



Supplement of

Covariation of redox potential profiles and the water table level at peat-land sites representing different drainage regimes: implications for ecological modelling

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S1. CWT figures

In all figures, the y-axis represents wavelet period in hours; notice that the axis is logarithmic and inverted (short periods, i.e. higher frequency is up). X-axis represents the date, formatted as the last two digits of year-month. Colour indicates wavelet coherence; dark red indicates strong synphase coherence, and dark blue indicates strong anti-phase coherence.

535 LTD

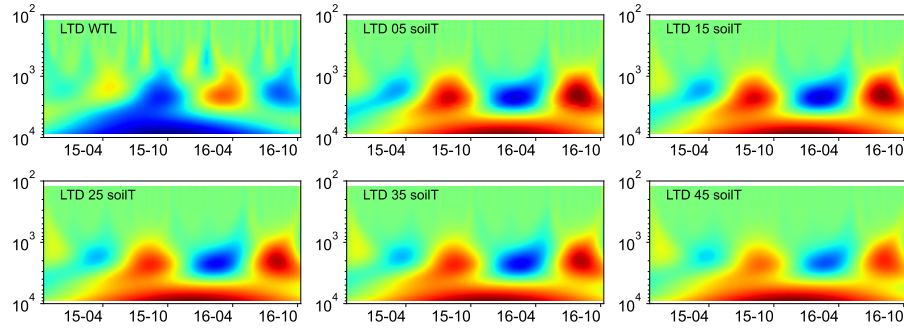


Figure S1. Left to right, top to bottom: Mexican hat wavelet coherence with 1) WTL data from the LTD plot; 2) soil temperature (soilT) at 5 cm depth; 3) soilT at 15 cm depth; 4) soilT at 25 cm depth; 5) soilT at 35 cm depth; 6) soilT at 45 cm depth.

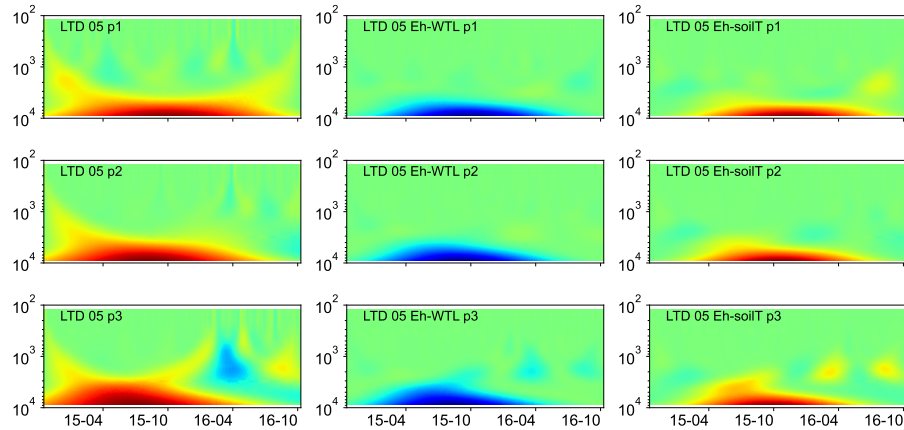


Figure S2. Left: Wavelet coherence between Mexican hat wave and E_h at LTD plot, 5 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at LTD plot, 5 cm depth. three probes plotted separately.

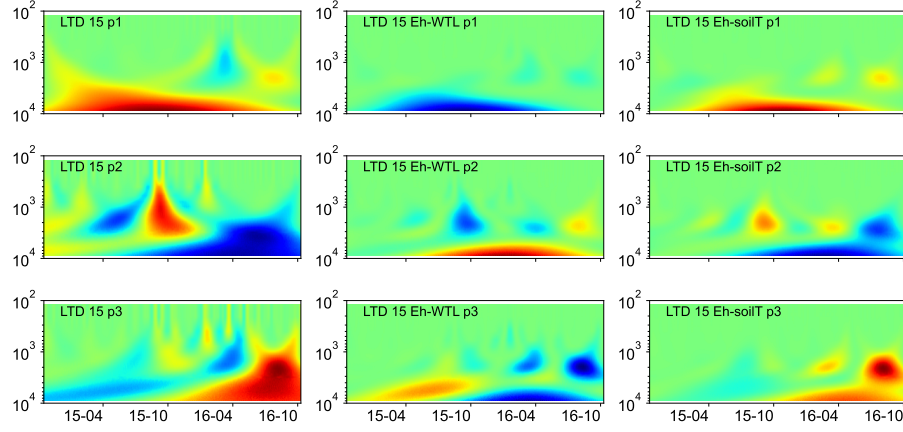


Figure S3. Left: Wavelet coherence between Mexican hat wave and E_h at LTD plot, 15 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at LTD plot, 15 cm depth. three probes plotted separately.

