eNote 001

ERROR CHECKING OF THE MINERALOGICAL DATA-FRAME: Bentonite Quarry study of Egypt

BY

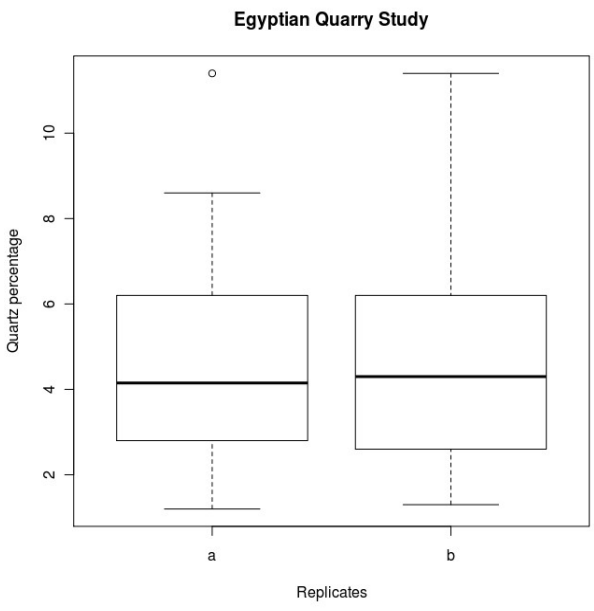
George F. Hart

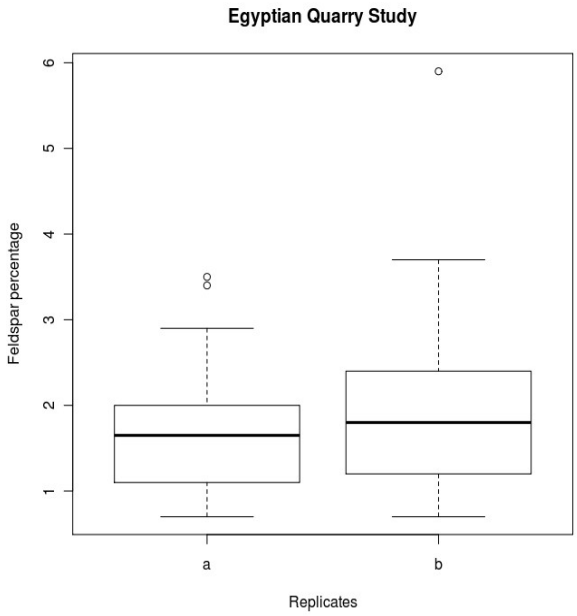
This data-frame is used for the study of the bentonite characteristics of some quarries in Egypt by Agha, Ferrell and Hart. Hart.

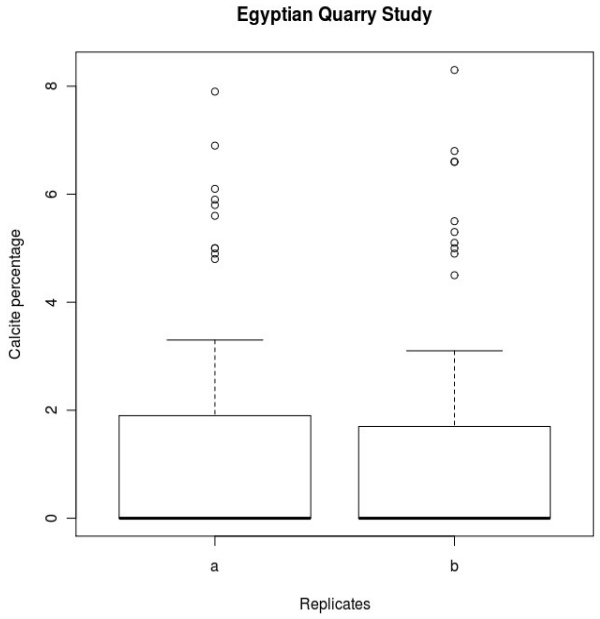
CONCLUSIONS

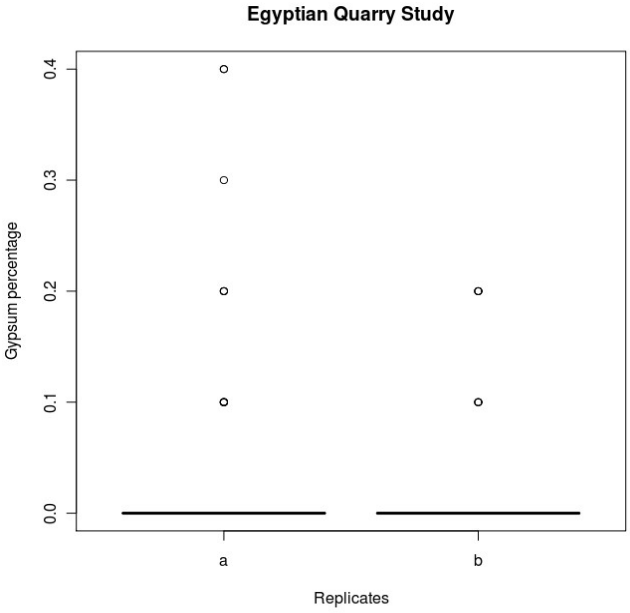
Replicate samples show general consistency but most of the variables depart from normality and need to be transformed prior to further analysis.

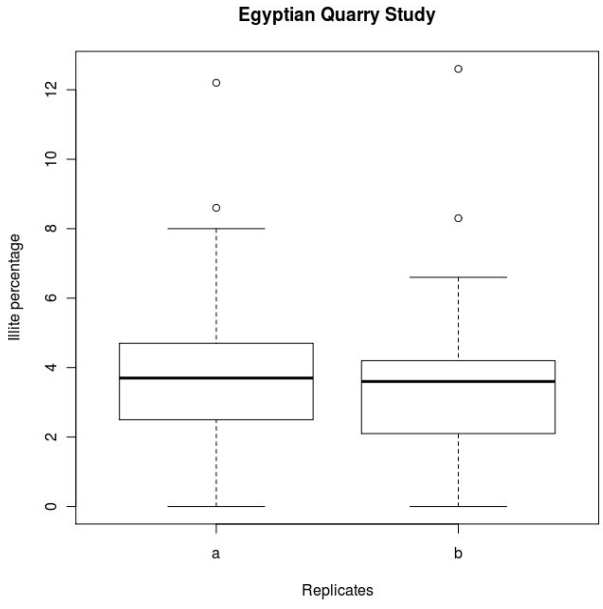
APPENDIX ONE: Box plots of replicates: untransformed predictor variables

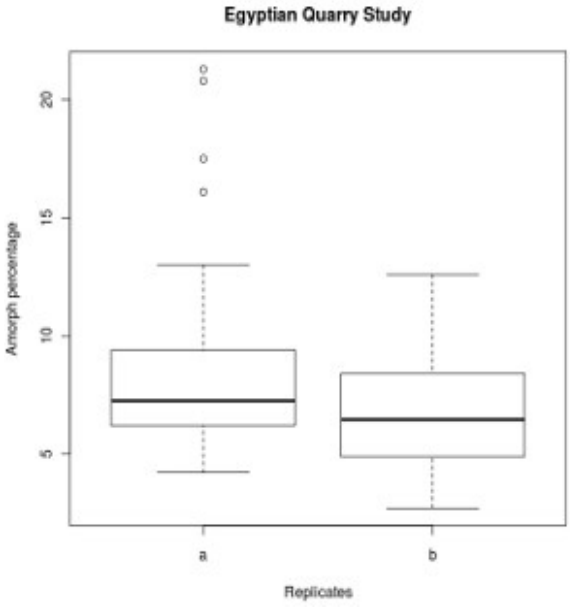


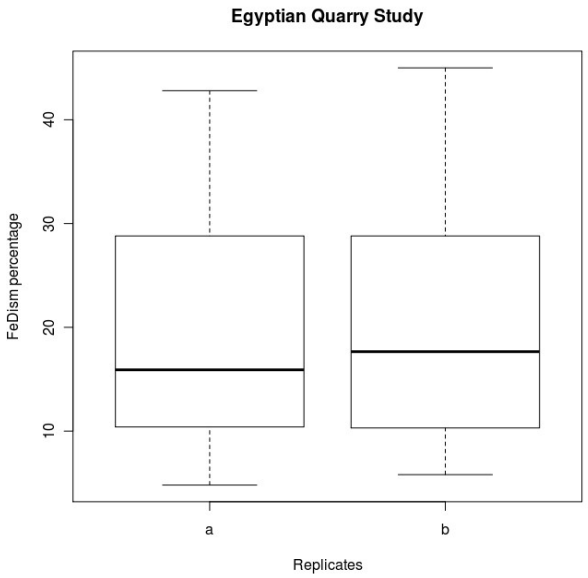


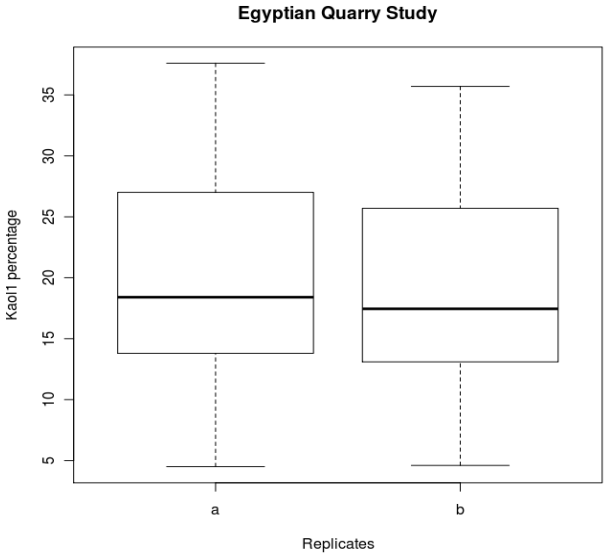

Egyptian Quarry Study
Calcite percentage
0
2
4
6
8
a
b
Replicates

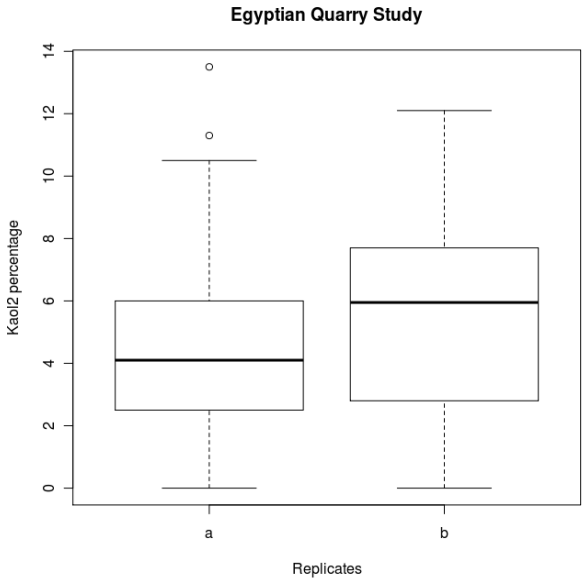

Egyptian Quarry Study
Gypsum percentage
0.0
0.1
0.2
0.3
0.4
a
b
Replicates

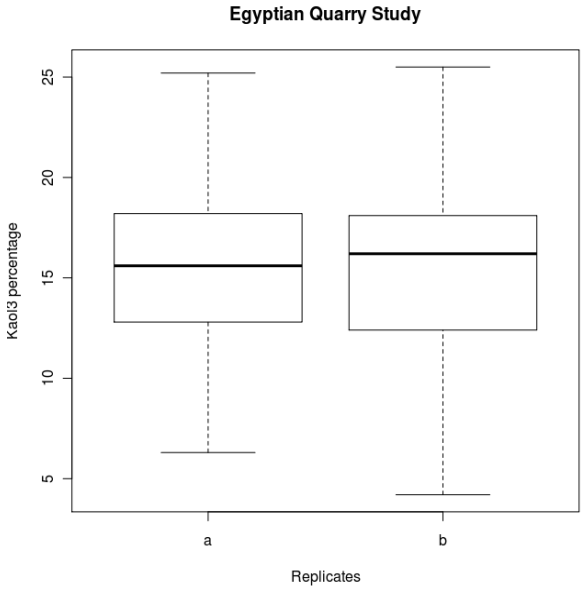

Egyptian Quarry Study
Illite percentage
0
2
4
6
8
10
12
a
b
Replicates

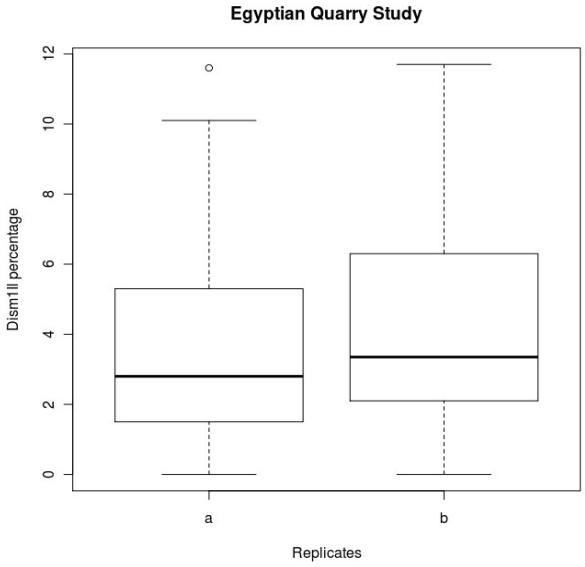

Egyptian Quarry Study
Amorph percentage
5
10
15
20
a
b
Replicates

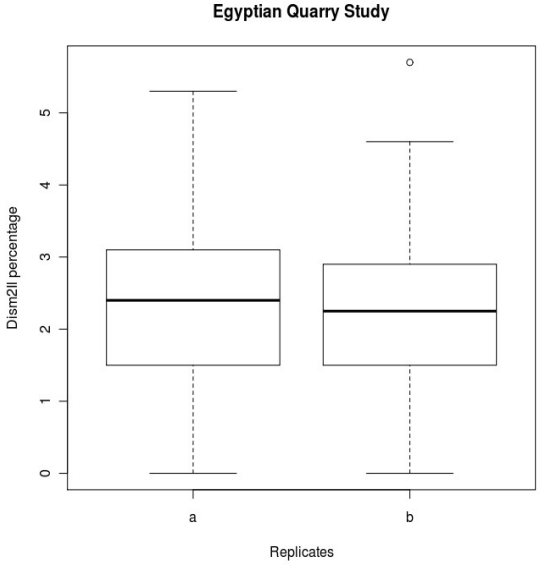

Egyptian Quarry Study
FeDism percentage
10
20
30
40
a
b
Replicates

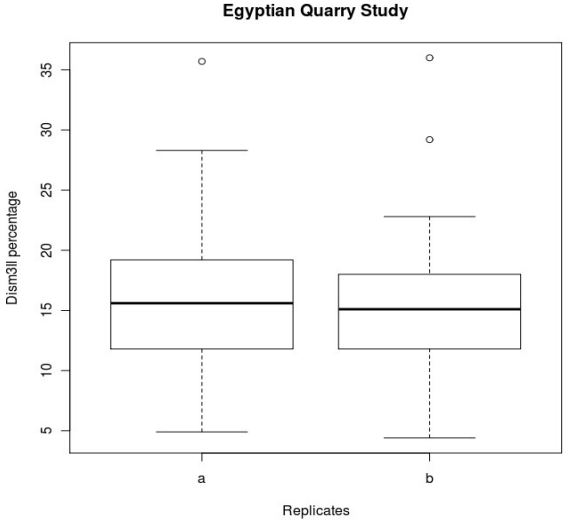

Egyptian Quarry Study
Kaol1 percentage
5
10
15
20
25
30
35
a
b
Replicates

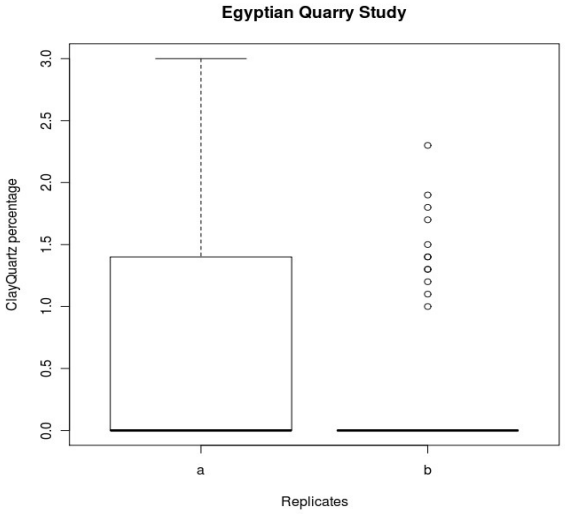

Egyptian Quarry Study
Kaol2 percentage
0
2
4
6
8
10
12
14
a
b
Replicates


Egyptian Quarry Study
Kaol3 percentage
5
10
15
20
25
a
b
Replicates

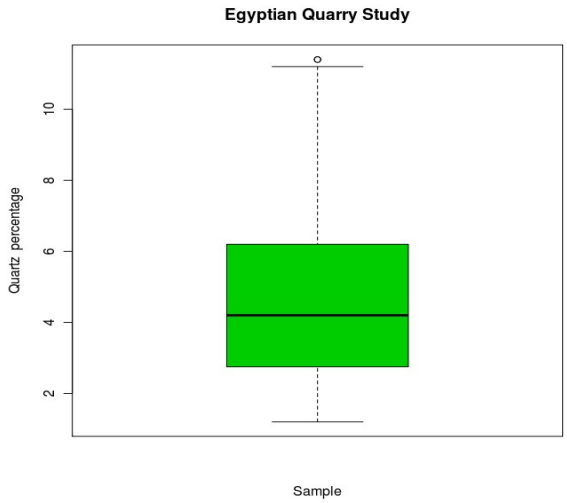

Egyptian Quarry Study
Dism1II percentage
0
2
4
6
8
10
12
a
b
Replicates

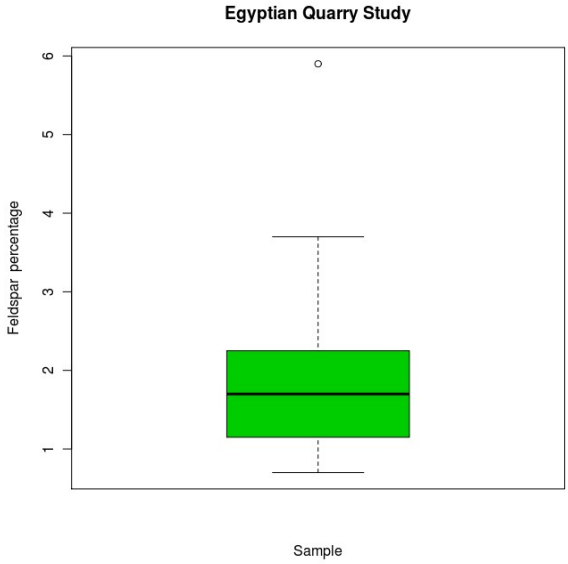

Egyptian Quarry Study
Dism2II percentage
0
1
2
3
4
5
a
b
Replicates

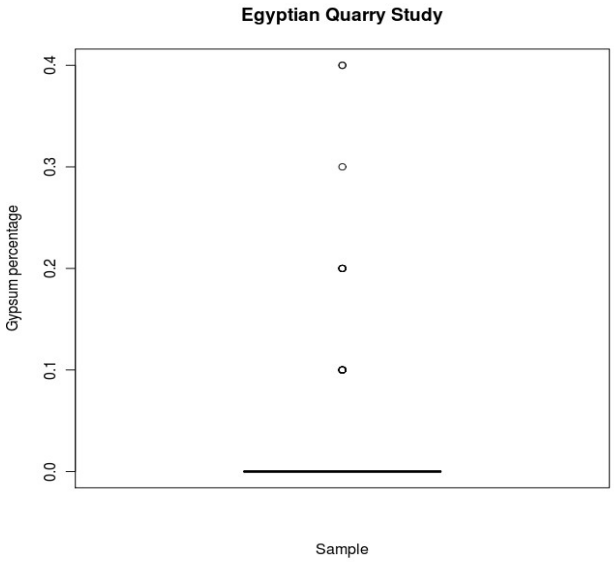

Egyptian Quarry Study
Dism3II percentage
5
10
15
20
25
30
35
a
b
Replicates

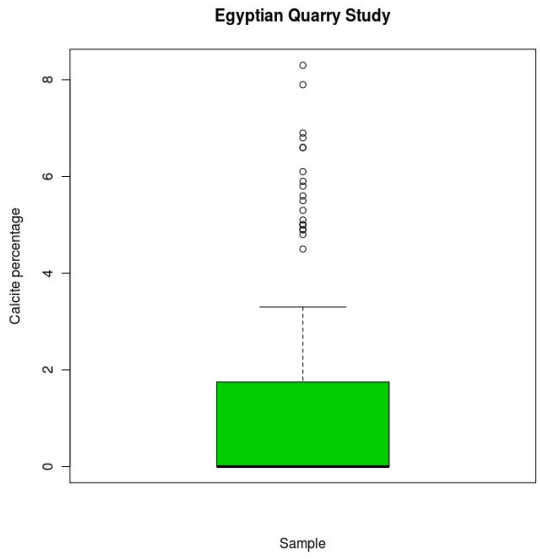

Egyptian Quarry Study
ClayQuartz percentage
0.0
0.5
1.0
1.5
2.0
2.5
3.0
a
b
Replicates

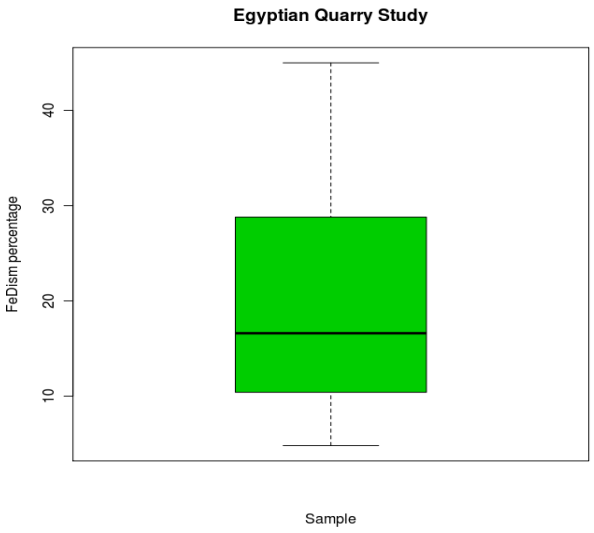
APPENDIX TWO: *Graphical results for the overall Region for all predictor variables: untransformed data-frame.*

