Garzke et al code

1. Figure 3, Table 2

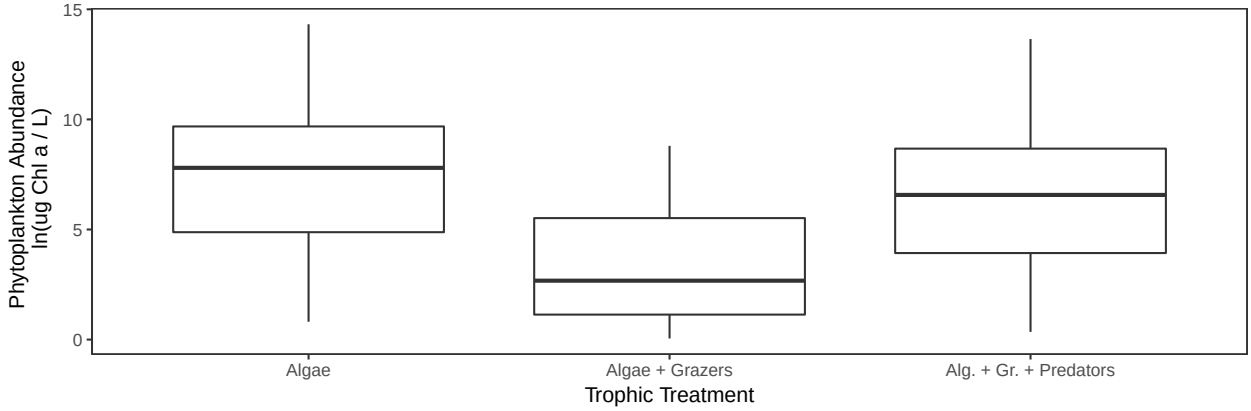
```
## Linear mixed-effects model fit by maximum likelihood
##  Data: data
##        AIC      BIC    logLik
##   911.4345 927.3993 -450.7173
##
## Random effects:
##  Formula: ~1 | Tank
##         (Intercept) Residual
## StdDev:    1.589104 2.694206
##
## Fixed effects: (chla) ~ trophic.level
##                       Value Std.Error  DF   t-value p-value
## (Intercept)       7.539167 0.6163073 150 12.232804  0.0000
## trophic.levelPZ  -4.427067 0.8715902  27 -5.079298  0.0000
## trophic.levelPZN -1.133333 0.8715902  27 -1.300305  0.2045
##  Correlation:
##                   (Intr) trp.PZ
## trophic.levelPZ  -0.707
## trophic.levelPZN -0.707  0.500
##
## Standardized Within-Group Residuals:
##        Min         Q1        Med         Q3        Max
## -1.8742548 -0.5991005  0.2573170  0.6675217  2.0122402
##
## Number of Observations: 180
## Number of Groups: 30
```

```
##               numDF denDF   F-value p-value
## (Intercept)       1   150 255.32565  <.0001
## trophic.level     2    27  13.92362   1e-04
```

```
## Linear mixed-effects model fit by maximum likelihood
##  Data: data
##        AIC      BIC    logLik
##   256.7193 271.7724 -123.3596
##
## Random effects:
##  Formula: ~1 | Tank
##         (Intercept)  Residual
## StdDev:   0.1745059 0.5271713
##
## Fixed effects: log(ER2) ~ trophic.level
##                       Value  Std.Error  DF   t-value p-value
## (Intercept)      -5.856289 0.09369633 120 -62.50286  0.0000
## trophic.levelPZ   0.393472 0.13250663  27   2.96945  0.0062
## trophic.levelPZN  0.057098 0.13250663  27   0.43091  0.6700
##  Correlation:
##                   (Intr) trp.PZ
## trophic.levelPZ  -0.707
```

