



Supplement of

Remineralization rate of terrestrial DOC as inferred from CO₂ supersaturated coastal waters

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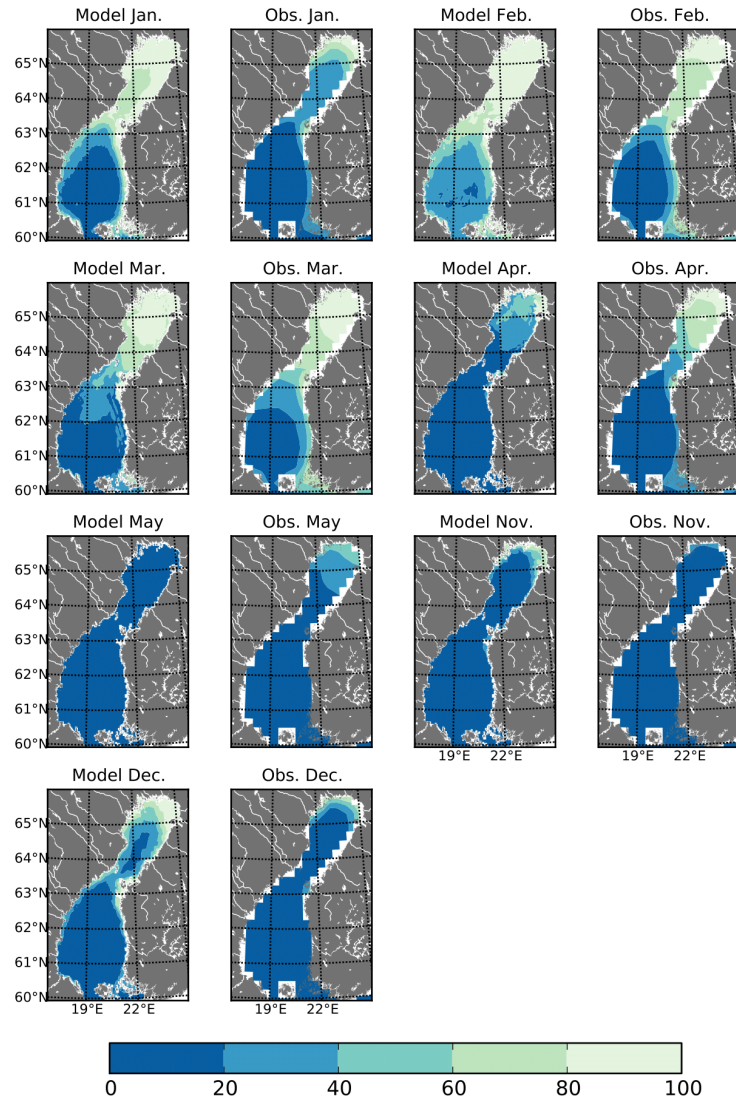


Figure S1. Modelled and observed sea ice concentration (%), climatological monthly mean for 1990-2010. Months with zero ice cover (June-October) are not shown. The observations in May are biased towards periods with sea ice (periods without sea ice are sometimes not reported), which to a large extent can describe the mismatch between modelled and observed sea ice during this month.

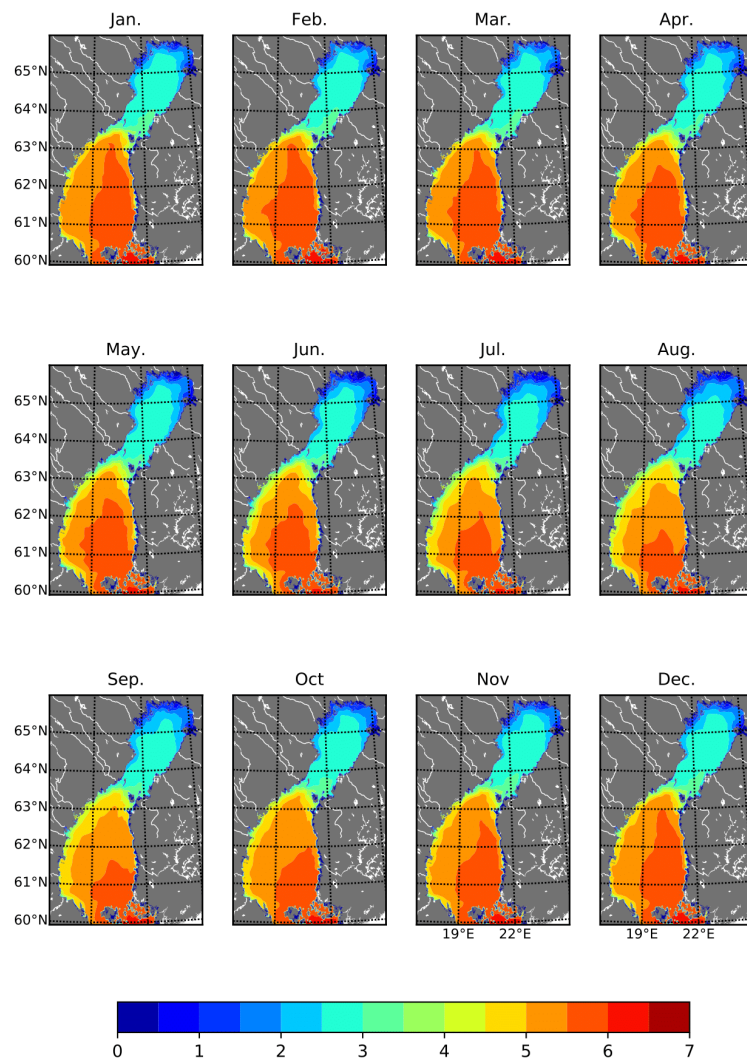


Figure S2. Modelled surface salinity, climatological monthly mean for 1990-2010.