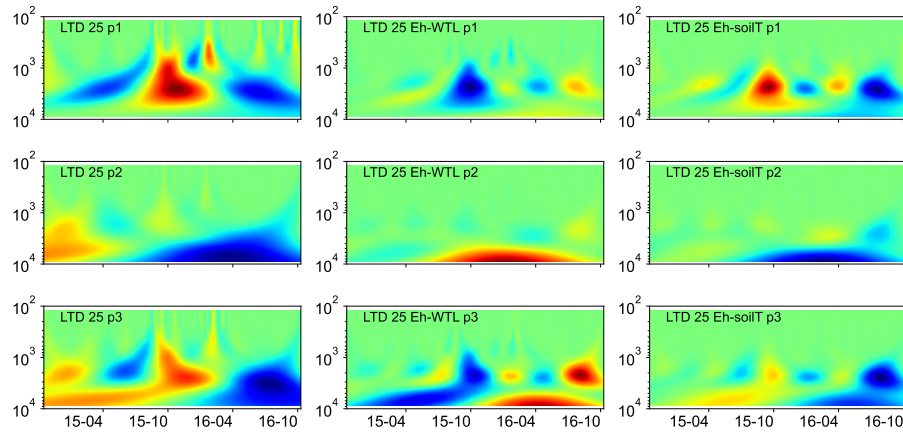


Figure S4. Left: Wavelet coherence between Mexican hat wave and E_h at LTD plot, 25 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at LTD plot, 25 cm depth. three probes plotted separately.

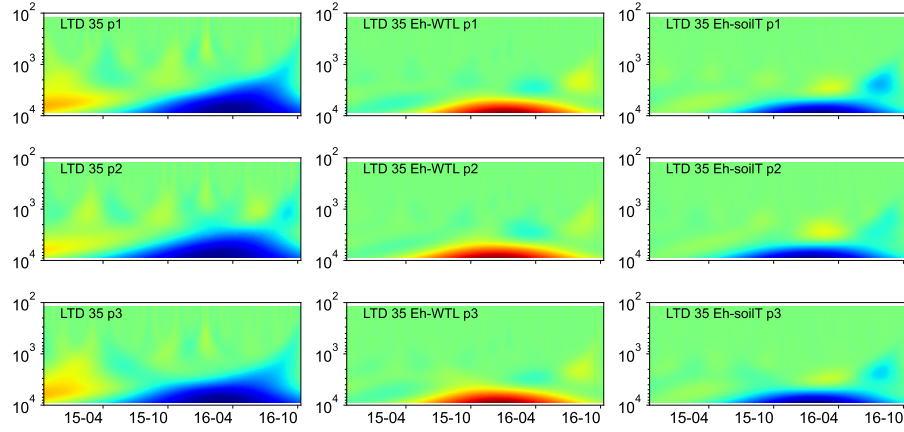


Figure S5. Left: Wavelet coherence between Mexican hat wave and E_h at LTD plot, 35 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at LTD plot, 35 cm depth. three probes plotted separately.

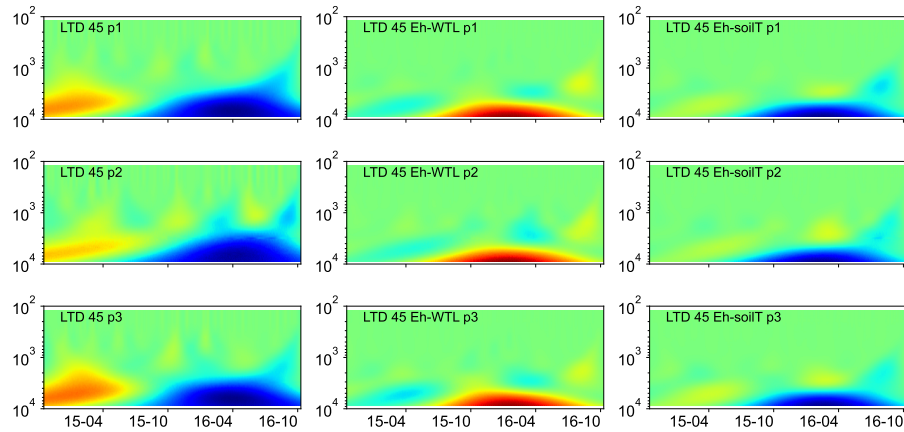


Figure S6. Left: Wavelet coherence between Mexican hat wave and E_h at LTD plot, 45 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at LTD plot, 45 cm depth. three probes plotted separately.