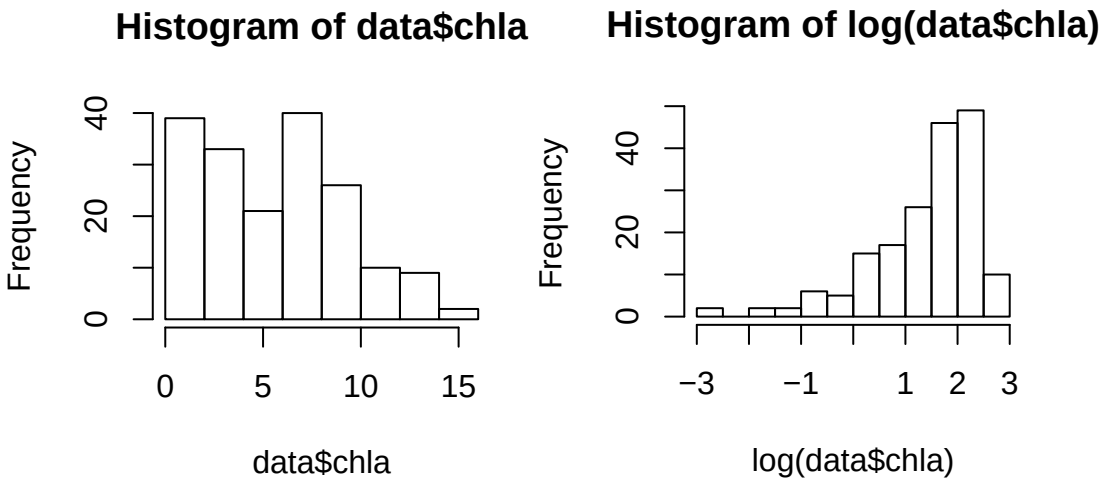
```
## trophic.levelPZN -0.707  0.500
##
## Standardized Within-Group Residuals:
##        Min         Q1        Med         Q3        Max
## -2.9520470 -0.5902139  0.1636847  0.5097069  3.3894860
##
## Number of Observations: 150
## Number of Groups: 30
```

```
##                numDF denDF   F-value p-value
## (Intercept)        1   120 11126.398  <.0001
## trophic.level      2    27     5.149  0.0128
```



2. Figure 3, Table 2

2.1 Phytoplankton abundance



2.1.1 Phytoplankton abundance candidate models

```
#### Phytoplankton coefficients for Figure 2
modPBF <- lme(log(chla) ~ 1 + I(invTi - invTT) + trophic.level + trophic.level*I(invTi - invTT) + I(inv
modPB8 <- lme(log(chla) ~ 1 + trophic.level*I(invTi - invTT) + trophic.level*I(invTT - mean(invTT)), ra
modPB7 <- lme(log(chla) ~ 1 + I(invTi - invTT) + trophic.level + trophic.level*I(invTT - mean(invTT)),
modPB6 <- lme(log(chla) ~ 1 + trophic.level*I(invTi - invTT), random = ~ 1 | Tank, data=data, method="M
```

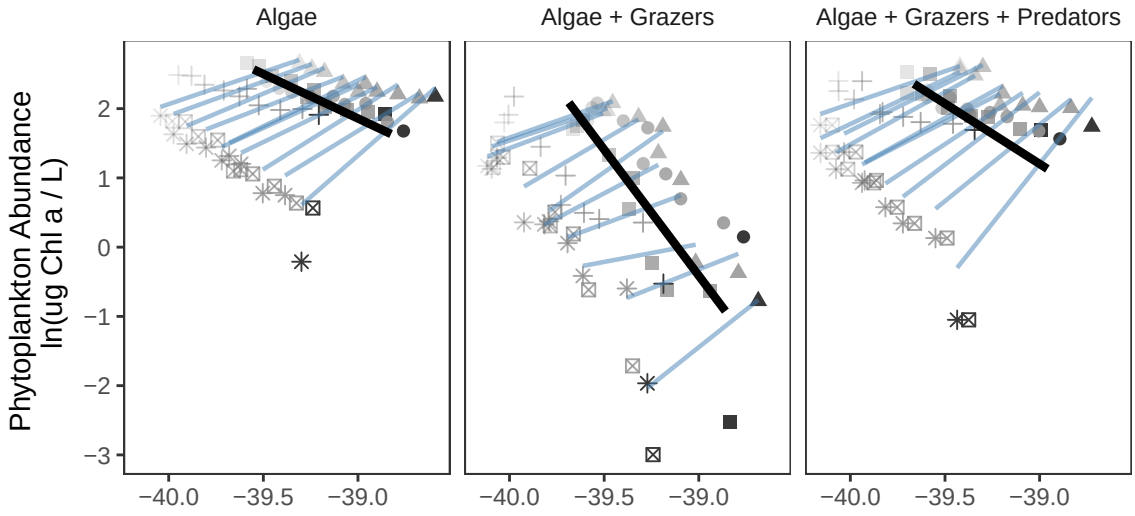
```
modPB5 <- lme(log(chla) ~ 1 + I(invTi - invTT) + trophic.level, random = ~ 1 | Tank, data=data, method=
modPB4 <- lme(log(chla) ~ 1 + I(invTi - invTT)*I(invTT - mean(invTT)), random = ~ 1 | Tank, data=data, r
modPB3 <- lme(log(chla) ~ 1 + I(invTi - invTT) + I(invTT - mean(invTT)), random = ~ 1 | Tank, data=data
modPB2 <- lme(log(chla) ~ 1 + I(invTi - invTT), random = ~ 1 | Tank, data=data, method="ML", na.action=r
modPB1 <- lme(log(chla) ~ 1 + trophic.level, random = ~ 1 | Tank, data=data, method="ML", na.action=na.
modPB0 <- lme(log(chla) ~ 1, random = ~ 1 | Tank, data=data, method="ML", na.action=na.omit)
```