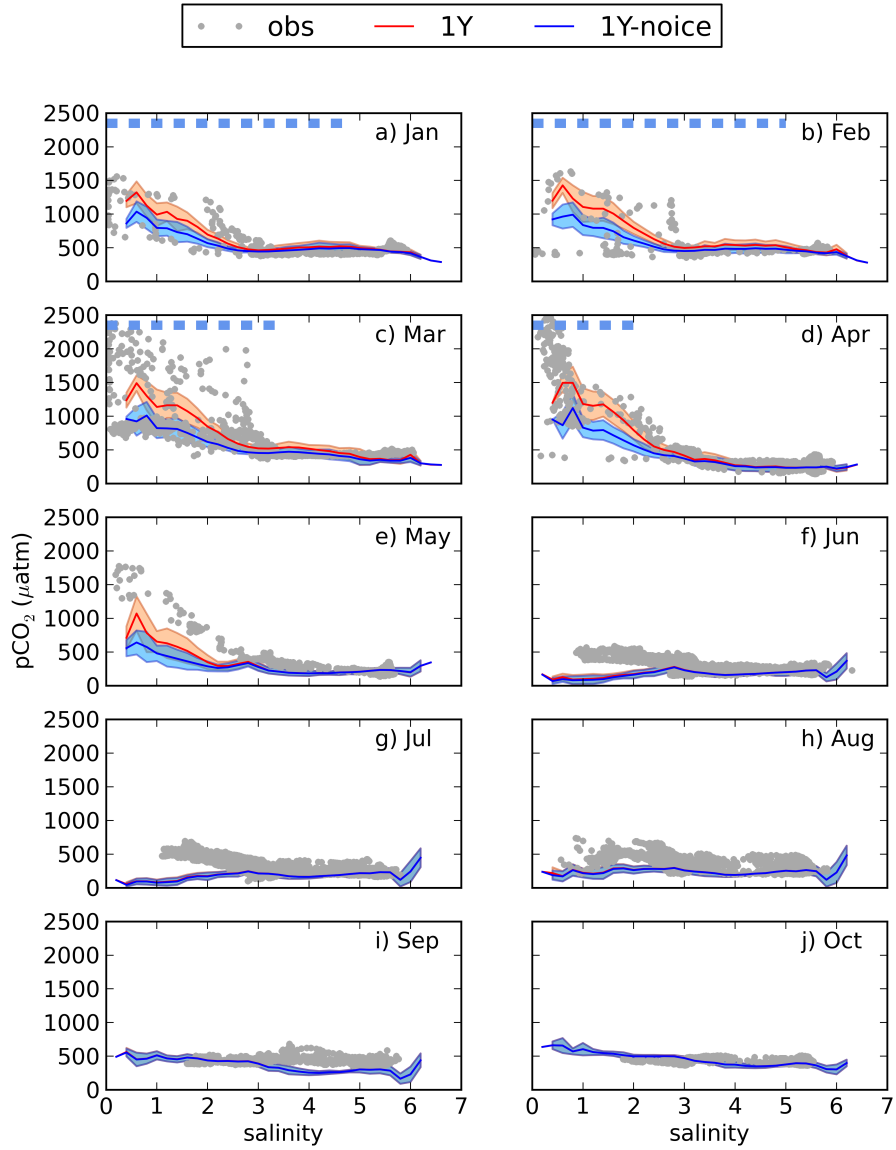


Figure S3. $p\text{CO}_2$ -salinity relationships for January-October (a-j). Grey dots show observed values. The red and blue lines show modelled climatological monthly means for the 1Y experiments, and for the 1Y-noice experiment, with the shaded area displaying the standard deviation. The 1Y-noice experiment is identical to the 1Y experiment, except for that the sea ice has no influence on the air-sea gas (carbon dioxide, CO_2 , and oxygen, O_2) exchange. The dashed blue line shows the ice extent (salinities where the ice concentration is larger than 60%).

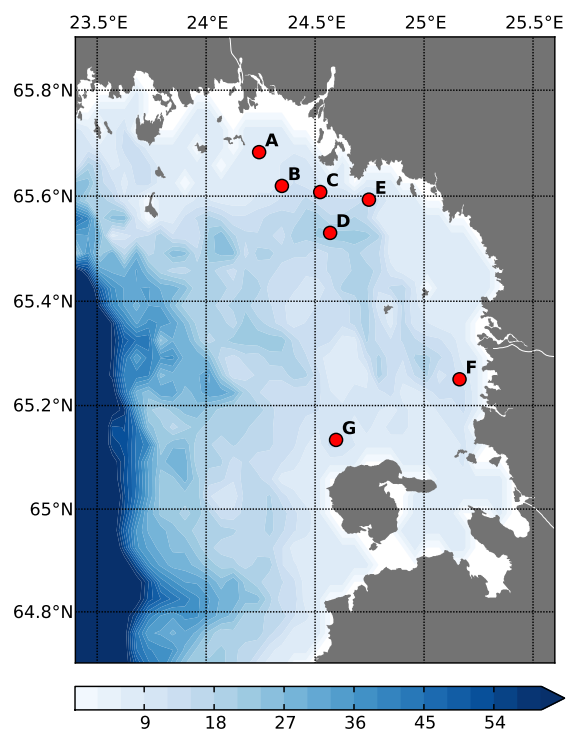


Figure S4. Map with HELCOM monitoring stations from which data have been collected (from the ICES data portal, <http://ocean.ices.dk/Helcom/Helcom.aspx?Mode=1>) to validate model performance in the low salinity region of the Gulf of Bothnia (Figure S5).

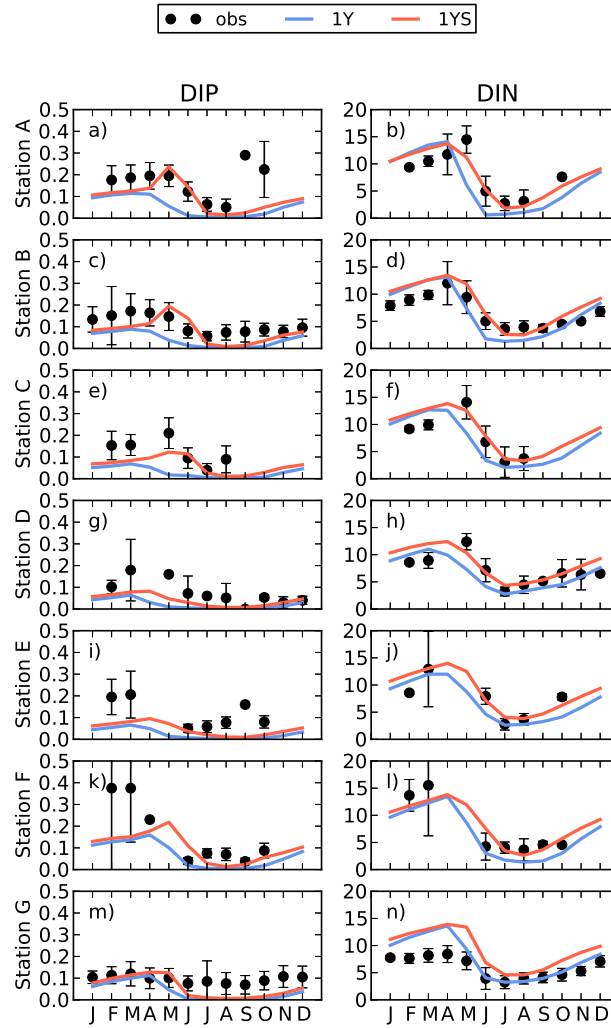


Figure S5. Observed (black dots) and modelled (blue and red lines) seasonal dynamics of DIP (dissolved inorganic phosphorus) and DIN (dissolved inorganic nitrogen) at stations A to G (Figure S4) in mmol m^{-3} . The blue lines show the results from the 1Y experiment, and the red line from the 1YS. The root mean square error (rmse) for the 1Y experiment is 0.086 and 2.3 for DIP and DIN, respectively. For the 1YS experiment the rmse equals 0.071 and 2.0 for DIP and DIN, respectively.

