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Variability in epilimnion depth estimations in lakes

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Supplementary material of HESS-2020-222

Table S1. Lake model parameters and calibrated values.

Parameter	Lake Erken	Lough Feeagh
Shf_factor	0.88	0.77
Swr_factor	0.98	0.93
Wind_factor	1.41	1.31
K_min	1.86e-6	3.48e-6
G2	2.14	0.56

Table S2: Pearson's correlation coefficient (r) matrices for all methods and all threshold combinations for Lough Feeagh and Lake Erken.

Lough Feeagh

		Method 1								Method 2								Method 3								Method 4							
		0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2
	0.025																																
	0.05	.59																															
	0.075	.46	.82																														
Method 1	0.1	.42	.76	.95																													
	0.125	.41	.73	.91	.98																												
	0.15	.39	.71	.89	.95	.99																											
	0.175	.38	.69	.86	.93	.97	.99																										
	0.2	.37	.67	.85	.91	.95	.97	.99																									
	0.025	.41	.68	.73	.74	.76	.78	.79	.79																								
	0.05	.26	.48	.61	.65	.68	.70	.72	.74	.64																							
	0.075	.16	.30	.39	.43	.46	.49	.51	.53	.40	.67																						
Method 2	0.1	.11	.22	.29	.33	.36	.38	.40	.42	.30	.51	.77																					
	0.125	.08	.16	.22	.25	.27	.29	.30	.32	.22	.38	.58	.75																				
	0.15	.07	.13	.17	.21	.23	.24	.25	.26	.18	.31	.46	.60	.79																			
	0.175	.06	.11	.15	.17	.19	.21	.22	.23	.15	.26	.38	.49	.66	.83																		
	0.2	.05	.09	.13	.15	.17	.18	.19	.19	.13	.22	.33	.42	.56	.71	.86																	
	0.025	.39	.64	.68	.71	.74	.77	.78	.79	.94	.61	.43	.34	.26	.22	.19	.16																
	0.05	.25	.46	.58	.63	.66	.68	.70	.72	.61	.95	.71	.55	.42	.34	.28	.24	.61															
	0.075	.15	.28	.37	.42	.45	.48	.50	.52	.38	.64	.97	.80	.60	.48	.40	.34	.43	.69														
Method 3	0.1	.11	.21	.27	.31	.34	.36	.38	.40	.29	.49	.73	.95	.79	.63	.53	.45	.33	.53	.76													
	0.125	.08	.15	.20	.23	.26	.27	.29	.30	.21	.36	.54	.70	.94	.85	.71	.61	.25	.39	.56	.74												
	0.15	.07	.12	.16	.20	.21	.23	.24	.25	.17	.29	.43	.56	.75	.94	.88	.75	.21	.32	.45	.60	.81											
	0.175	.06	.11	.14	.17	.18	.20	.21	.22	.14	.24	.36	.47	.63	.79	.95	.90	.18	.27	.38	.50	.68	.84										
	0.2	.05	.09	.12	.14	.16	.17	.18	.18	.12	.21	.31	.40	.54	.68	.81	.95	.15	.23	.32	.43	.57	.71	.85									
	0.025	.40	.70	.82	.81	.78	.75	.72	.70	.58	.50	.36	.29	.22	.19	.17	.15	.62	.50	.36	.28	.22	.19	.16	.14								
	0.05	.39	.68	.79	.78	.75	.72	.69	.68	.55	.48	.36	.29	.23	.20	.18	.15	.59	.49	.36	.29	.23	.20	.17	.15	1.00							
	0.075	.39	.67	.78	.77	.74	.71	.68	.66	.53	.46	.34	.29	.23	.21	.18	.16	.58	.47	.35	.28	.23	.20	.17	.15	.99	1.00						
Method 4	0.1	.39	.67	.78	.77	.74	.70	.67	.65	.53	.45	.33	.27	.23	.21	.18	.16	.58	.46	.33	.27	.22	.20	.17	.15	.99	1.00	1.00					
	0.125	.39	.67	.78	.77	.73	.70	.67	.65	.53	.44	.32	.26	.22	.20	.18	.15	.58	.45	.32	.26	.22	.19	.17	.15	.99	1.00	1.00	1.00				
	0.15	.39	.67	.78	.77	.73	.70	.67	.65	.53	.44	.32	.26	.22	.20	.18	.15	.58	.45	.32	.25	.21	.19	.17	.15	.99	1.00	1.00	1.00	1.00			
	0.175	.39	.67	.78	.77	.73	.70	.67	.65	.53	.44	.31	.26	.21	.19	.17	.15	.58	.45	.32	.25	.21	.19	.17	.14	.99	1.00	1.00	1.00	1.00	1.00		
	0.2	.39	.67	.78	.77	.73	.70	.67	.65	.53	.44	.31	.26	.21	.19	.17	.15	.58	.45	.32	.25	.21	.18	.16	.14	.99	1.00	1.00	1.00	1.00	1.00	1.00	