Table 1: Table S.1: Model selection results for Phytoplankton biomass, with 1|Tank as a random effect. Model terms are: intercept (Int), trophic treatment (TL), Temperature - weekly average (Tw), temperature - expt average (Tt), interaction terms and statistical estimates

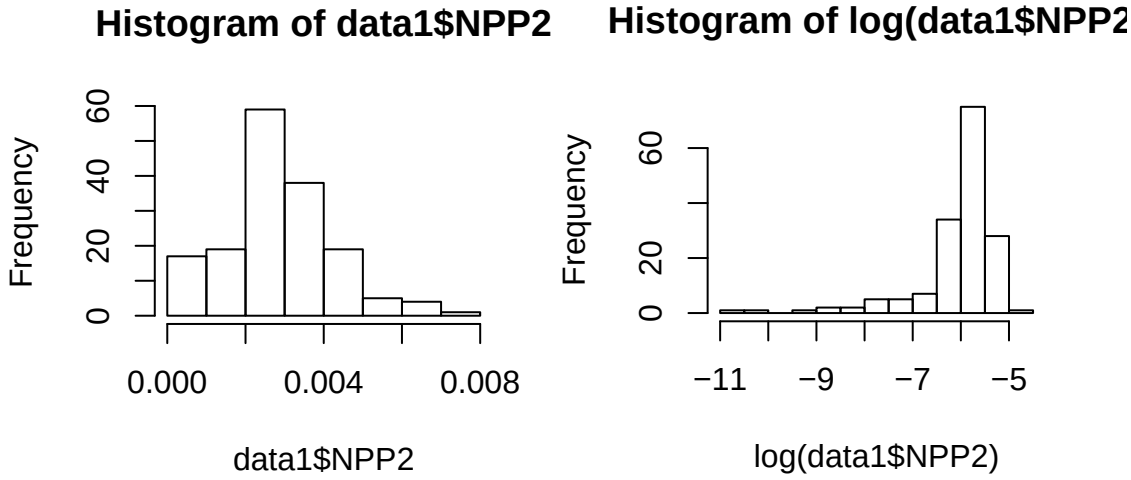
	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modPB7	2.27	+	-1.47	1.28	NA	NA	+	9	-120.08	259.22	0.00	7.331665e-01
modPB8	2.25	+	-1.37	1.28	NA	+	+	11	-118.83	261.24	2.02	2.668334e-01
modPBF	2.35	+	-1.22	2.15	1.51	+	NA	10	-134.62	290.55	31.33	1.152411e-07
modPB4	1.63	NA	-1.47	1.65	1.29	NA	NA	6	-162.55	337.59	78.37	7.023629e-18
modPB5	2.13	+	-1.47	NA	NA	NA	NA	6	-163.22	338.93	79.71	3.599893e-18
modPB6	2.11	+	-1.37	NA	NA	+	NA	8	-162.07	340.98	81.77	1.287549e-18
modPB3	1.63	NA	-1.46	1.85	NA	NA	NA	5	-165.43	341.21	82.00	1.148295e-18
modPB2	1.63	NA	-1.47	NA	NA	NA	NA	4	-171.08	350.39	91.18	1.166052e-20
modPB1	1.88	+	NA	NA	NA	NA	NA	5	-205.52	421.39	162.18	4.458665e-36
modPB0	1.39	NA	NA	NA	NA	NA	NA	3	-212.99	432.11	172.89	2.102002e-38

```
## <ScaleContinuousPosition>
##  Range:
##  Limits:    0 --    1
```