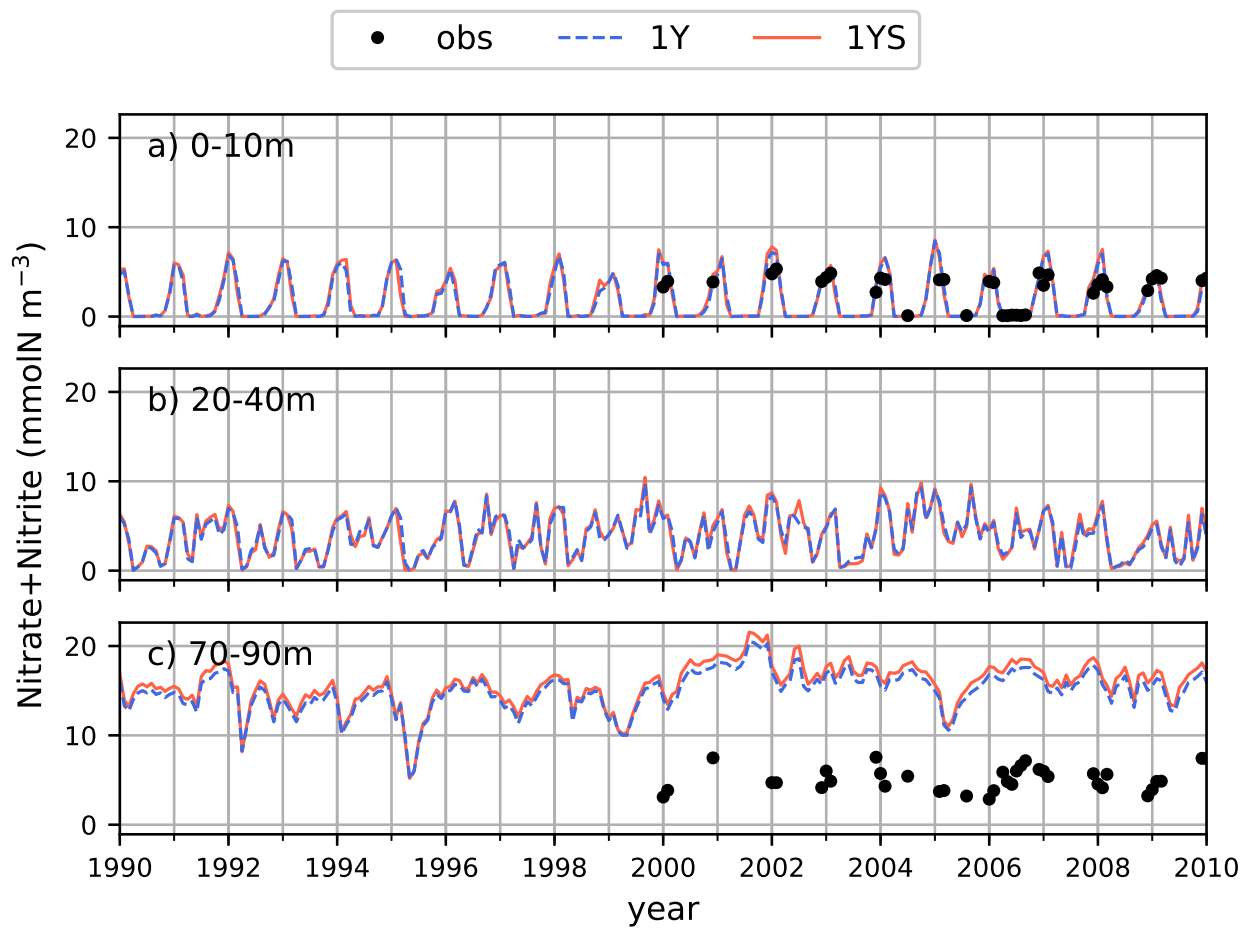


Figure S6. Timeseries of modelled monthly means and observed concentrations of nitrate plus nitrite at a) 0-10m, b) 20-40m and c) 70-90m, at the C3 station in the Bothnian Sea.

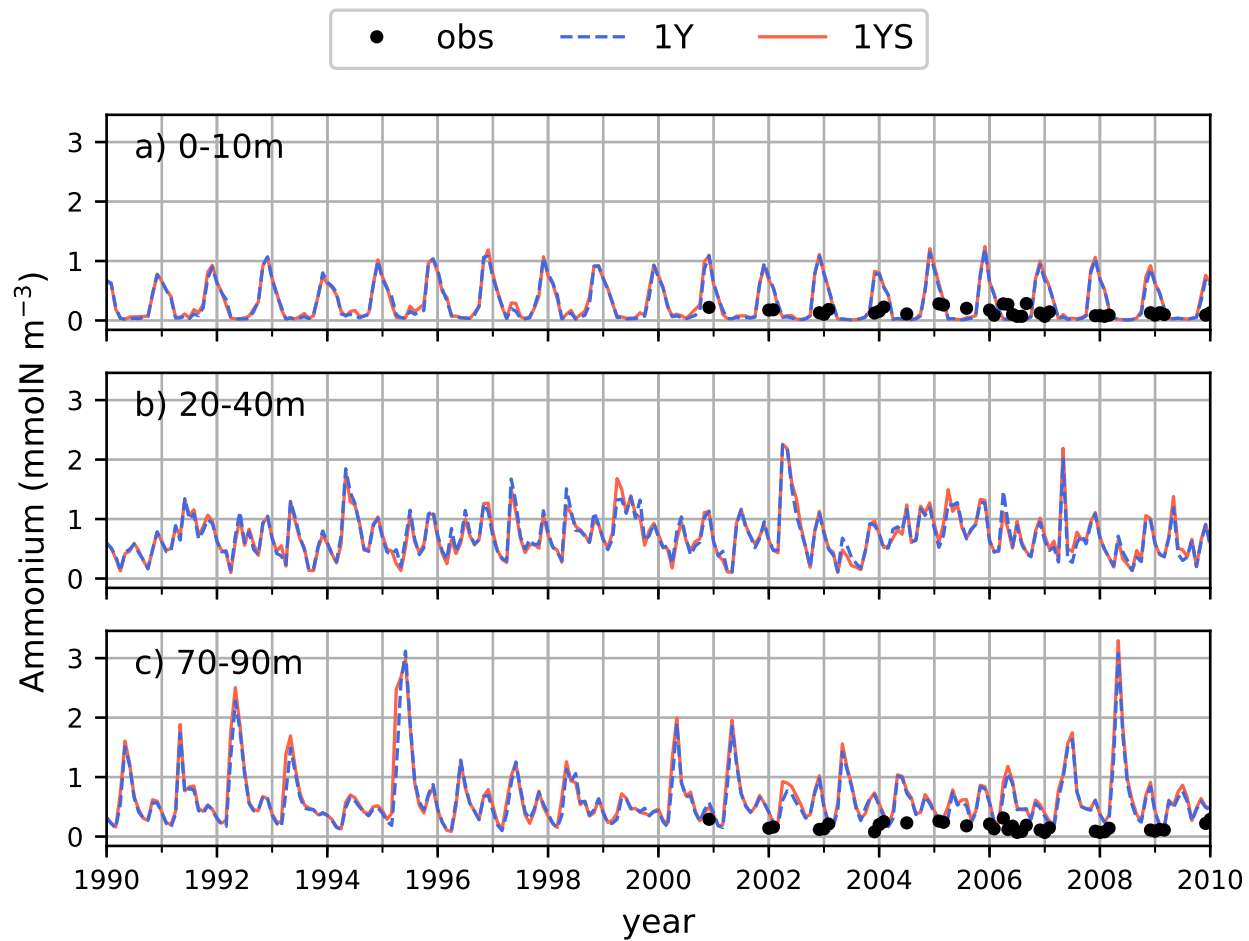


Figure S7. Timeseries of modelled monthly means and observed concentrations of ammonium at a) 0-10m, b) 20-40m and c) 70-90m, at the C3 station in the Bothnian Sea.

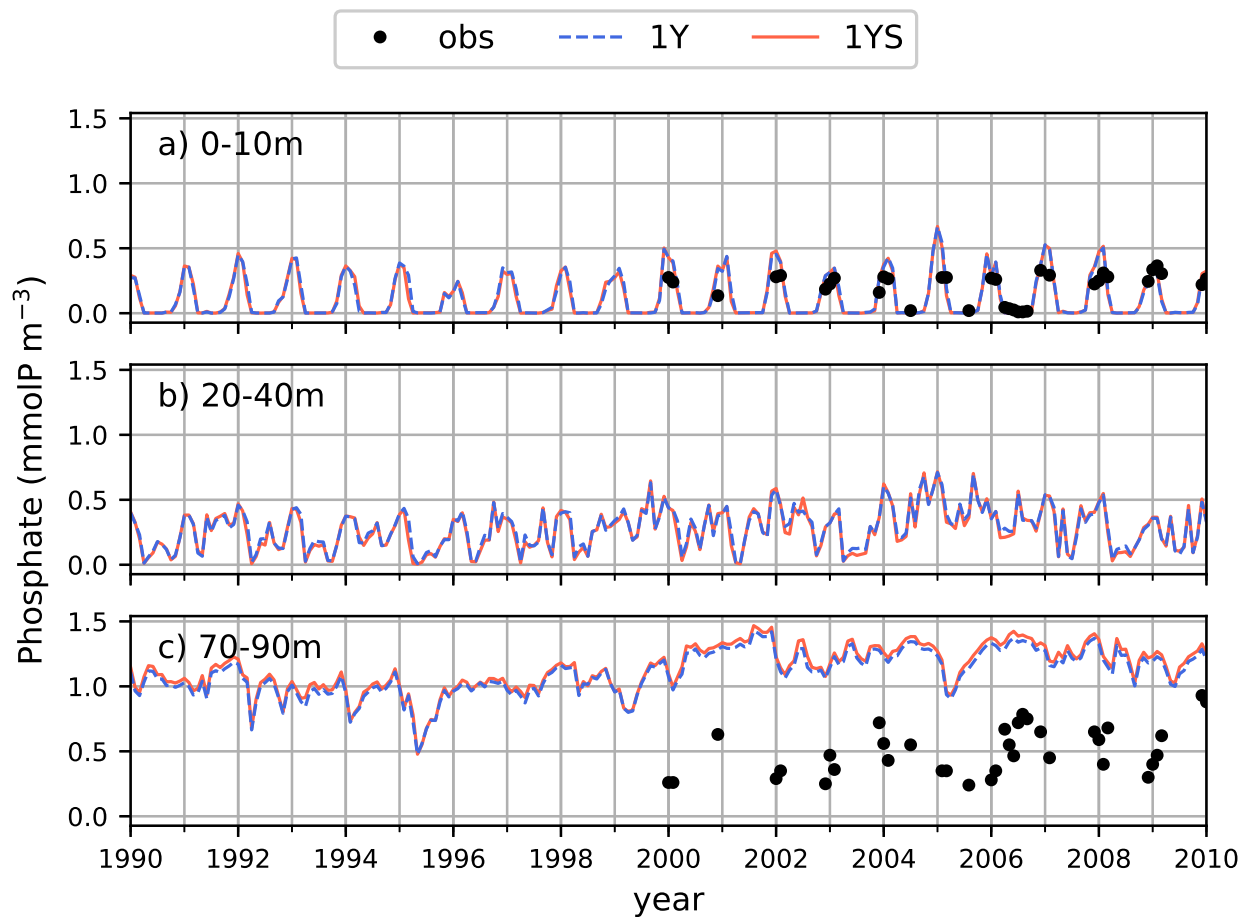


Figure S8. Timeseries of modelled monthly means and observed concentrations of phosphate at a) 0-10m, b) 20-40m and c) 70-90m, at the C3 station in the Bothnian Sea.