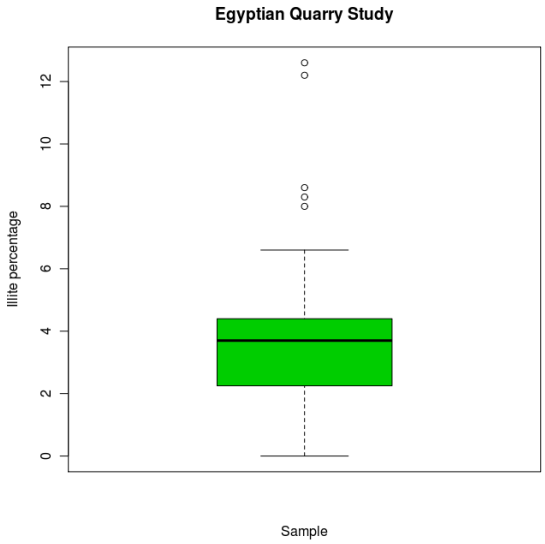


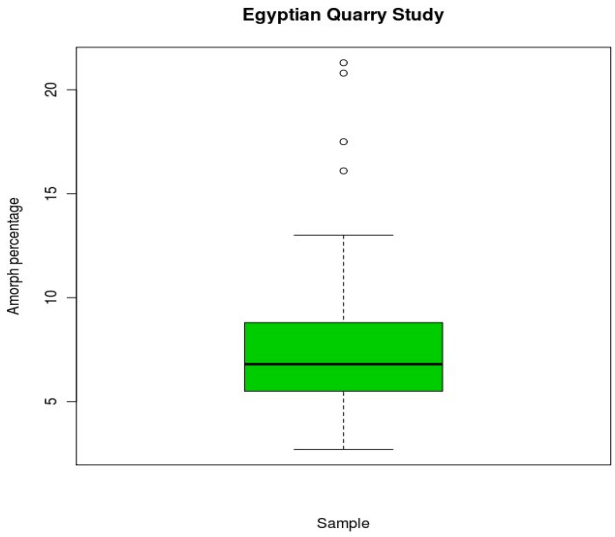


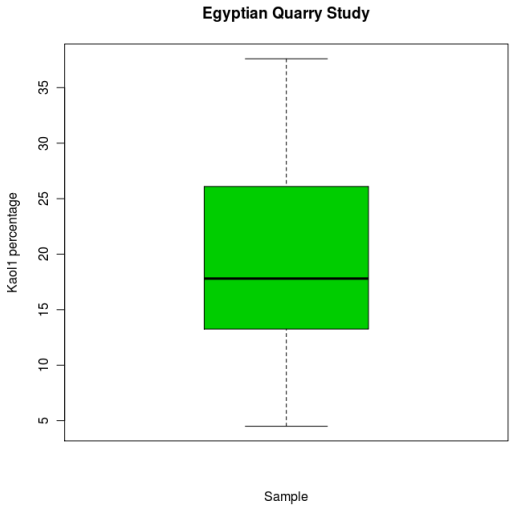


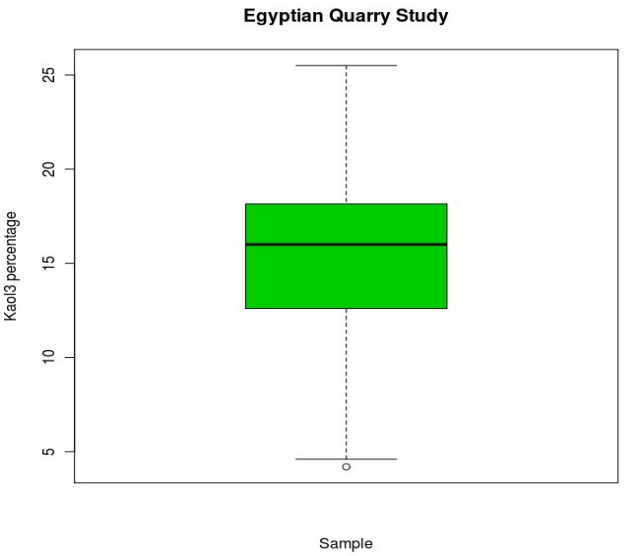


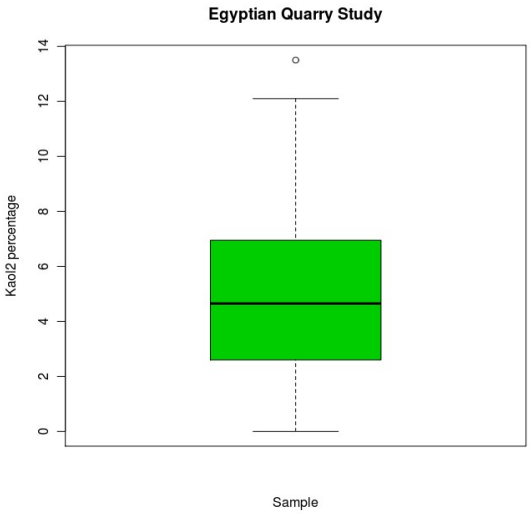

Egyptian Quarry Study
FeDism percentage
10
20
30
40
Sample

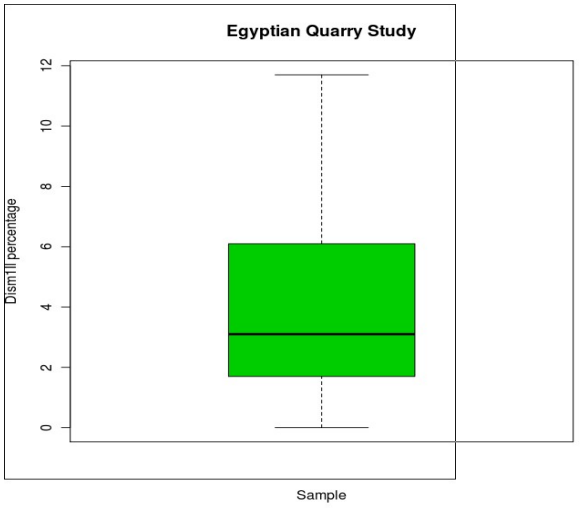

Egyptian Quarry Study
Illite percentage
0
2
4
6
8
10
12
Sample

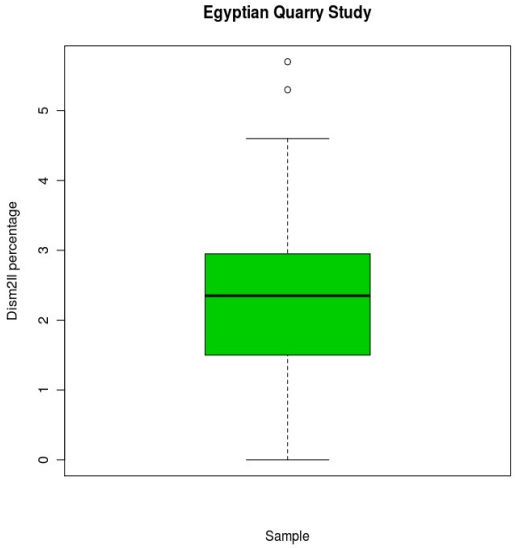

Egyptian Quarry Study
Amorph percentage
5
10
15
20
Sample

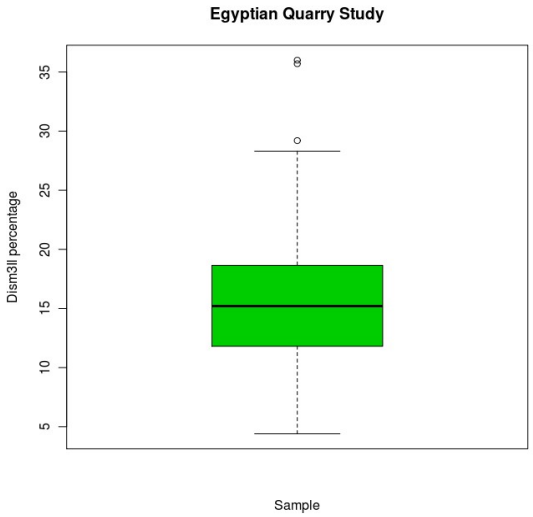

Egyptian Quarry Study
Kaol1 percentage
5
10
15
20
25
30
35
Sample

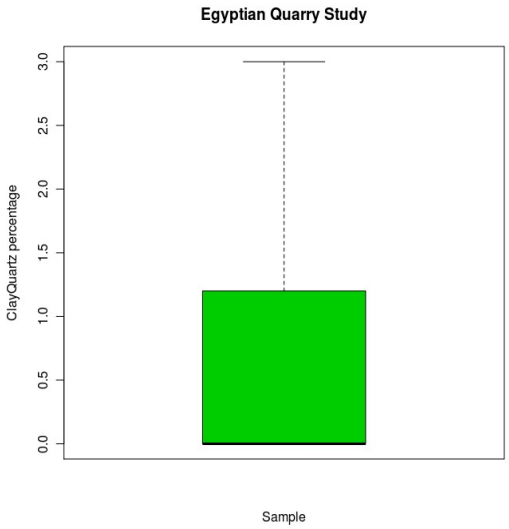

Egyptian Quarry Study
Kaol3 percentage
5
10
15
20
25
Sample


Egyptian Quarry Study
Kaol2 percentage
0
2
4
6
8
10
12
14
Sample


Egyptian Quarry Study
Dism1ll percentage
0
2
4
6
8
10
12
Sample

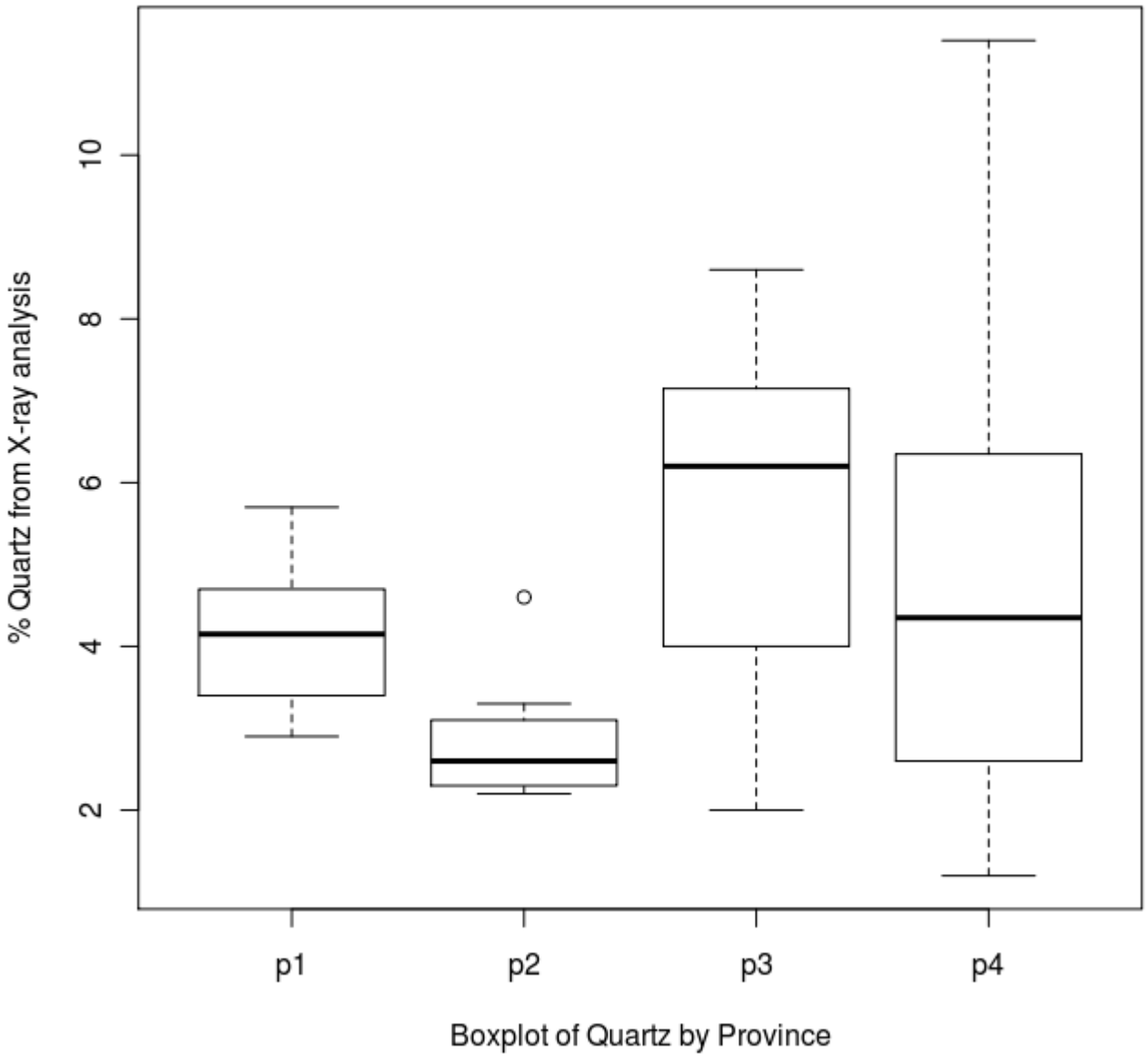

Egyptian Quarry Study
Dism2ll percentage
0
1
2
3
4
5
Sample


Egyptian Quarry Study
Dism3ll percentage
5
10
15
20
25
30
35
Sample

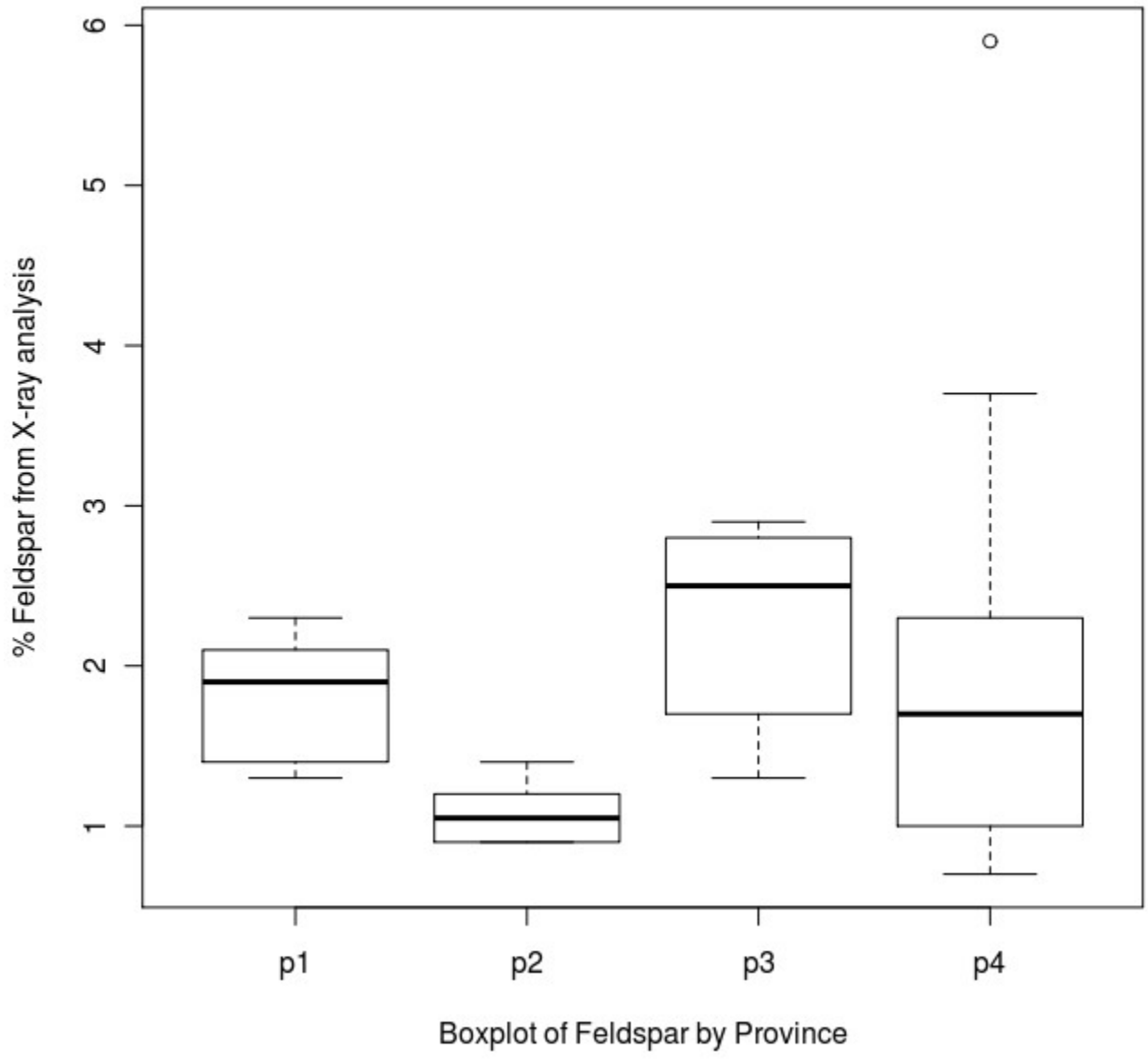

Egyptian Quarry Study
ClayQuartz percentage
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Sample

APPENDIX THREE: *Graphical results for the Provinces for all predictor variables: untransformed data-frame.*

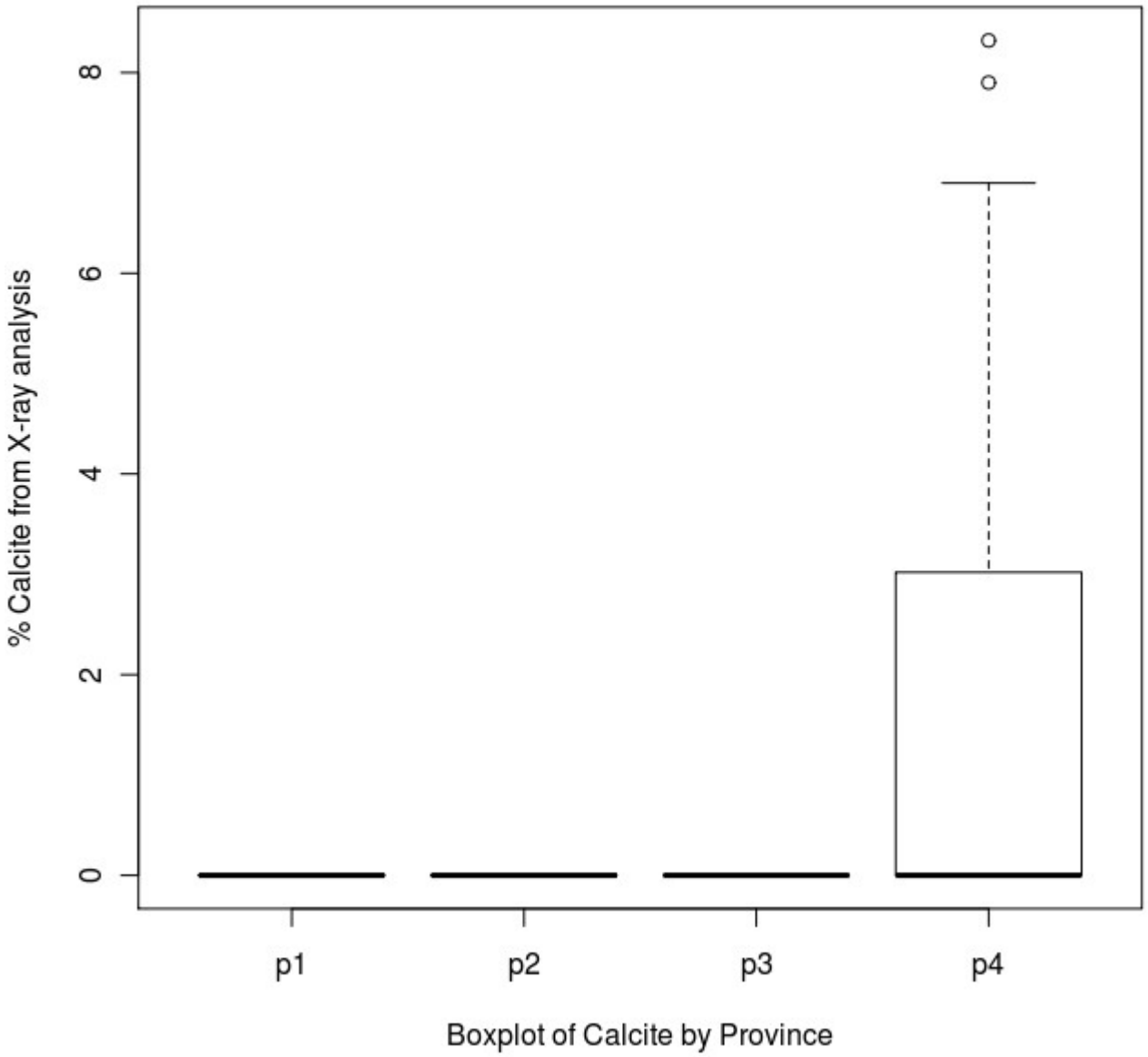
QUARTZ: The box plots indicate the variable is negatively skewed in Provinces P1 and P3 and positively skewed in P2. P1 and P4 have similar modes but the 1st and 4th quartiles are quite different except for the single outlier of s023. P1 can be clearly separated from P2 and partially from P3. P4 cannot be differentiated from the others.



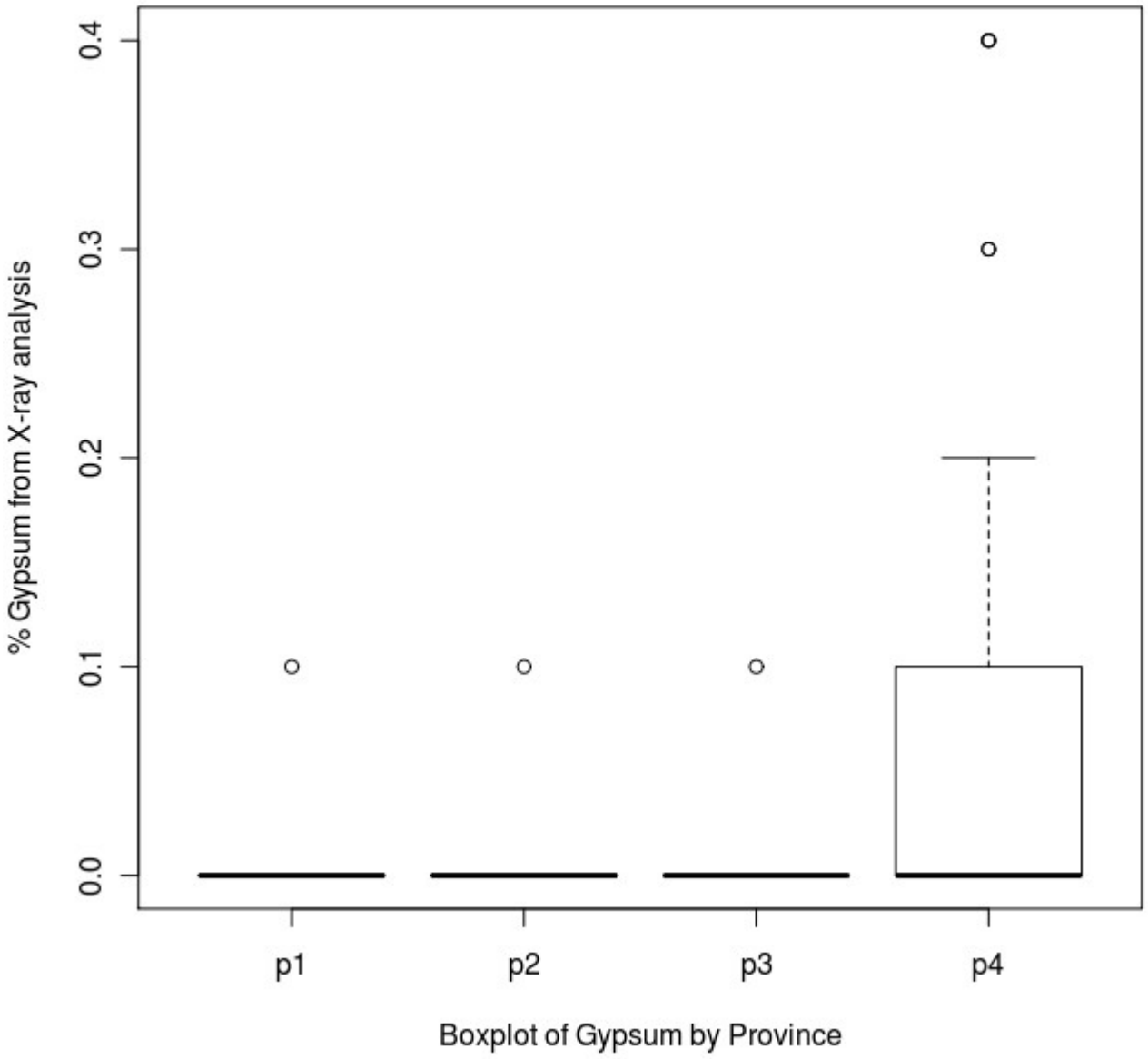
FELDSPAR: The box plots indicate the variable is similar to Quartz. The outlier is S80.



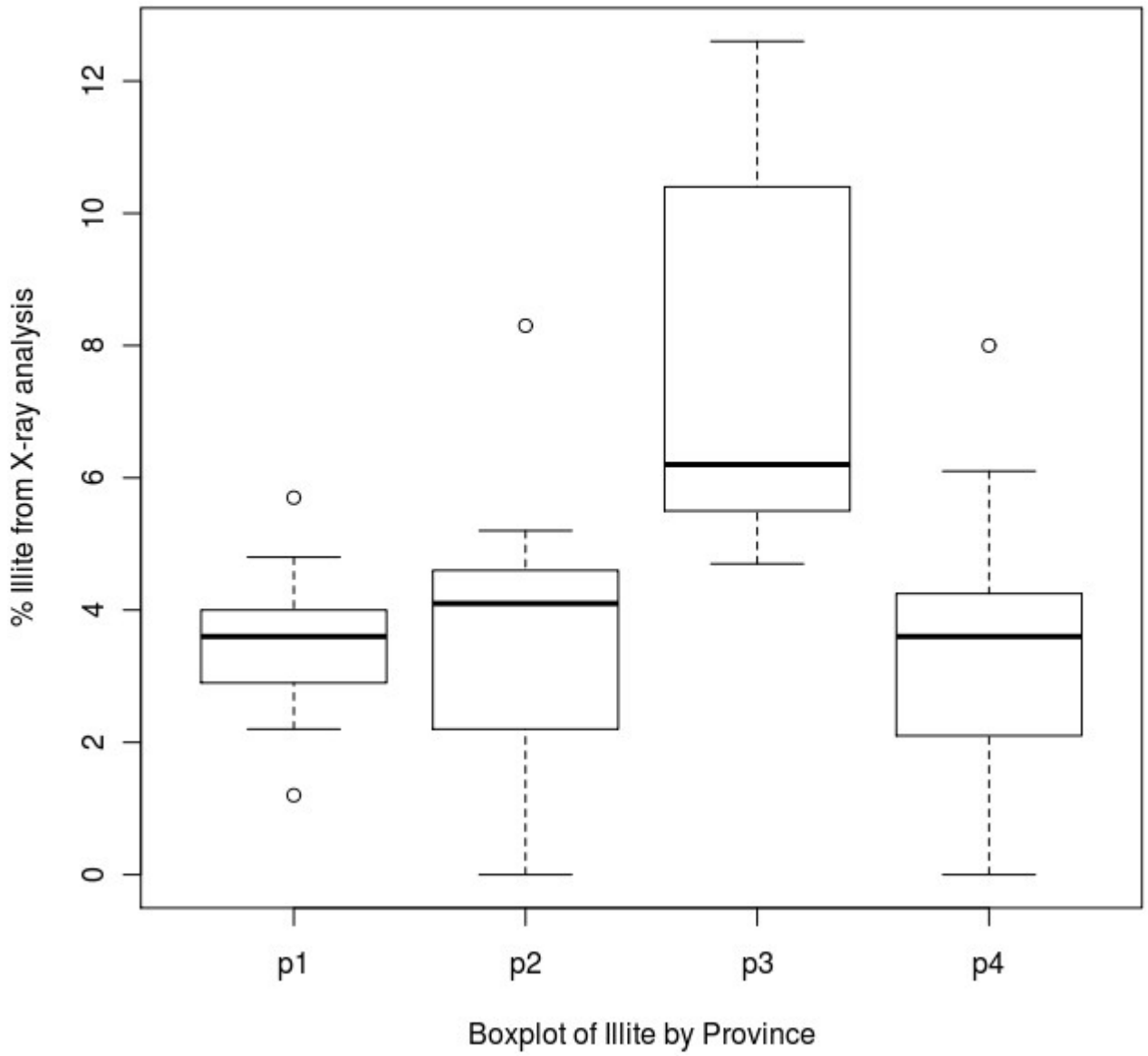
CALCITE. This mineral is a clear separator that is only present in P4.



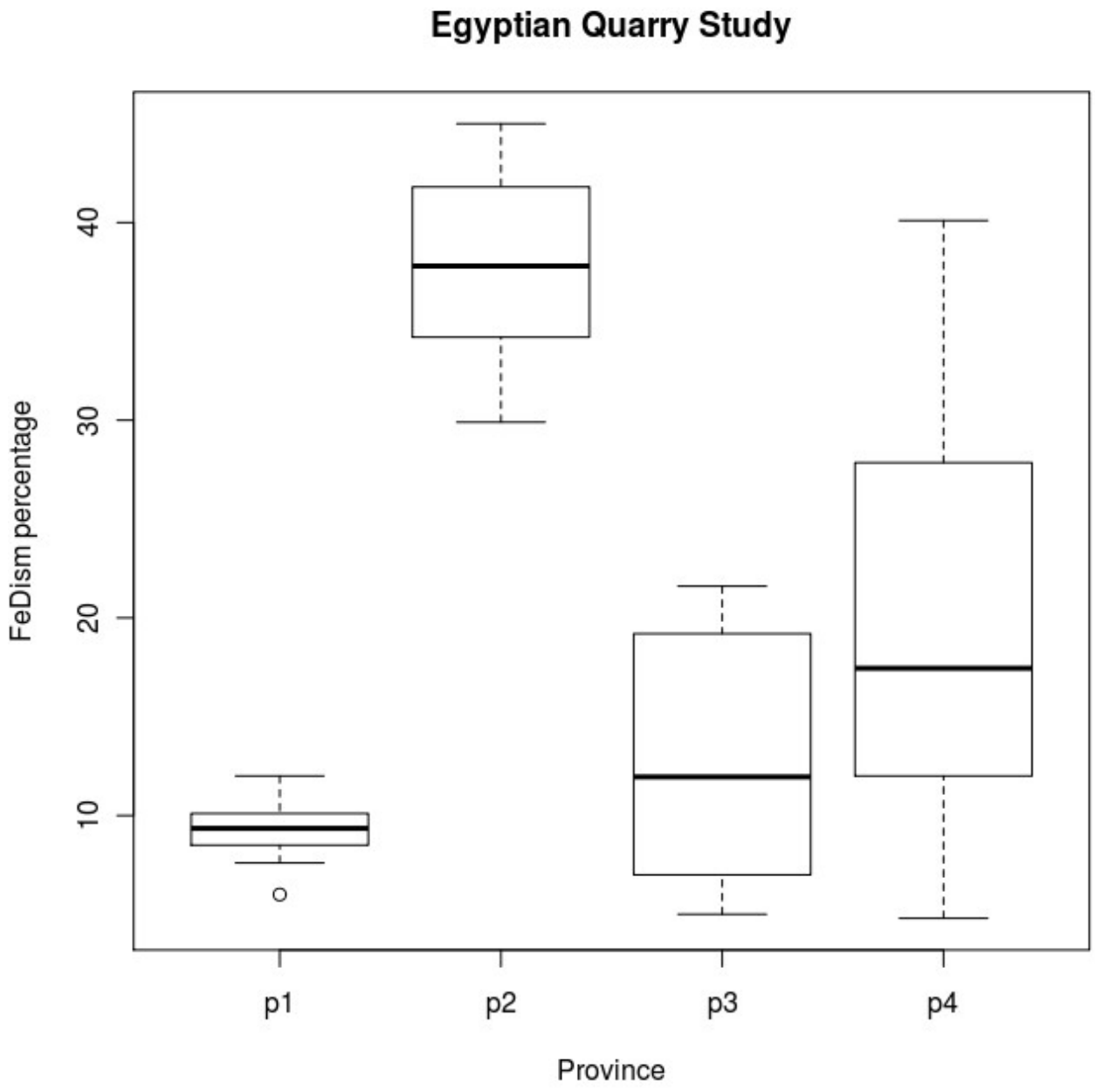
GYPSUM. This mineral is a clear separator that is mainly present in P4.



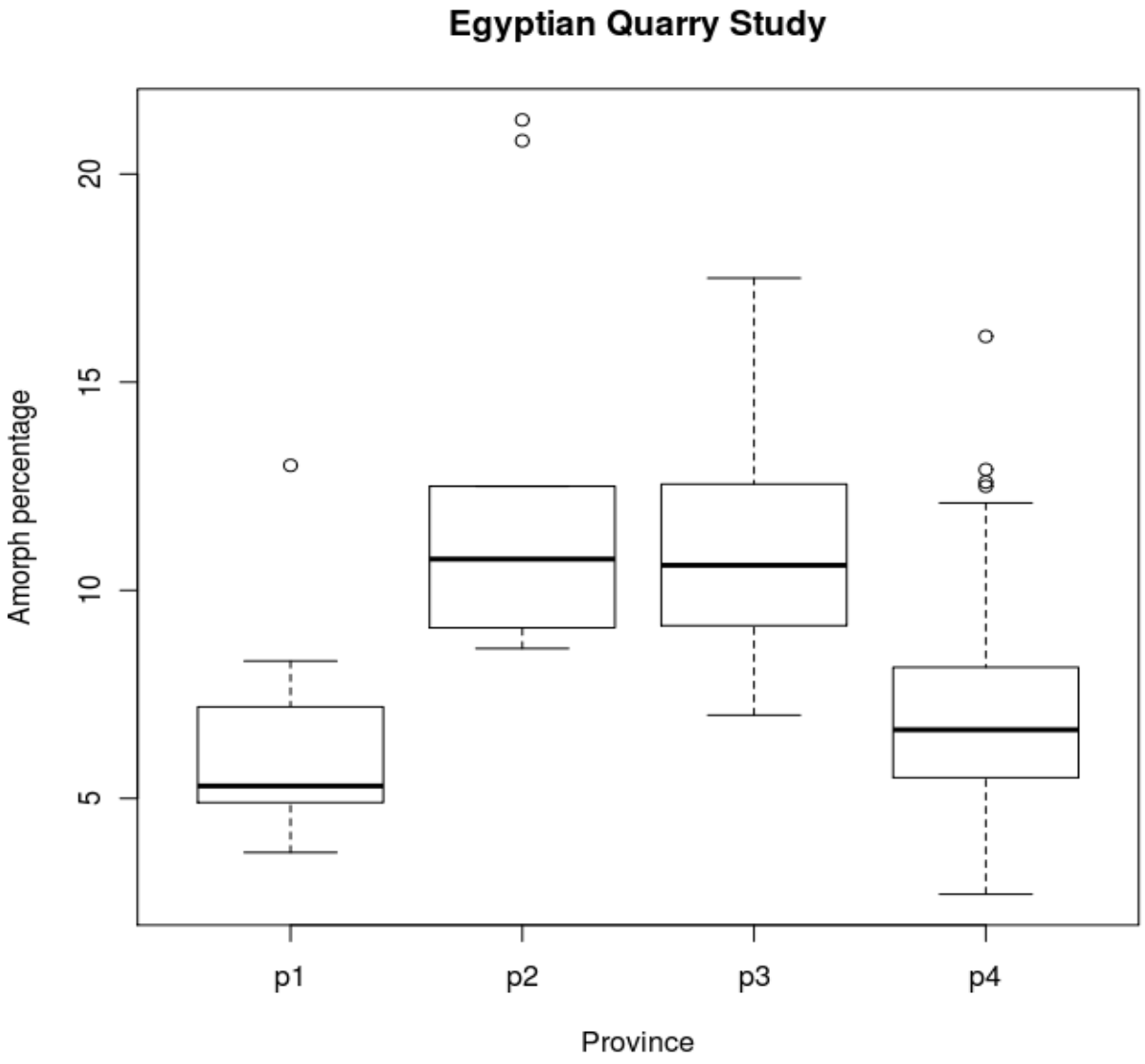
ILLLITE. This mineral is negatively skewed in P1,P2, and P4. And positively skewed in P3. P3 can be separated from the other provinces by its higher percentage of Illite.