STD

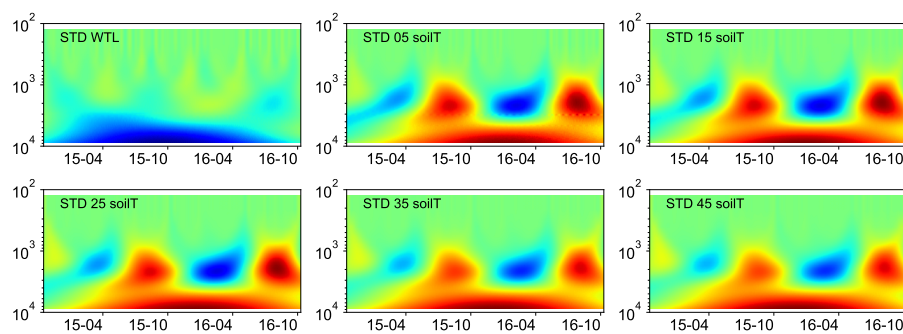


Figure S7. Left to right, top to bottom: Mexican hat wavelet coherence with 1) WTL data from the STD plot; 2) soil temperature (soilT) at 5 cm depth; 3) soilT at 15 cm depth, 4) soilT at 25 cm depth; 5) soilT at 35 cm depth; 6) soilT at 45 cm depth.

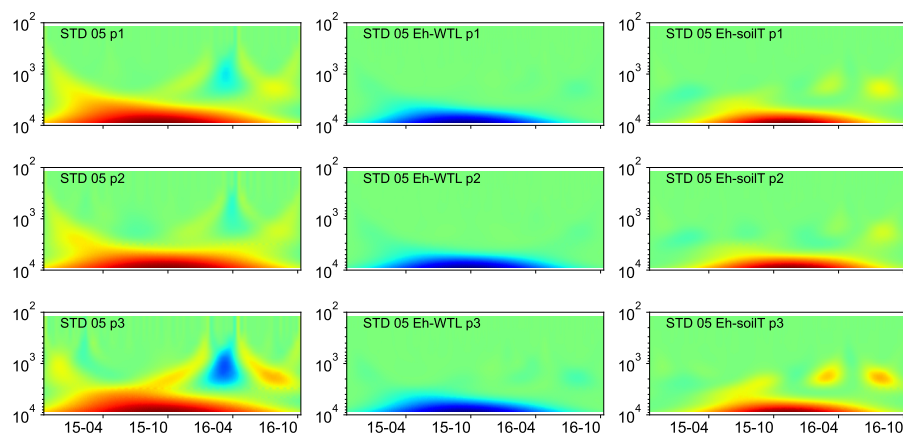


Figure S8. Left: Wavelet coherence between Mexican hat wave and E_h at the STD plot (5 cm depth); centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at the STD plot (5 cm depth). Three probes plotted separately.

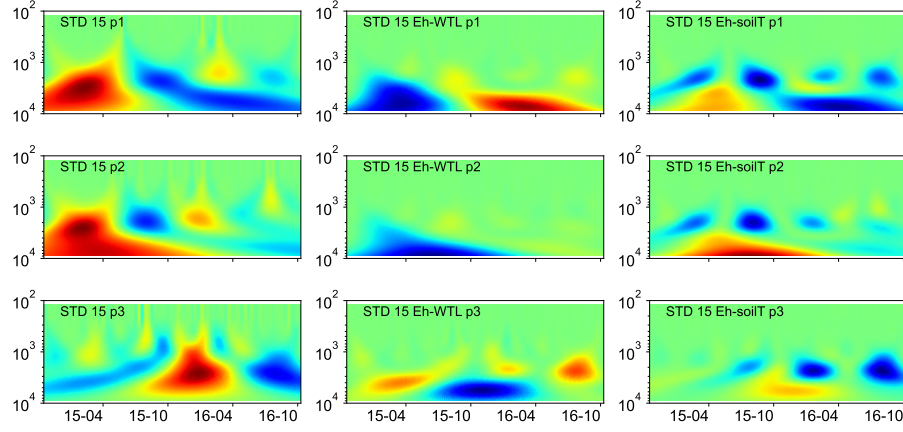


Figure S9. Left: Wavelet coherence between Mexican hat wave and E_h at STD plot, 15 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at STD plot, 15 cm depth. three probes plotted separately.

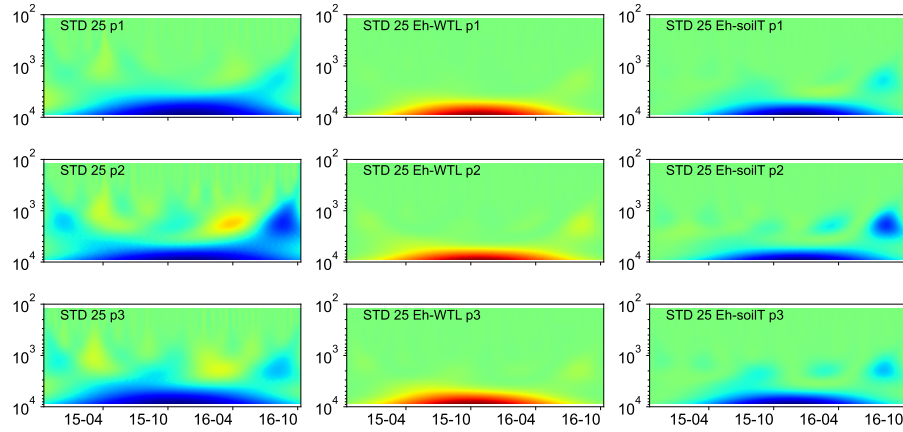


Figure S10. Left: Wavelet coherence between Mexican hat wave and E_h at the STD plot (25 cm depth); centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at the STD plot (25 cm depth). Three probes plotted separately.