Figure 2ABC: Phytoplankton biomass and how it varied with temperature within tanks (blue lines) and across tanks (black lines).



2.2 Net ecosystem oxygen production




```
## Linear mixed-effects model fit by maximum likelihood
##  Data: data1
##        AIC      BIC    logLik
##   414.8637 430.3016 -202.4318
##
## Random effects:
##  Formula: ~1 | Tank
##          (Intercept)  Residual
## StdDev: 3.464756e-05 0.8442055
##
## Fixed effects: log(NPP2) ~ 1 + trophic.level
##                       Value Std.Error  DF   t-value p-value
## (Intercept)      -6.163431 0.1159605 132 -53.15111  0.0000
## trophic.levelPZ   0.062089 0.1632458  27   0.38034  0.7067
## trophic.levelPZN  0.239692 0.1647647  27   1.45475  0.1573
##  Correlation:
##                   (Intr) trp.PZ
## trophic.levelPZ  -0.710
## trophic.levelPZN -0.704  0.500
##
## Standardized Within-Group Residuals:
##        Min         Q1        Med         Q3        Max
## -5.3500137 -0.1060028  0.1826710  0.5197017  1.4224875
##
## Number of Observations: 162
## Number of Groups: 30
##               numDF denDF  F-value p-value
## (Intercept)       1   132 8203.698  <.0001
## trophic.level     2    27    1.138  0.3352
```

Table 2: Table 1.1: Model selection results for Net Ecosystem Oxygen Production, with 1|Tank as a random effect. Model terms are: intercept (Int), trophic treatment (TL), Temperature - weekly average (Tw), temperature - expt average (Tt), interaction terms and statistical estimates

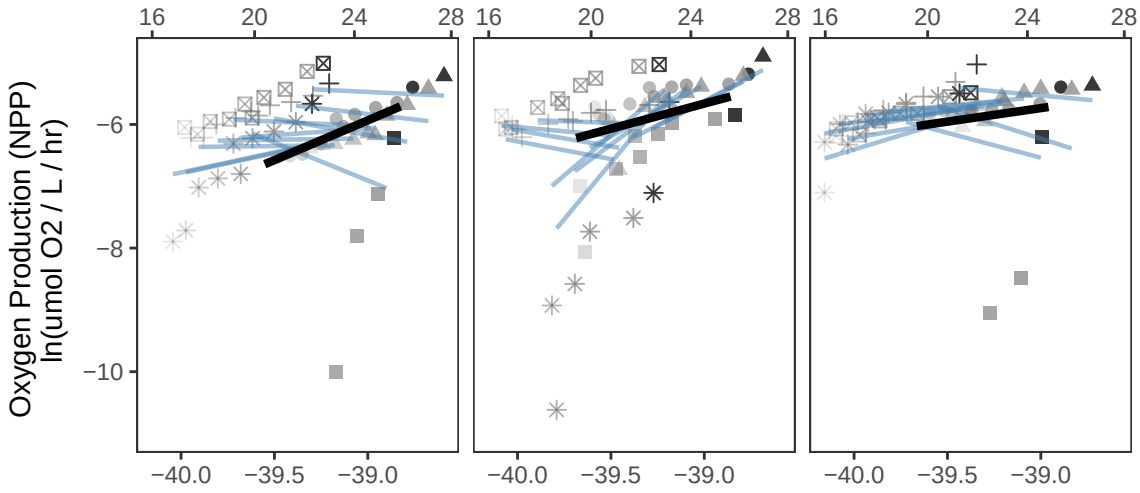
	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modNPP8	-6.32	+	0.09	-1.30	NA	+	+	11	-191.90	407.56	0.00	0.379804423
modNPP3	-6.00	NA	-0.38	-0.64	NA	NA	NA	5	-199.14	408.67	1.11	0.218252095
modNPPF	-6.31	+	0.06	-1.24	-0.37	+	+	12	-191.82	409.74	2.18	0.127837762
modNPP7	-6.23	+	-0.39	-1.28	NA	NA	+	9	-195.48	410.15	2.59	0.103989814
modNPP4	-6.00	NA	-0.37	-0.57	-0.47	NA	NA	6	-199.02	410.57	3.01	0.084145720
modNPP2	-6.00	NA	-0.38	NA	NA	NA	NA	4	-202.37	412.99	5.43	0.025199207
modNPP0	-6.06	NA	NA	NA	NA	NA	NA	3	-203.58	413.32	5.76	0.021340413
modNPP6	-6.17	+	0.04	NA	NA	+	NA	8	-198.22	413.38	5.82	0.020740957
modNPP5	-6.09	+	-0.40	NA	NA	NA	NA	6	-201.09	414.73	7.17	0.010556933
modNPP1	-6.16	+	NA	NA	NA	NA	NA	5	-202.43	415.25	7.69	0.008132677