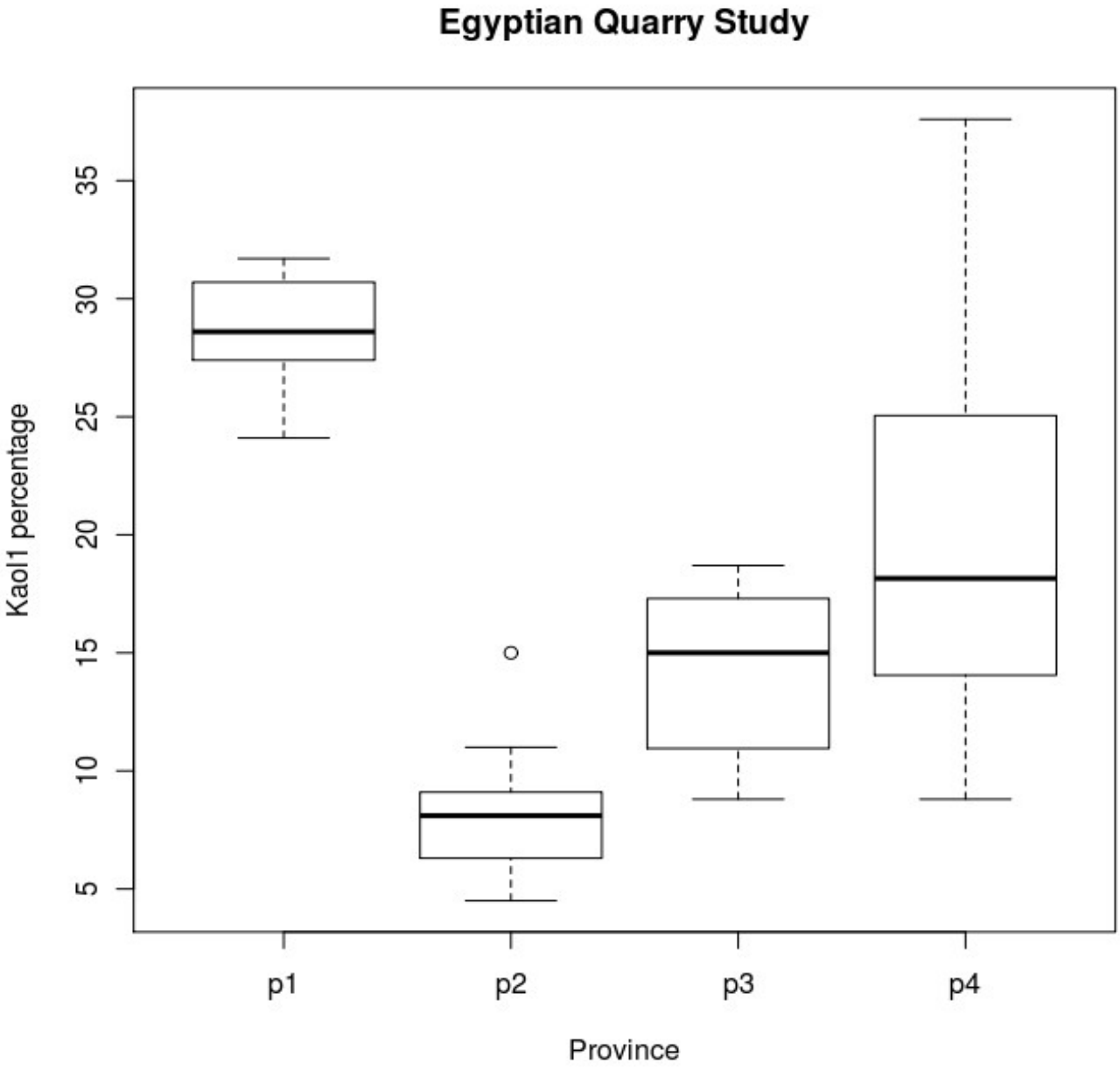
FeDism. This mineral is positively skewed in Provinces P2, P3 and P4 and can be used to separate P2 from the other Provinces.



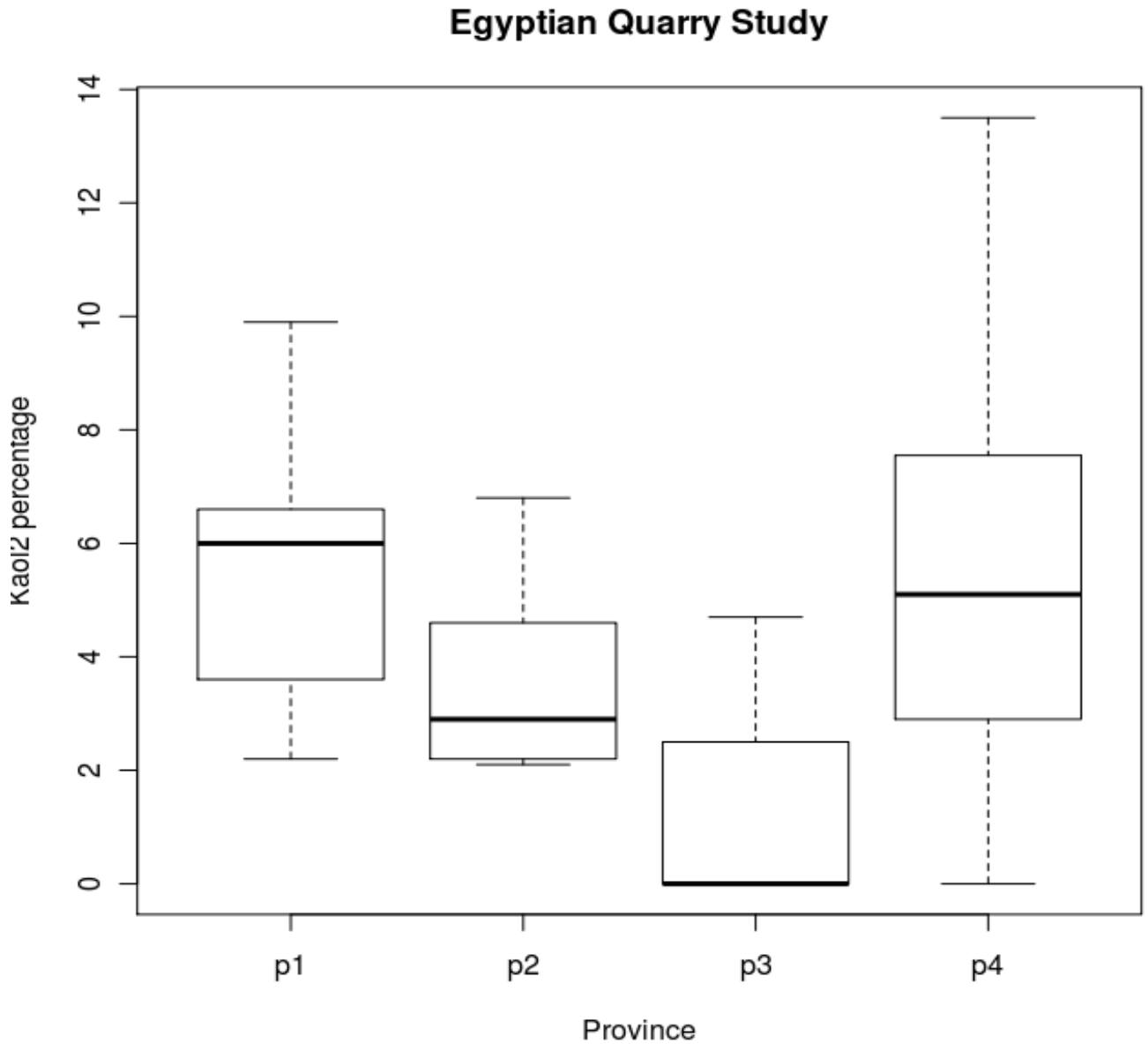
AMORPHOUS. This mineral is positively skewed for Provinces P1, P3 and P4.



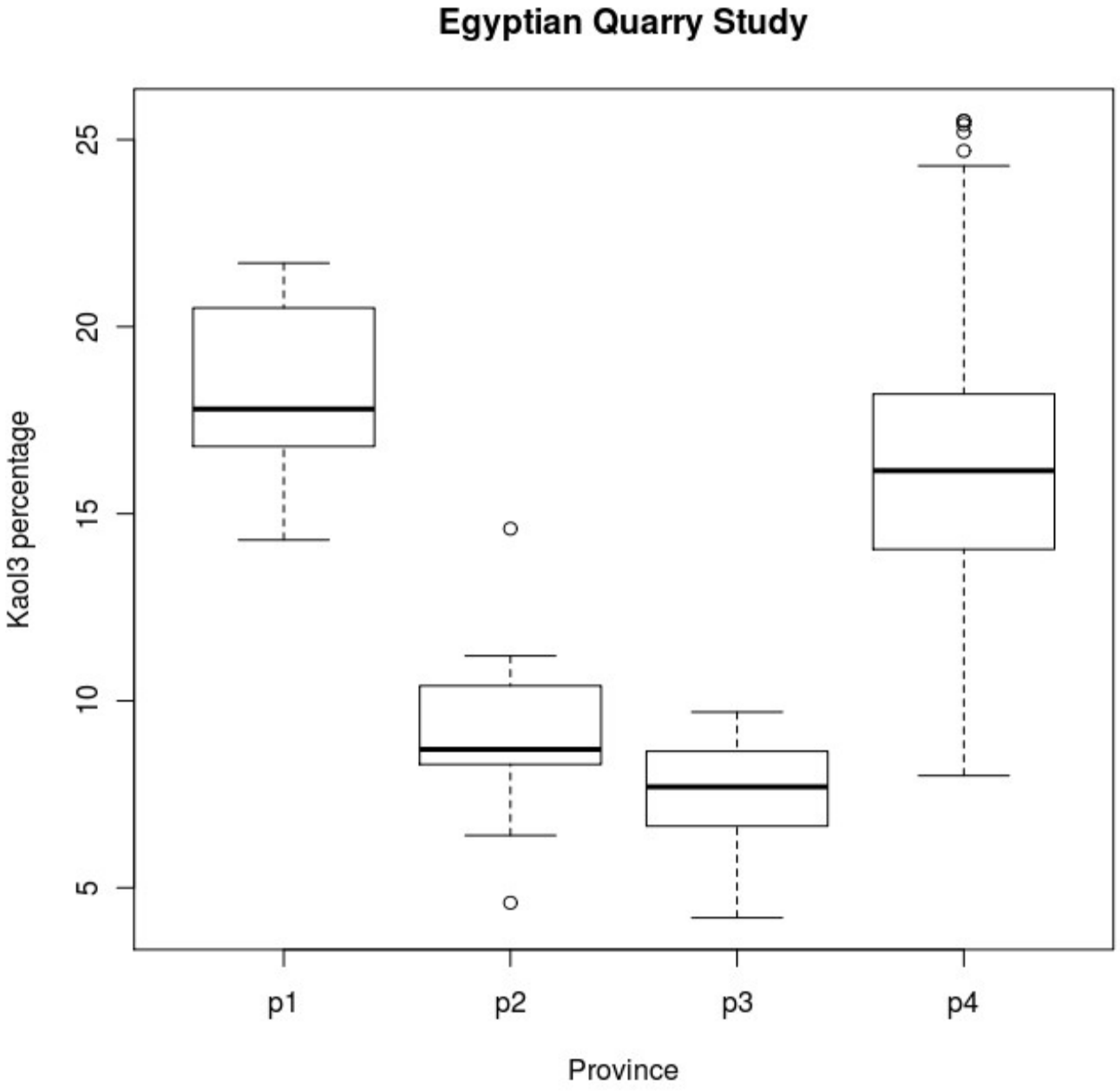
KAOL1. This mineral is positively skewed for Provinces P1, and P4.



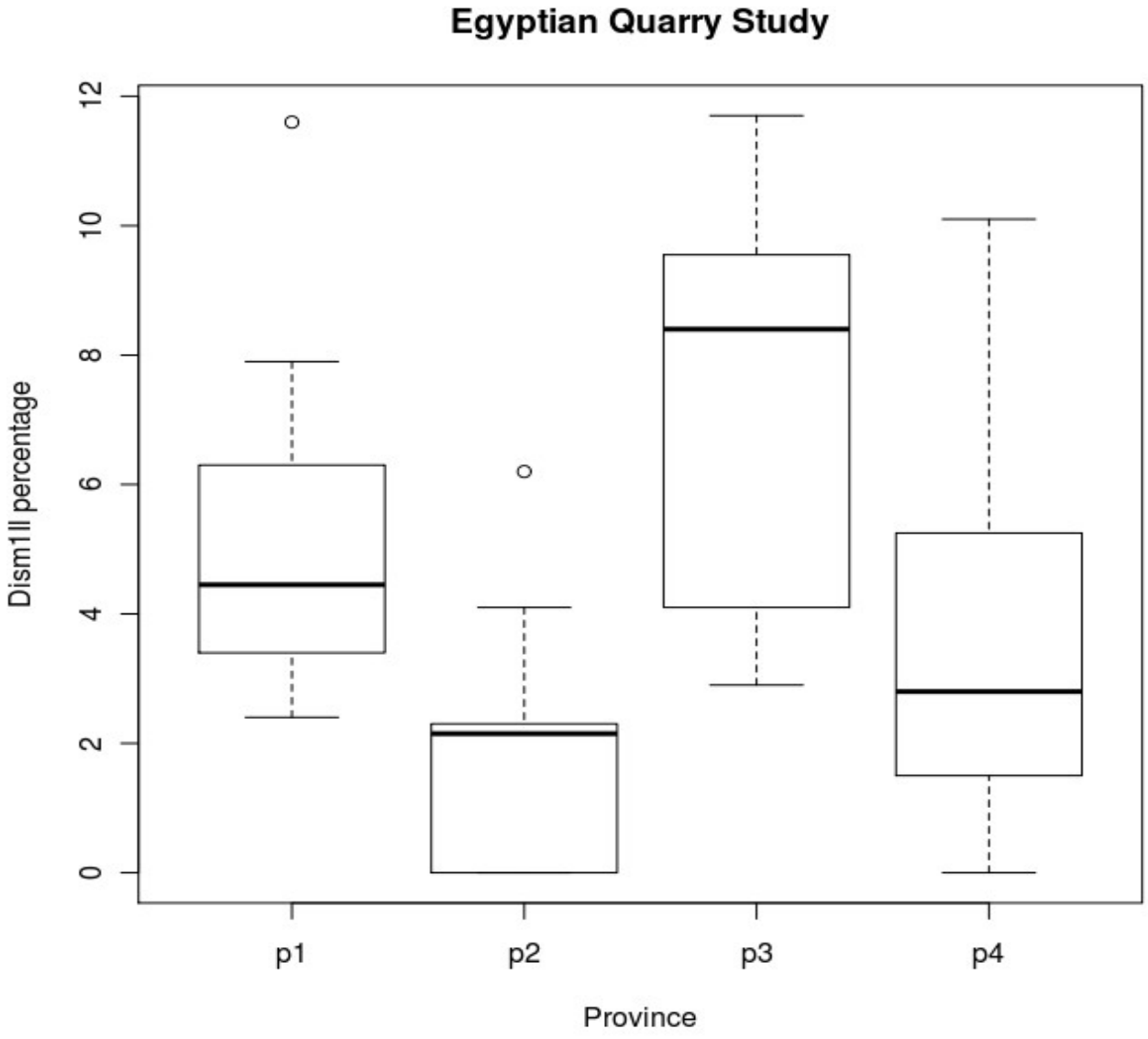
KAOL2. This mineral is positively skewed for Provinces P2, P3 and P4 and negatively skewed for Province P1.



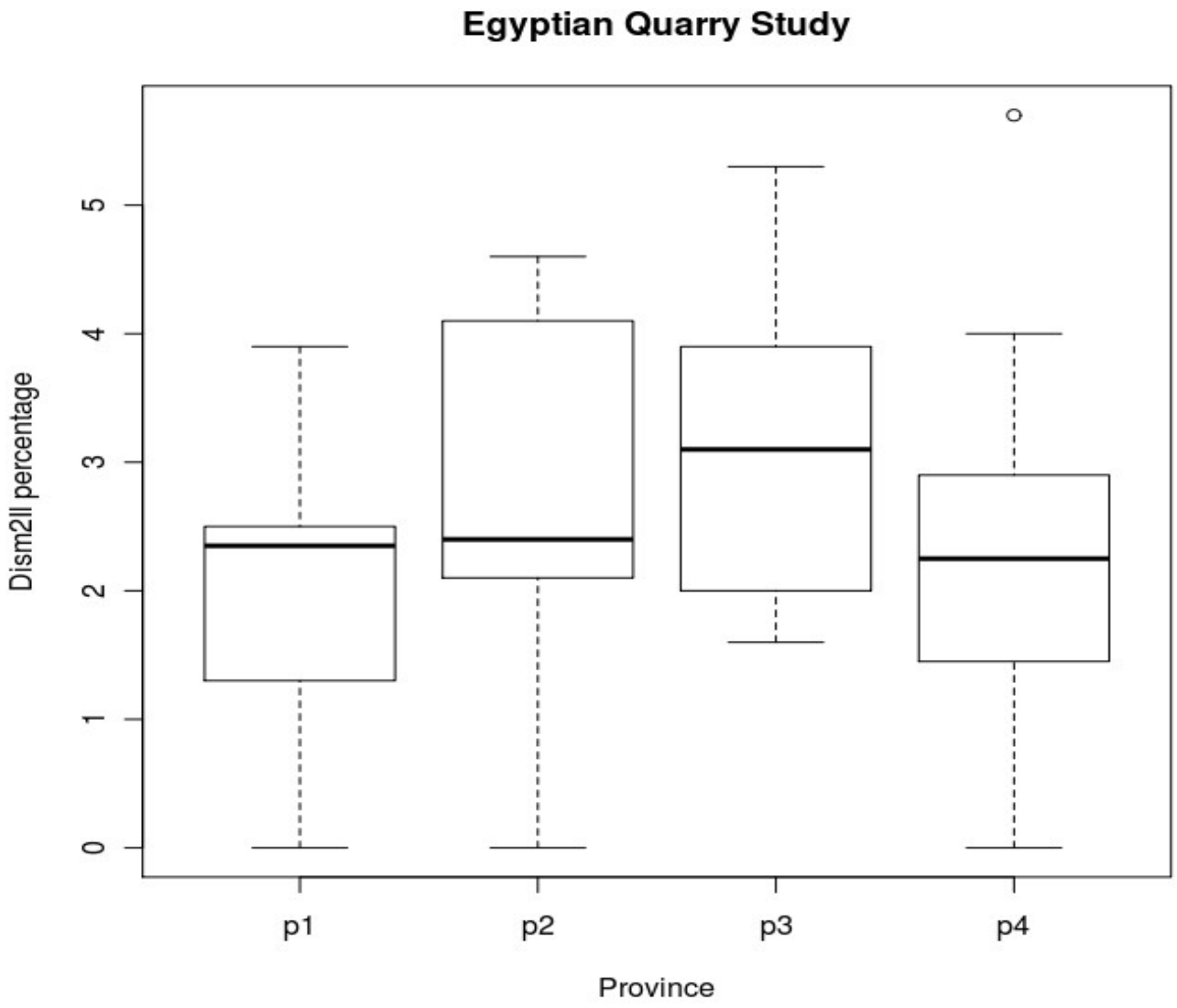
KAOL3. This mineral is positively skewed for Provinces P1 and P2 and negatively skewed for P3 and P4.



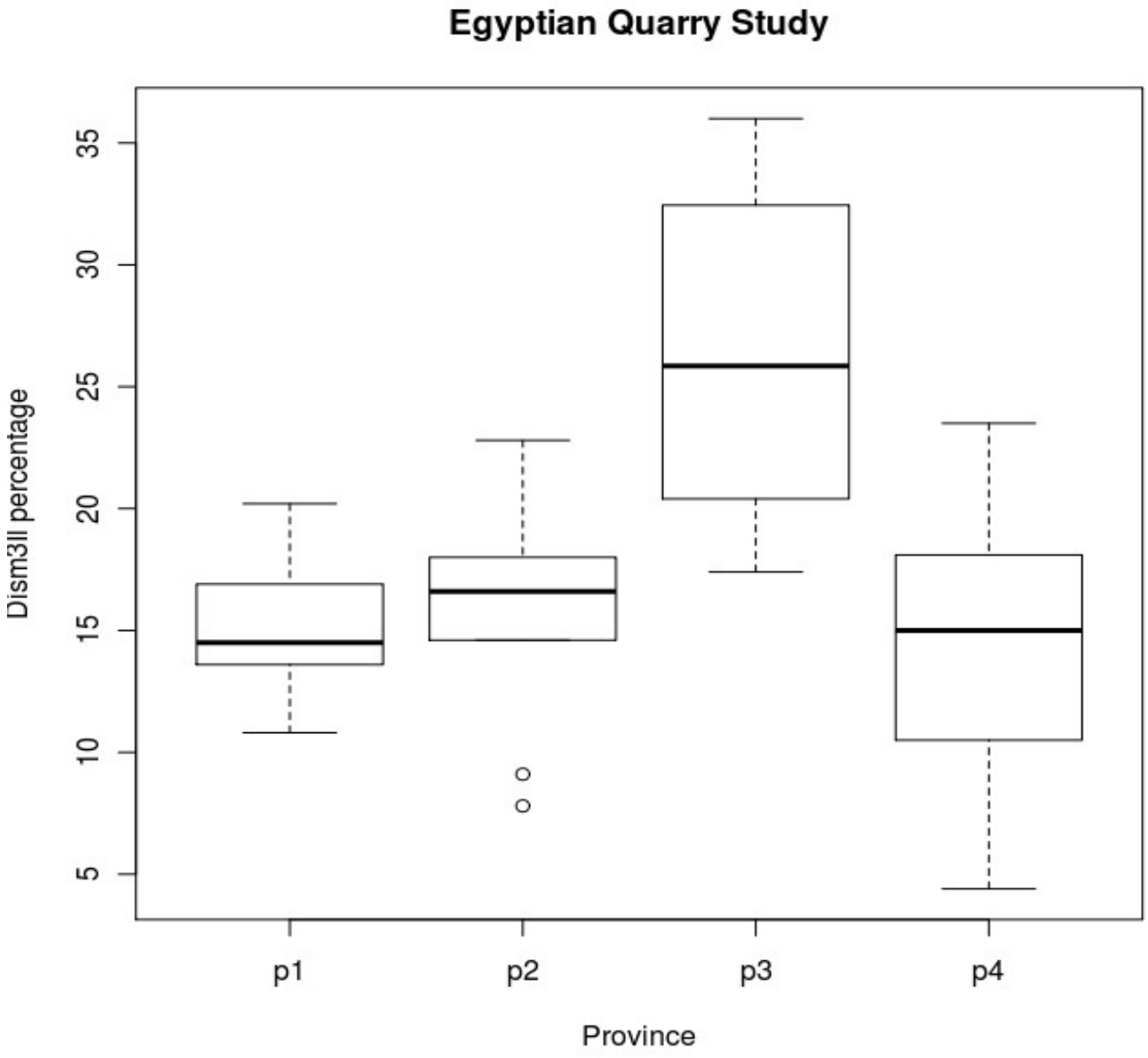
Dism1Il. This mineral is positively skewed for Provinces P1 and P4 and negatively skewed for P2 and P3.



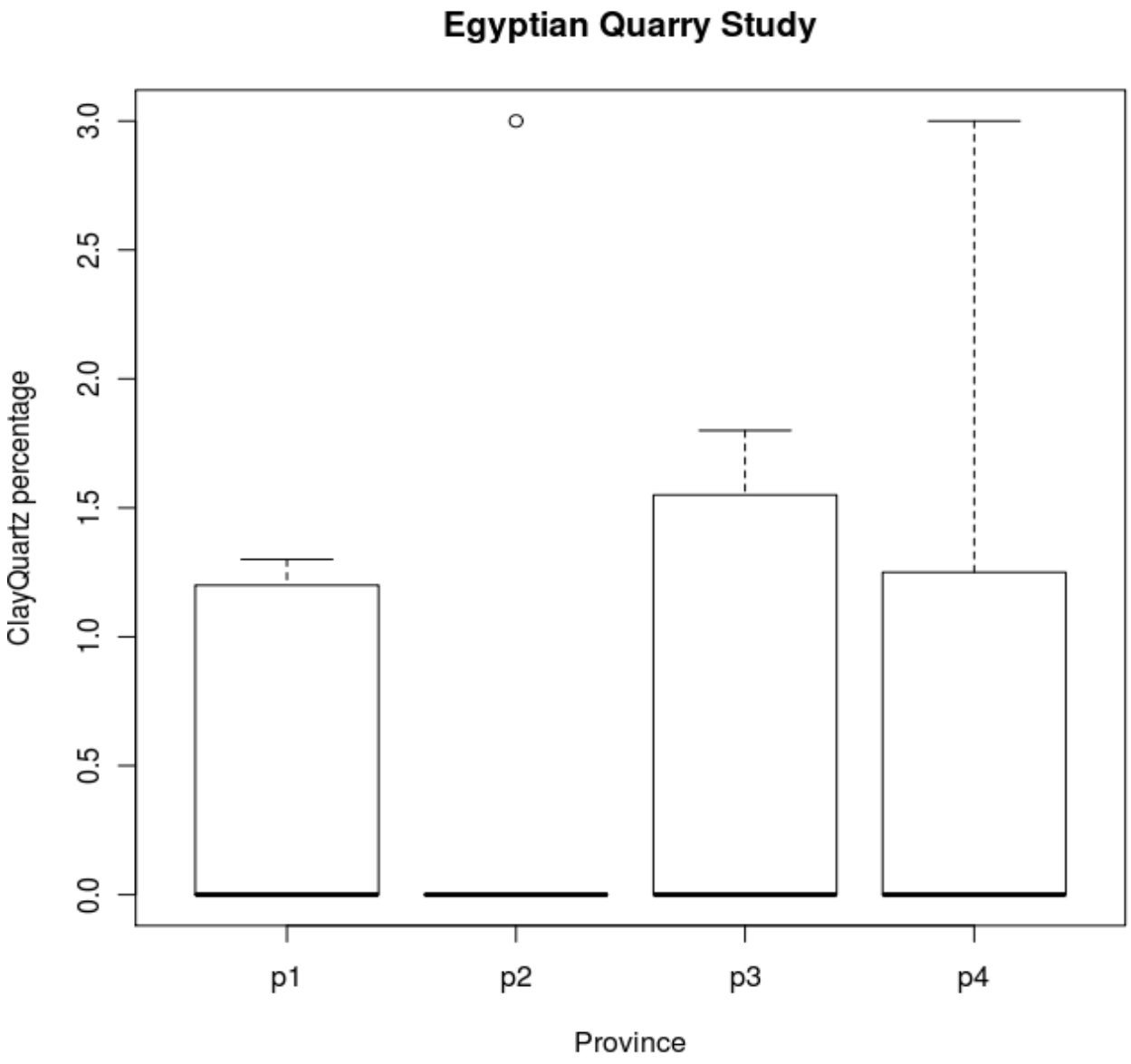
Dism2II. This mineral is negatively skewed for Provinces P1, P3 and P4 and positively skewed for P2.



Dism3ll. This mineral is positively skewed for Provinces P1 and P3, and negatively skewed for P2 and P4.

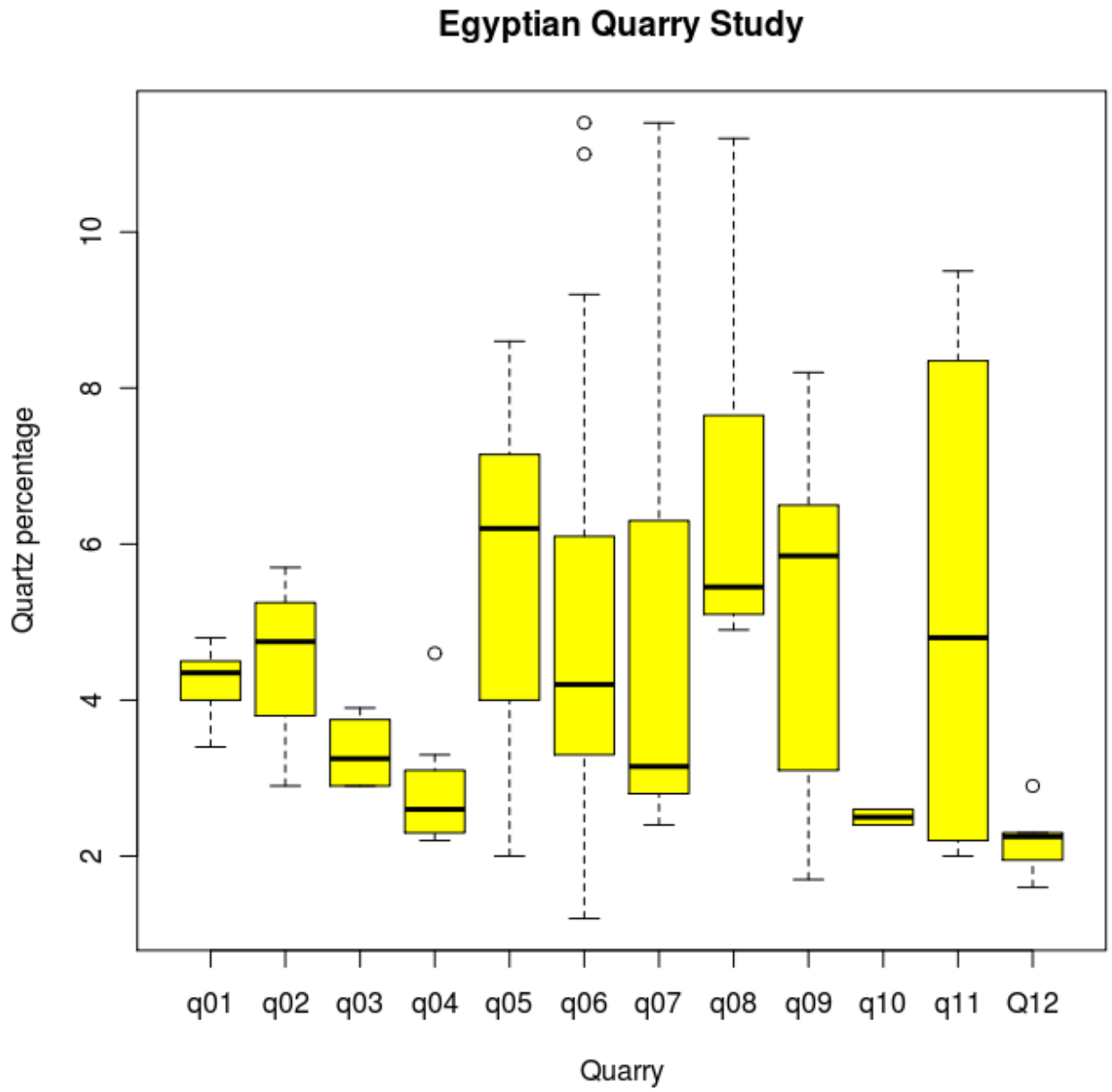


ClayQuartz. This mineral is positively skewed for all Provinces.