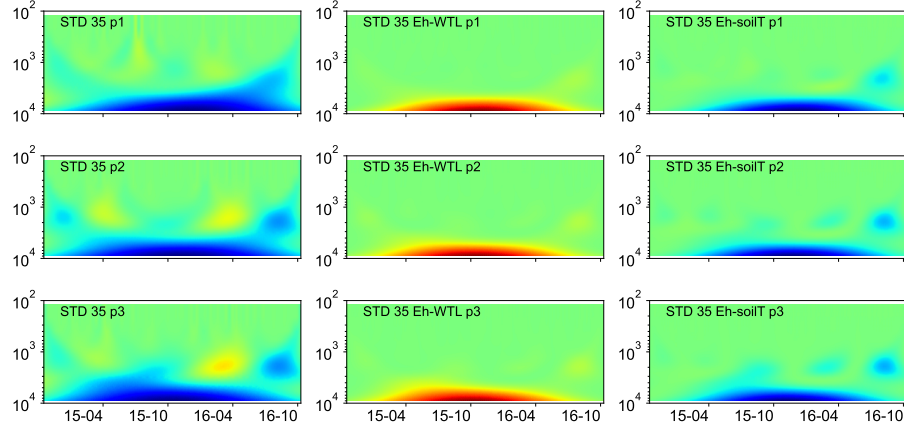


Figure S11. Left: Wavelet coherence between Mexican hat wave and E_h at STD plot, 35 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at STD plot, 35 cm depth. three probes plotted separately.

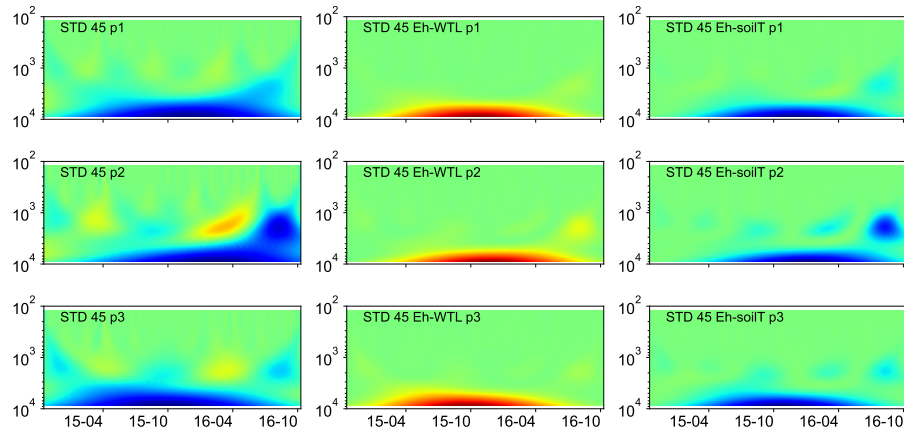


Figure S12. Left: Wavelet coherence between Mexican hat wave and E_h at the STD plot (45 cm depth); centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at the STD plot (45 cm depth). Three probes plotted separately.

UD

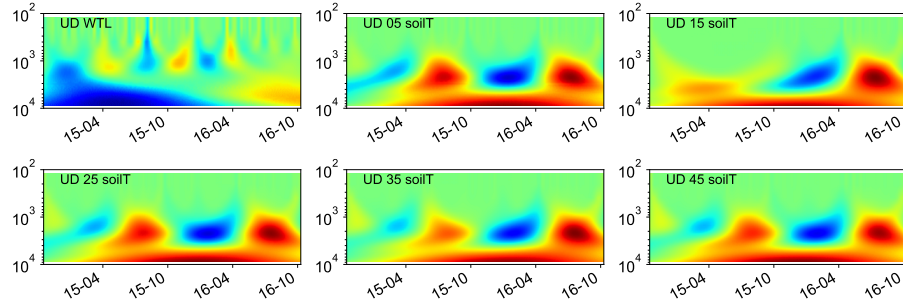


Figure S13. Left to right, top to bottom: Mexican hat wavelet coherence with 1) WTL data from the UD plot; 2) soil temperature (soilT) at 5 cm depth; 3) soilT at 15 cm depth; 4) soilT at 25 cm depth; 5) soilT at 35 cm depth; 6) soilT at 45 cm depth.