Table 3: Table 1.2: Confidence intervals for averaged models for NPP

	2.5 %	97.5 %
(Intercept)	-6.6018031	-6.0341170
trophic.levelPZ	0.0204002	0.8048887
trophic.levelPZN	0.0399869	0.8637557
I(invTi - invTT)	-0.6899418	0.8624403
I(invTT - mean(invTT))	-2.2961709	-0.2785884
I(invTi - invTT):trophic.levelPZ	-2.6531750	-0.2849762
I(invTi - invTT):trophic.levelPZN	-1.3044611	0.9008073
I(invTT - mean(invTT)):trophic.levelPZ	-0.8273011	1.7762975
I(invTT - mean(invTT)):trophic.levelPZN	-0.5432110	2.2415518
I(invTi - invTT):trophic.levelPZ	-2.6531750	-0.2849762
I(invTi - invTT):trophic.levelPZN	-1.3044611	0.9008073
I(invTi - invTT):I(invTT - mean(invTT))	-2.3031652	1.5563285

NPP Coefficients for Figure 2DEF

FIGURE 2D-F: NPP



2.2 Net ecosystem oxygen consumption (ER)

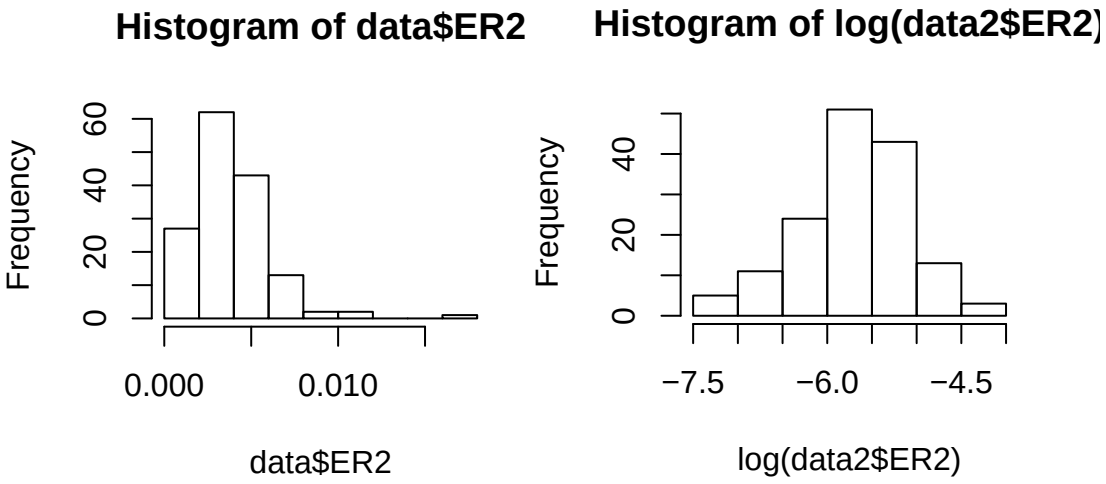


Table 4: Table 1.1: Model selection results for Net Ecosystem Oxygen Consumption (ER), with 1|Tank as a random effect. Model terms are: intercept (Int), trophic treatment (TL), Temperature - weekly average (Tw), temperature - expt average (Tt), interaction terms and statistical estimates

