**Linear Mixed Model: Nitrogen**

Linear mixed model fit by REML t-tests use Satterthwaite approximations to degrees of freedom

Formula: d15N ~ Region \* CCL\_combined + (1 | Region/SITE\_CODE)

Data: data\_new2

REML criterion at convergence: 1813.5

Scaled residuals:

Min 1Q Median 3Q Max

-5.9785 -0.4130 0.0350 0.5089 5.1712

Random effects:

Groups Name Variance Std.Dev.

SITE\_CODE:Region (Intercept) 5.127 2.264

Region (Intercept) 8.859 2.976

Residual 2.084 1.444

Number of obs: 489, groups: SITE\_CODE:Region, 14; Region, 4

Fixed effects:

**Estimate Std. Error df t value Pr(>|t|)**

(Intercept) 11.587590 3.165136 0.000000 3.661 0.97668

RegionGulf of Cal 3.256741 4.840711 0.000000 0.673 0.98080

RegionCen-SoAm Pac Coast 3.276701 4.688938 0.000000 0.699 0.98246

RegionEPac Islands -0.727088 4.635607 0.000000 -0.157 0.99146

CCL\_combined 0.035297 0.007621 478.300000 4.631 4.69e-06 \*\*\*

RegionGulf of Cal:CCL\_combined -0.021483 0.020867 474.200000 -1.030 0.30374

RegionCen-SoAm Pac Coast:CCL\_combined -0.055132 0.019586 481.000000 -2.815 0.00508 \*\*

RegionEPac Islands:CCL\_combined -0.004667 0.015663 474.700000 -0.298 0.76589

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**> Anova(region\_Nm1)**

Analysis of Deviance Table (Type II Wald chisquare tests)

Response: d15N

Chisq Df Pr(>Chisq)

Region 0.3758 3 0.94519

CCL\_combined 19.7301 1 8.919e-06 \*\*\*

Region:CCL\_combined 8.4453 3 0.03765 \*

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**> SC\_Nm1<-aov(data=SC, d15N~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 3 1253.2 417.7 147.638 < 2e-16 \*\*\*

CCL\_combined 1 46.5 46.5 16.442 8.5e-05 \*\*\*

Ordered\_SITE:CCL\_combined 3 59.6 19.9 7.019 0.000203 \*\*\*

Residuals 133 376.3 2.8

17 observations deleted due to missingness

**> SC\_Nm2<-aov(data=SC, d15N~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 3 1423.9 474.6 129.9 <2e-16 \*\*\*

Residuals 154 562.5 3.7

**> GC\_Nm1<-aov(data=GC, d15N~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 1 0.83 0.8291 0.650 0.423

CCL\_combined 1 1.07 1.0695 0.839 0.363

Ordered\_SITE:CCL\_combined 1 0.00 0.0005 0.000 0.984

Residuals 63 80.32 1.2749

14 observations deleted due to missingness

**> GC\_Nm2<-aov(data=GC, d15N~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 1 2.28 2.276 1.826 0.18

Residuals 79 98.45 1.246

**> CSC\_Nm1<-aov(data=CSC, d15N~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 2 49.19 24.597 9.455 0.000186 \*\*\*

CCL\_combined 1 2.32 2.316 0.890 0.347891

Ordered\_SITE:CCL\_combined 2 8.70 4.349 1.672 0.193661

Residuals 91 236.73 2.601

19 observations deleted due to missingness

**> CSC\_Nm2<-aov(data=CSC, d15N~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 2 213.4 106.72 31.68 1.2e-11 \*\*\*

Residuals 113 380.7 3.37

**> EPI\_Nm1<-aov(data=EPI, d15N~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 2 70.51 35.26 28.223 2.26e-11 \*\*\*

CCL\_combined 1 10.62 10.62 8.505 0.004 \*\*

Ordered\_SITE:CCL\_combined 2 3.08 1.54 1.231 0.295

Residuals 178 222.36 1.25

74 observations deleted due to missingness

**> EPI\_Nm2<-aov(data=EPI, d15N~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 4 198.5 49.62 35.66 <2e-16 \*\*\*

Residuals 253 352.1 1.39

**Linear Mixed Model: Carbon**

Linear mixed model fit by REML t-tests use Satterthwaite approximations to degrees of freedom

Formula: d13C ~ Region \* CCL\_combined + (1 | Region/SITE\_CODE)

Data: data\_new2

REML criterion at convergence: 1932.2

Scaled residuals:

Min 1Q Median 3Q Max

-4.6032 -0.3337 0.0876 0.4487 5.2285

Random effects:

Groups Name Variance Std.Dev.

