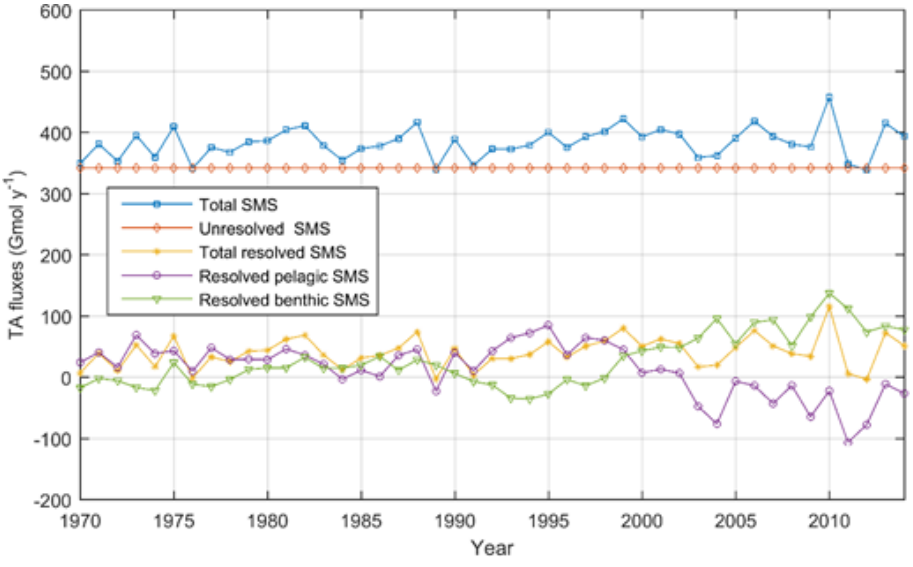

Figure 7. Annual mean TA sources minus sinks (SMS) (Gmol yr^{-1}) in the entire Baltic Sea according to BALTSEM calculations: resolved benthic sources minus sinks (SMS) (green line), resolved pelagic SMS (purple line), total resolved SMS (yellow line), unresolved SMS (red line), and total SMS (blue line).

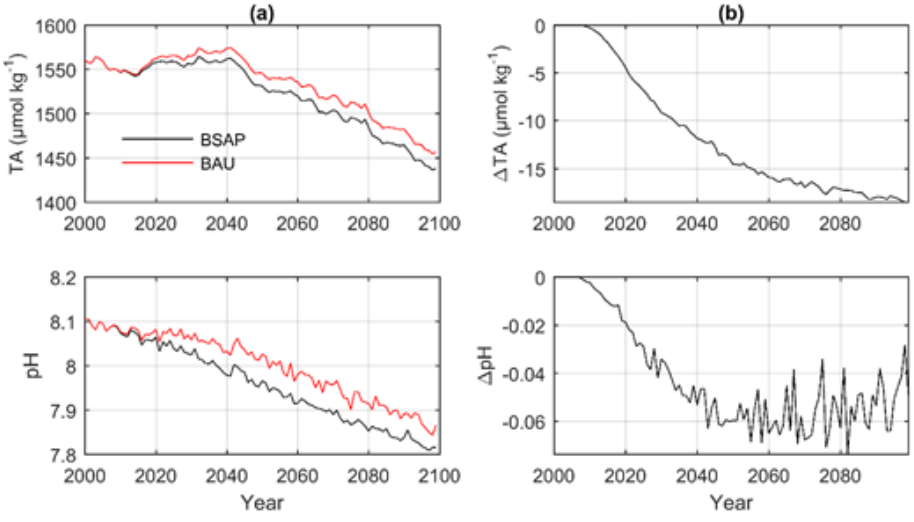

Figure 9. **(a)** Simulated annual mean surface water TA and pH in subbasin 9 (GS) according to the BSAP (black lines) and BAU (red lines) nutrient load scenarios, respectively; **(b)** Differences between the BSAP and BAU scenarios.