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modER7	-5.97	+	0.03	-1.01	NA	NA	+	9	-116.00	251.29	0.00	0.642421786
modER8	-5.95	+	-0.15	-1.01	NA	+	+	11	-115.11	254.13	2.84	0.154934883
modERF	-5.91	+	-0.18	-0.66	-0.27	+	NA	10	-116.36	254.31	3.02	0.141646149
modER1	-5.86	+	NA	NA	NA	NA	NA	5	-123.36	257.14	5.85	0.034479202
modER5	-5.86	+	0.02	NA	NA	NA	NA	6	-123.35	259.29	8.00	0.011766479
modER3	-5.71	NA	0.01	-0.54	NA	NA	NA	5	-125.20	260.82	9.53	0.005466582
modER0	-5.71	NA	NA	NA	NA	NA	NA	3	-127.86	261.89	10.61	0.003195622
modER6	-5.84	+	-0.15	NA	NA	+	NA	8	-122.46	261.94	10.65	0.003125018
modER4	-5.71	NA	0.01	-0.53	-0.04	NA	NA	6	-125.20	262.99	11.70	0.001850063

	Int	TL	Tw	Tt	Tw*Tt	Tw*TL	Tt*TL	df	logLik	AICc	d	w
modER2	-5.71	NA	0.01	NA	NA	NA	NA	4	-127.86	264.00	12.71	0.001114216