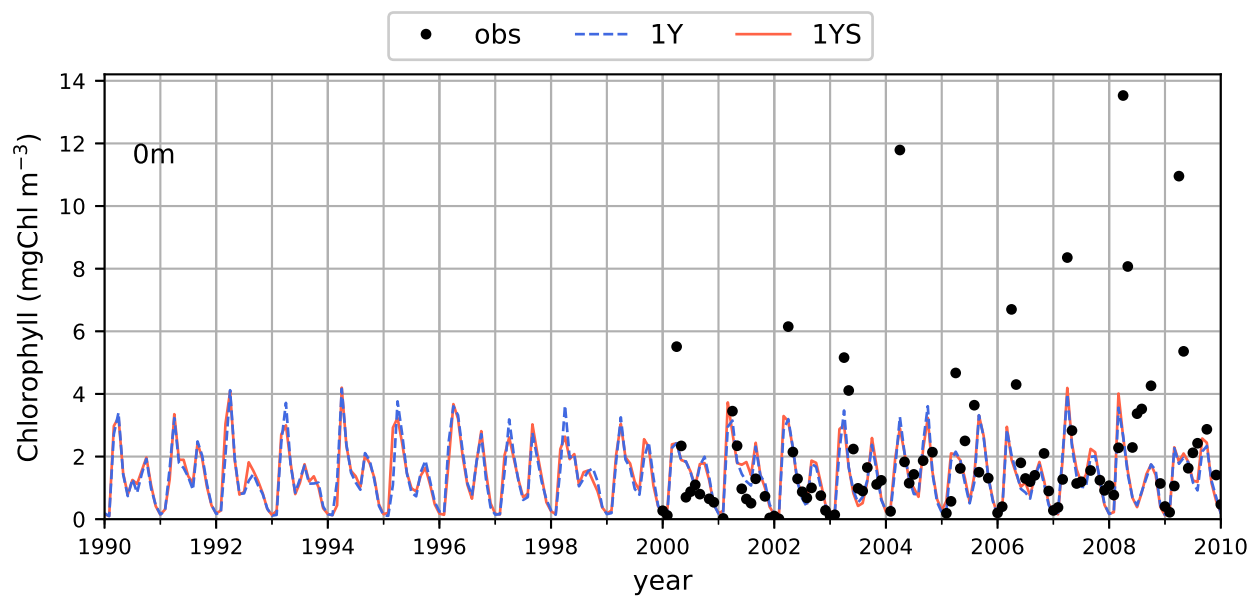


Figure S9. Timeseries of modelled and observed concentrations of chlorophyll at the C3 station.

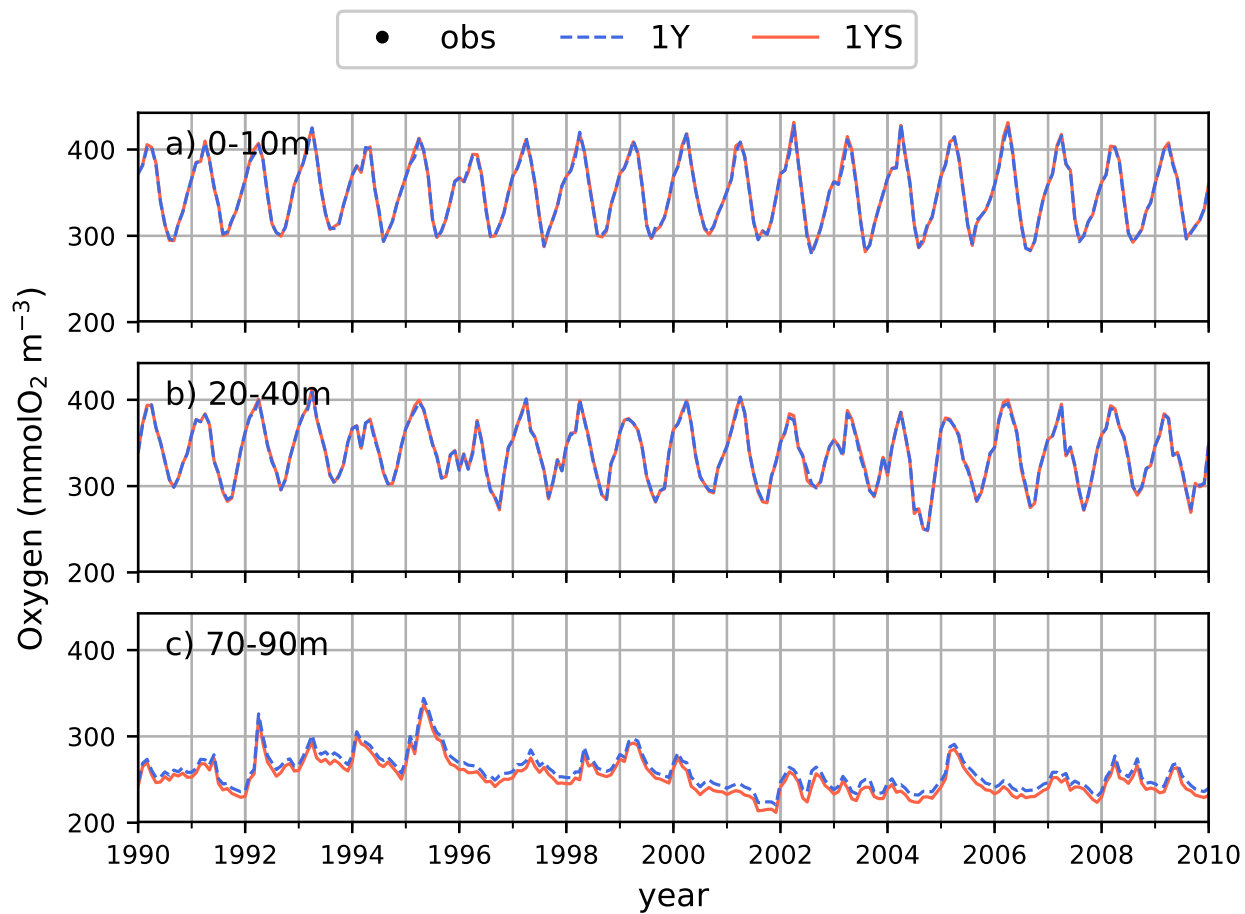


Figure S10. Timeseries of modelled monthly means and observed concentrations of oxygen at a) 0-10m, b) 20-40m and c) 70-90m, at the C3 station in the Bothnian Sea.