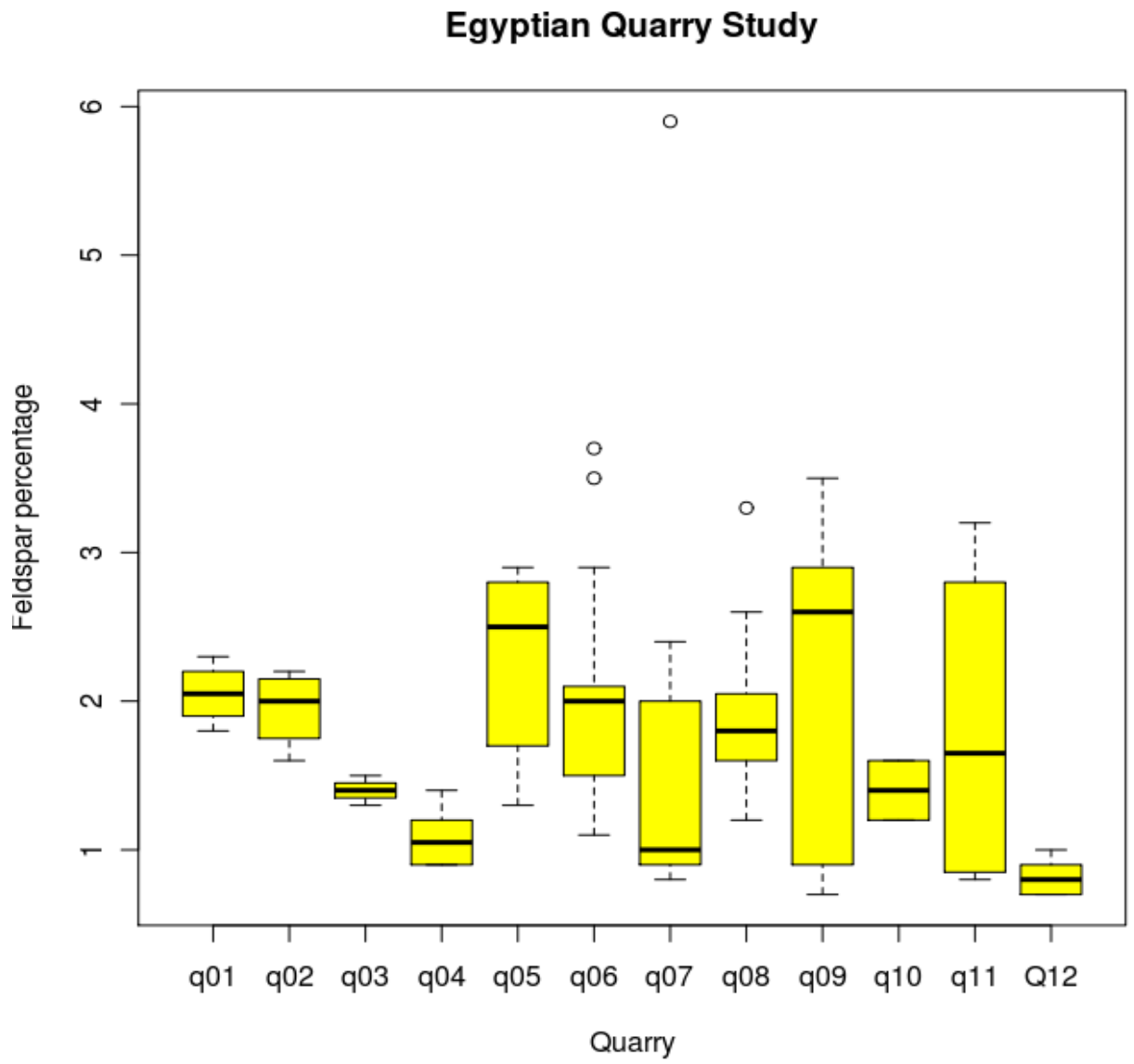
APPENDIX FOUR: Graphical results for the Quarries for all predictor variables: untransformed data-frame

QUARTZ: Quarries 1, 2, 5, 9 and 12 are negatively skewed and 3, 4, 6, 7, 8, and 11are positively skewed.



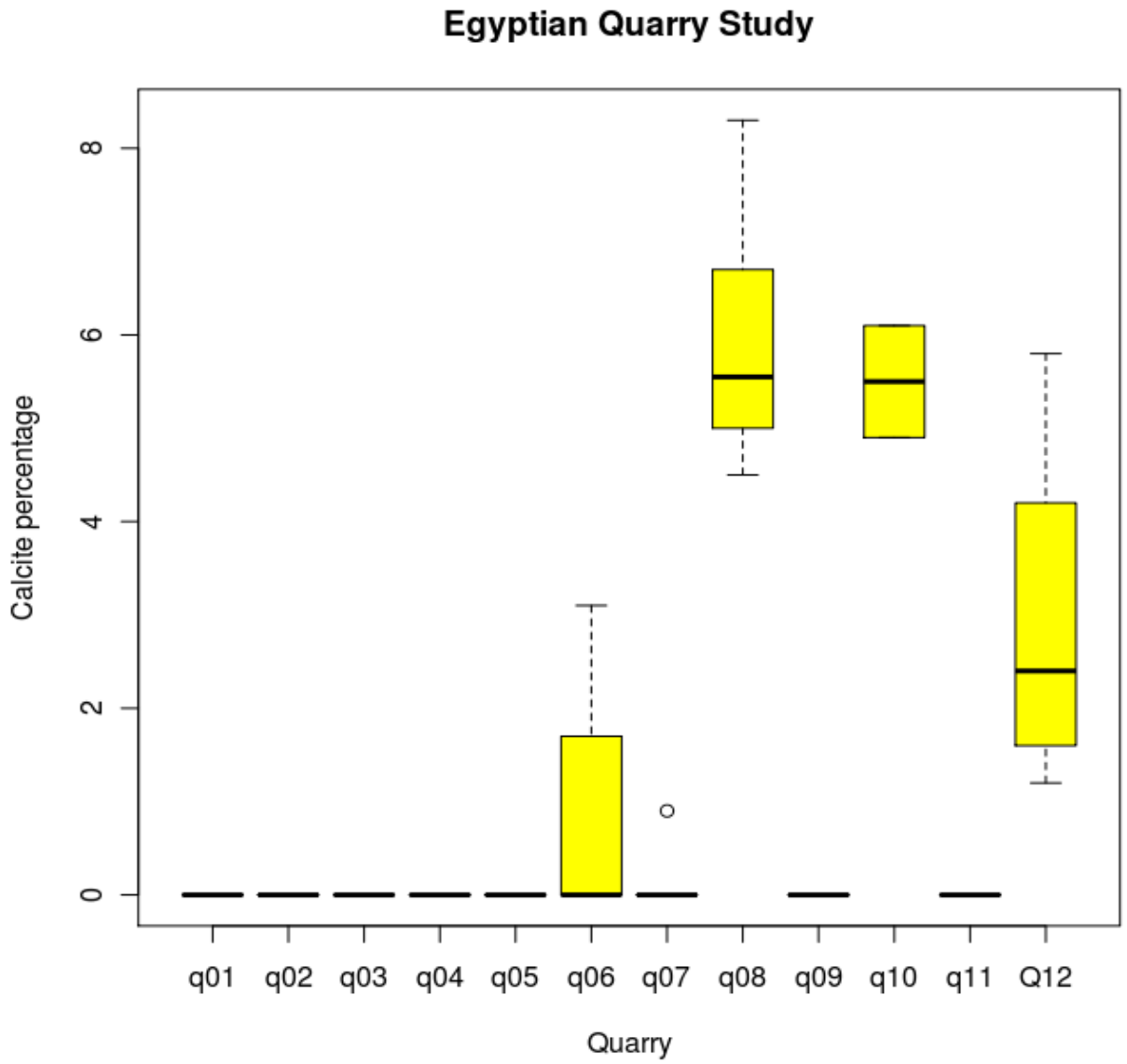
FELDSPAR:

The variable is negatively skewed for Quarries 2, 4, 5, 6, and 9 and positively skewed for Quarries 7, 8 and 11.



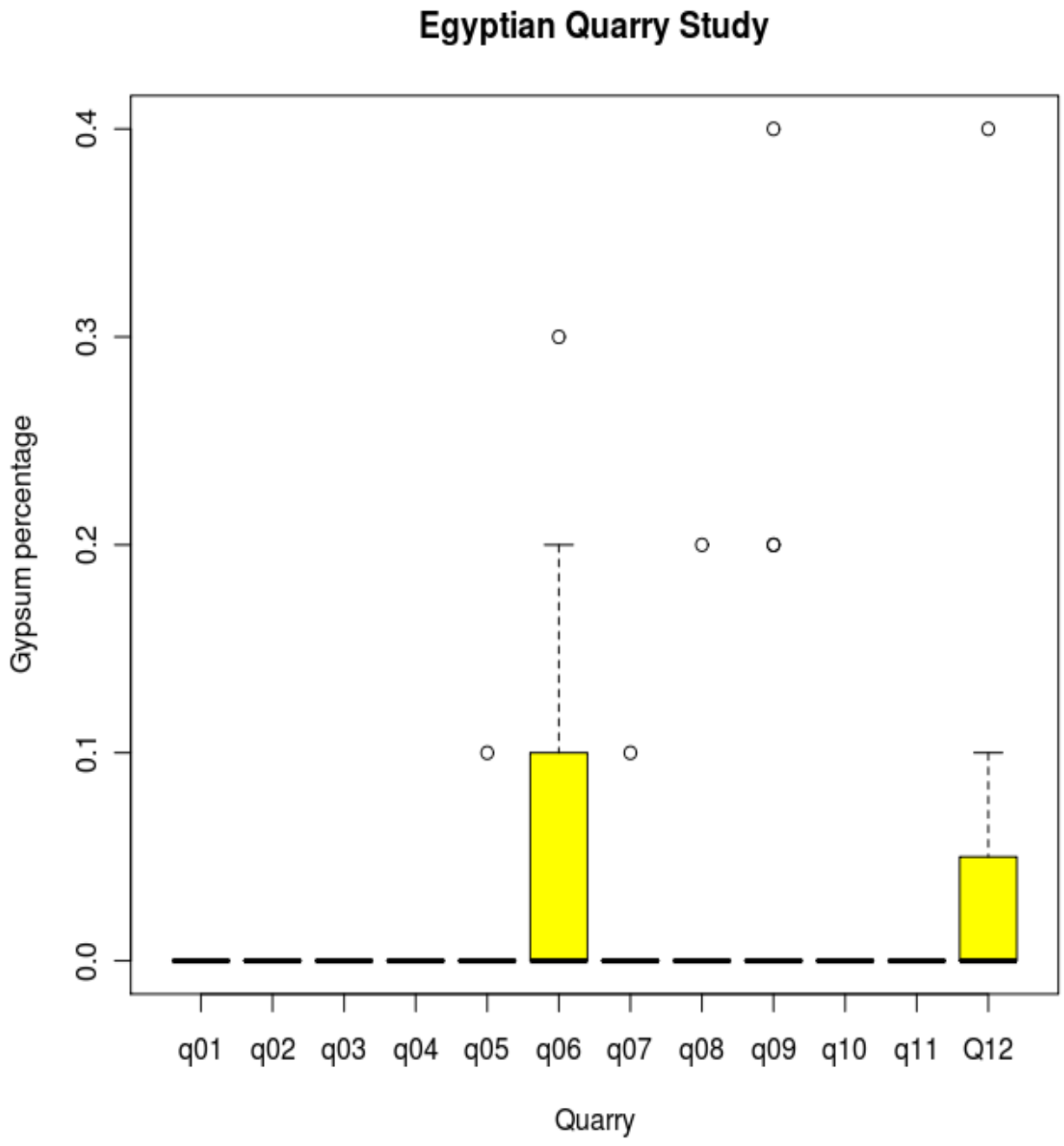
CALCITE:

The variable is clearly positively skewed in Quarries 6, 8, and 12.



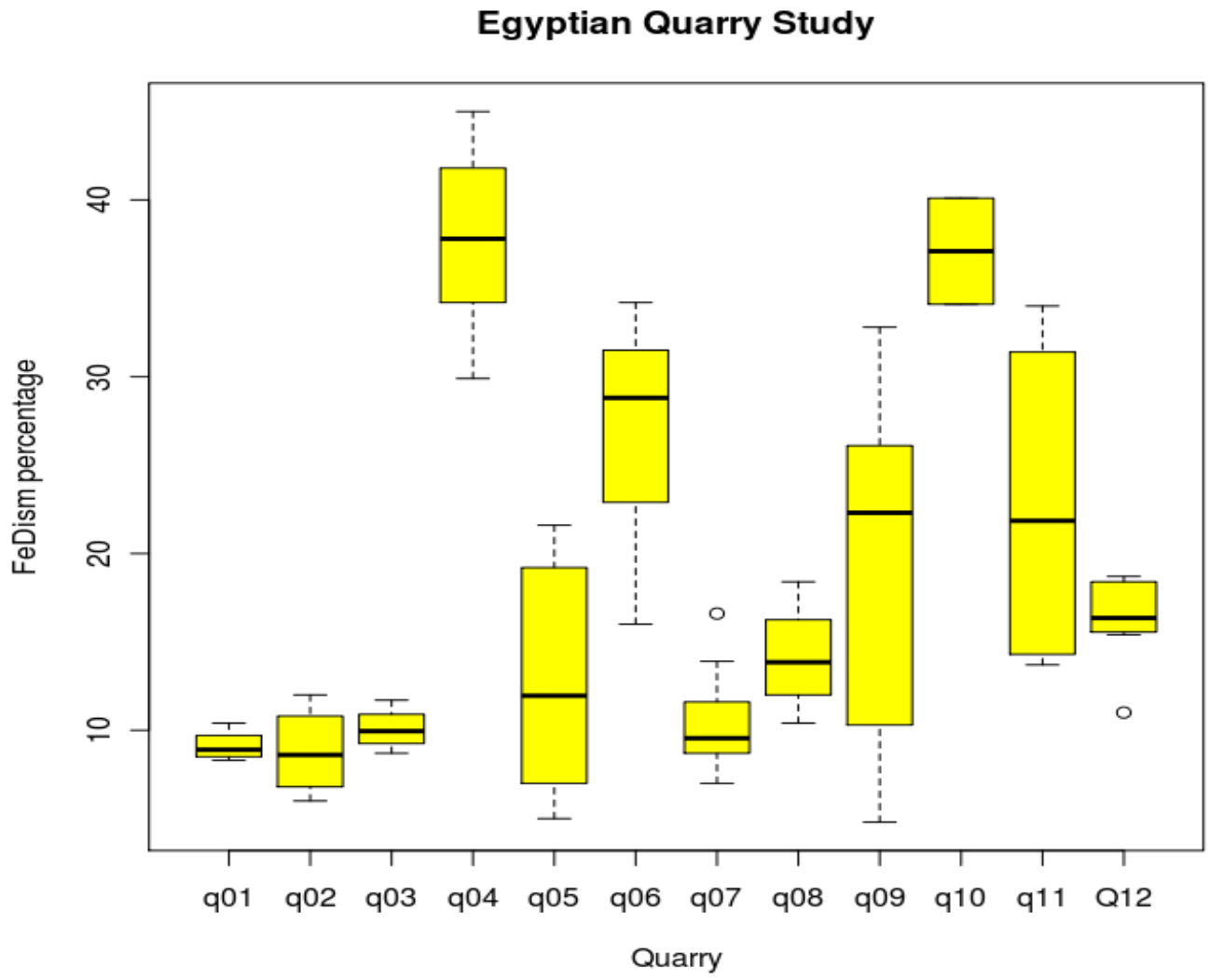
GYPSUM:

The variable is positively skewed in Quarries 6 and 12 and has clear outliers.



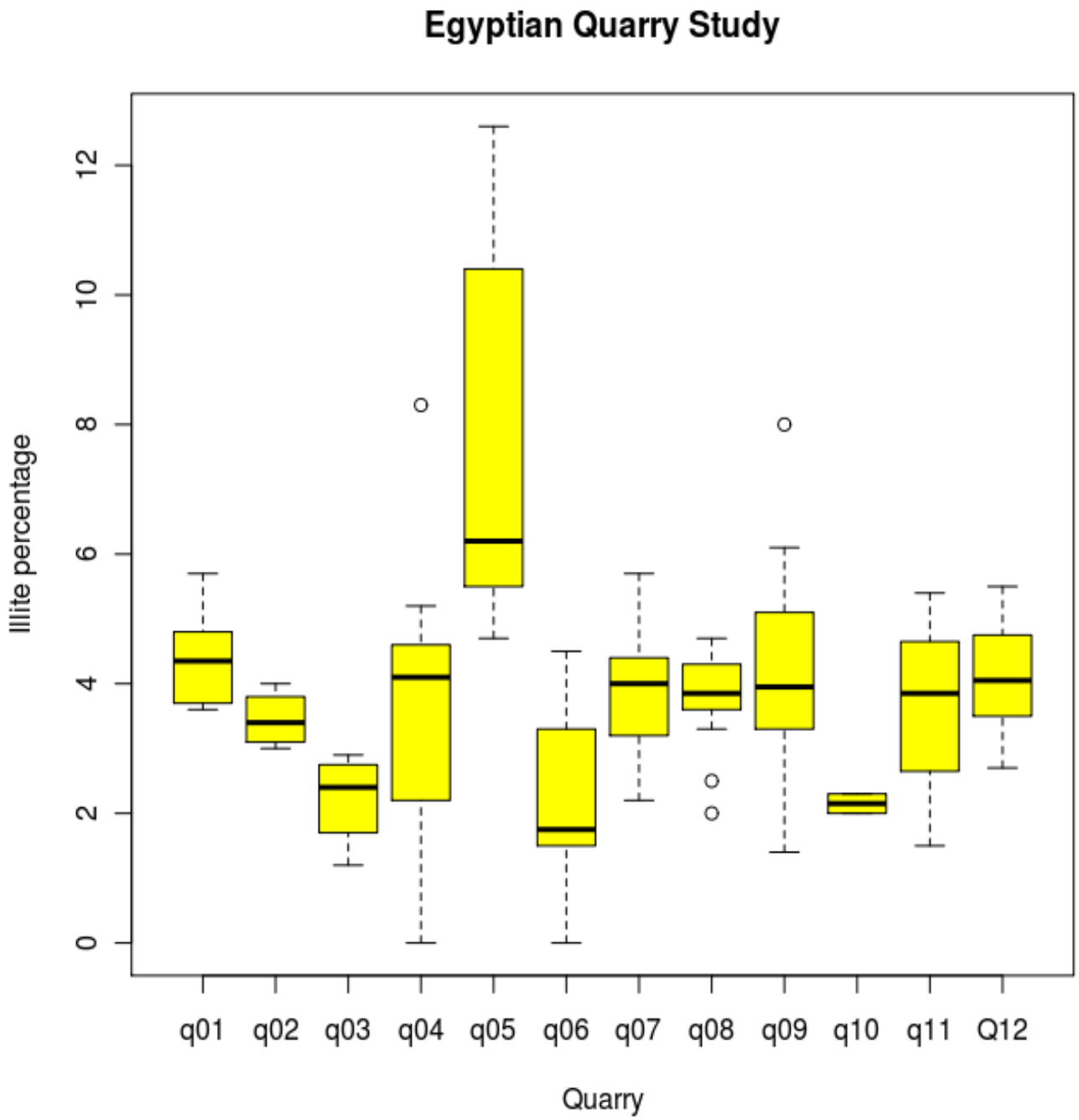
FeDism:

The variable is negatively skewed for Quarries 6 and 9 and positively skewed for Quarries 1, 2, 3, 4, 5, 7, 8, 11, and 12.



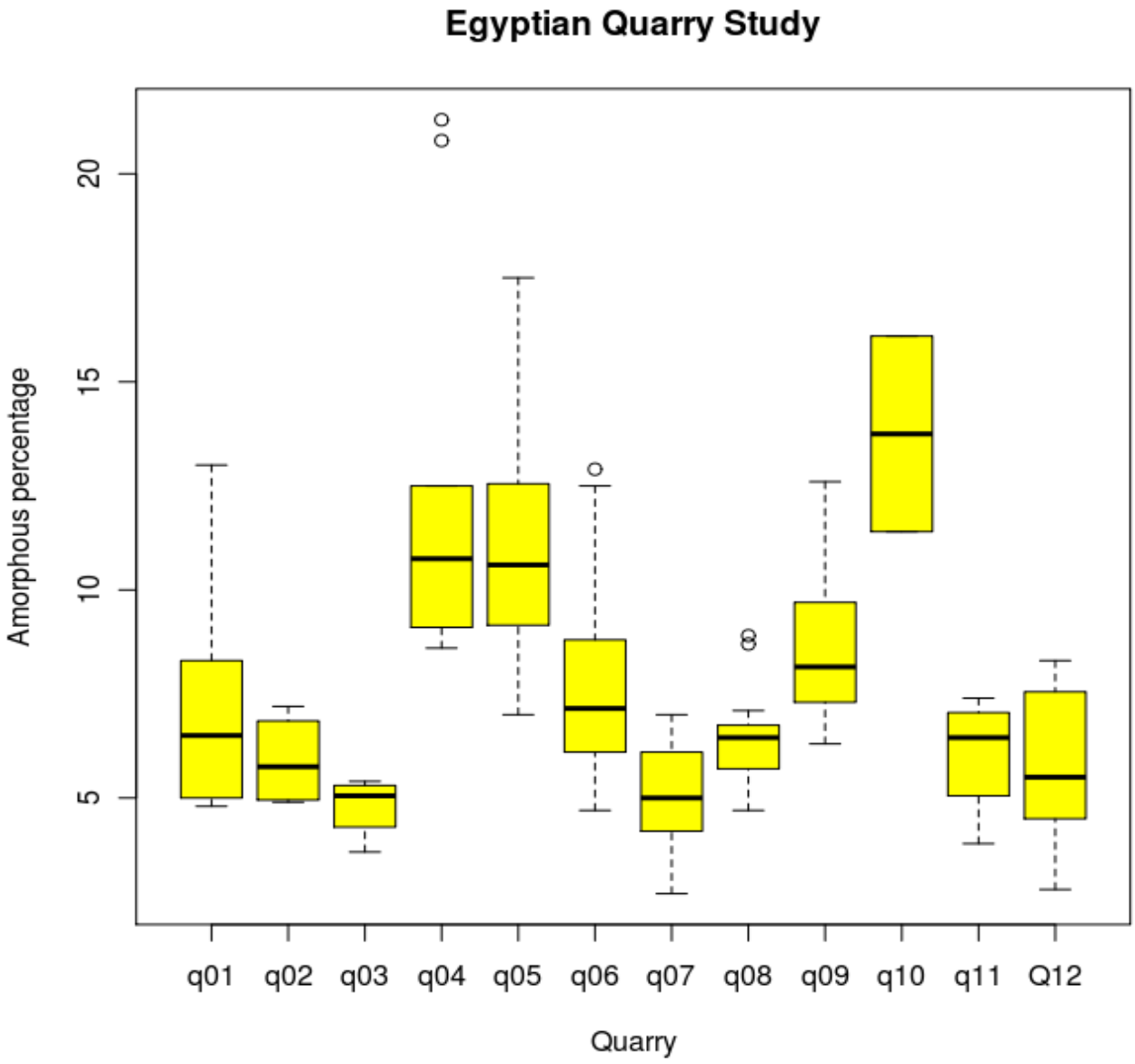
ILLITE:

The variable is positively skewed for Quarries 2, 5, 6, 8, 9, and 12, and negatively skewed for Quarries 1, 3, 4, 7, and 11.



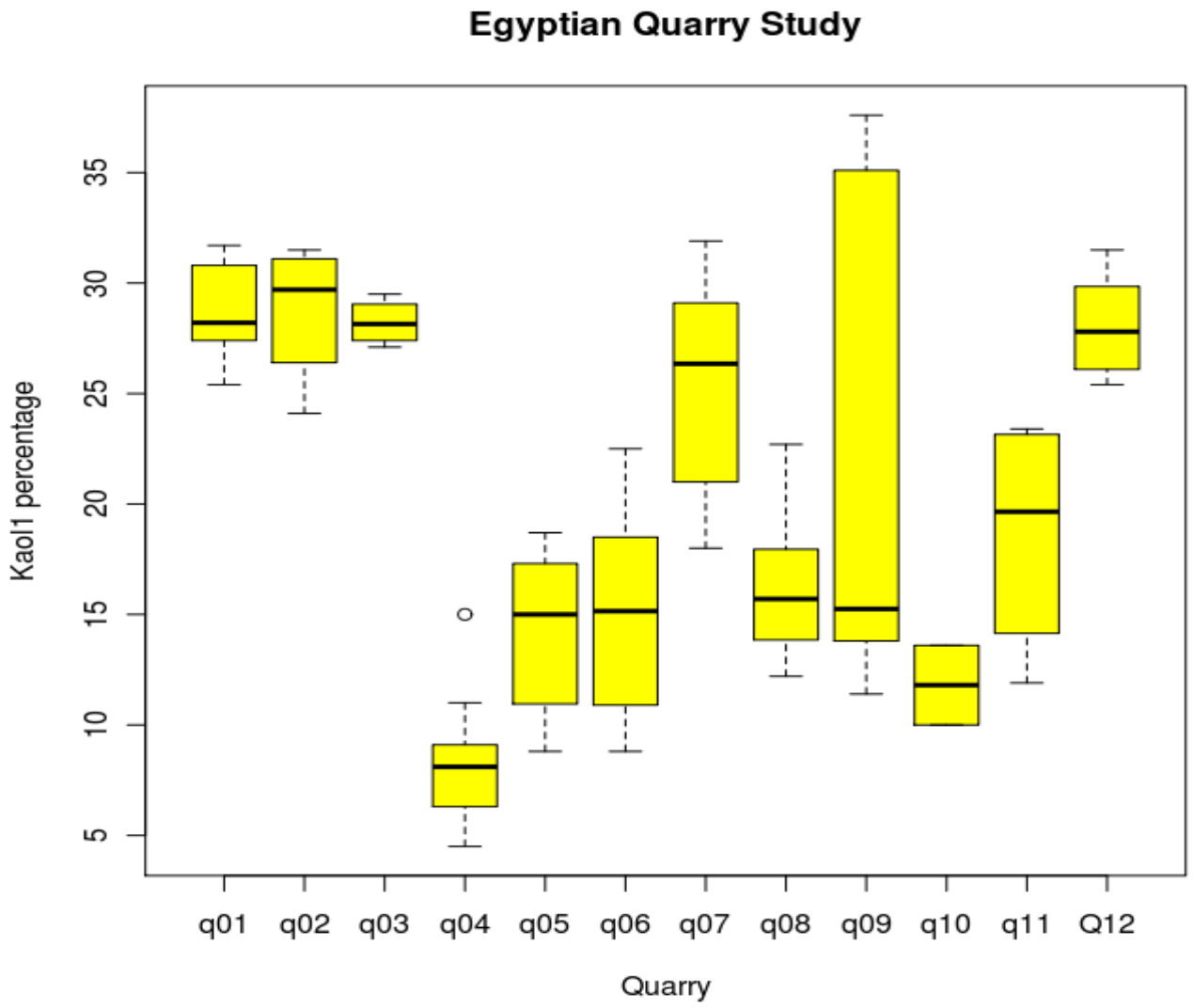
AMORPHOUS:

The variable is positively skewed for Quarries 1, 2, 6, 7, 9 and 12, and negatively skewed for Quarries 3, 8 and 11.



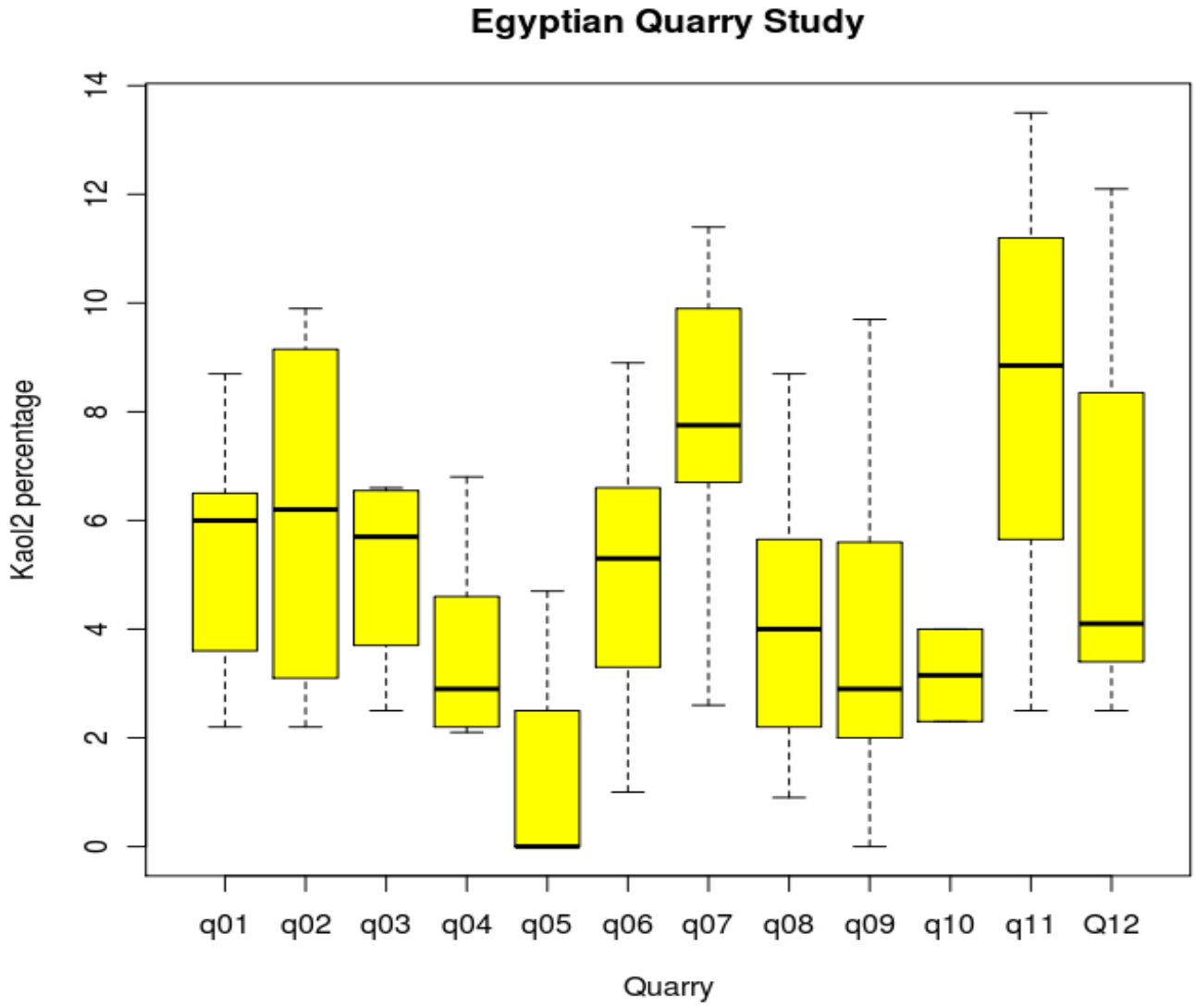
KAOL1:

The variable is positively skewed for Quarries 1, 3, and 9, and negatively skewed for Quarries 2, 4, 5, 6, 7, and 11.