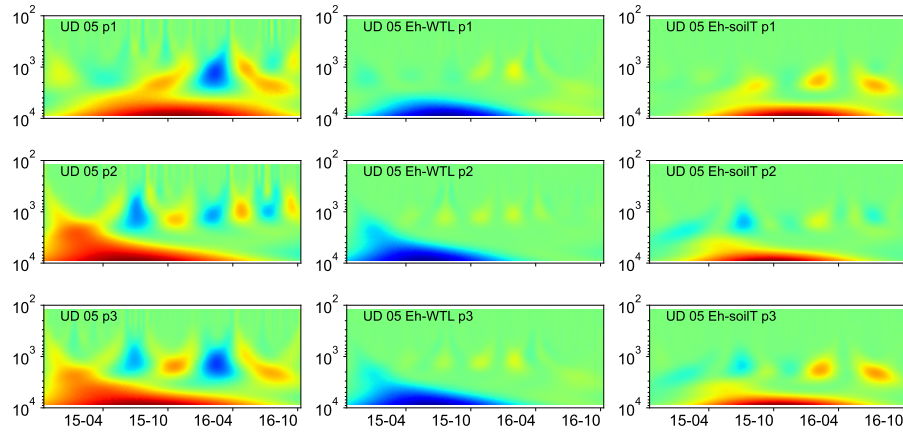


Figure S14. Left: Wavelet coherence between Mexican hat wave and E_h at the UD plot (5 cm depth); centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at the UD plot (5 cm depth). Three probes plotted separately.

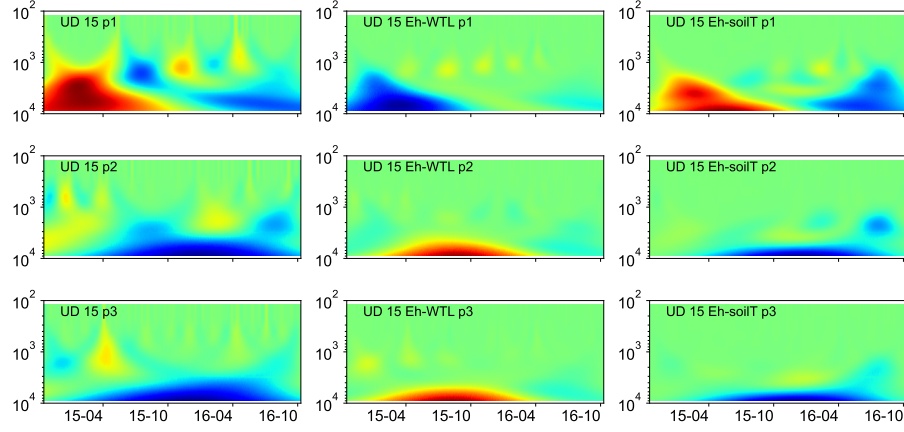


Figure S15. Left: Wavelet coherence between Mexican hat wave and E_h at UD plot, 15 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at UD plot, 15 cm depth. three probes plotted separately.

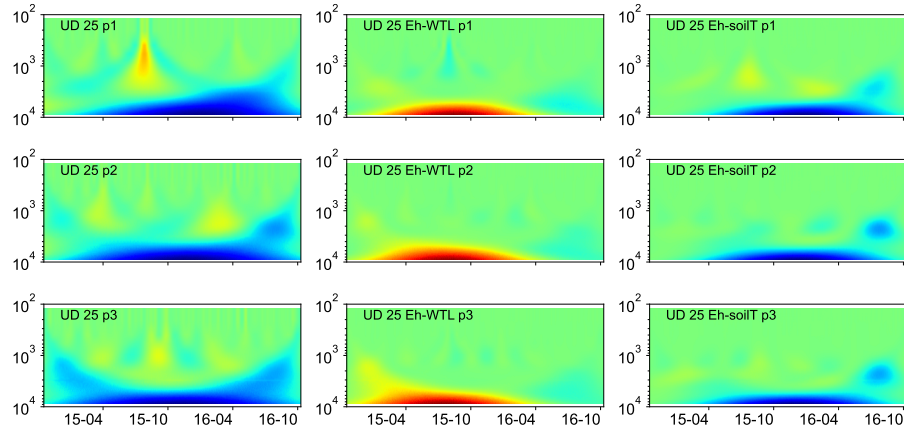


Figure S16. Left: Wavelet coherence between Mexican hat wave and E_h at the UD plot (25 cm depth); centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at the UD plot (25 cm depth). Three probes plotted separately.

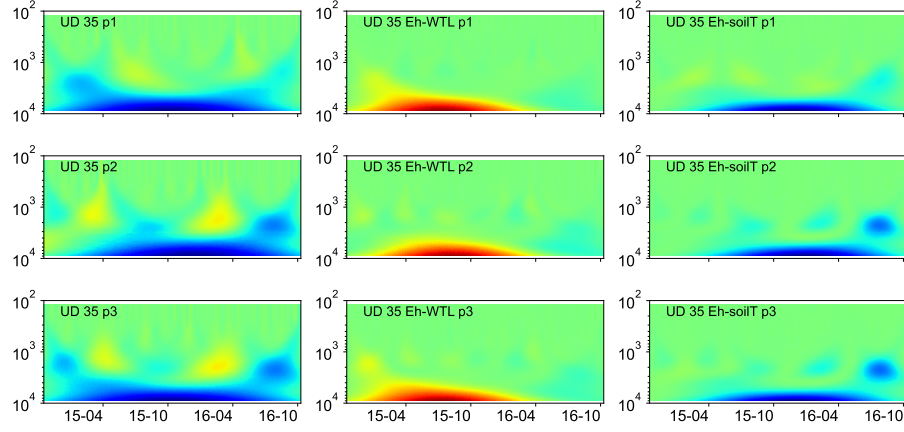


Figure S17. Left: Wavelet coherence between Mexican hat wave and E_h at UD plot, 35 cm depth; centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at UD plot, 35 cm depth. three probes plotted separately.

