Supporting information to Malve & Qian: Estimating nutrients and Chlorophyll a relationships in Finnish Lakes

September 5, 2006

Lake Type	*mean TP*	*mean TN*	*mean Chla*	*TN/TP -ratio* (percentiles)	
				5 %	95 %
1	11.0	347	4.9	17.1	79.0
2	18.3	485	9.3	14.5	60.0
3	13.3	349	5.9	16.0	77.0
4	20.3	496	11.0	14.1	66.7
5	32.2	582	18.6	9.3	50.0
6	34.1	631	21.2	11.7	33.3
7	20.6	444	12.1	12.1	75.0
8	39.5	715	25.9	10.8	42.9
9	52.2	815	33.9	9.6	31.3
all lakes	27.8	571	16.4	11.7	57.1

Table 1: Mean of observed TP [μg L^{-1}], TN [μg L^{-1}] and Chla [μg L^{-1}] and 5% & 95 % percentiles of TN/TP-ration within Lake types specified by Finnish Environment Institute.

Type	*TP - TN*	*TP - Chla*	*TN - Chla*
1	0.64	0.75	0.69
2	0.66	0.73	0.55
3	0.65	0.80	0.68
4	0.78	0.83	0.77
5	0.80	0.84	0.79
6	0.76	0.64	0.60
7	0.76	0.87	0.74
8	0.76	0.87	0.74
9	0.78	0.80	0.78
all	0.80	0.83	0.76

Table 2: Correlation between log(TP), log(TN) and log(Chla) within Lake types specified by Finnish Environment Institute.

Year	*N*	*Year*	*N*	*Year*	*N*	*Year*	*N*
1988	2	1993	426	1998	1,610	2003	2,220
1989	59	1994	1,478	1999	1,533	2004	774
1990	66	1995	1,621	2000	2,029		
1991	78	1996	1,687	2001	1,972		
1992	71	1997	1,714	2002	2,088		

Table 3: The number of observations (N) per year from 1988 to 2004.

Type	*N*	*Type*	*N*	*Type*	*N*
1	485	4	3,949	7	391
2	6,536	5	1,080	8	2,729
3	388	6	1,326	9	2,544

Table 4: Number of observations (N) within the lake types.

Coplots are designed to graphically present a multivariate relationship on a two-dimensional surface, using a series of bivariate scatter plots. Figures 1 and 2 in Supporting Information shows the four-dimensional surface of log(Chla) as a function of log(TP), log(TN), and lake depth. In Figure 1, Supporting Information, each panel illustrates the log(Chla)–log(TP) relationship at different log(TN) and depth values (indicated by the location of the shaded bars on top of panels and on the right hand side of the panels). The far left panels have the lowest log(TN) values and the far right panels have the highest log(TN) values. Lowest panels have the shallowest and the highest panels the deepest lakes. Figure 2, Supporting Information, shows the log(Chla)–log(TP) relationship is relatively stable, regardless of log(TN) and depth; while the log(Chla)–log(TN) relationship is dependent on log(TP) and depth values. Although the log(Chla)–log(TN) relationship is noisier, the Loess curve between the variables (follows the trend of the data) tends to increase with log(TP) and decrease with depth.

