

1 **Supplementary Materials**

2 **Table S1. Performance of the model in reproducing these key tidal constituents at stations List TG, Havneby TG, and Vidaå TG.**
3 **Amplitudes (A, cm) and phases (φ , °) were compared between the model and observations applying RMSD measure.**

station	tide	simulations	observation
List TG	M2	A: 76.7 φ : 023.9	A: 77.9 φ : 023.9
	S2	A: 14.8 φ : 094.6	A: 12.9 φ : 094.6
	N2	A: 11.9 φ : 358.2	A:13.3 φ : 358.2
	O1	A: 7.04 φ : 267.7	A: 8.33 φ : 269.3
	K1	A: 5.79 φ : 063.9	A: 5.80 φ : 056.7
	Q1	A: 1.9 φ : 210.8	A: 2.64 φ : 210.8
	M4	A: 5.08 φ : 202.5	A: 5.08 φ : 214.9
	RMSD A: 1.79 (cm) φ : 5.4(°)		
Havneby TG	M2	A: 73.9 φ : 033.5	A: 79.8 φ : 024.8
	S2	A: 13.0 φ : 113.8	A: 19.5 φ : 094.9
	N2	A: 9.48 φ : 355.2	A: 13.4 φ : 359.2
	O1	A: 6.54 φ : 278.5	A: 8.33 φ : 269.3
	K1	A: 5.85 φ : 077.5	A: 5.80 φ : 056.7
	Q1	A: 2.62 φ : 211.1	A: 2.64 φ : 210.8
	M4	A: 7.71 φ : 207.5	A: 7.84 φ : 224.9
	RMSD A: 3.72 (cm) φ : 12.3(°)		
Vidaå TG	M2	A: 63.4 φ : 041.3	A: 63.4 φ : 042.4
	S2	A: 14.9 φ : 113.1	A: 14.9 φ : 113.1
	N2	A: 9.75 φ : 018.4	A: 9.78 φ : 018.3
	O1	A: 6.95 φ : 284.4	A: 6.95 φ : 284.5
	K1	A: 5.58 φ : 079.3	A: 5.58 φ : 079.4
	Q1	A: 1.80 φ : 217.7	A: 1.78 φ : 217.7
	M4	A: 4.77 φ : 014.5	A: 4.77 φ : 025.9
	RMSD A: 0.01 (cm) φ : 4.3(°)		

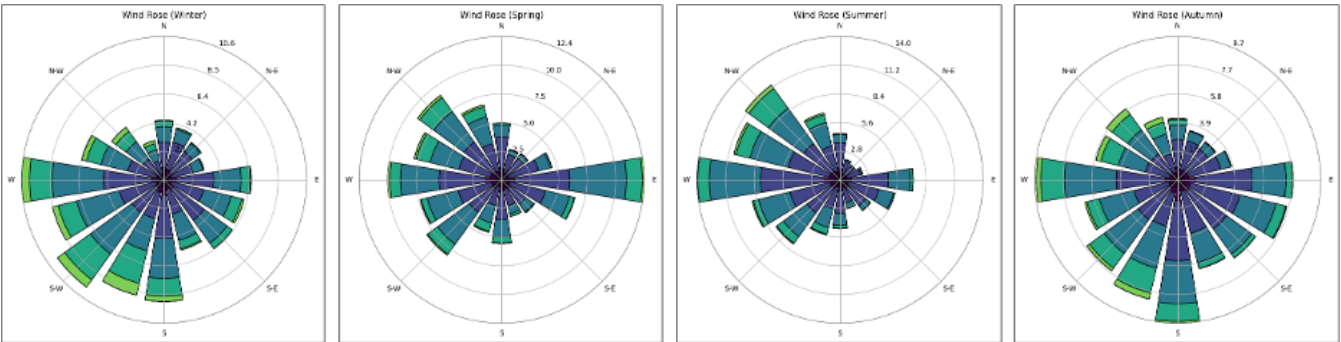


Figure S1. Dominant wind directions in seasons.