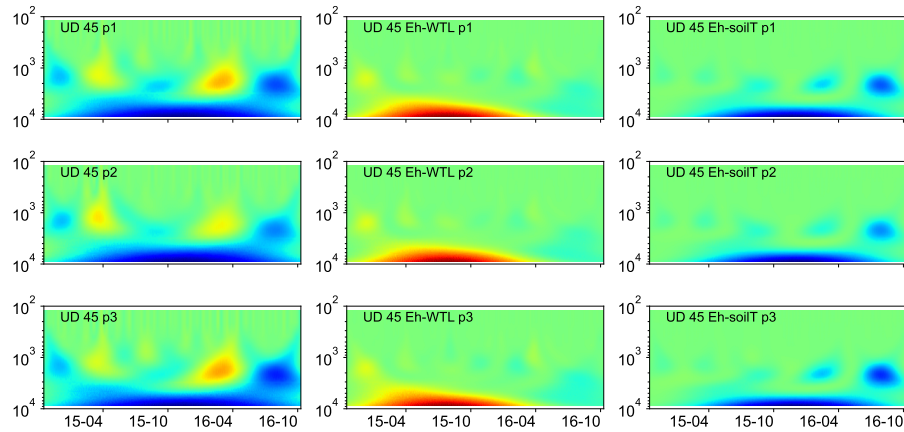


Figure S18. Left: Wavelet coherence between Mexican hat wave and E_h at the UD plot (45 cm depth); centre: interaction between E_h and WTL wavelets; right: interaction between E_h and soil temperature wavelets at the UD plot (45 cm depth). Three probes plotted separately.

S2. Enzyme activity tables

Enzyme activity presented as as $\mu\text{g L-tyrosine}$ for Protease and $\text{NH}_4\text{-N}$ for Urease and Arg.Deaminase, $\text{h}^{-1} \text{ g}^{-1} \text{ d.w. soil}$,
540 respectively.

Table S1. Enzyme activity at the three mesotrophic study sites during Autumn 2014 (n=9; mean values $\pm$ standard error (SE); data subjected to Tukey HSD tests and Box-Cox transformation; different letters express statistically significant results, where lowercase letters (a) refer to mean comparisons of homogeneous groups vertically, and uppercase letters (A) refer to horizontally between surfaces.

Treatment	Long-term Drainage (LTD)	Short-term Drainage (STD)	Undrained (UD)
Depth, cm	Protease	Protease	Protease
0-10	219.4 $\pm$ 11.4aA	428.0 $\pm$ 17.8aB	1519.2 $\pm$ 22.9aC
10-20	128.1 $\pm$ 14.4bA	410.5 $\pm$ 40.9abB	590.7 $\pm$ 12.1bC
20-30	125.7 $\pm$ 19.6bA	347.8 $\pm$ 17.5bB	358.8 $\pm$ 9.9cB
30-40	217.4 $\pm$ 23.9aA	220.6 $\pm$ 29.4cA	324.7 $\pm$ 14.0cB
40-50	202.5 $\pm$ 20.7aA	198.5 $\pm$ 26.4cA	314.5 $\pm$ 27.7cB
Depth, cm	Urease	Urease	Urease
0-10	127.2 $\pm$ 14.6aA	193.0 $\pm$ 17.2aB	1119.6 $\pm$ 10.1aC
10-20	96.6 $\pm$ 8.2aA	74.5 $\pm$ 11.3bA	339.9 $\pm$ 68.4bB
20-30	37.9 $\pm$ 3.1bA	49.0 $\pm$ 7.1bcA	66.4 $\pm$ 19.1cA
30-40	27.2 $\pm$ 4.0bcA	39.0 $\pm$ 3.5cA	71.4 $\pm$ 11.3cB
40-50	19.7 $\pm$ 6.0cA	41.4 $\pm$ 6.4cA	35.1 $\pm$ 8.1cA
Depth, cm	Arginine deaminase	Arginine deaminase	Arginine deaminase
0-10	33.5 $\pm$ 5.1aA	46.6 $\pm$ 8.3aA	31.8 $\pm$ 2.6aA
10-20	30.5 $\pm$ 2.9aA	50.8 $\pm$ 4.7aB	27.4 $\pm$ 1.7aA
20-30	42.8 $\pm$ 6.9aAB	58.1 $\pm$ 5.1aB	31.8 $\pm$ 1.1aC
30-40	32.6 $\pm$ 2.4aA	59.9 $\pm$ 1.7aB	56.5 $\pm$ 3.5bB
40-50	50.2 $\pm$ 5.7aA	108.6 $\pm$ 11.4bC	72.5 $\pm$ 5.9bB

Table S2. Enzyme activity at the three mesotrophic study sites during Spring 2015 (n=9; mean values $\pm$ standard error (SE); data subjected to Tukey HSD tests and Box-Cox transformation; different letters express statistically significant results, where lowercase letters (a) refer to mean comparisons of homogeneous groups vertically, and uppercase letters (A) refer to horizontally between surfaces.