Lake Erken

		Method 1								Method 2								Method 3								Method 4							
		0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2	0.03	0.05	0.08	0.1	0.13	0.15	0.18	0.2
	0.025																																
	0.05	.94																															
	0.075	.89	.97																														
Method 1	0.1	.85	.94	.98																													
	0.125	.82	.91	.96	.99																												
	0.15	.79	.89	.94	.97	.99																											
	0.175	.77	.87	.92	.96	.98	1.00																										
	0.2	.75	.85	.90	.94	.97	.99	1.00																									
	0.025	.85	.92	.92	.89	.87	.85	.83	.81																								
	0.05	.78	.87	.92	.94	.95	.95	.95	.94	.85																							
	0.075	.70	.78	.84	.87	.90	.92	.92	.93	.75	.90																						
Method 2	0.1	.64	.73	.78	.82	.85	.87	.88	.89	.70	.84	.94																					
	0.125	.59	.67	.72	.75	.78	.81	.83	.85	.64	.77	.86	.93																				
	0.15	.55	.62	.66	.70	.73	.76	.78	.80	.59	.71	.80	.87	.94																			
	0.175	.50	.57	.61	.64	.67	.69	.72	.74	.54	.65	.74	.80	.87	.93																		
	0.2	.45	.52	.55	.58	.61	.63	.66	.68	.49	.59	.67	.73	.80	.86	.93																	
	0.025	.75	.83	.86	.87	.88	.88	.88	.88	.84	.86	.82	.79	.73	.69	.64	.58																
	0.05	.72	.81	.86	.89	.91	.92	.93	.93	.78	.92	.89	.86	.81	.77	.72	.66	.91															
	0.075	.66	.74	.79	.83	.86	.88	.90	.91	.71	.85	.94	.92	.88	.84	.78	.72	.83	.92														
Method 3	0.1	.62	.70	.75	.78	.82	.84	.86	.87	.67	.80	.90	.96	.92	.88	.82	.77	.79	.88	.95													
	0.125	.58	.65	.70	.73	.76	.79	.81	.83	.63	.75	.84	.90	.97	.94	.88	.82	.73	.82	.89	.94												
	0.15	.53	.61	.65	.68	.71	.73	.76	.78	.58	.69	.78	.84	.91	.97	.93	.87	.68	.76	.84	.88	.94											
	0.175	.49	.56	.59	.63	.65	.68	.70	.72	.53	.64	.72	.78	.85	.91	.98	.94	.63	.71	.78	.82	.88	.93										
	0.2	.45	.51	.54	.57	.60	.62	.64	.66	.48	.58	.66	.72	.78	.84	.91	.98	.57	.65	.72	.76	.81	.87	.93									
	0.025	.78	.83	.86	.88	.88	.88	.88	.88	.77	.84	.82	.79	.74	.70	.65	.59	.90	.90	.84	.80	.74	.69	.64	.58								
	0.05	.76	.81	.83	.85	.86	.86	.86	.86	.74	.82	.81	.79	.75	.71	.66	.61	.88	.90	.85	.81	.76	.71	.65	.60	.99							
	0.075	.74	.79	.82	.83	.84	.84	.84	.84	.72	.80	.79	.78	.74	.71	.66	.62	.86	.88	.85	.81	.76	.71	.66	.61	.98	.99						
Method 4	0.1	.73	.78	.81	.82	.83	.83	.83	.83	.71	.79	.78	.76	.73	.70	.66	.62	.85	.87	.83	.80	.75	.71	.66	.61	.97	.99	1.00					
	0.125	.73	.77	.80	.81	.82	.82	.82	.82	.70	.78	.77	.75	.72	.70	.66	.61	.84	.86	.82	.79	.74	.70	.66	.61	.96	.98	.99	1.00				
	0.15	.72	.77	.79	.81	.81	.81	.81	.81	.69	.77	.75	.74	.71	.69	.65	.61	.84	.86	.81	.78	.73	.69	.65	.61	.96	.98	.99	1.00	1.00			
	0.175	.72	.76	.79	.80	.81	.81	.81	.80	.69	.76	.75	.73	.70	.67	.64	.60	.83	.85	.80	.77	.72	.68	.64	.60	.95	.98	.99	.99	1.00	1.00		
	0.2	.71	.76	.78	.80	.80	.80	.80	.80	.69	.76	.74	.72	.69	.67	.63	.59	.83	.85	.80	.76	.71	.67	.63	.59	.95	.98	.99	.99	1.00	1.00	1.00	