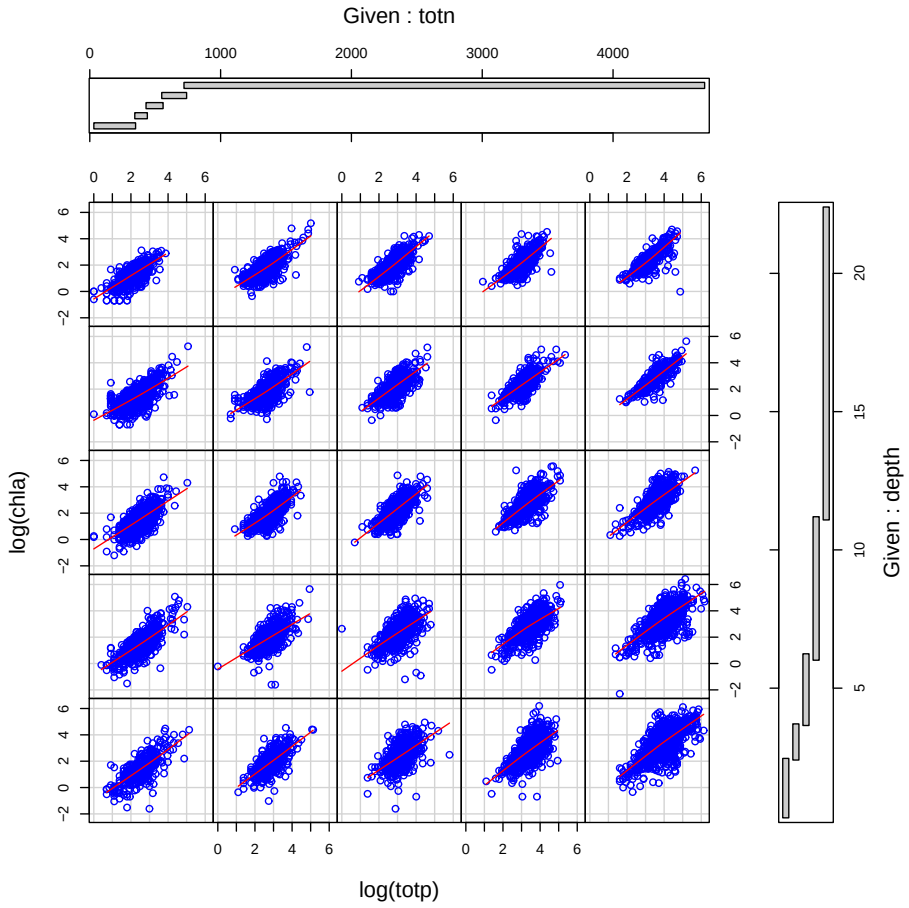

Figure 1: Conditioning plot that illustrates the log(Chla) [μg L^{-1}] to log(TP) [μg L^{-1}] relationship conditioned on log(TN) concentrations [μg L^{-1}] and depth [m]. The gray solid line is the Loess curve that follows the trend of the data.

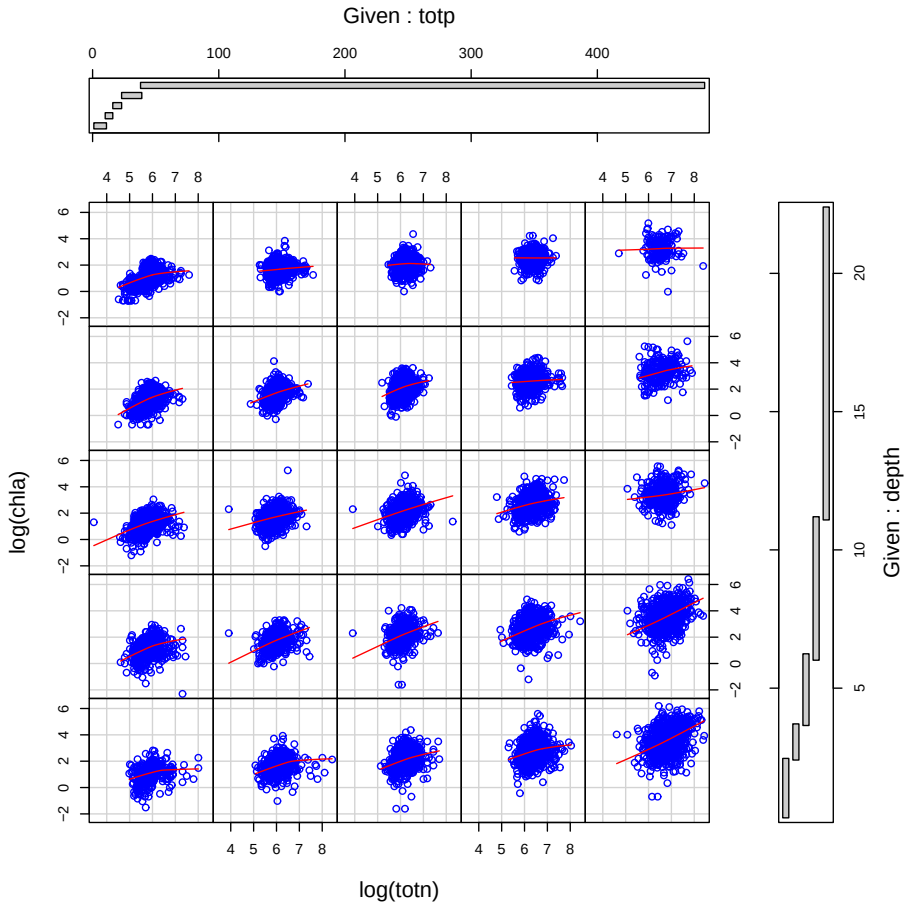

Figure 2: Conditioning plot that illustrates the log(Chla) [μg L^{-1}] to log(TN) [μg L^{-1}] relationship conditioned on log(TP) concentrations [μg L^{-1}] and depth [m]. The gray solid line is the Loess curve.

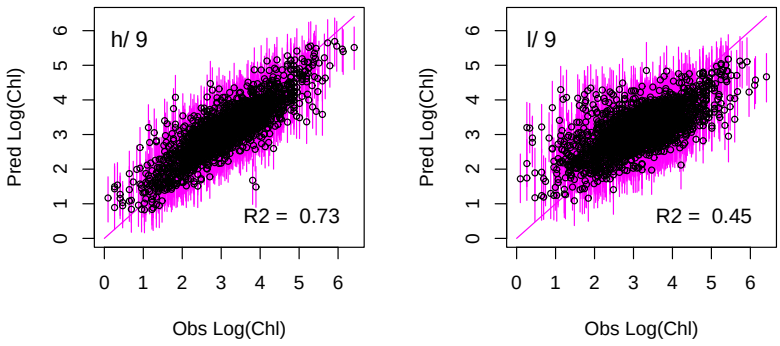

Figure 3: 10 %, 50 % (circle) and 90 % percentiles of predicted Chla concentration [μg L^{-1}]as a function of observed value for shallow, very humic lakes, type 9 . Percentiles have been calculated with the hierarchical linear model (h/9) and with non-hierarchical type specific dummy variable model. 10 % and 90 % percentiles are connected with vertical gray lines. R^2 denotes R squared.