

Black shale analysis

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1 Method

I compared the outcomes Ti/Zr and Th/Cr between formations using analysis of variation. All analyses were done in SAS version 9.3 and with Proc Mixed. I examined quantile-quantile plots for all analyses to assess the need for transformations. I also adjusted pairwise comparisons of means using Tukey's method.

2 Ti/Zr

After examining quantile-quantile plots I analysed the log (base 10) of the outcome. I show the analysis of variance of Ti/Zr below. The model is not significant (P=0.4143).

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Formation	2	30	0.91	0.4143

I show the means of Ti/Zr below (on the log scale). The Pr > |t| tests if the means are equal to zero.

Least Squares Means

Effect	Formation	Estimate	Standard Error	DF	t Value	Pr > t
Formation	Barney Creek Formation	1.4229	0.08193	30	17.37	<.0001
Formation	Velkerri Formation	1.2602	0.09460	30	13.32	<.0001
Formation	Wollogorang Formation	1.2970	0.1466	30	8.85	<.0001

Although the model is not significant, I compare the formations below. The Adj P is the P value comparing pairs of means. None are significant.

Differences of Least Squares Means

Effect	Formation	Formation	Estimate	Standard Error	DF	t Value	Pr > t	Adjustment	Adj P
Formation	Barney Creek Formation	Velkerri Formation	0.1627	0.1251	30	1.30	0.2034	Tukey-Kramer	0.4061
Formation	Barney Creek Formation	Wollogorang Formation	0.1258	0.1679	30	0.75	0.4594	Tukey-Kramer	0.7362
Formation	Velkerri Formation	Wollogorang Formation	-0.03687	0.1744	30	-0.21	0.8340	Tukey-Kramer	0.9757

3 Th/Cr

After examining quantile-quantile plots I analysed the log (base 10) of the outcome. I show the analysis of variance of Th/Cr below. The model is not significant (P=0.1273).

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Formation	2	30	2.21	0.1273

I show the means of Th/Cr below (on the log scale). The Pr > |t| tests if the means are equal to zero.

Least Squares Means

Effect	Formation	Estimate	Standard Error	DF	t Value	Pr > t
Formation	Barney Creek Formation	-0.3658	0.1571	30	-2.33	0.0268
Formation	Velkerri Formation	-0.8696	0.1814	30	-4.79	<.0001
Formation	Wollogorang Formation	-0.5476	0.2811	30	-1.95	0.0608

Although the model is not significant, I compare the formations below. The Adj P is the P value comparing pairs of means. None are significant.

Differences of Least Squares Means

Effect	Formation	Formation	Estimate	Standard Error	DF	t Value	Pr > t	Adjustment	Adj P
Formation	Barney Creek Formation	Velkerri Formation	0.5039	0.2400	30	2.10	0.0443	Tukey-Kramer	0.1070
Formation	Barney Creek Formation	Wollogorang Formation	0.1818	0.3220	30	0.56	0.5766	Tukey-Kramer	0.8398
Formation	Velkerri Formation	Wollogorang Formation	-0.3221	0.3345	30	-0.96	0.3434	Tukey-Kramer	0.6056