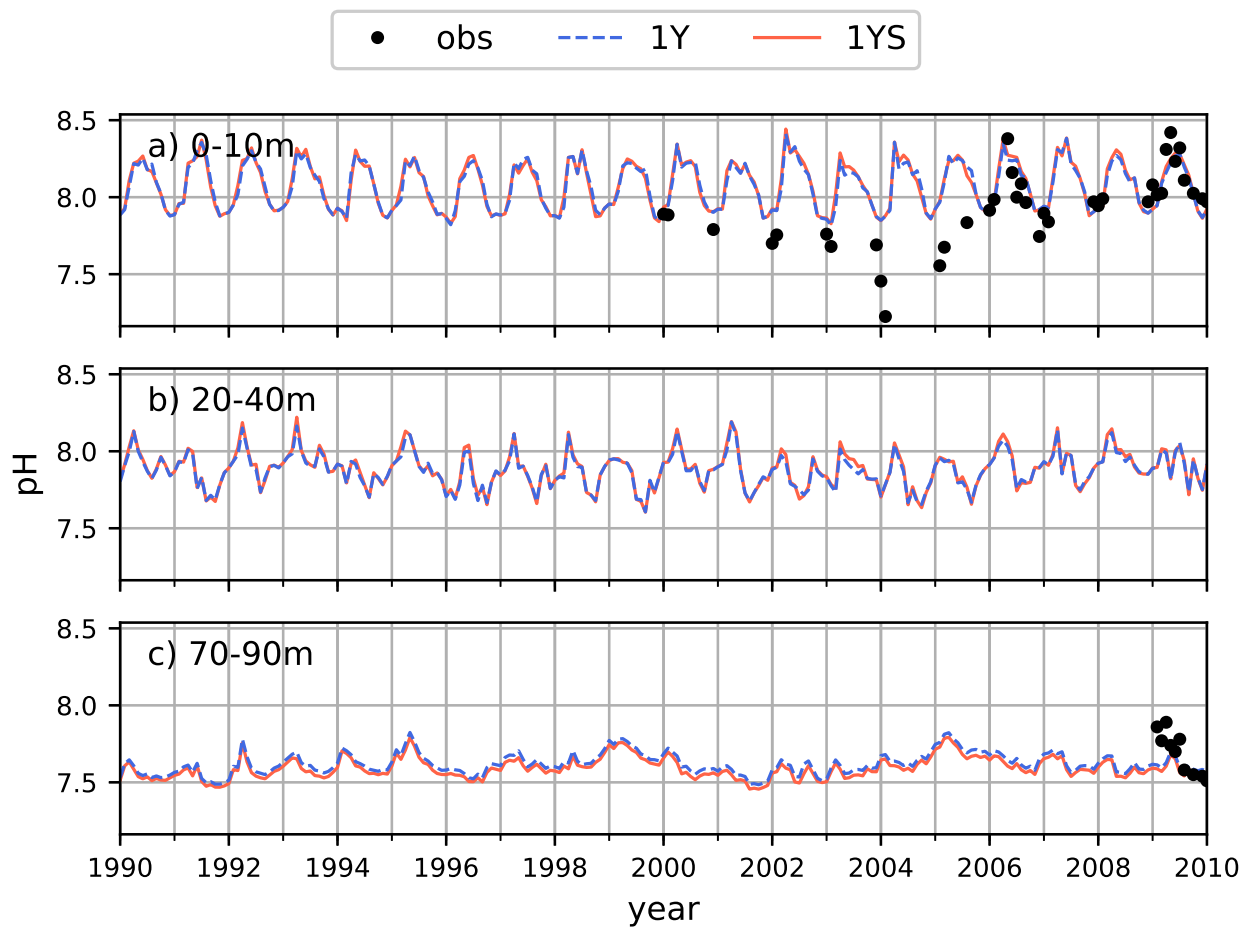


Figure S11. Timeseries of modelled monthly means and observed concentrations of pH at a) 0-10m, b) 20-40m and c) 70-90m, at the C3 station in the Bothnian Sea.

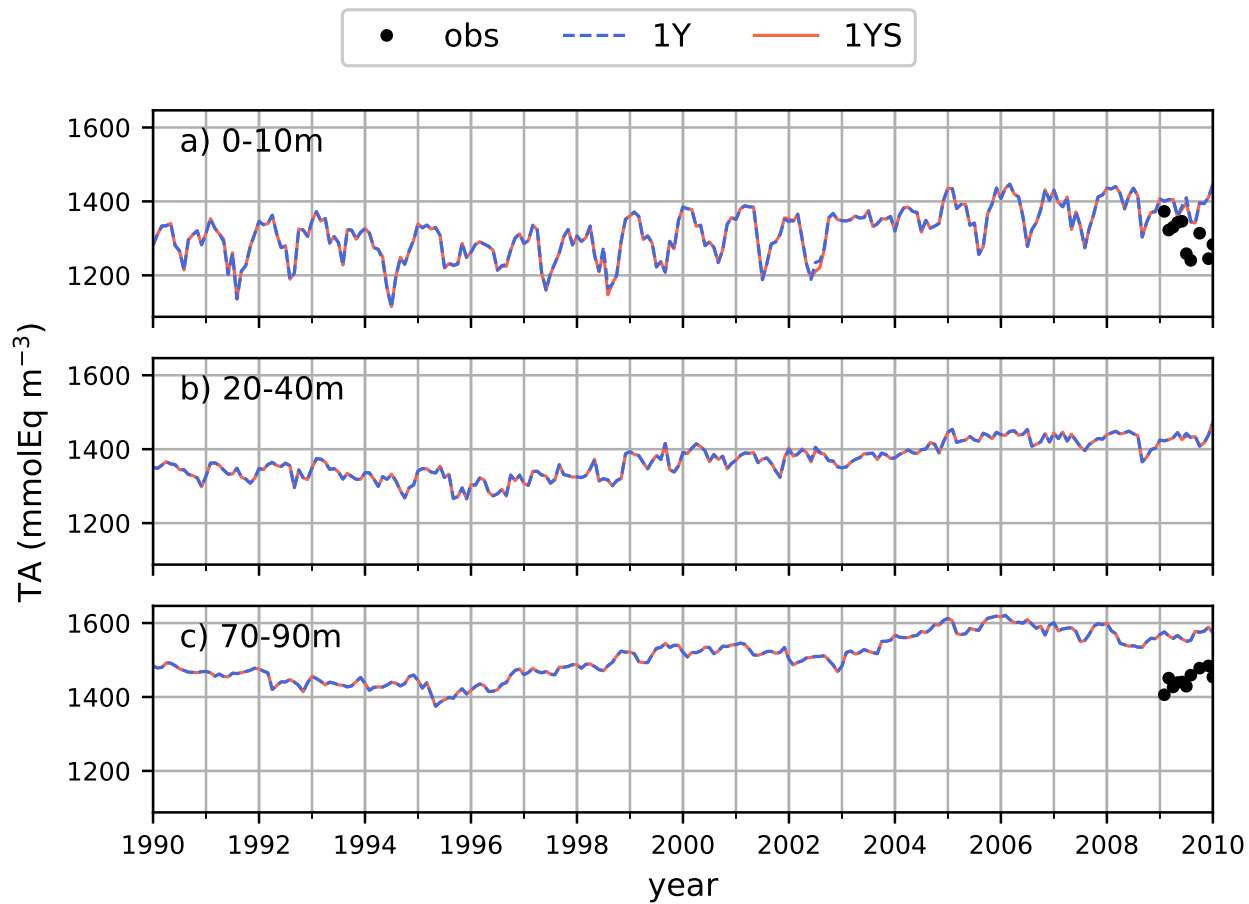


Figure S12. Timeseries of modelled monthly means and observed concentrations of total alkalinity at a) 0-10m, b) 20-40m and c) 70-90m, at the C3 station in the Bothnian Sea.