ER coefficients for Figure GHI

FIGURE 2G-I: ER

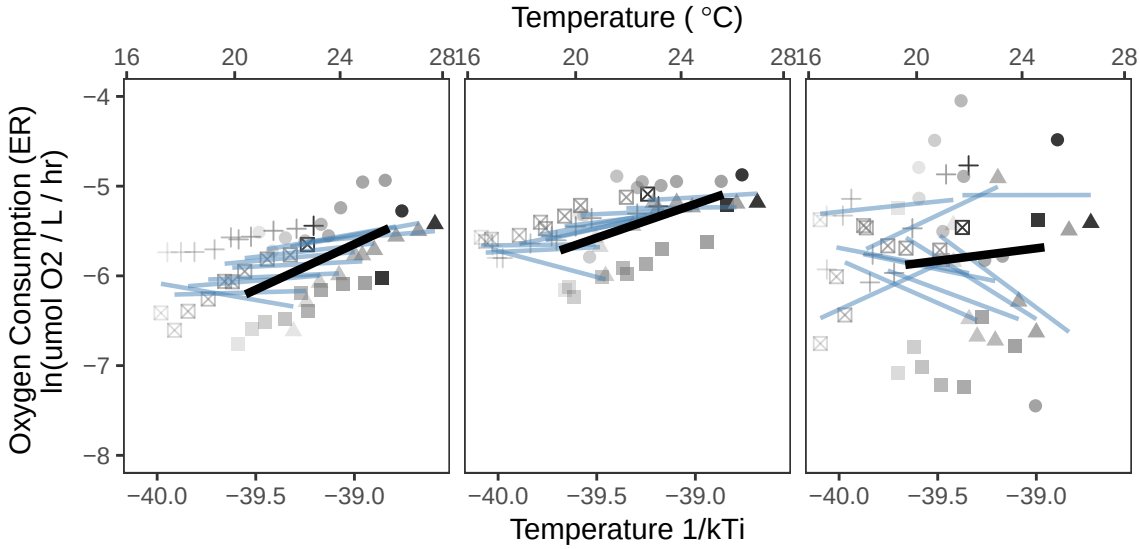
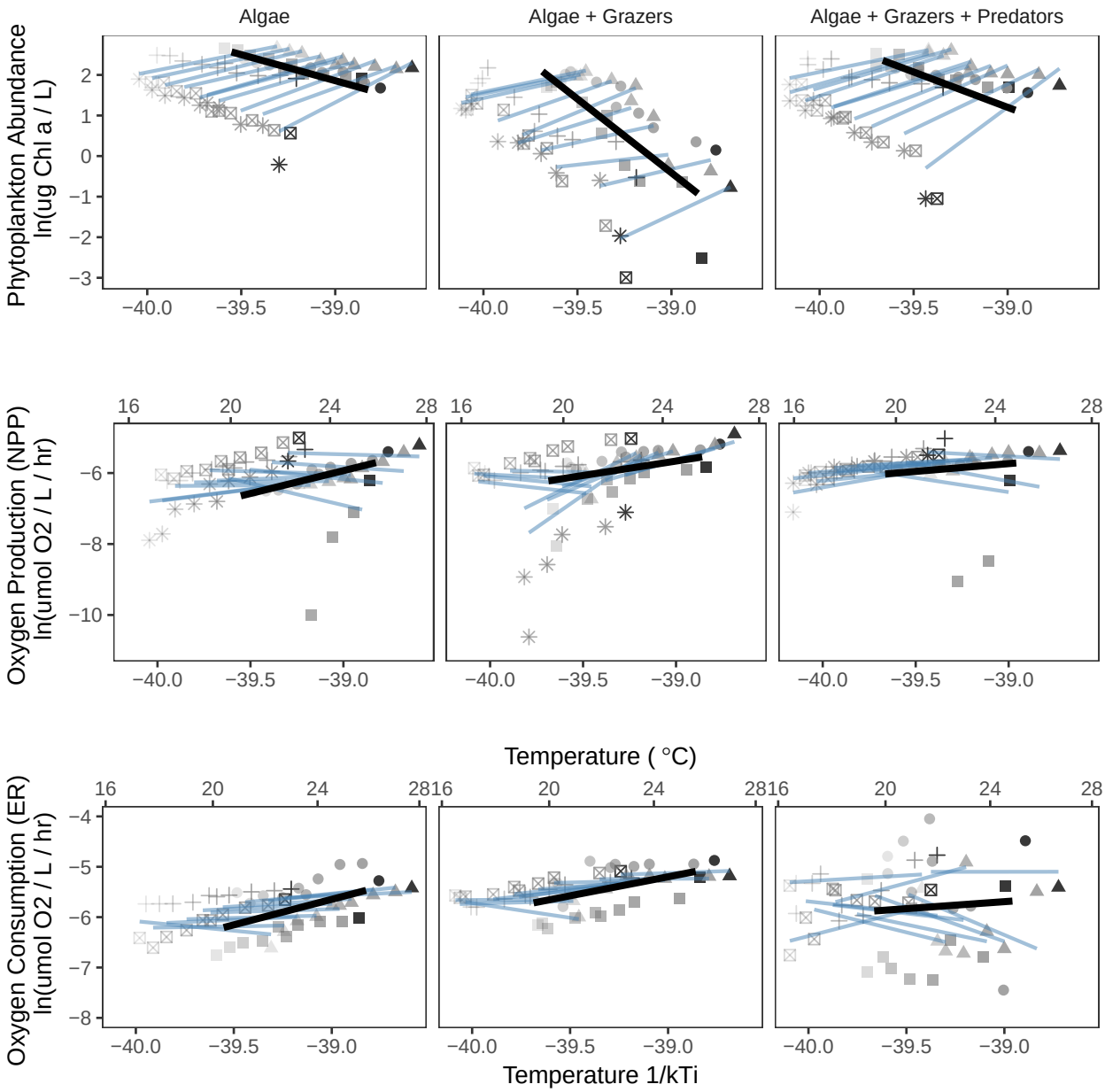


Figure 2 (Full)


Algae
Algae + Grazers
Algae + Grazers + Predators
Phytoplankton Abundance
ln(ug Chl a / L)
Oxygen Production (NPP)
ln(umol O2 / L / hr)
Oxygen Consumption (ER)
ln(umol O2 / L / hr)
Temperature (°C)
Temperature 1/kTi

```
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```