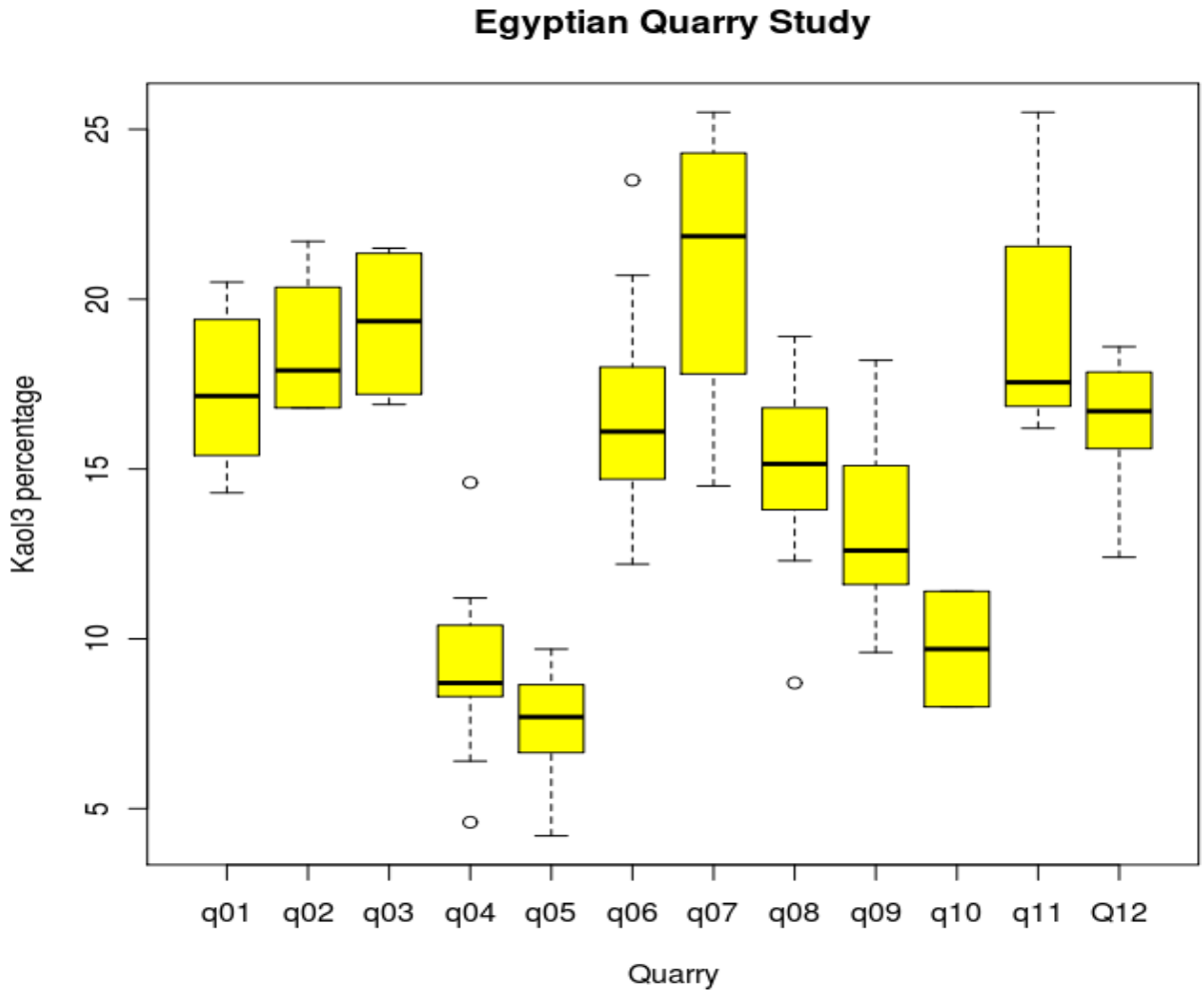
KAOL2:

The variable is negatively skewed for Quarries 1, 2, 3, 6, 8, 10, and 11; and positively skewed for Quarries 4, 5, 7, 9 and 12.



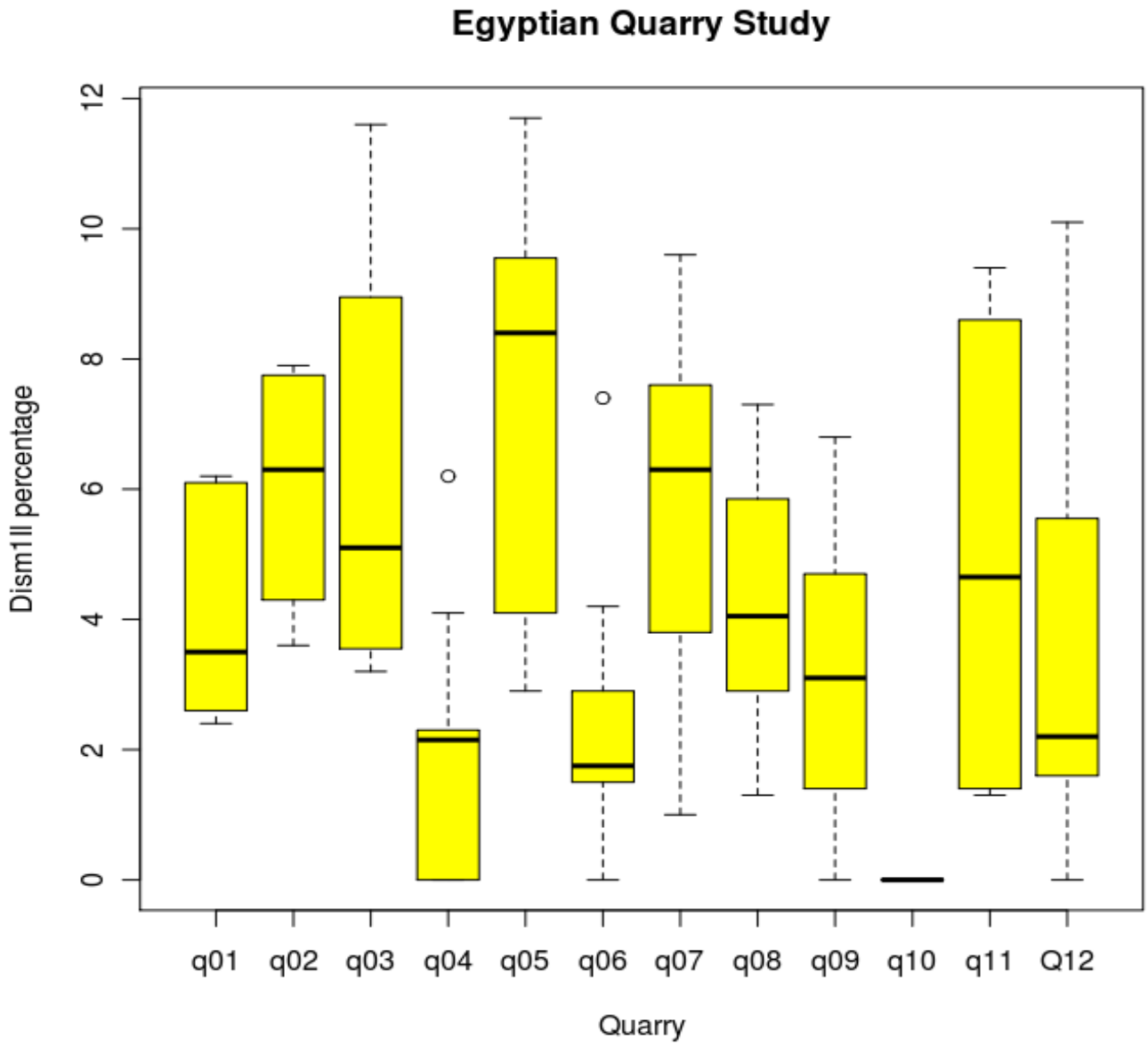
KAOL3:

The variable is positively skewed for Quarries 1, 2, 3, 4, 6, 8, 9, and 11 and negatively skewed for Quarries 3, 5, 7, and 10.



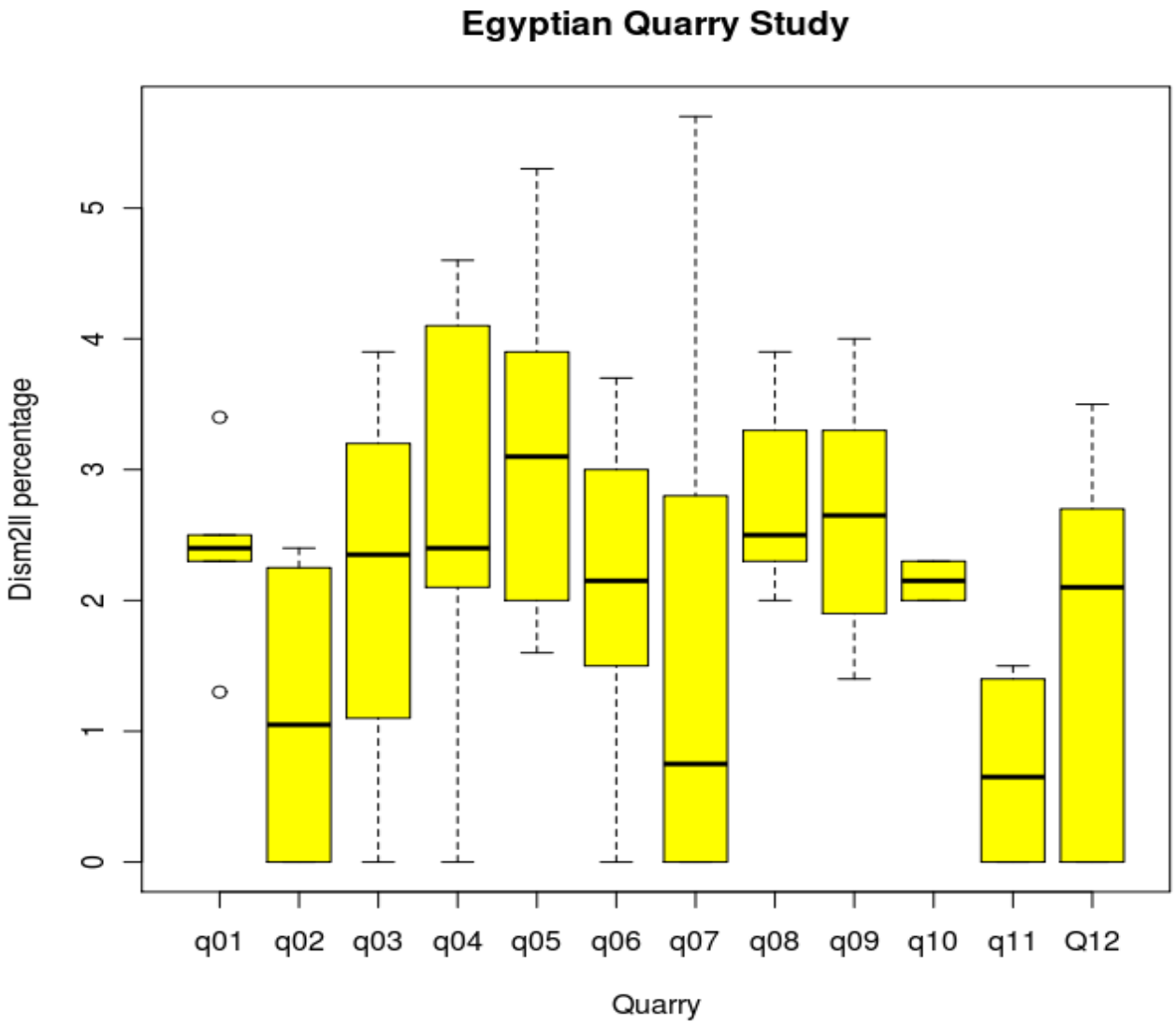
Dism1II:

The variable is positively skewed for Quarries 1, 3, 6, 8, and 12 and negatively skewed for Quarries 2, 4, 5, and 7.



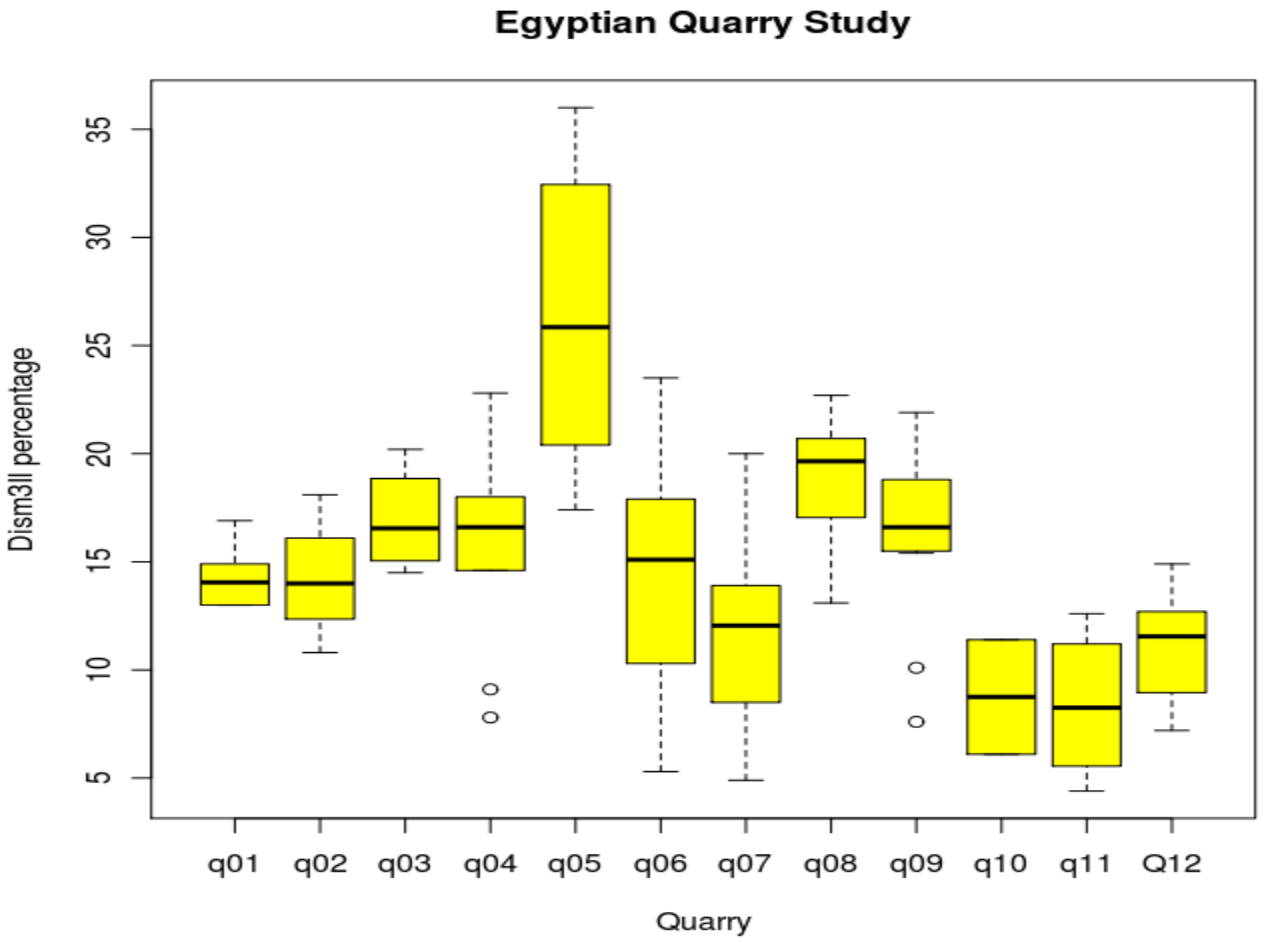
Dism2II:

The variable is negatively skewed for Quarries 3, 5, 9, and 12; and positively skewed for Quarries 4, 7, 8, and 11.



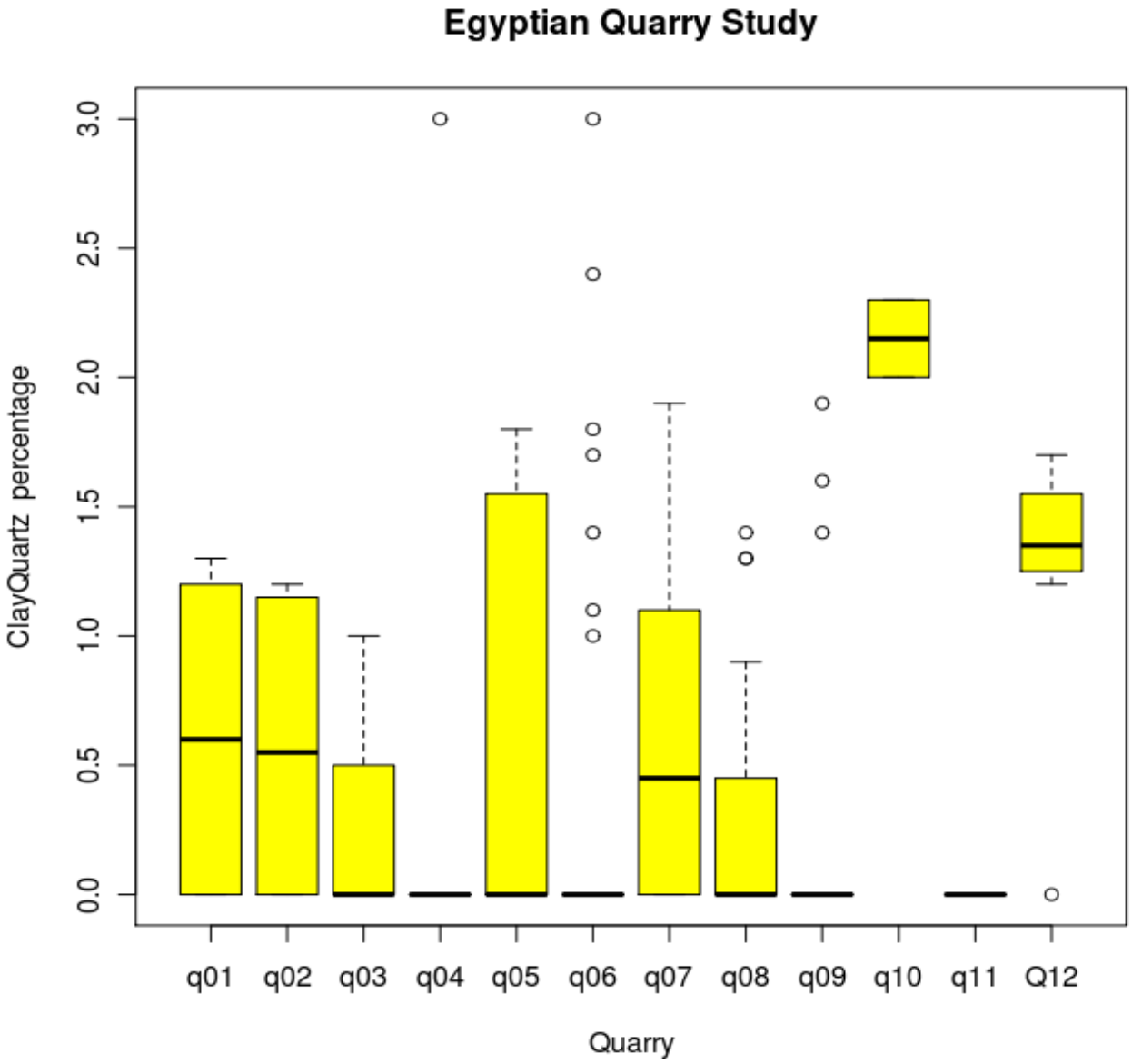
Dism3II:

The variable is positively skewed for Quarries 3 and 9; and negatively skewed for Quarries 1, 4, 6, 7, 8, and 12.



CLAYQUARTZ:

The variable is positively skewed for all Quarries.



APPENDIX FIVE: ***Descriptive statistics for the untransformed predictor variables.***

Quartz	Feldspar
Min. : 1.200	Min. :0.700
1st Qu.: 2.775	1st Qu.:1.175
Median : 4.200	Median :1.700
Mean : 4.681	Mean :1.787
3rd Qu.: 6.200	3rd Qu.:2.225
Max. :11.400	Max. :5.900

Calcite	Gypsum	FeDism	Illite
Min. :0.000	Min. :0.00000	Min. : 4.80	Min. : 0.000
1st Qu.:0.000	1st Qu.:0.00000	1st Qu.:10.40	1st Qu.: 2.275
Median :0.000	Median :0.00000	Median :16.60	Median : 3.700
Mean :1.231	Mean :0.02581	Mean :19.47	Mean : 3.669
3rd Qu.:1.725	3rd Qu.:0.00000	3rd Qu.:28.80	3rd Qu.: 4.400
Max. :8.300	Max. :0.40000	Max. :45.00	Max. :12.600

Amorph	Kaol2	Kaol3	Kaol1
Min. : 2.700	Min. : 0.000	Min. : 4.20	Min. : 4.50
1st Qu.: 5.500	1st Qu.: 2.600	1st Qu.:12.70	1st Qu.:13.32
Median : 6.800	Median : 4.650	Median :16.00	Median :17.80
Mean : 7.631	Mean : 4.997	Mean :15.52	Mean :19.22
3rd Qu.: 8.800	3rd Qu.: 6.875	3rd Qu.:18.12	3rd Qu.:26.05
Max. :21.300	Max. :13.500	Max. :25.50	Max. :37.60

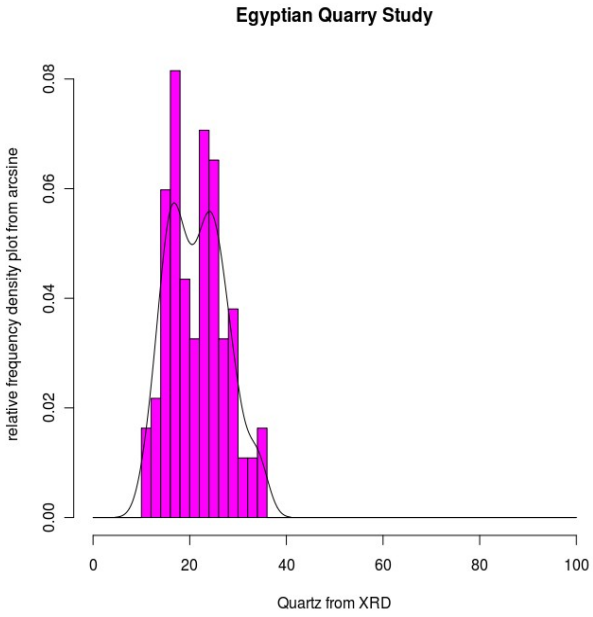
Dism1Il	Dism2Il	Dism3Il	ClayQuartz
Min. : 0.000	Min. :0.000	Min. : 4.40	Min. :0.0000
1st Qu.: 1.700	1st Qu.:1.500	1st Qu.:11.80	1st Qu.:0.0000
Median : 3.100	Median :2.350	Median :15.20	Median :0.0000
Mean : 3.857	Mean :2.157	Mean :15.25	Mean :0.5073
3rd Qu.: 6.100	3rd Qu.:2.925	3rd Qu.:18.62	3rd Qu.:1.2000
Max. :11.700	Max. :5.700	Max. :36.00	Max. :3.0000

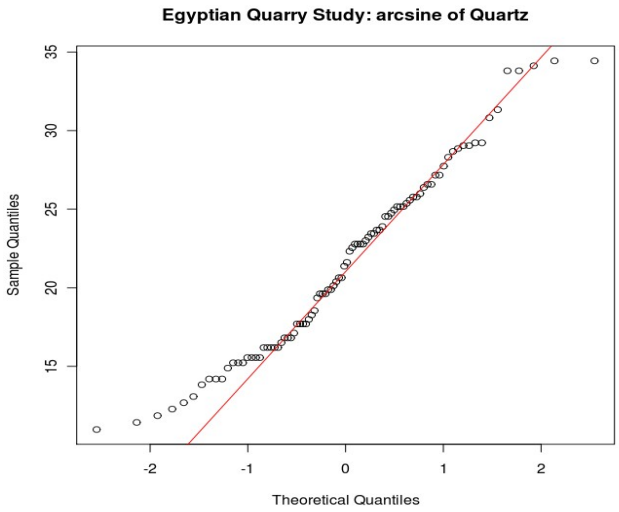
APPENDIX SIX: ***analysis of the transformed data-frame.***

At the Egyptian Region level it is clear that the many zero values are a problem in transforming some of the variables.

Quartz

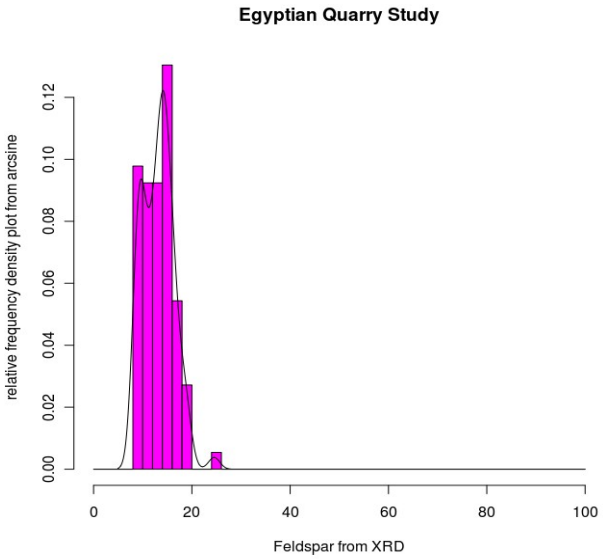
Shapiro-Wilk normality test: W=0.9702, p-value=0.03322. Note there is very little difference from the complete data-frame except the p-value is increased. The hypothesis that the sample is from a normal distribution is not accepted.

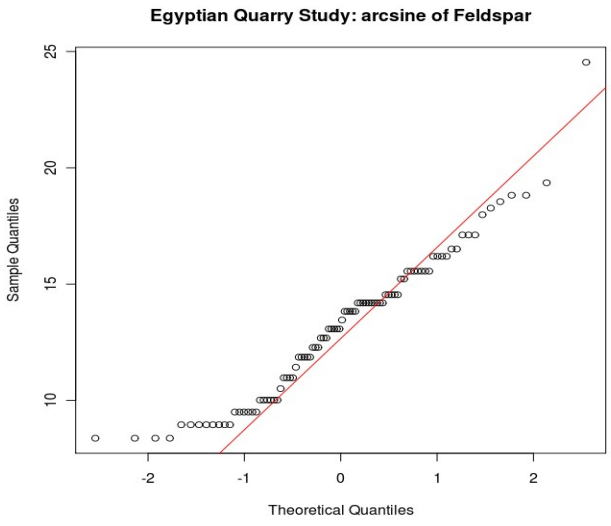




Feldspar

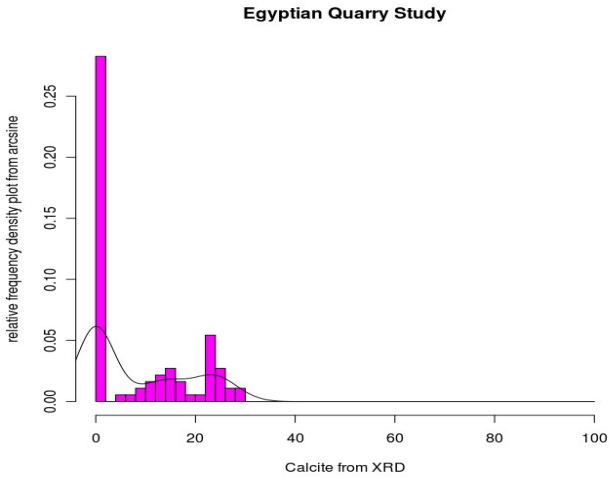
The Shapiro-Wilk normality test: W=0.954, p-value=0.002626. The hypothesis that the sample is from a normal distribution is not accepted.

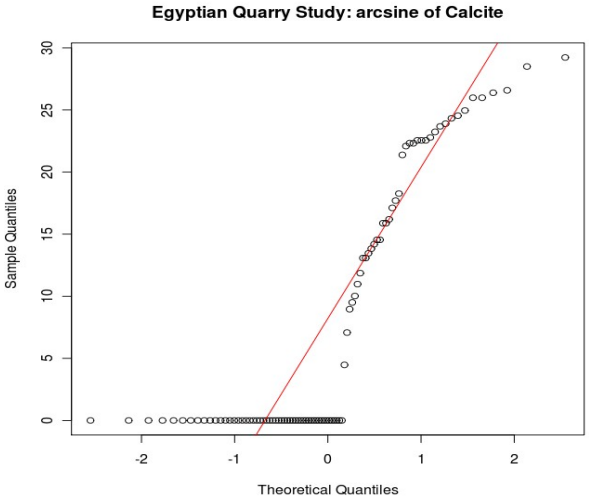




Calcite

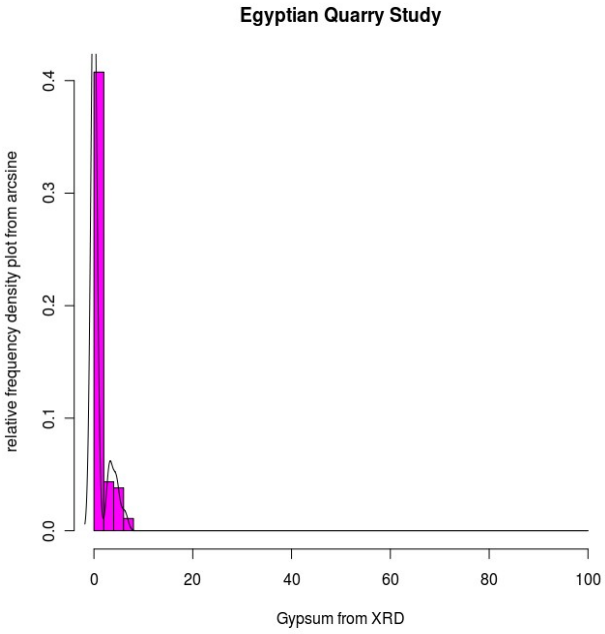
Shapiro-Wilk normality test : W = 0.7491, p-value = 3.083e-11. The hypothesis that the sample is from a normal distribution is not accepted.