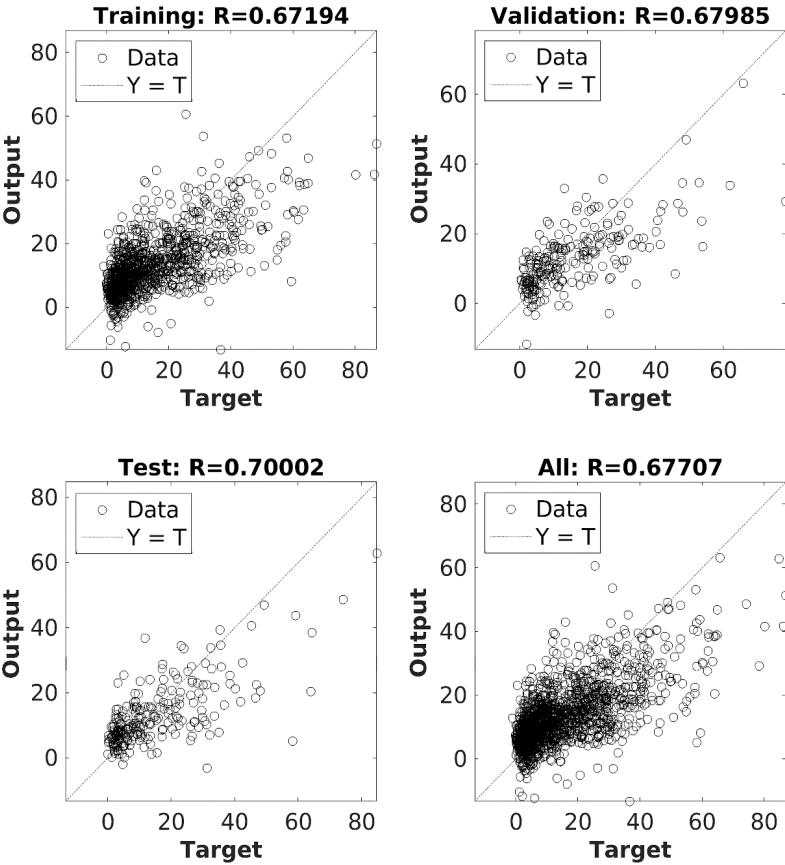


Figure S2. Regression analysis for the NN trained at the data from all seasons.

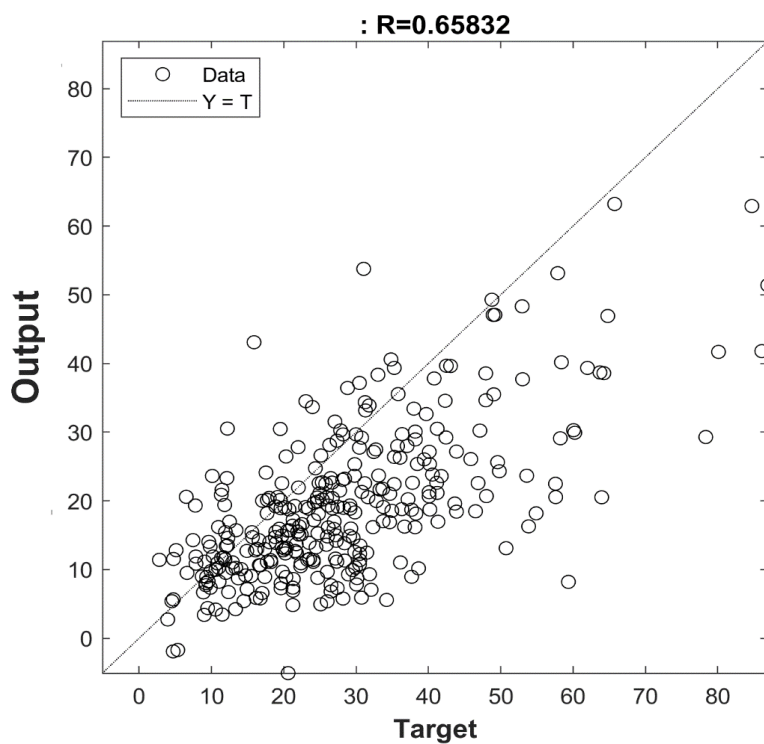


Figure S3. Regression analysis for the NN trained on the whole database applied to the winter dataset.