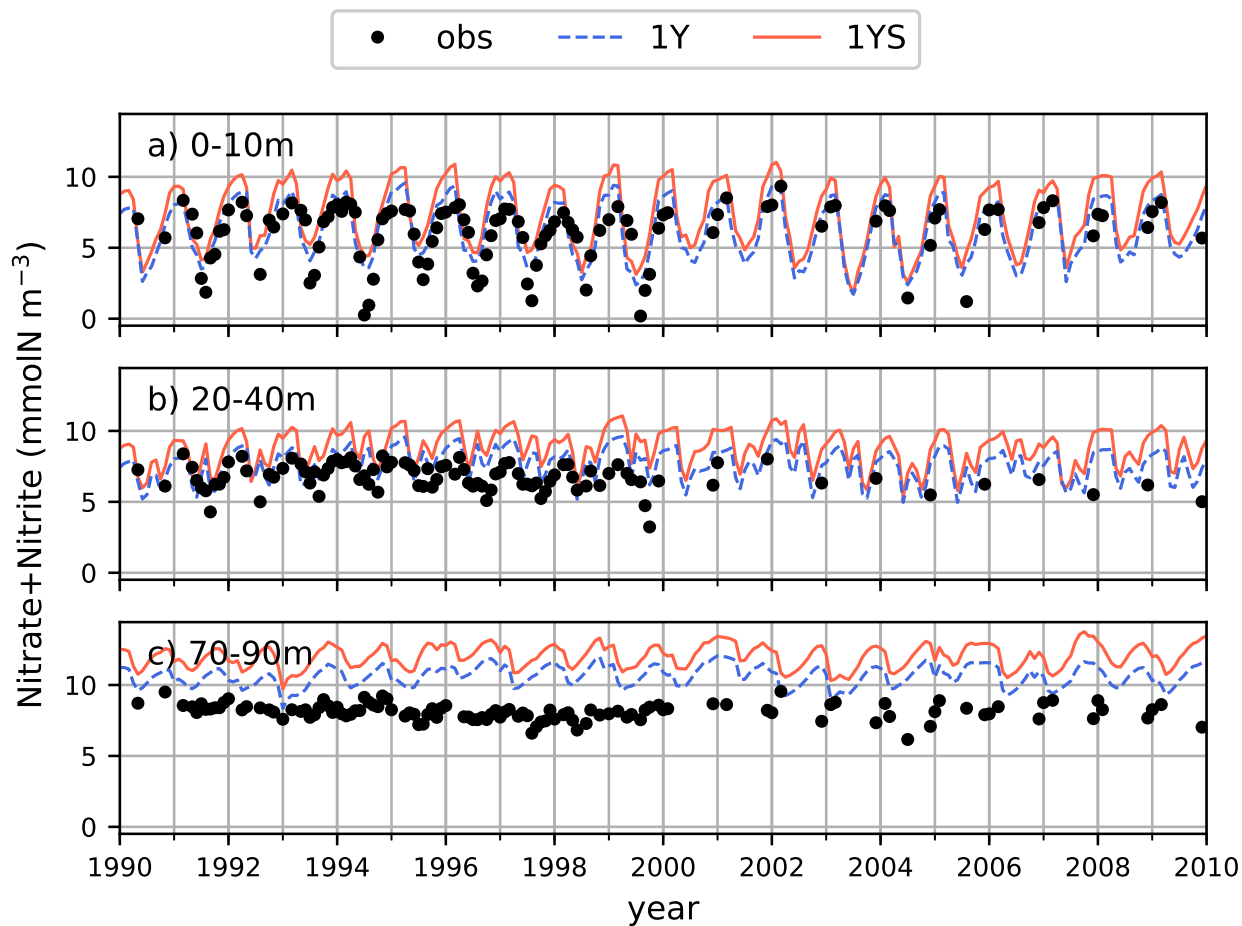


Figure S13. Timeseries of modelled monthly means and observed concentrations of nitrate plus nitrite at a) 0-10m, b) 20-40m and c) 70-90m, at the F9-A13 station in the Bothnian Bay.

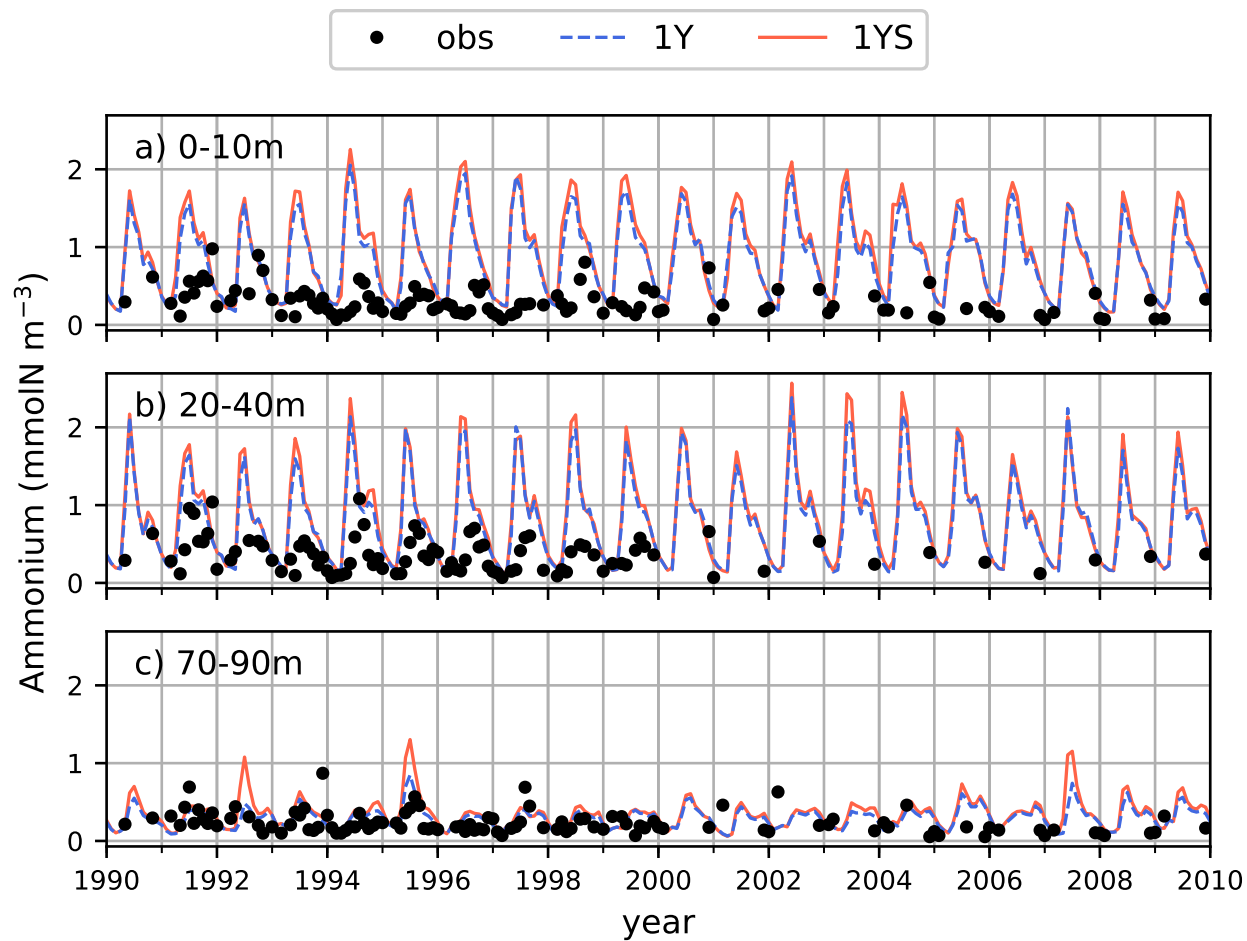


Figure S14. Timeseries of modelled monthly means and observed concentrations of ammonium at a) 0-10m, b) 20-40m and c) 70-90m, at the F9-A13 station in the Bothnian Bay.