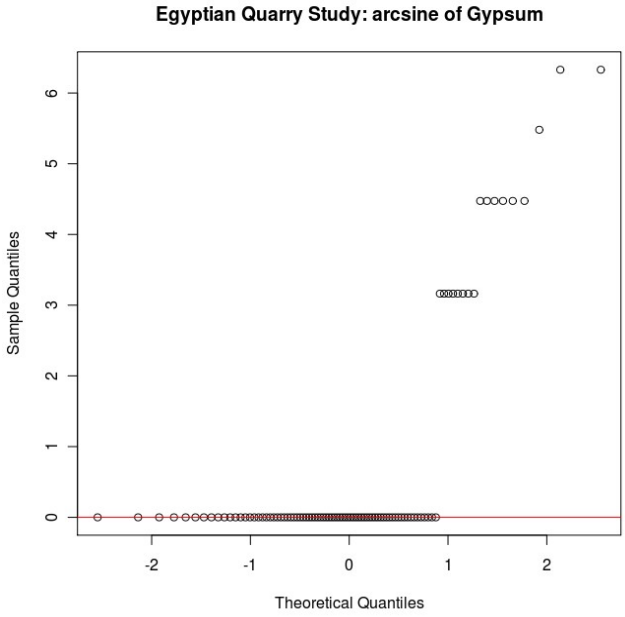




Gypsum

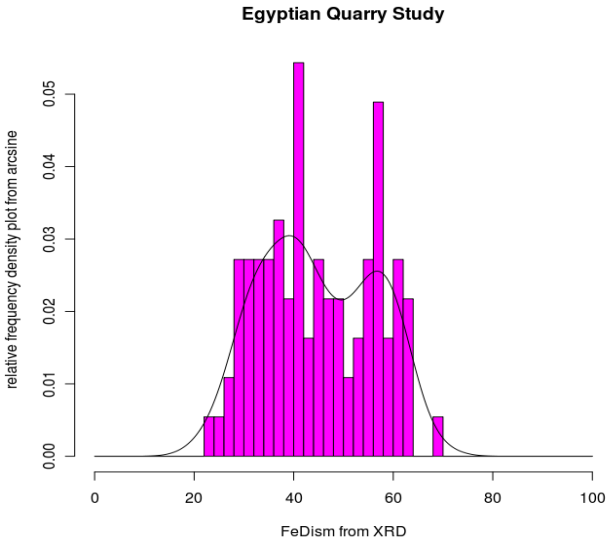
Shapiro-Wilk normality test : W = 0.5065, p-value = 4.743e-16 . The hypothesis that the sample is from a normal distribution is not accepted.

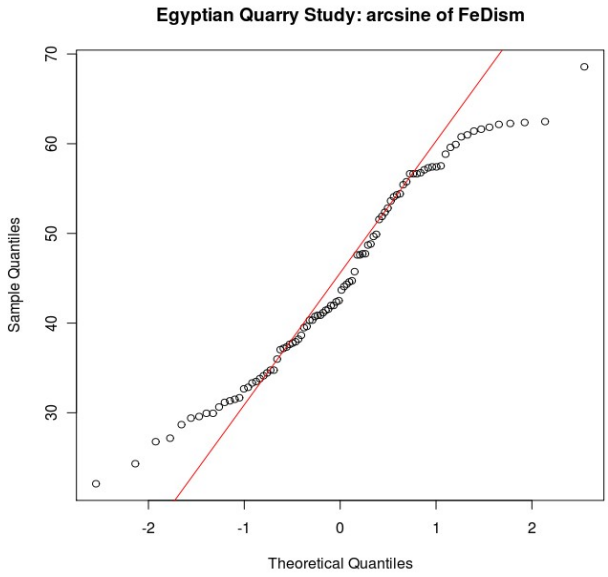




FeDism

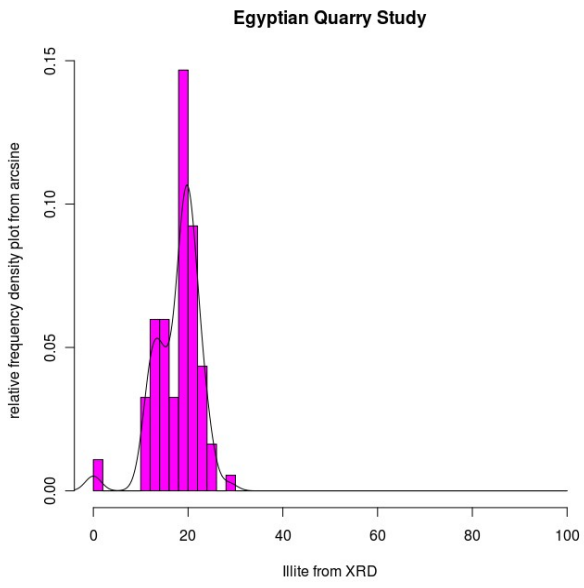
Shapiro-Wilk normality test : W = 0.9623, p-value = 0.009257 . The hypothesis that the sample is from a normal distribution is not accepted.

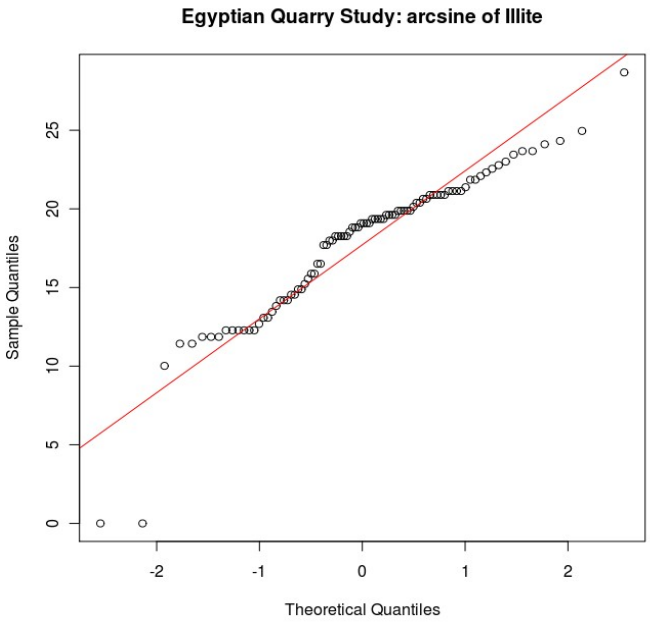




Illite

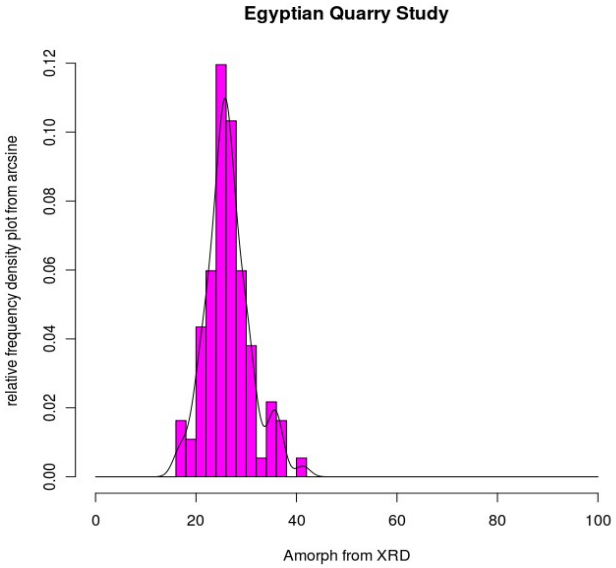
Shapiro-Wilk normality test : W = 0.9117, p-value = 1.148e-05 . The hypothesis that the sample is from a normal distribution is not accepted.

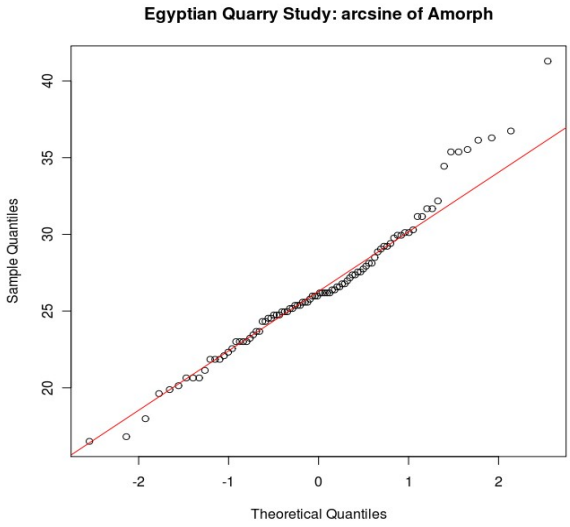




Amorphous

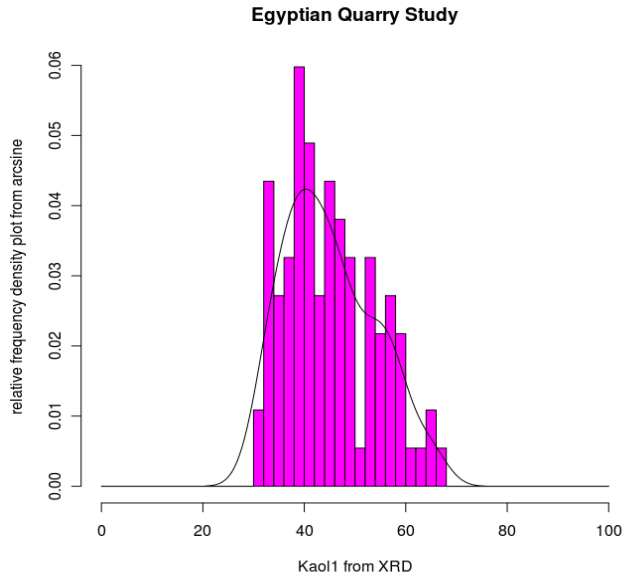
Shapiro-Wilk normality test : W = 0.9677, p-value = 0.02197. The hypothesis that the sample is from a normal distribution is not accepted.

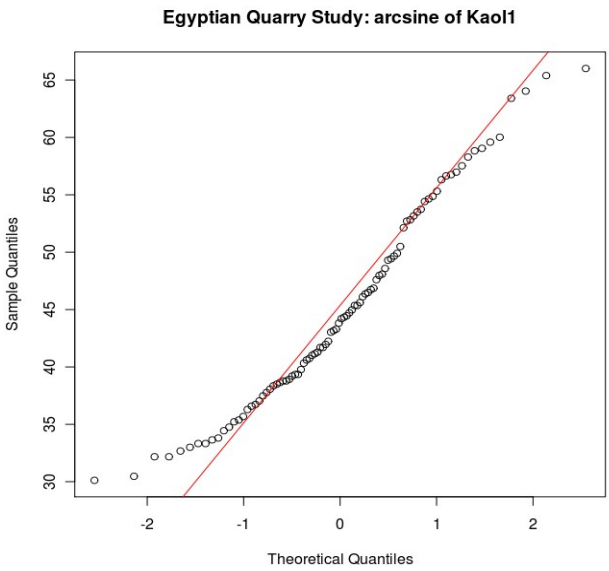




Kaol1

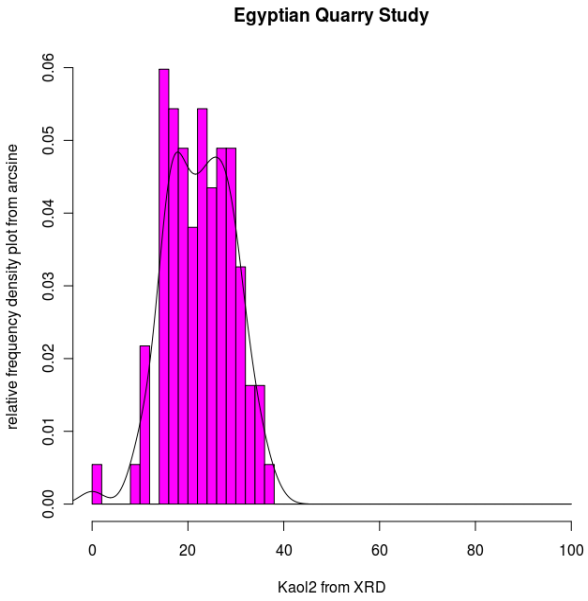
Shapiro-Wilk normality test : W = 0.9637, p-value = 0.01163 . The hypothesis that the sample is from a normal distribution is not accepted.

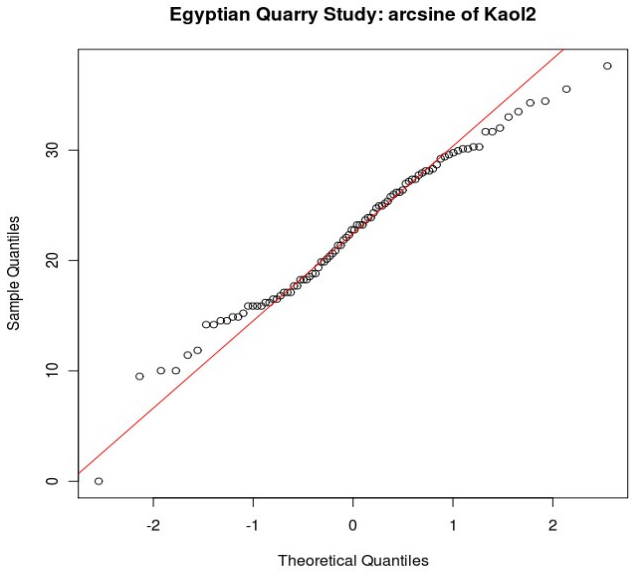




Kaol2

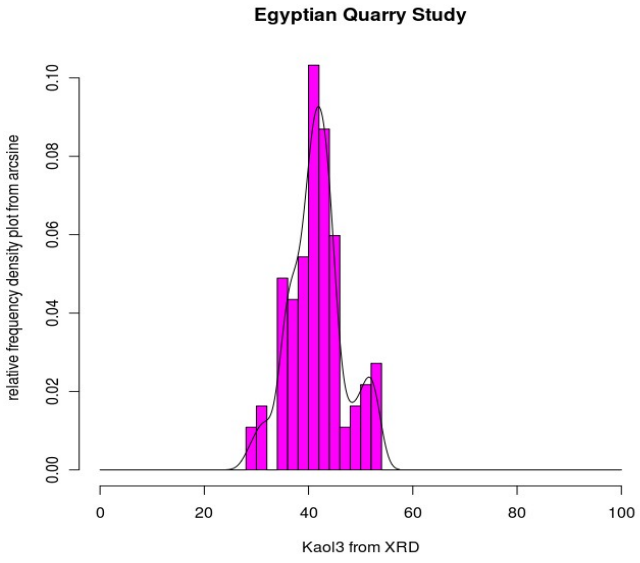
Shapiro-Wilk normality test : W = 0.9847, p-value = 0.3571.The hypothesis that the sample is from a normal distribution is not rejected.

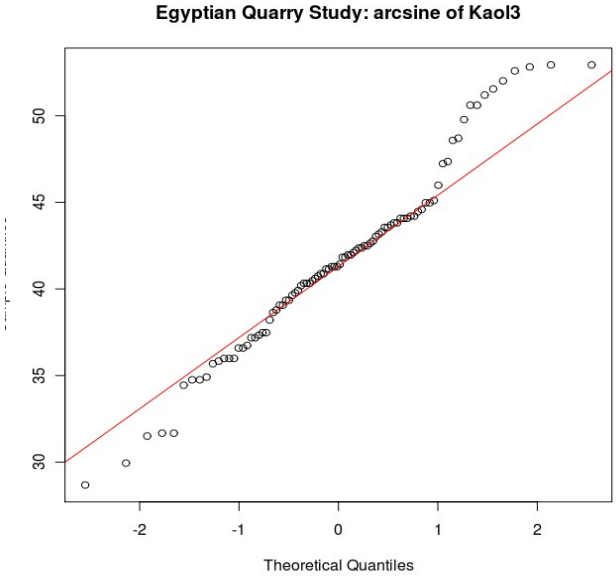




Koal3

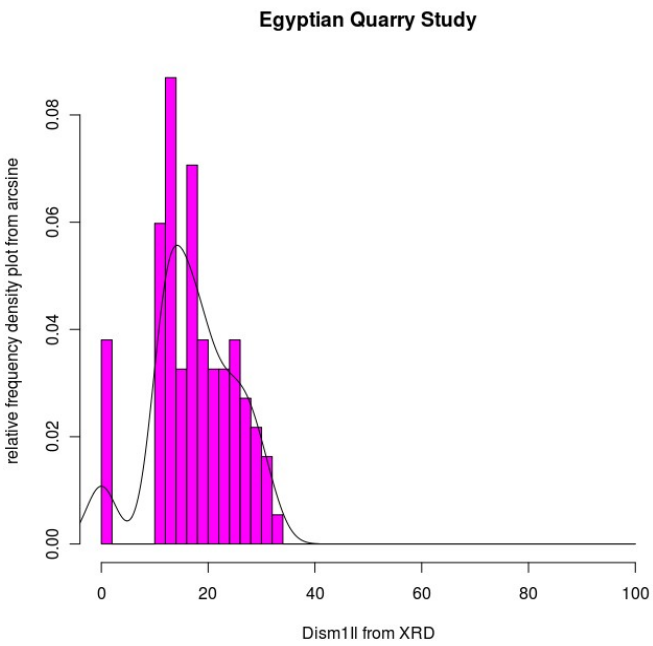
Shapiro-Wilk normality test : W = 0.9741, p-value = 0.06332 . The hypothesis that the sample is from a normal distribution is not rejected.

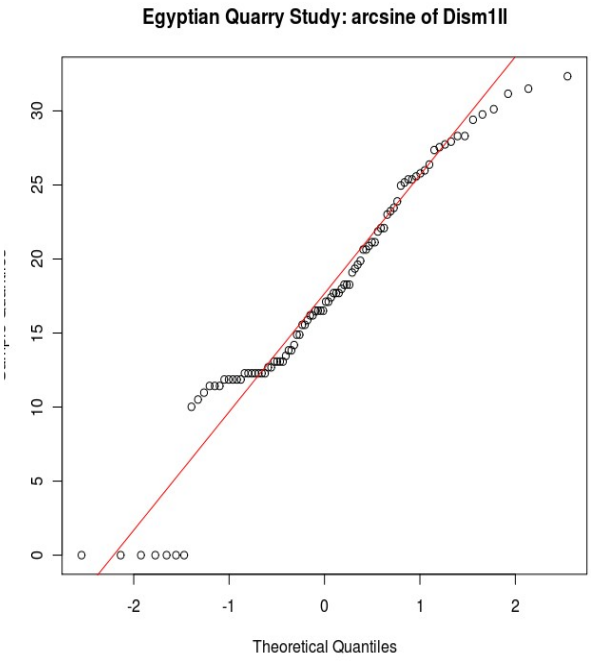




Dism1Il

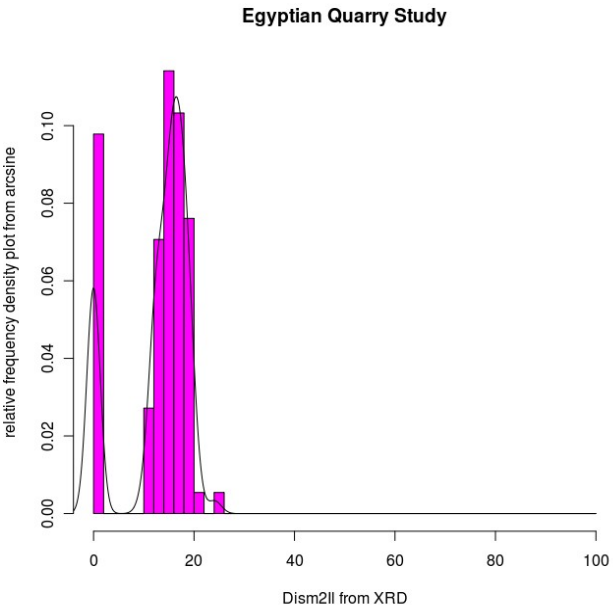
Shapiro-Wilk normality test : W = 0.9513, p-value = 0.001761. The hypothesis that the sample is from a normal distribution is not accepted.

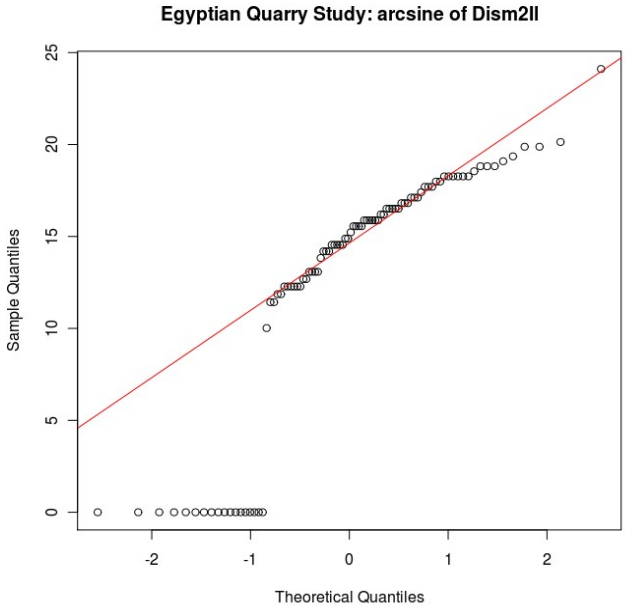




Dism2Il

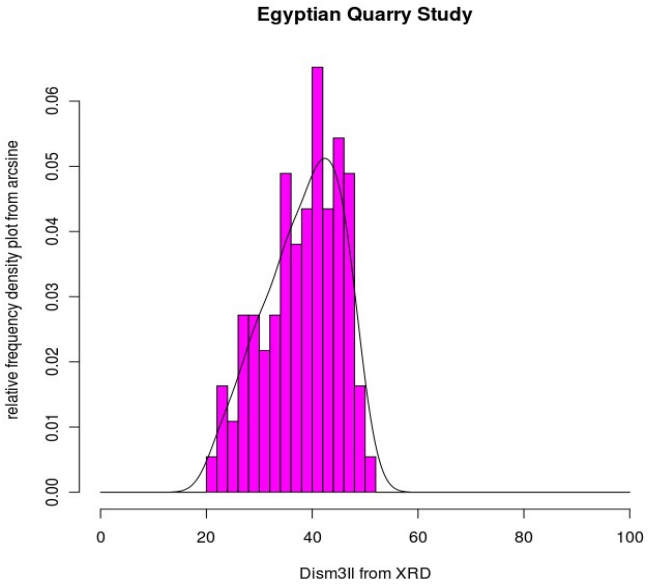
Shapiro-Wilk normality test : W = 0.7863, p-value = 3.107e-10 . The hypothesis that the sample is from a normal distribution is not accepted.

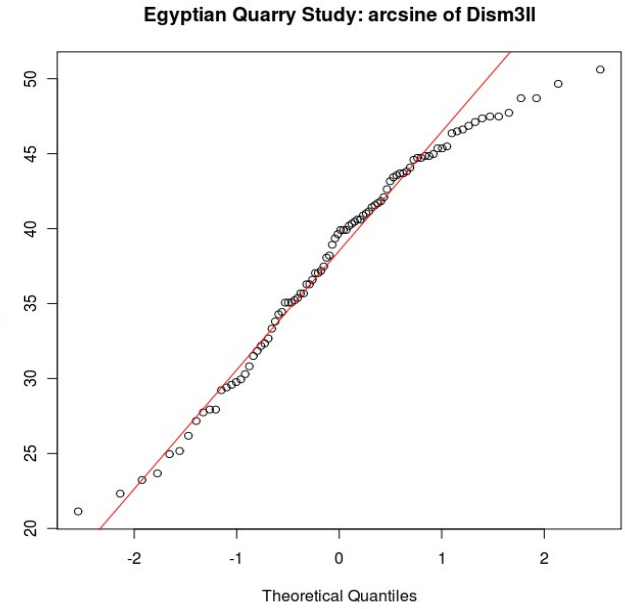




Dism3Il

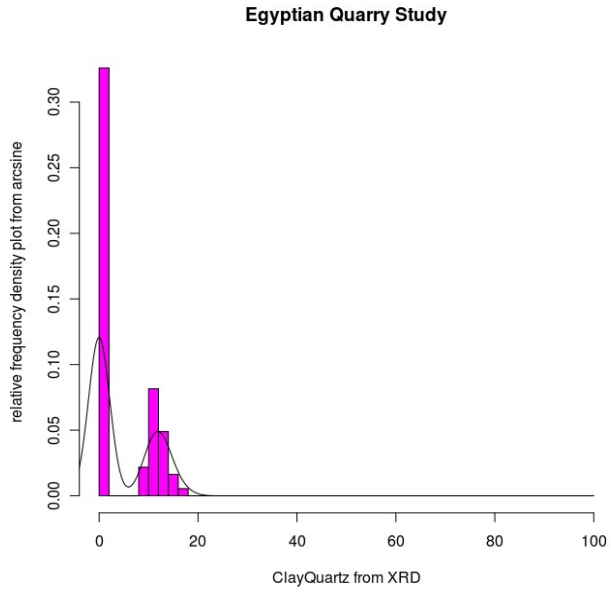
Shapiro-Wilk normality test : W = 0.9648, p-value = 0.01372 . The hypothesis that the sample is from a normal distribution is not accepted.

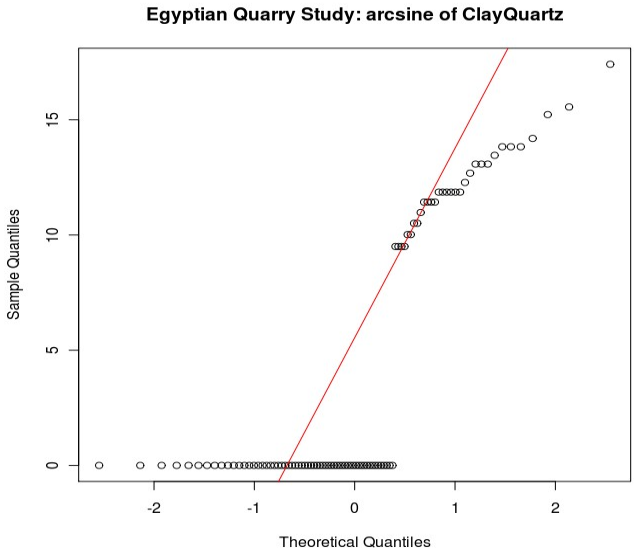




ClayQuartz

Shapiro-Wilk normality test : W = 0.673, p-value = 5.225e-13 . The hypothesis that the sample is from a normal distribution is not accepted.





APPENDIX SIX: Analysis of individual provinces

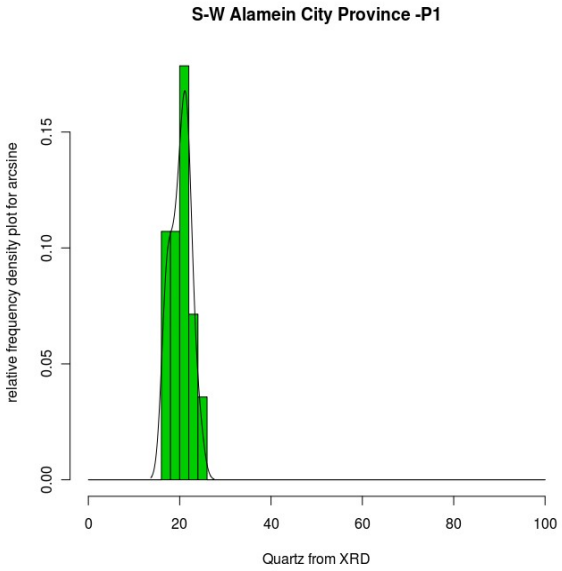
S_W Alamein City Province

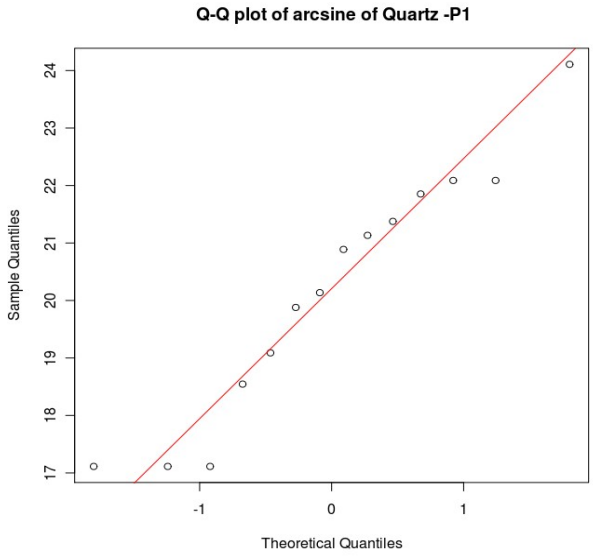
P1 comprised 14 samples from 3 quarries.

Arcsine of Quartz

Shapiro-Wilk normality test , data: Quartza . W = 0.9383, p-value = 0.3967 .

The hypothesis that the sample is from a normal distribution is not rejected.