Treatment	Long-term Drainage (LTD)	Short-term Drainage (STD)	Undrained (UD)
Depth	Protease	Protease	Protease
0-10	282.8 $\pm$ 7.2aA	498.4 $\pm$ 21.0aB	1065.7 $\pm$ 34.5aC
10-20	164.6 $\pm$ 10.2bA	377.1 $\pm$ 17.8bB	700.6 $\pm$ 24.2bC
20-30	62.7 $\pm$ 6.4cA	281.0 $\pm$ 20.6cB	336.8 $\pm$ 12.2cB
30-40	113.9 $\pm$ 7.9dA	191.1 $\pm$ 10.2dB	298.4 $\pm$ 15.9cdC
40-50	213.6 $\pm$ 8.4eA	206.8 $\pm$ 21.4dA	247.1 $\pm$ 16.2dA
Depth	Urease	Urease	Urease
0-10	353.8 $\pm$ 25.8aA	446.8 $\pm$ 14.9aB	1366.6 $\pm$ 25.9aC
10-20	66.2 $\pm$ 9.7bA	38.6 $\pm$ 7.4cA	180.7 $\pm$ 8.1bB
20-30	27.9 $\pm$ 7.6cdA	53.5 $\pm$ 6.0bB	143.1 $\pm$ 9.6cC
30-40	39.4 $\pm$ 2.9bcA	17.6 $\pm$ 3.7cB	53.7 $\pm$ 5.3dA
40-50	17.4 $\pm$ 3.1dA	47.9 $\pm$ 3.2cB	53.5 $\pm$ 3.7dB
Depth	Arginine deaminase	Arginine deaminase	Arginine deaminase
0-10	11.0 $\pm$ 0.6aA	12.2 $\pm$ 1.2abA	7.4 $\pm$ 0.3aB
10-20	4.2 $\pm$ 0.3cA	6.2 $\pm$ 0.2cB	4.4 $\pm$ 0.5cA
20-30	3.2 $\pm$ 0.6cA	7.1 $\pm$ 0.5cB	8.4 $\pm$ 0.4aB
30-40	9.0 $\pm$ 0.8abA	10.0 $\pm$ 0.4bAB	11.1 $\pm$ 0.4bB
40-50	7.0 $\pm$ 0.5bA	13.1 $\pm$ 0.4aC	10.9 $\pm$ 0.2bB

Table S3. Enzyme activity at the three mesotrophic study sites during Summer 2015 (n=9; mean values $\pm$ standard error (SE); data subjected to Tukey HSD tests and Box-Cox transformation; different letters express statistically significant results, where lowercase letters (a) refer to mean comparisons of homogeneous groups vertically, and uppercase letters (A) refer to horizontally between surfaces.

Treatment	Long-term Drainage (LTD)	Short-term Drainage (STD)	Undrained (UD)
Depth	Protease	Protease	Protease
0-10	296.7 $\pm$ 13.1aA	700.1 $\pm$ 20.1aB	1605.6 $\pm$ 34.9aC
10-20	255.3 $\pm$ 3.6bA	362.3 $\pm$ 14.9bB	786.5 $\pm$ 30.0bC
20-30	115.1 $\pm$ 5.2cA	350.0 $\pm$ 11.4bB	308.3 $\pm$ 14.6cB
30-40	133.8 $\pm$ 5.7cA	271.1 $\pm$ 11.3cB	360.9 $\pm$ 17.8cC
40-50	133.9 $\pm$ 5.0cA	256.2 $\pm$ 11.0cC	214.95 $\pm$ 10.3dB
Depth	Urease	Urease	Urease
0-10	431.0 $\pm$ 13.7aB	162.5 $\pm$ 7.7aA	1124.3 $\pm$ 13.8aC
10-20	90.6 $\pm$ 5.6bB	40.9 $\pm$ 3.5bA	147.7 $\pm$ 8.3bC
20-30	71.5 $\pm$ 4.9bB	40.8 $\pm$ 4.5bA	53.2 $\pm$ 2.8cA
30-40	25.3 $\pm$ 2.7cB	48.8 $\pm$ 2.5bA	47.9 $\pm$ 2.4cA
40-50	6.9 $\pm$ 1.2dA	49.7 $\pm$ 2.3bC	35.3 $\pm$ 2.9dB
Depth	Arginine deaminase	Arginine deaminase	Arginine deaminase
0-10	12.8 $\pm$ 0.8aA	8.8 $\pm$ 1.0aB	7.5 $\pm$ 0.4aB
10-20	6.0 $\pm$ 0.8bA	9.4 $\pm$ 0.6aB	8.6 $\pm$ 0.6abB
20-30	7.6 $\pm$ 0.3cA	9.1 $\pm$ 0.3aB	8.4 $\pm$ 0.3abAB
30-40	7.3 $\pm$ 0.3cB	10.8 $\pm$ 0.6aA	10.3 $\pm$ 0.1cA
40-50	7.6 $\pm$ 0.7cA	13.9 $\pm$ 0.4bB	9.3 $\pm$ 0.5bcA