SITE\_CODE:Region (Intercept) 2.260 1.5034

Region (Intercept) 0.575 0.7583

Residual 2.725 1.6507

Number of obs: 489, groups: SITE\_CODE:Region, 14; Region, 4

Fixed effects:

**Estimate Std. Error df t value** Pr(>|t|)

(Intercept) -15.830060 1.159333 0.000000 -13.654 1.000

RegionGulf of Cal 0.454900 2.375935 0.000000 0.191 0.999

RegionCen-SoAm Pac Coast -0.403314 2.107894 0.000000 -0.191 1.000

RegionEPac Islands 0.236843 1.961329 0.000000 0.121 1.000

CCL\_combined 0.000248 0.008635 479.400000 0.029 0.977

RegionGulf of Cal:CCL\_combined 0.002491 0.023778 479.000000 0.105 0.917

RegionCen-SoAm Pac Coast:CCL\_combined 0.016424 0.021993 453.700000 0.747 0.456

RegionEPac Islands:CCL\_combined -0.001133 0.017839 479.700000 -0.063 0.949

> Anova(region\_Cm1)

Analysis of Deviance Table (Type II Wald chisquare tests)

Response: d13C

Chisq Df Pr(>Chisq)

Region 0.2625 3 0.9669

CCL\_combined 0.0963 1 0.7563

Region:CCL\_combined 0.6024 3 0.8959

**> SC\_Cm1<-aov(data=SC, d13C~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 3 24.5 8.156 1.591 0.195

CCL\_combined 1 0.2 0.234 0.046 0.831

Ordered\_SITE:CCL\_combined 3 22.5 7.496 1.462 0.228

Residuals 133 681.8 5.126

17 observations deleted due to missingness

**> SC\_Cm2<-aov(data=SC, d13C~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 3 38.9 12.981 2.432 0.0672 .

Residuals 154 822.0 5.338

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**> GC\_Cm1<-aov(data=GC, d13C~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 1 10.89 10.887 11.847 0.00103 \*\*

CCL\_combined 1 0.07 0.072 0.079 0.77988

Ordered\_SITE:CCL\_combined 1 3.60 3.604 3.921 0.05205 .

Residuals 63 57.89 0.919

14 observations deleted due to missingness

**> GC\_Cm2<-aov(data=GC, d13C~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 1 12.65 12.646 12.46 0.000696 \*\*\*

Residuals 79 80.16 1.015

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**> CSC\_Cm1<-aov(data=CSC, d13C~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 2 3.45 1.7228 1.883 0.158

CCL\_combined 1 1.81 1.8083 1.976 0.163

Ordered\_SITE:CCL\_combined 2 2.05 1.0271 1.123 0.330

Residuals 91 83.25 0.9149

19 observations deleted due to missingness

**> CSC\_Cm2<-aov(data=CSC, d13C~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 2 4.4 2.198 2.573 0.0807 .

Residuals 113 96.5 0.854

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**> EPI\_Cm1<-aov(data=EPI, d13C~Ordered\_SITE\*CCL\_combined)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 2 837.8 418.9 167.334 <2e-16 \*\*\*

CCL\_combined 1 0.0 0.0 0.006 0.937

Ordered\_SITE:CCL\_combined 2 6.4 3.2 1.275 0.282

Residuals 178 445.6 2.5

74 observations deleted due to missingness

**> EPI\_Cm2<-aov(data=EPI, d13C~Ordered\_SITE)**

Df Sum Sq Mean Sq F value Pr(>F)

Ordered\_SITE 4 845.0 211.25 65.29 <2e-16 \*\*\*

Residuals 253 818.6 3.24

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