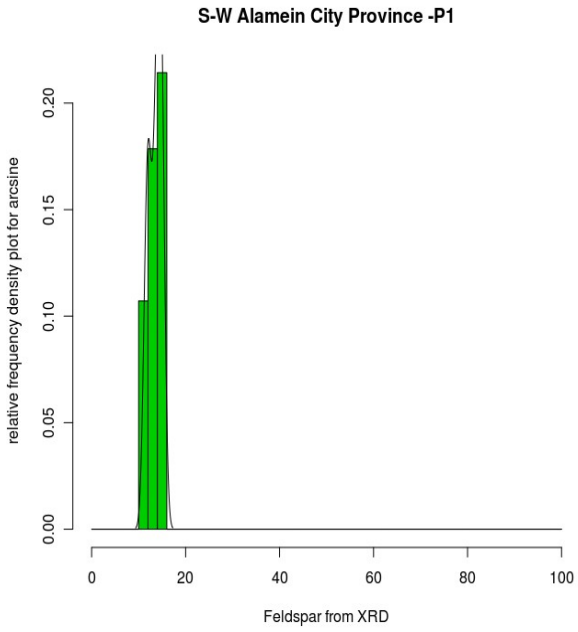


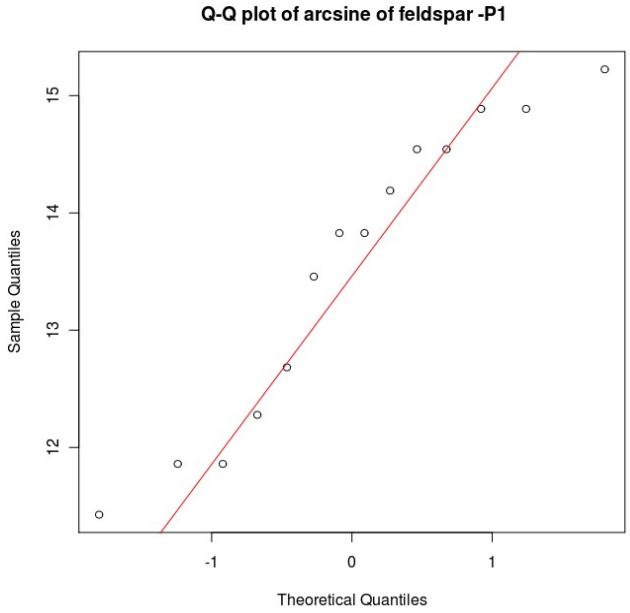


Arcsine of Feldspar

Shapiro-Wilk normality test , data: Feldspara . W = 0.9143, p-value = 0.1821 .

The hypothesis that the sample is from a normal distribution is not rejected.

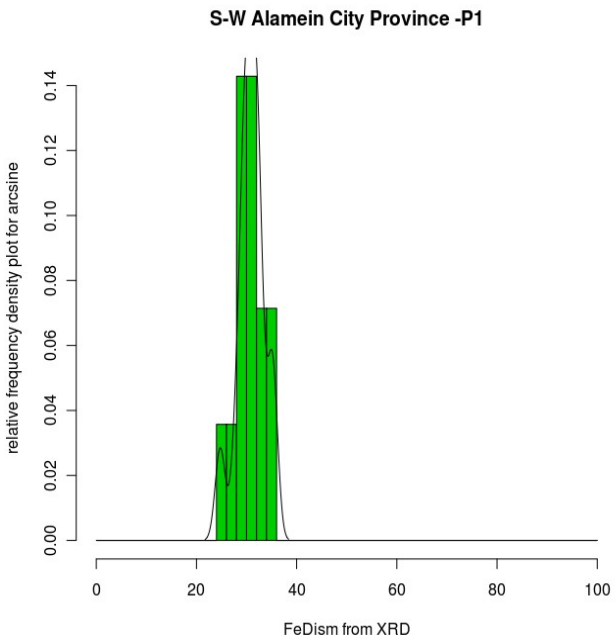


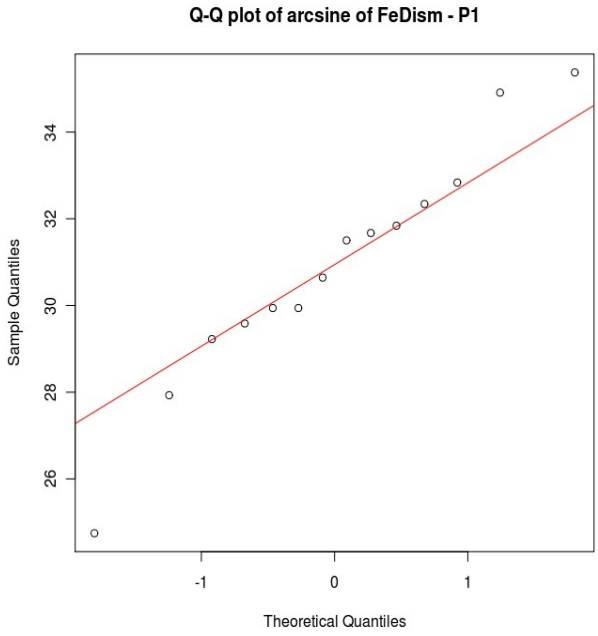


Arcsine of FeDism

Shapiro-Wilk normality test , data: FeDisma . W = 0.9638, p-value = 0.7853

The hypothesis that the sample is from a normal distribution is not rejected.

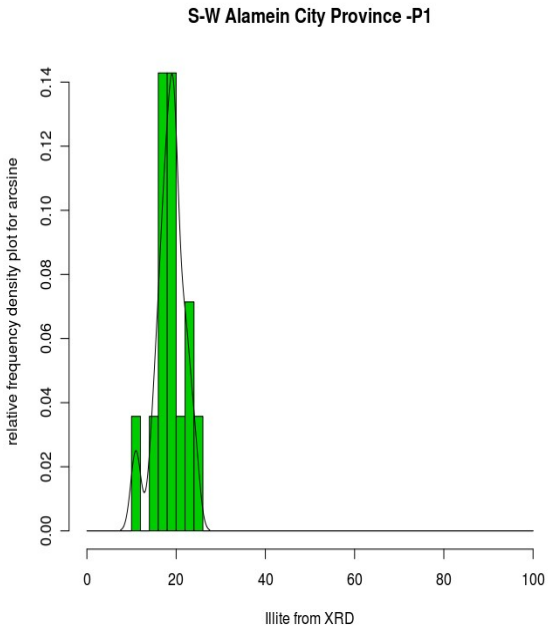


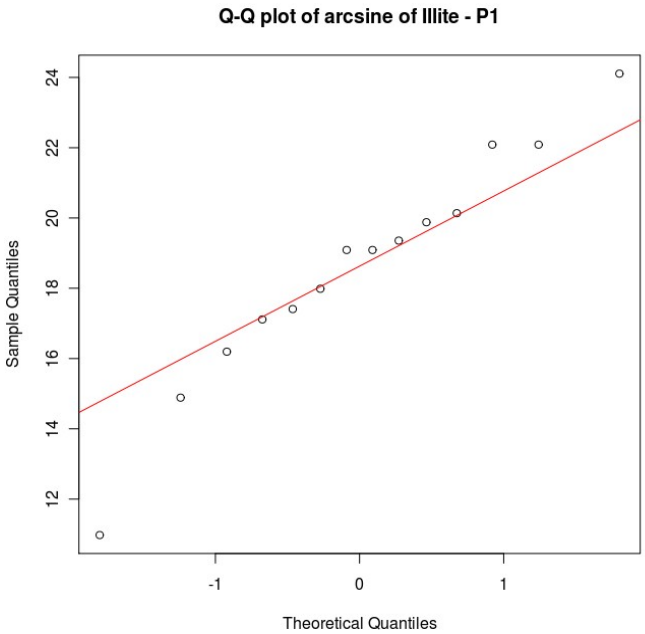


Arcsine of Illite

Shapiro-Wilk normality test , data: Illitea . W = 0.9654, p-value = 0.8092

The hypothesis that the sample is from a normal distribution is not rejected.

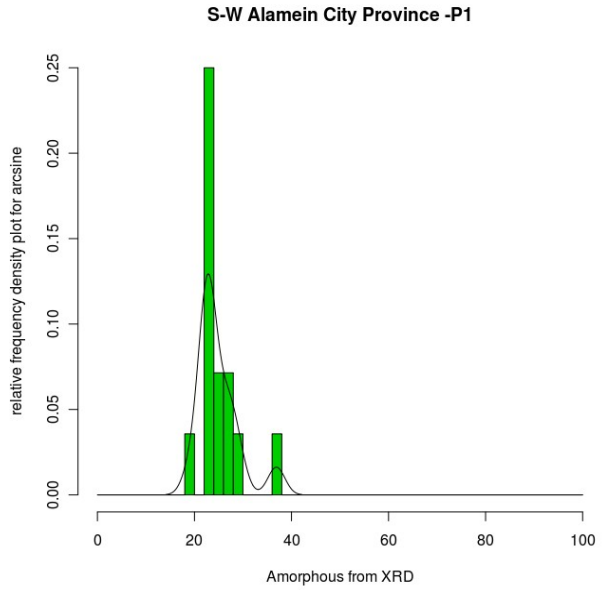


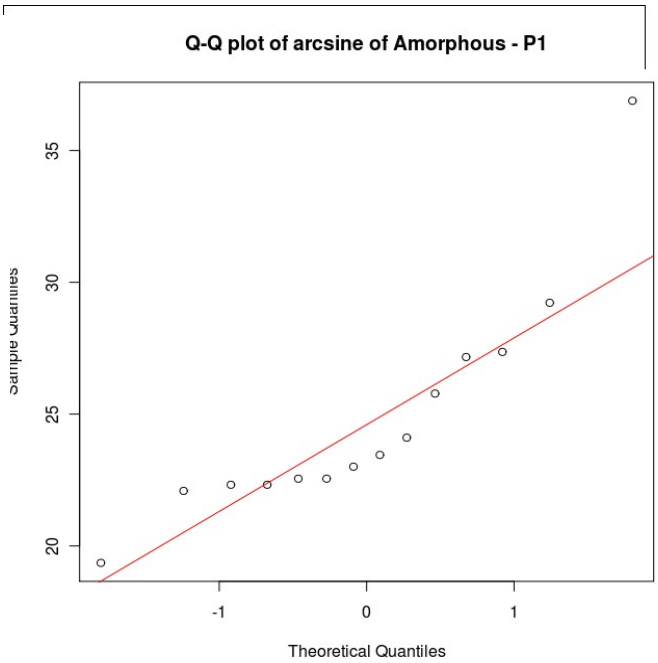


Arcsine of Amorphous

Shapiro-Wilk normality test , data: Amorpha, W = 0.8288, p-value = 0.01159

The hypothesis that the sample is from a normal distribution is rejected.

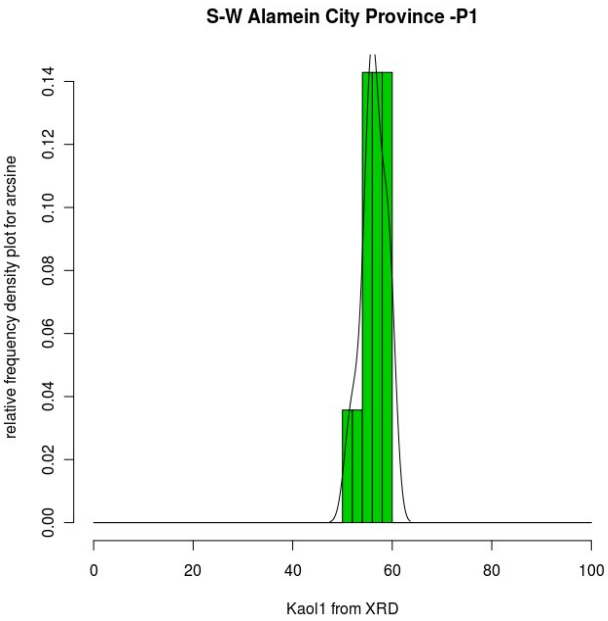


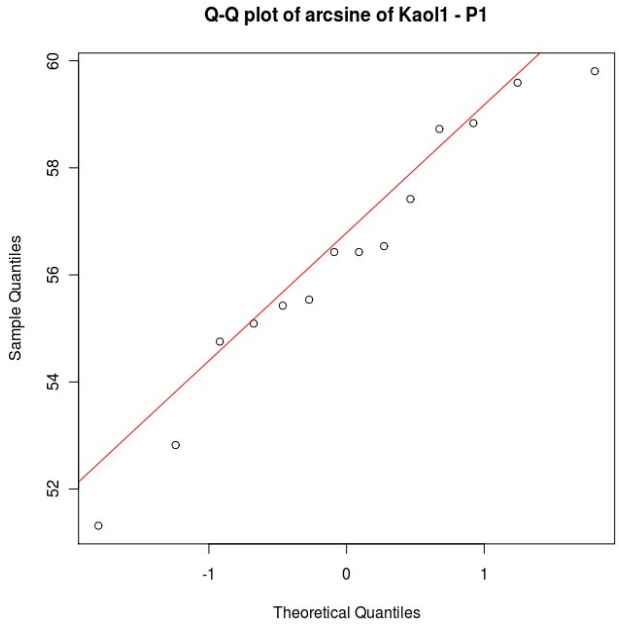


Arcsine of Kaol1

Shapiro-Wilk normality test , data: Kaol1a , W = 0.9556, p-value = 0.6507

The hypothesis that the sample is from a normal distribution is not rejected.

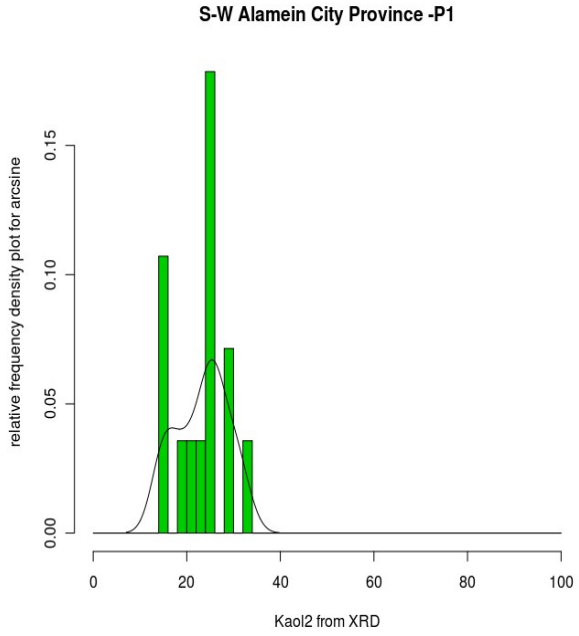


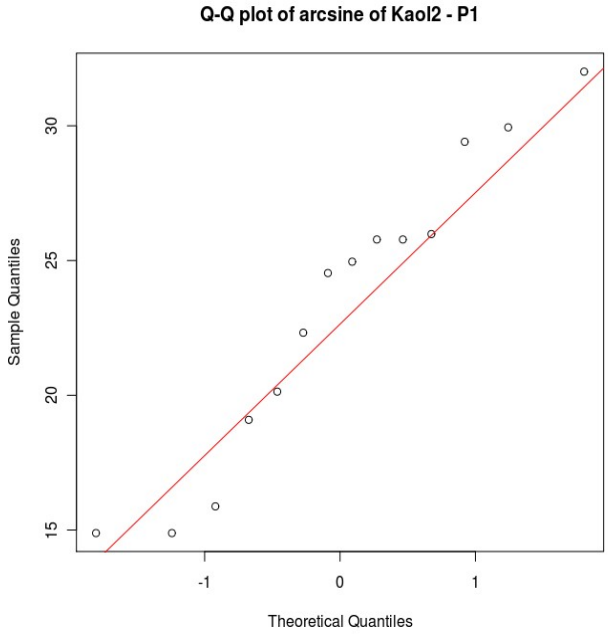


Arcsine of Kaol2

Shapiro-Wilk normality test , data: Kaol2a , W = 0.9373, p-value = 0.385

The hypothesis that the sample is from a normal distribution is not rejected.

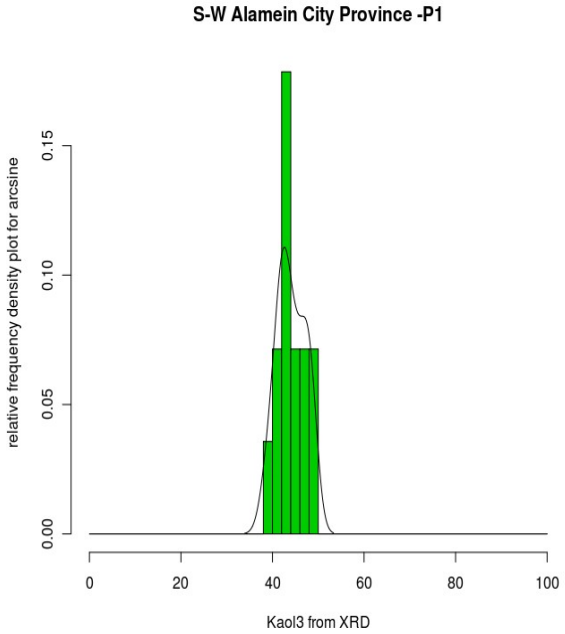


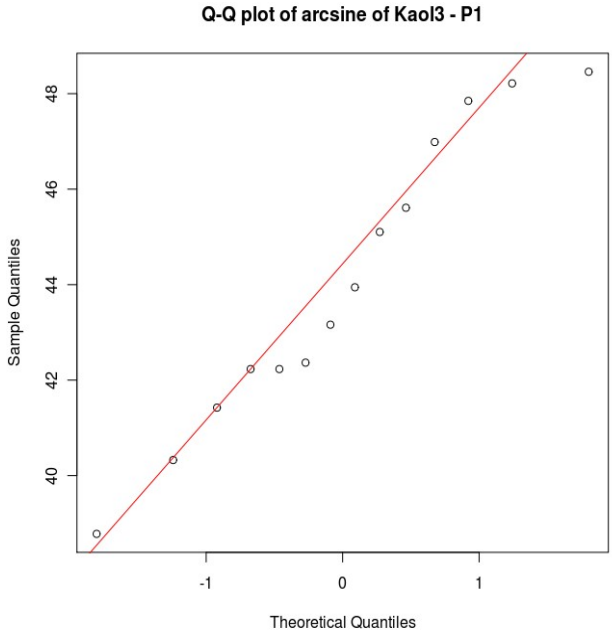


Arcsine of Kaol3

Shapiro-Wilk normality test , data: Kaol3a , W = 0.9501, p-value = 0.5621

The hypothesis that the sample is from a normal distribution is not rejected.

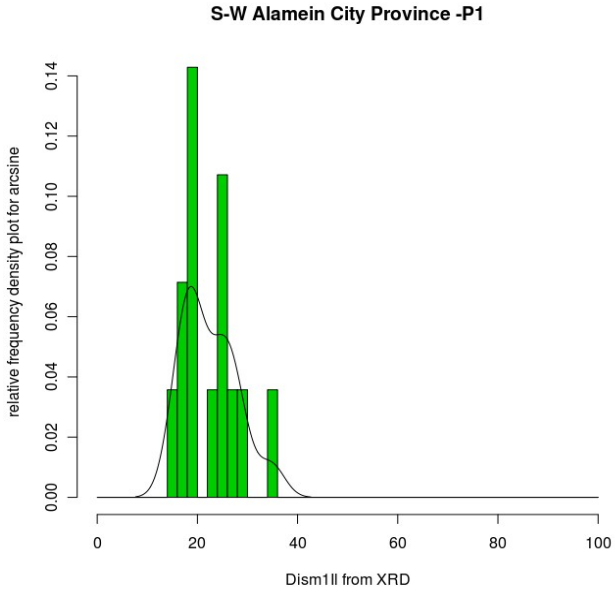


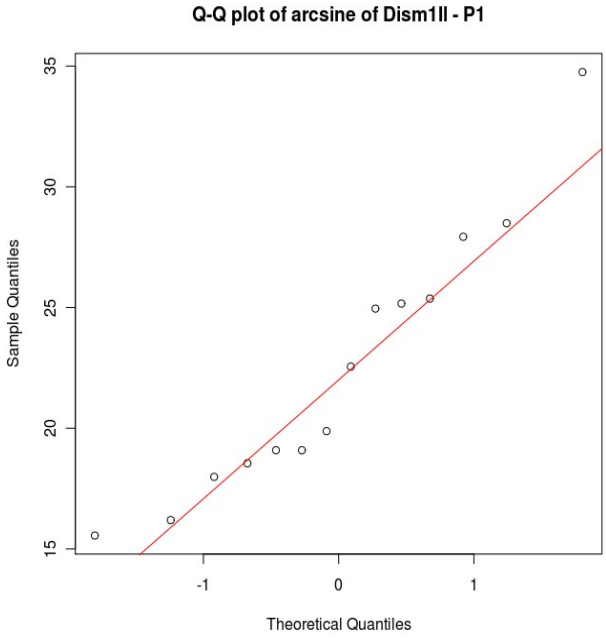


Arcsine of Dism1Il

Shapiro-Wilk normality test , data: Dism1Ila, W = 0.9311, p-value = 0.3161.

The hypothesis that the sample is from a normal distribution is not rejected.

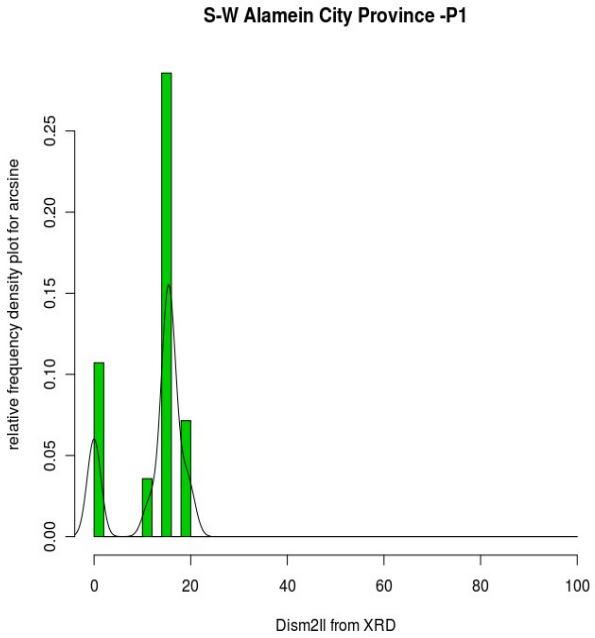


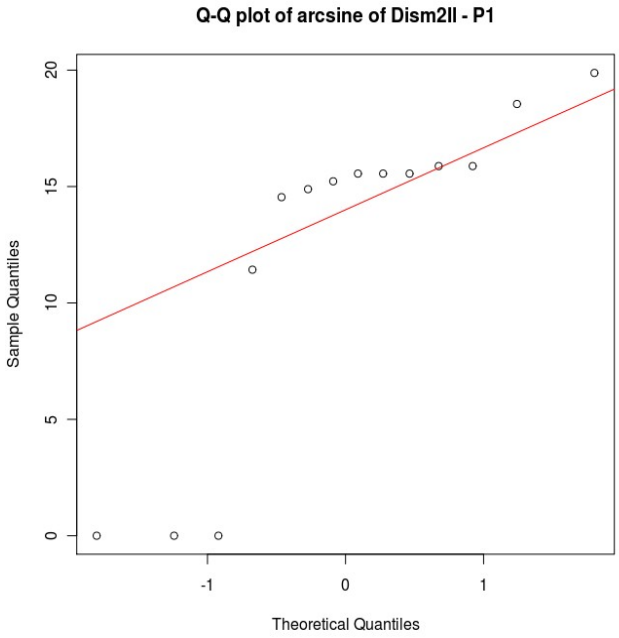


Arcsine of Dism2Il

Shapiro-Wilk normality test , data: Dism2Ila, W = 0.7337, p-value = 0.0008447.

The hypothesis that the sample is from a normal distribution is rejected.

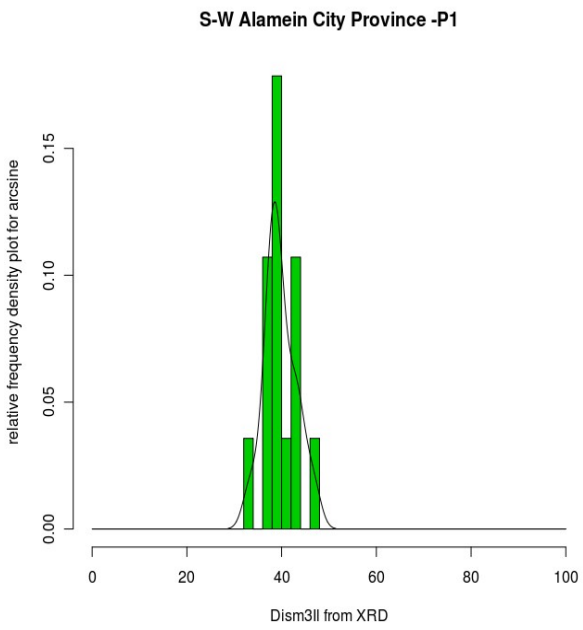


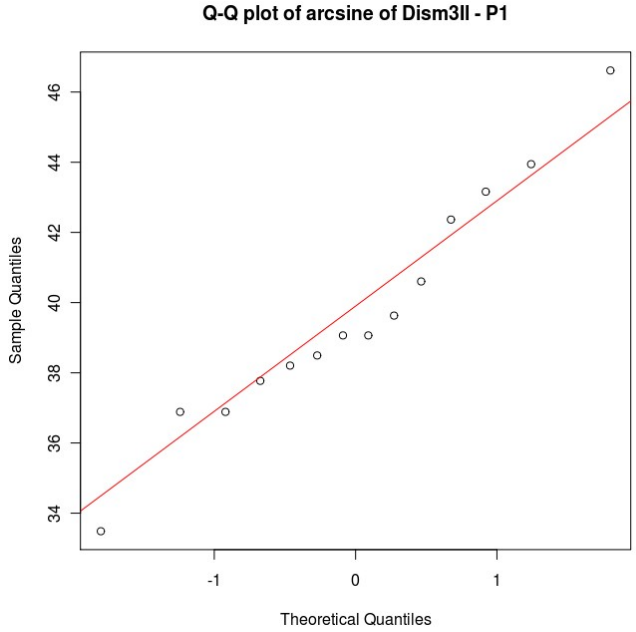


Arcsine of Dism3Il

Shapiro-Wilk normality test , data: Dism3Ila , W = 0.9682, p-value = 0.8515 .

The hypothesis that the sample is from a normal distribution is not rejected.

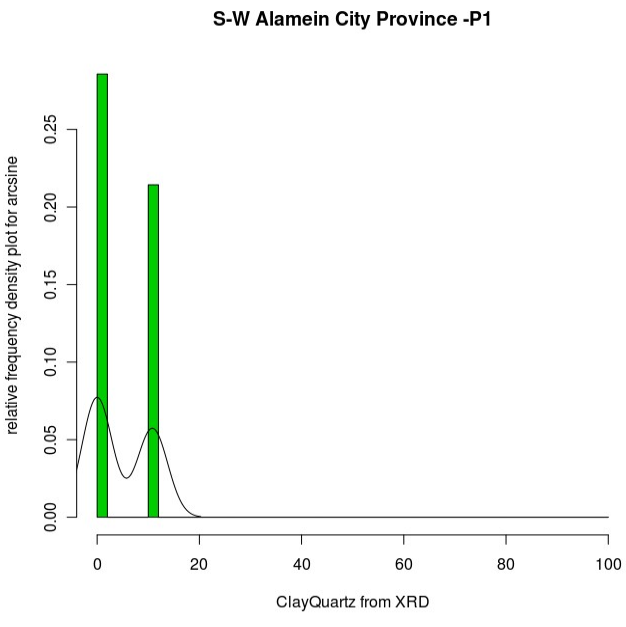


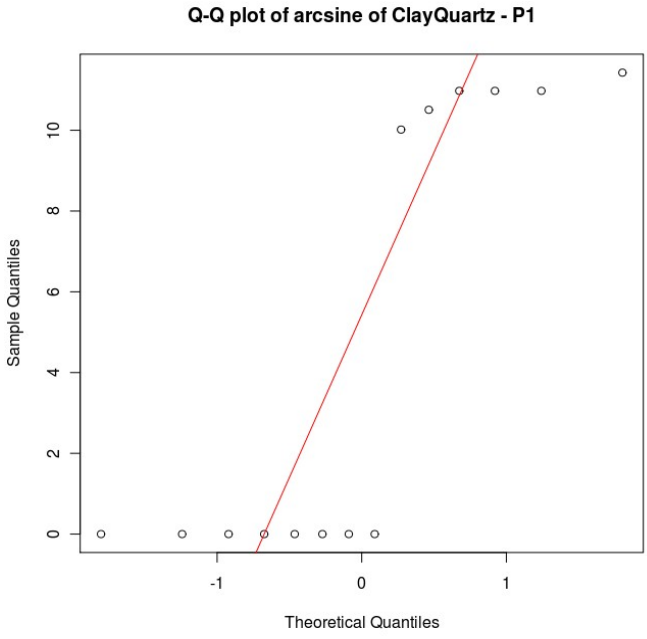


Arcsine of ClayQuartz

Shapiro-Wilk normality test , data: ClayQuartza, W = 0.6651, p-value = 0.0001645.

The hypothesis that the sample is from a normal distribution is rejected.





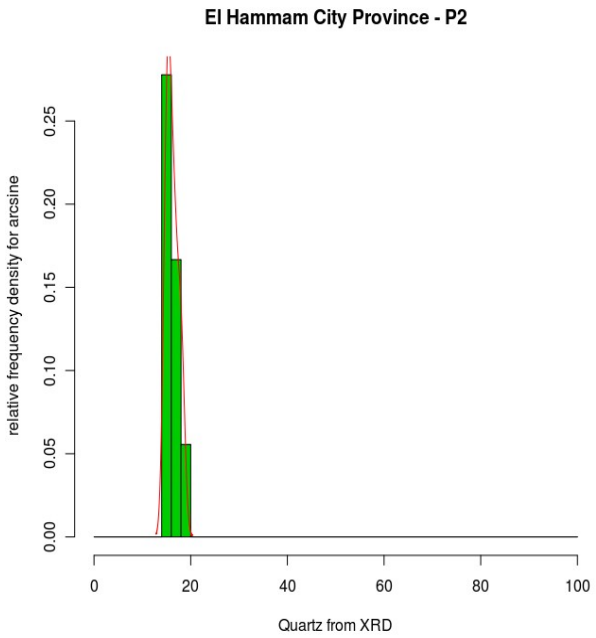
South of El Hammam City Province

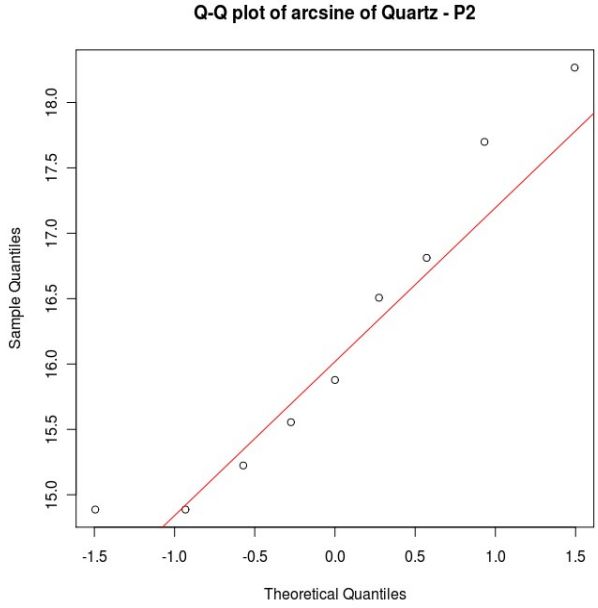
P2 comprised 10 samples from 1 quarry. Calcite and Gypsum were not present and only sample s023 contained Clay Quartz. *This sample should be dropped from further analysis as the indication is that some machine error occurred*.