Table S4. Correlations of E_h and enzyme activities within profiles, between depths. Year 2014 – Autumn, Mesotrophic fen. Treatment LTD and STD. Value for E_h is the mean of two weeks preceding the sampling. Correlations are significant at $p < 0.05$, $N=5$. Statistically significant correlations are designated **.

Variable-Treatment							
E_h -LTD	1						
Protease-LTD	-0.5999	1.0000					
Urease-LTD	0.7478	-0.0198	1.0000				
Arg. deam.-LTD	-0.4915	0.0133	-0.6312	1.0000			
E_h -STD	0.4543	0.4167	0.8642	-0.4329	1.0000		
Protease-STD	0.9645**	-0.4144	0.8956**	-0.5579	0.6454	1.0000	
Urease-STD	0.5318	0.3229	0.8883**	-0.4012	0.9933**	0.7087	1.0000
Arg. deam.-STD	-0.7859	0.2471	-0.6702	0.8563	-0.4869	-0.7738	-0.4998

Table S5. Correlations of E_h and enzyme activities within profiles, between depths. Year 2015 – Spring, Mesotrophic fen. Treatment LTD, STD and UD. E_h is the mean of two weeks preceding the sampling. Correlations are significant at p < 0.05, N=5. Statistically significant correlations are designated **.

Variable-Treatment											
E _h -LTD		1									
Protease-LTD		0.875	1								
Urease-LTD		0.9178**	0.7456	1							
Arg. deam.-LTD		0.5342	0.6857	0.6831	1						
E _h -STD		0.9482**	0.7124	0.878	0.4201	1					
Protease-STD		0.9102**	0.5976	0.8679	0.2638	0.9587**	1				
Urease-STD		0.8961**	0.7527	0.9855**	0.6694	0.8115	0.8296	1			
Arg. deam.-STD		0.3318	0.686	0.3718	0.7731	0.0561	-0.0465	0.4511	1		
E _h -UD		0.9794**	0.7774	0.9449**	0.5228	0.9832**	0.9529**	0.9021**	0.2036	1	
Protease-UD		0.9425**	0.6774	0.9125**	0.4261	0.9924**	0.9773**	0.8554	0.0523	0.9879**	1
Urease-UD		0.9098**	0.7316	0.9955**	0.6465	0.8552	0.8694	0.9951**	0.3758	0.9308**	0.8968**
Arg. deam.-UD		-0.5038	-0.1413	-0.3124	0.3562	-0.685	-0.734	-0.2301	0.6173	-0.5655	-0.6622
											-0.3038

Table S6. Correlations of E_h and enzyme activities within profiles, between depths. Year 2015 – Summer, Mesotrophic fen. Treatment LTD, STD and UD. Value for E_h is the mean of two weeks preceding the sampling. Correlations are significant at p < 0.05, N=5. Statistically significant correlations are designated **.

Variable-Treatment											
E _h -LTD		1									
Protease-LTD		0.9360**		1							
Urease-LTD		0.9499**		0.8062 1							
Arg. deam.-LTD		0.8056 0.5478		0.9141** 1							
E _h -STD		0.9705** 0.8264		0.9879**		0.9233**		1			
Protease-STD		0.9431** 0.8079		0.9973**		0.8936**		0.9767** 1			
Urease-STD		0.9105** 0.7128		0.9629**		0.9750**		0.9807**		0.9424** 1	
Arg. deam.-STD		-0.4707 -0.5141		-0.5736		-0.3016		-0.4545		-0.6145 -0.3646 1	
E _h -UD		0.8984** 0.6922		0.9777**		0.9777**		0.9769**		0.9670** 0.9883** -0.4377 1	
Protease-UD		0.9866** 0.9292**		0.9636**		0.7979		0.9638**		0.9604** 0.9031** -0.5939 0.8974** 1	
Urease-UD		0.9552** 0.7976		0.9913**		0.9393**		0.9978**		0.9795** 0.9874** -0.4727 0.9854** 0.9559** 1	
Arg. deam.-UD		-0.747 -0.6761		-0.7848		-0.6128		-0.7375		-0.8224 -0.6433 0.5906 -0.7322 -0.7385 -0.7233	