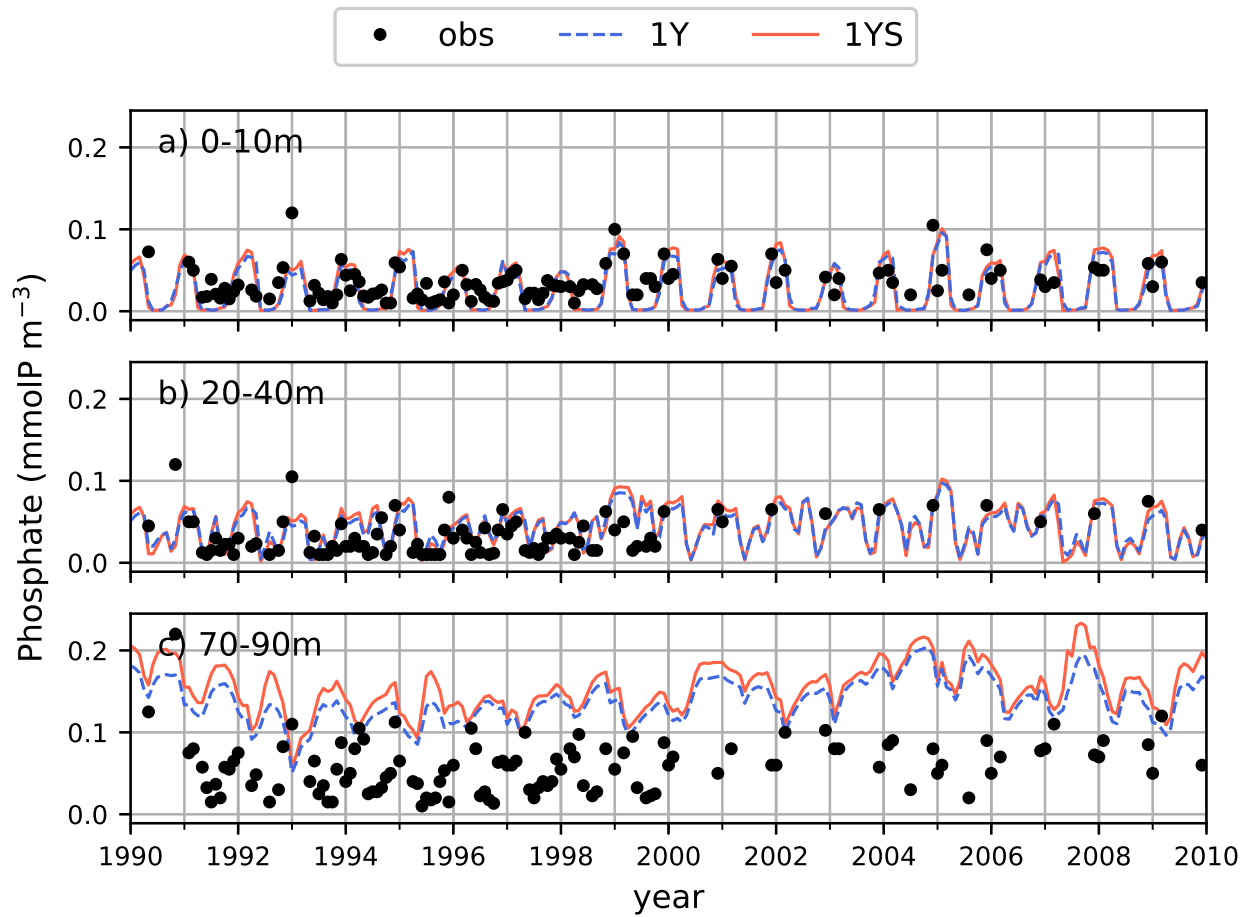


Figure S15. Timeseries of modelled monthly means and observed concentrations of phosphate at a) 0-10m, b) 20-40m and c) 70-90m, at the F9-A13 station in the Bothnian Bay.

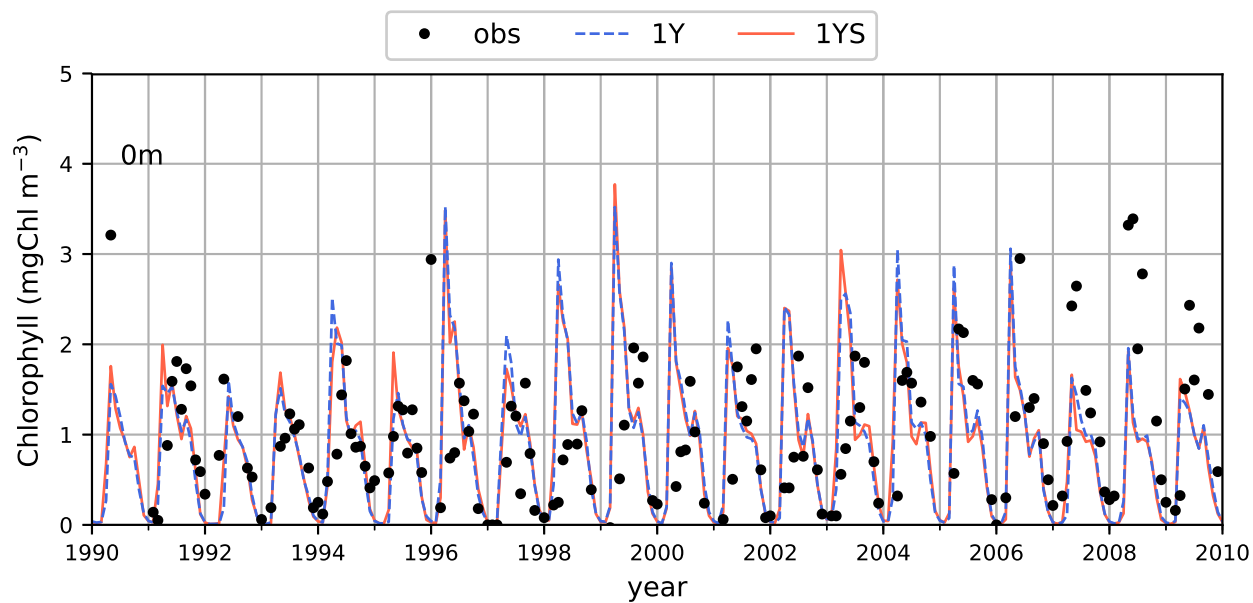


Figure S16. Timeseries of modelled and observed concentrations of chlorophyll at the F9-A13 station.

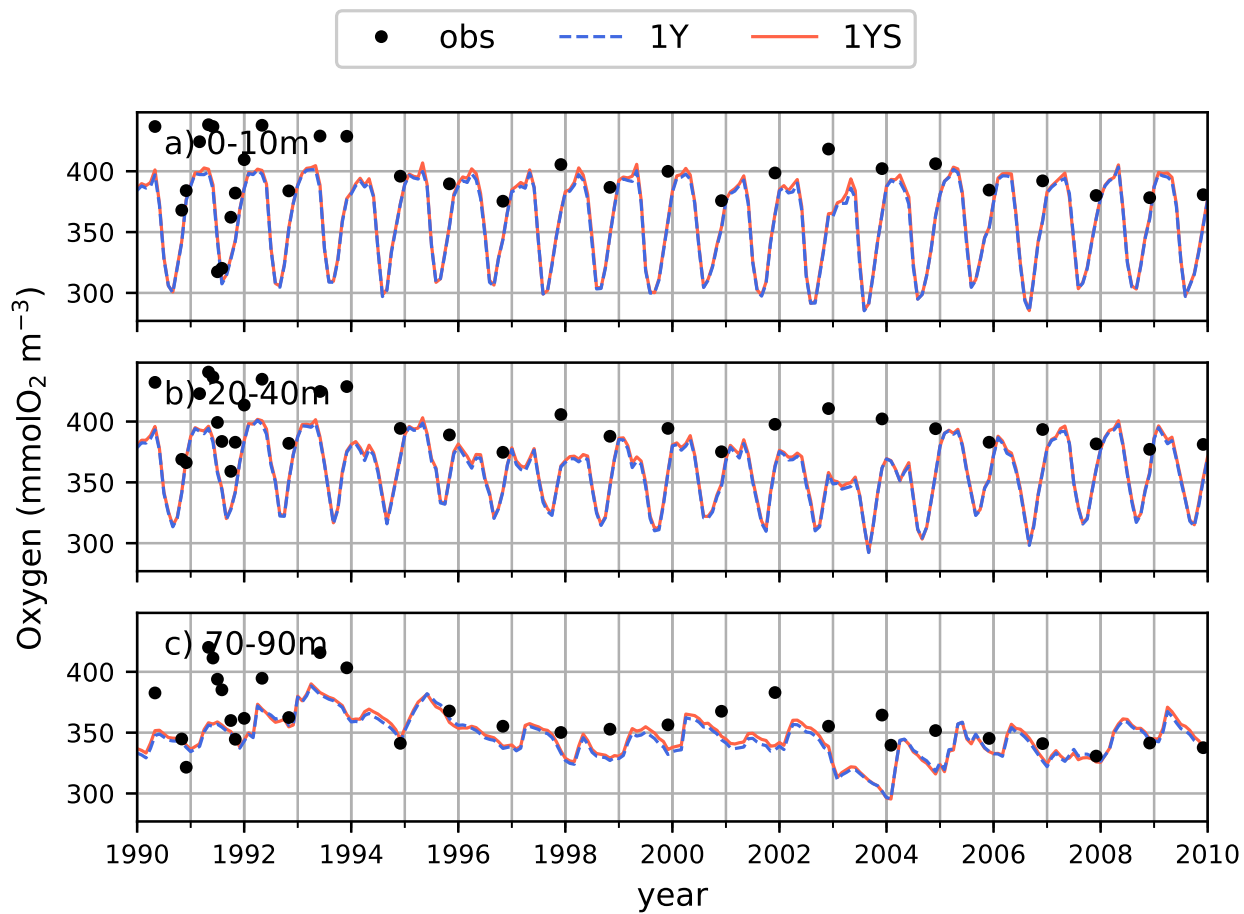


Figure S17. Timeseries of modelled monthly means and observed concentrations of oxygen at a) 0-10m, b) 20-40m and c) 70-90m, at the F9-A13 station in the Bothnian Bay.