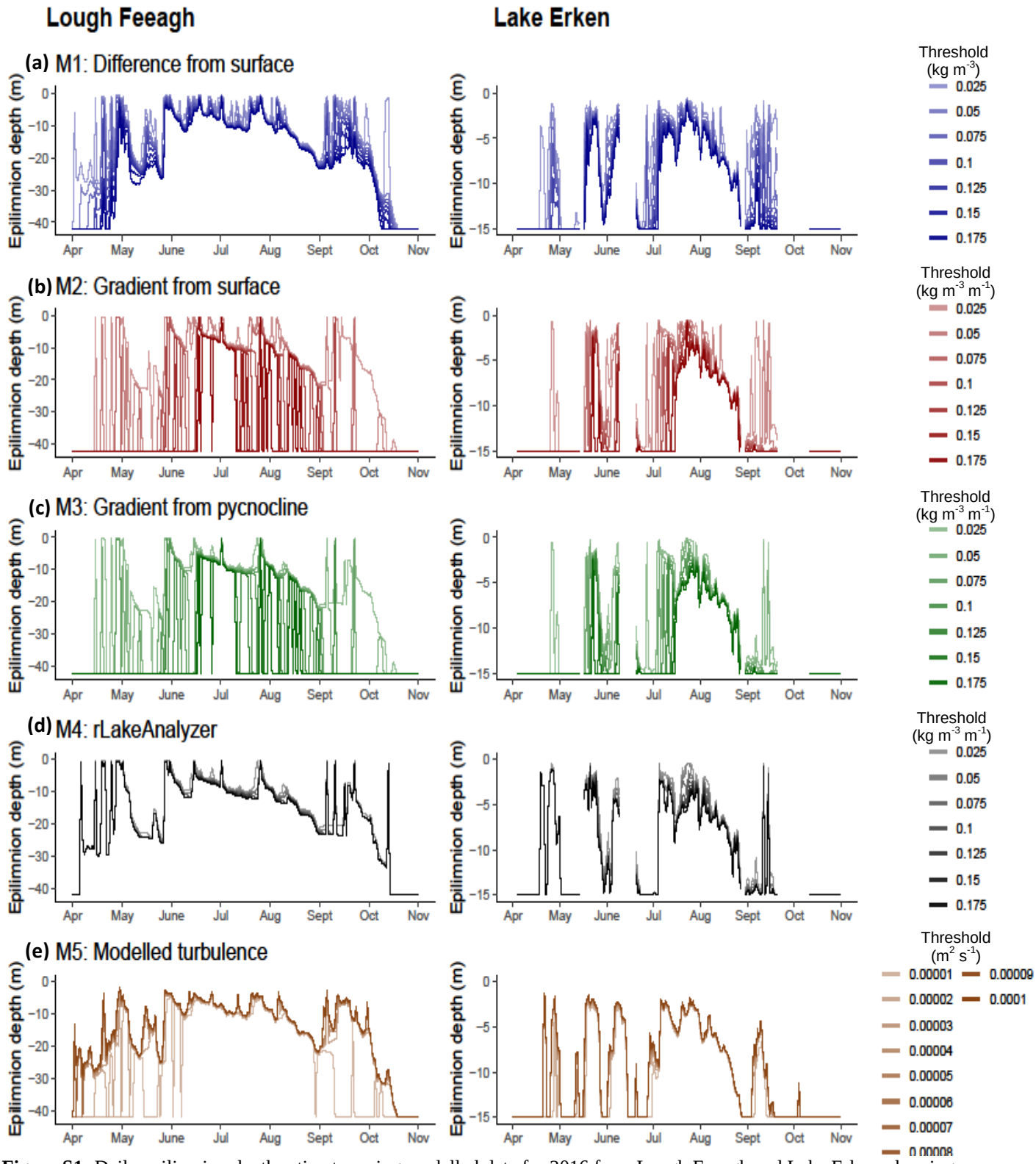

Figure S1: Daily epilimnion depth estimates using modelled data for 2016 from Lough Feeagh and Lake Erken, showing estimates from all profile based epilimnion depth methods, including M1, the absolute difference from the surface method **(a)**, M2, the gradient from the surface method **(b)**, M3, the gradient from the pycnocline method **(c)** and M4, the rLakeAnalyzer method **(d)**, as well as M5, the modelled turbulence based method **(e)**, calculated using the full range of thresholds, and for each lake.