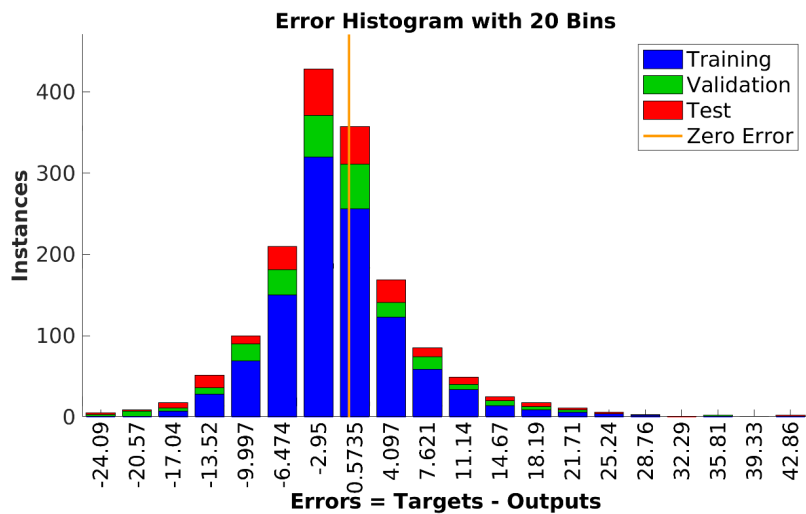


Figure S4. Errors histogram. Errors are in mg/L.

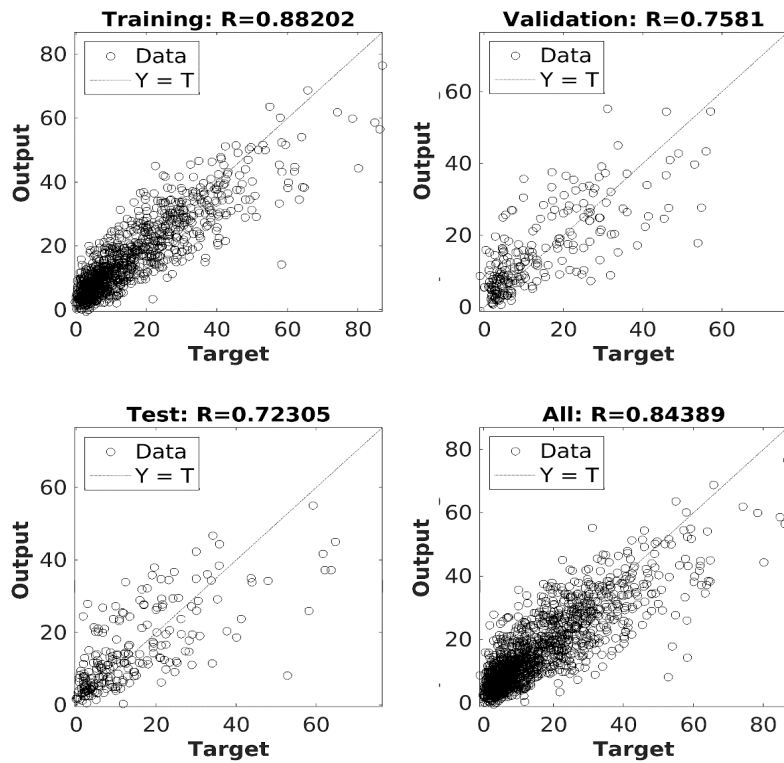


Figure S5. Regression analysis for the NN with two additional features, trained on the full dataset.