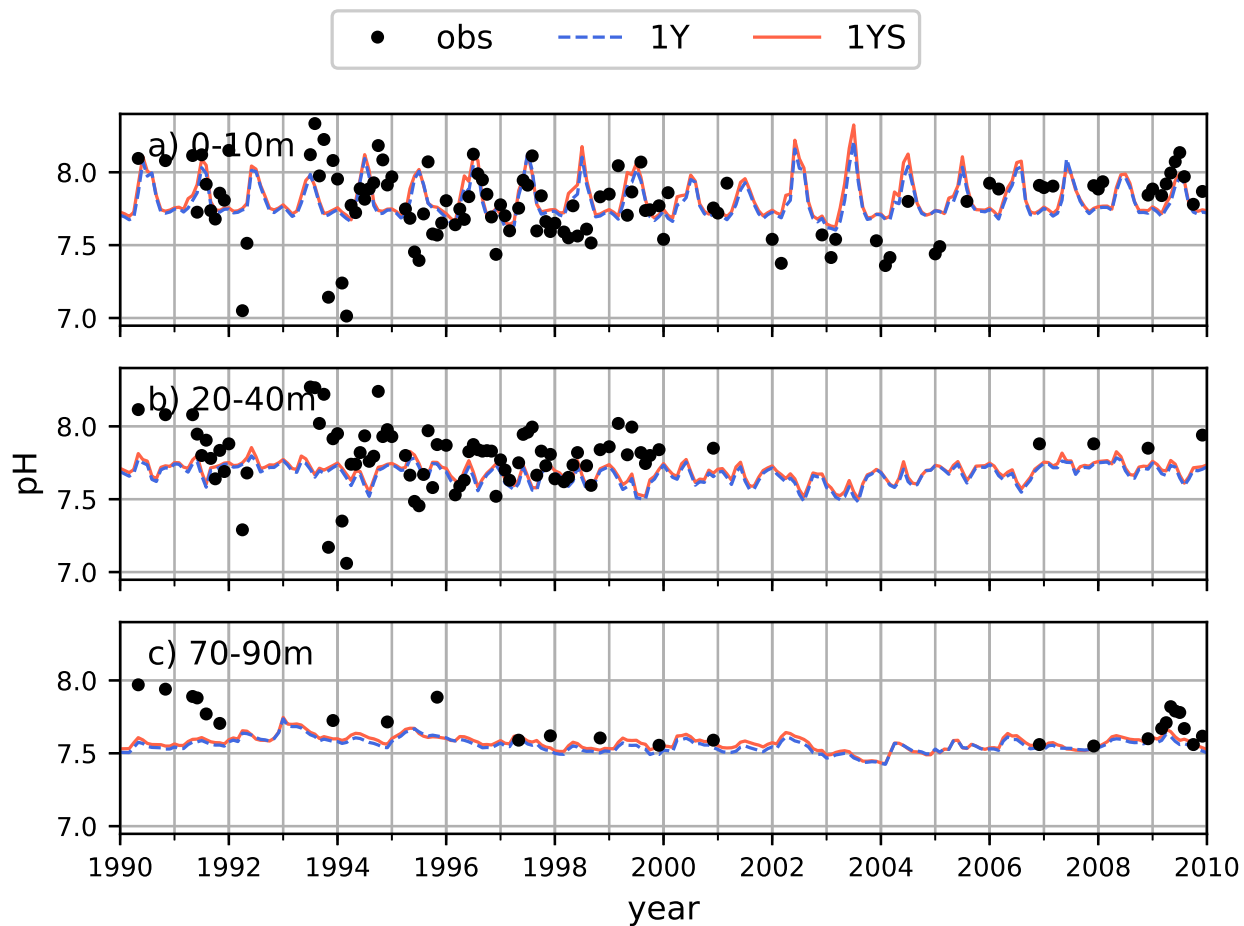


Figure S18. Timeseries of modelled monthly means and observed concentrations of pH at a) 0-10m, b) 20-40m and c) 70-90m, at the F9-A13 station in the Bothnian Bay.

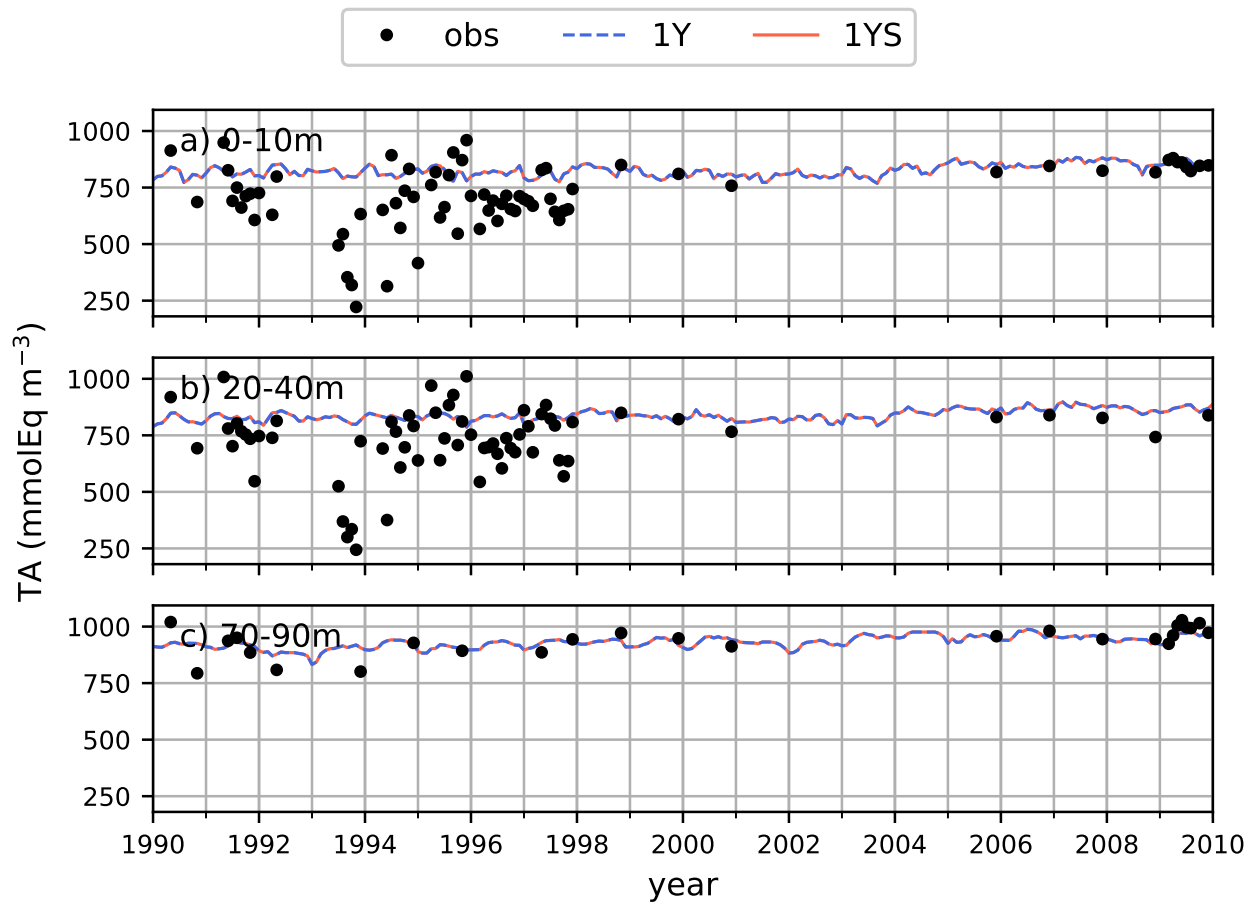


Figure S19. Timeseries of modelled monthly means and observed concentrations of total alkalinity at a) 0-10m, b) 20-40m and c) 70-90m, at the F9-A13 station in the Bothnian Bay.