>p2a<-p2[-(9),]

Arcsine of Quartz

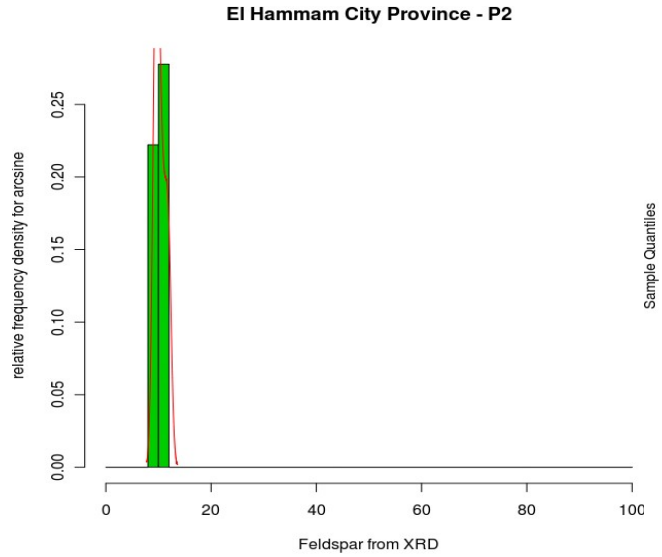
Shapiro-Wilk normality test . data: Quartza . W = 0.9183, p-value = 0.3784
The hypothesis that the sample is from a normal distribution is not rejected.

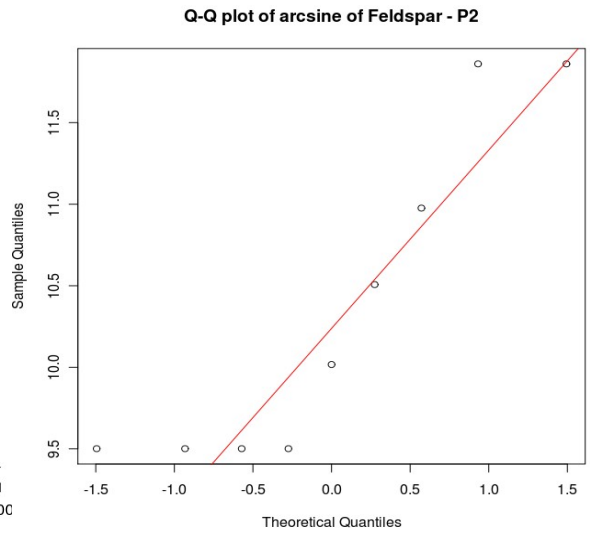




Arcsine of Feldspar

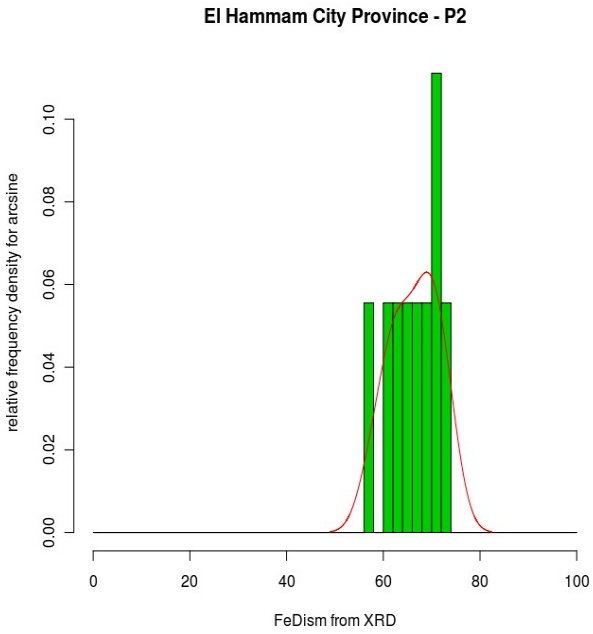
Shapiro-Wilk normality test . data: Feldspara . W = 0.8105, p-value = 0.02689
The hypothesis that the sample is from a normal distribution is rejected.

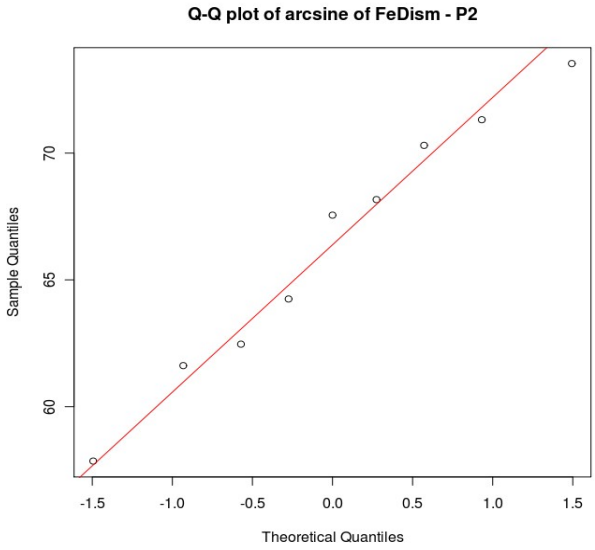




Arcsine of FeDism

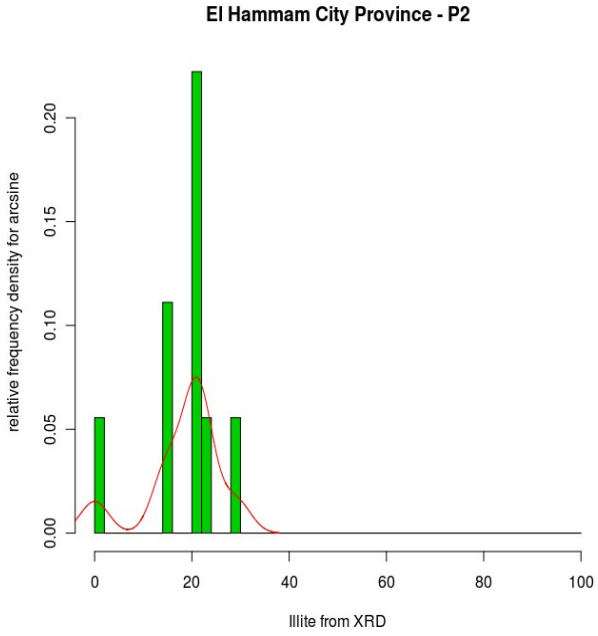
Shapiro-Wilk normality test . data: FeDisma . W = 0.9705, p-value = 0.8989
The hypothesis that the sample is from a normal distribution is not rejected.

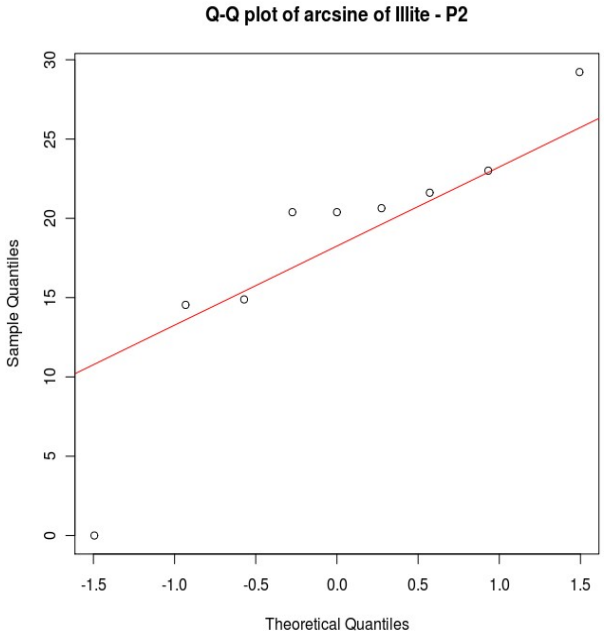




Arcsine of Illite

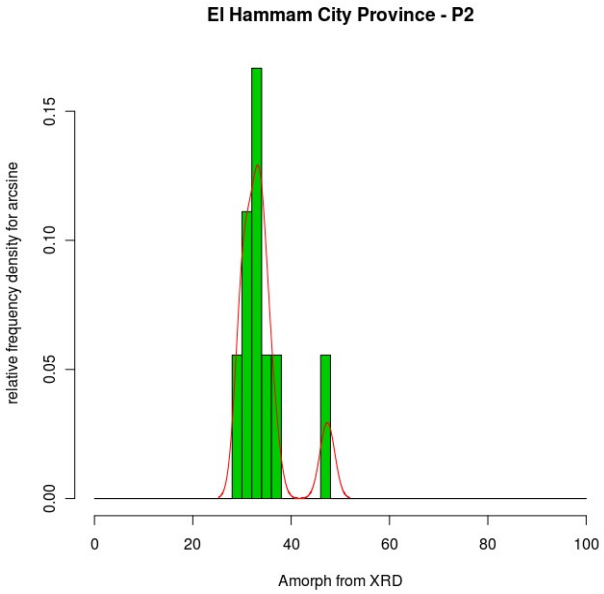
Shapiro-Wilk normality test . data: Illitea . W = 0.8607, p-value = 0.09767.
The hypothesis that the sample is from a normal distribution is not rejected.

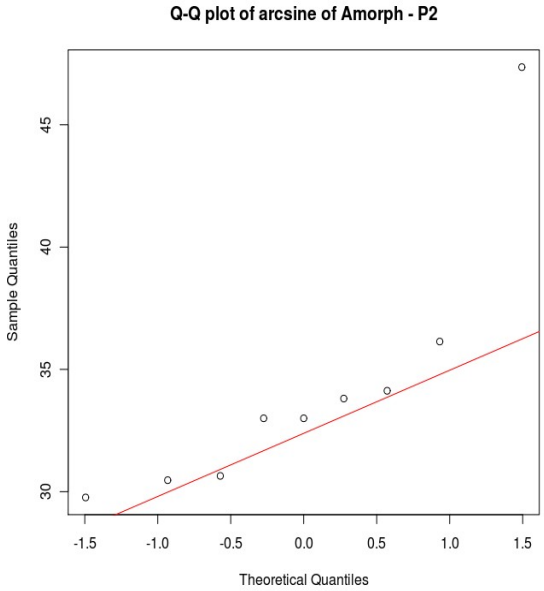




Arcsine of Amorph

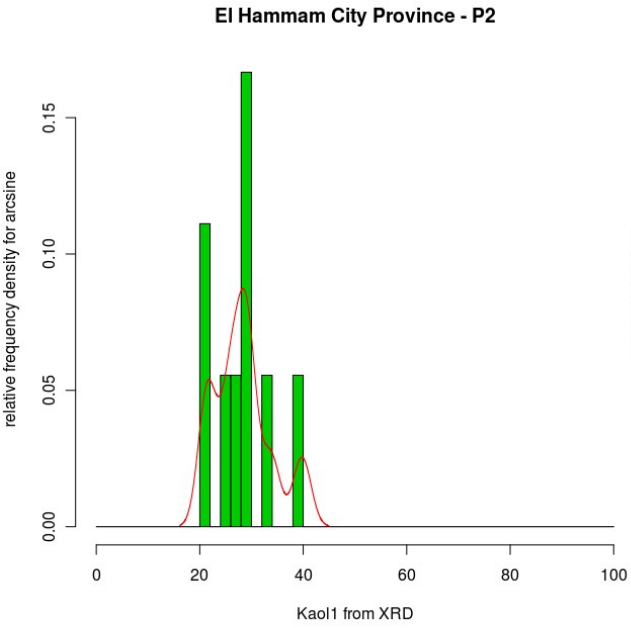
Shapiro-Wilk normality test . data: Amorpha . W = 0.743, p-value = 0.004492. The hypothesis that the sample is from a normal distribution is rejected.

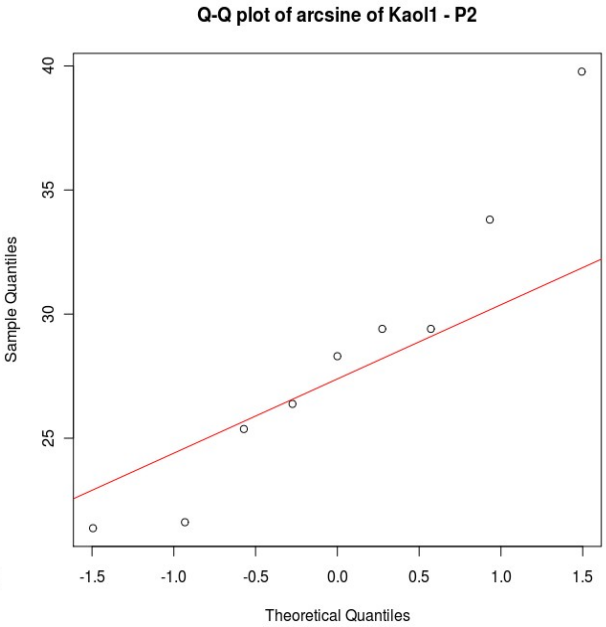




Arcsine of Kaol1

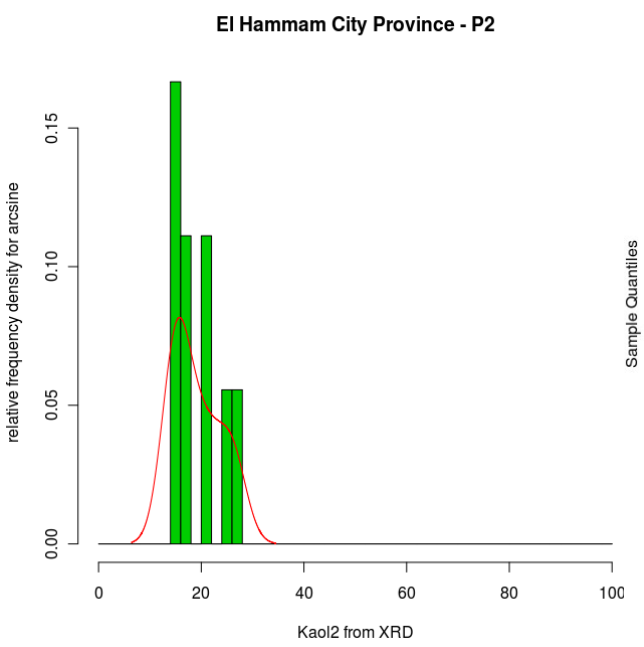
Shapiro-Wilk normality test . data: Kaol1a . W = 0.9356, p-value = 0.5359.
The hypothesis that the sample is from a normal distribution is not rejected.

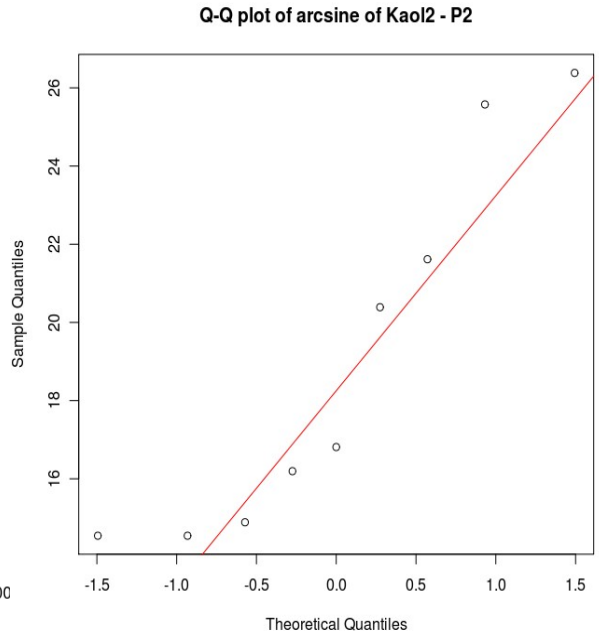




Arcsine of Kaol2

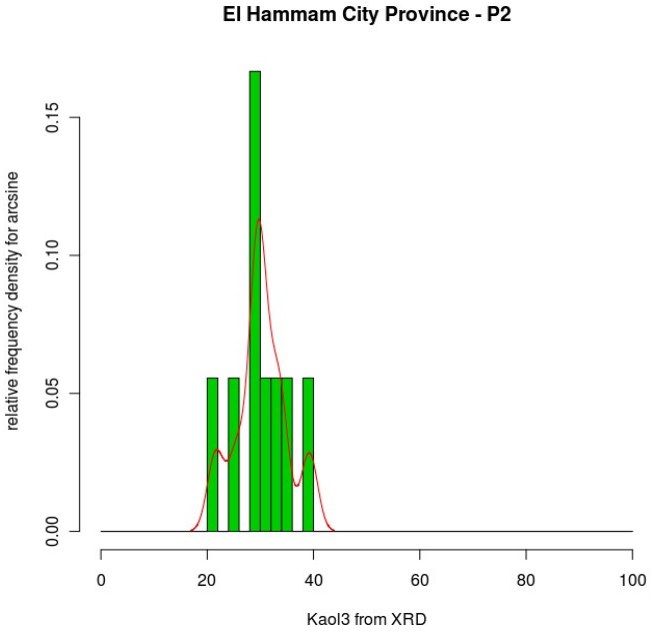
Shapiro-Wilk normality test . data: Kaol2a . W = 0.8576, p-value = 0.09036.
The hypothesis that the sample is from a normal distribution is not rejected.

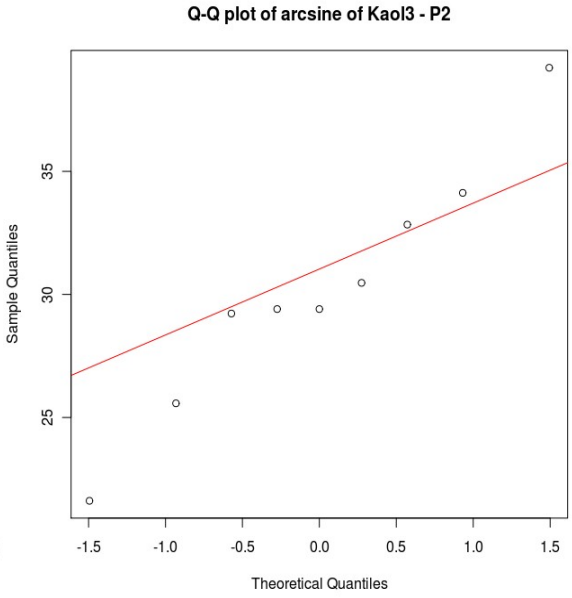




Arcsine of Kaol3

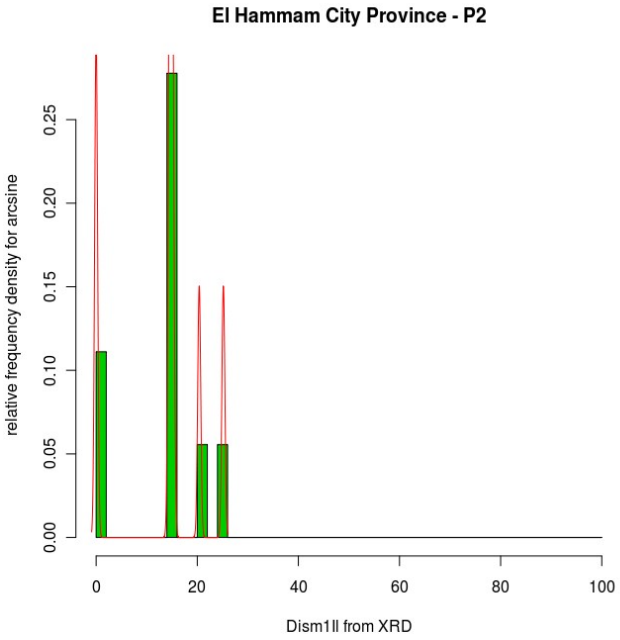
Shapiro-Wilk normality test . data: Kaol3a . W = 0.9682, p-value = 0.8789.
The hypothesis that the sample is from a normal distribution is not rejected.

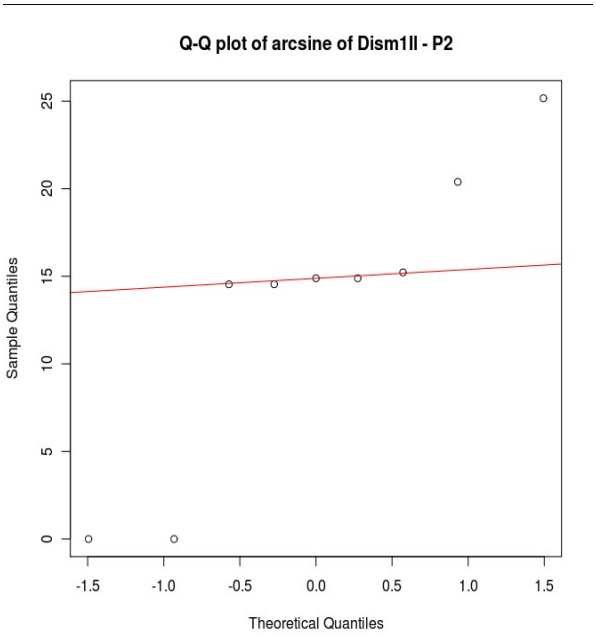




Arcsine of Dism1Il

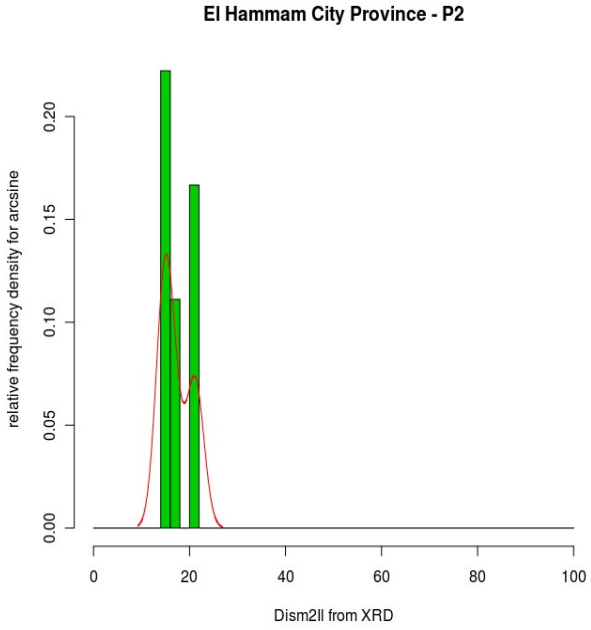
Shapiro-Wilk normality test . data: Dism1Ila . W = ,0.8377 p-value = 0.05438
The hypothesis that the sample is from a normal distribution is not rejected.

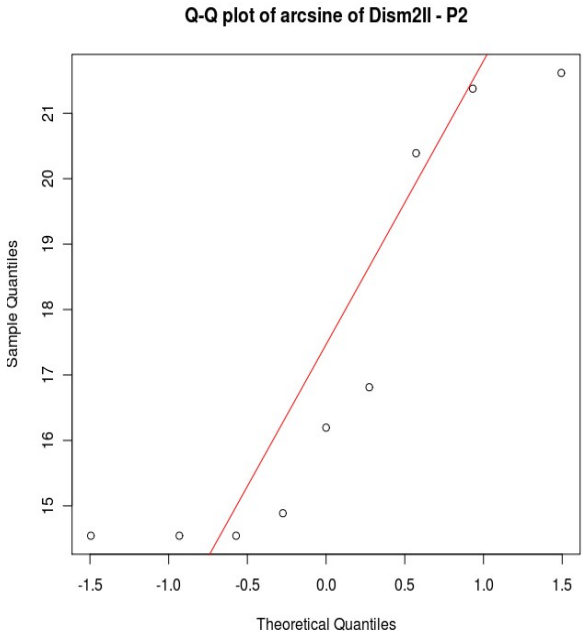




Arcsine of Dism2Il

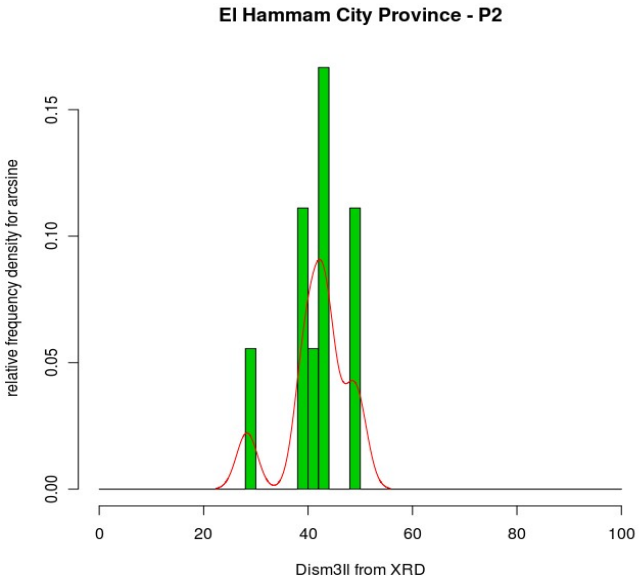
Shapiro-Wilk normality test . data: Dism2Ila . W = 0.797, p-value = 0.01887
The hypothesis that the sample is from a normal distribution is rejected.

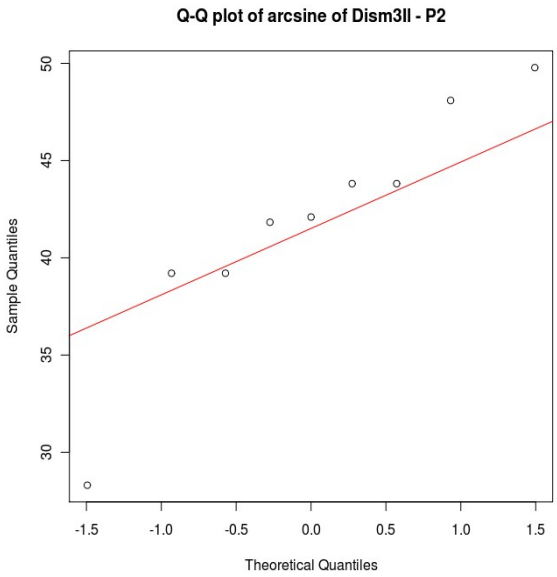




Arcsine of Dism3Il

Shapiro-Wilk normality test . data: Dism3Ila . W = 0.9002, p-value = 0.2529.
The hypothesis that the sample is from a normal distribution is not rejected.



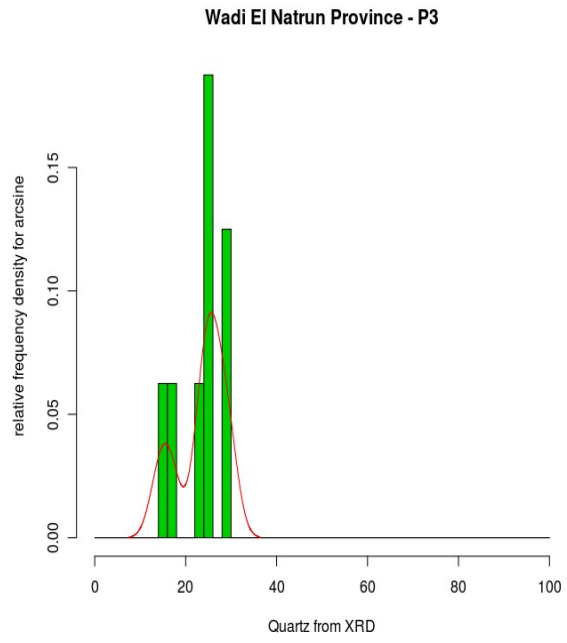


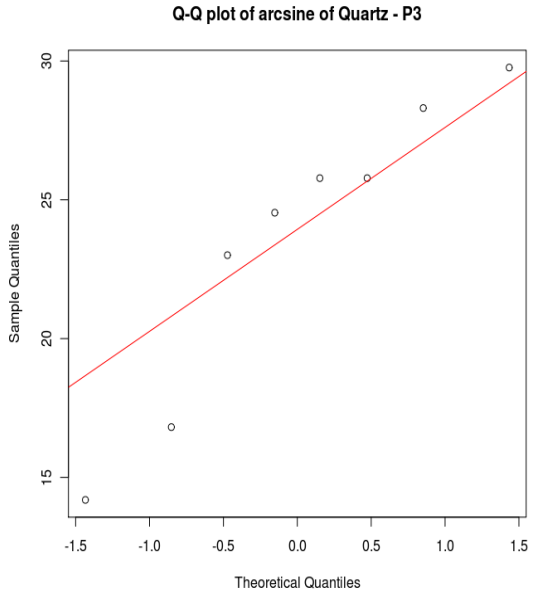
Wadi El Natrun Province

P3 comprised 8 samples from 1 quarry. Calcite was not present in the samples. Gypsum was present only in samples s031, in a low value, which suggests it is real. However, the sample was rejected by the Shapiro-Wilk test for normality.

Arcsine of Quartz

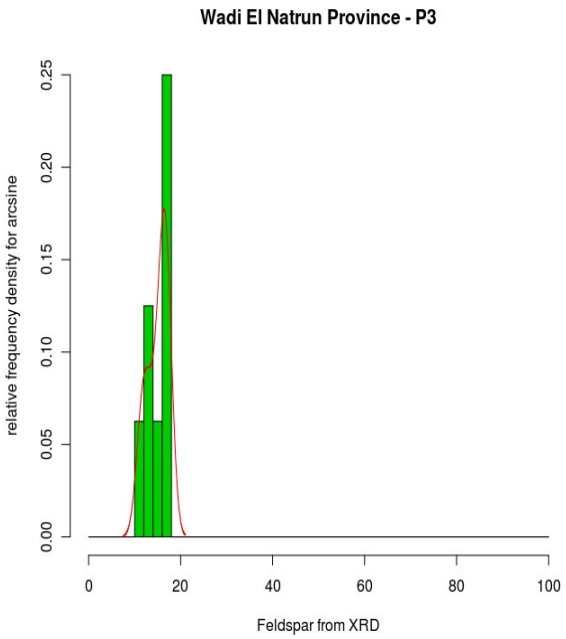
Shapiro-Wilk normality test . data: Quartza . W = 0.9022, p-value = 0.3025.
The hypothesis that the sample is from a normal distribution is not rejected.

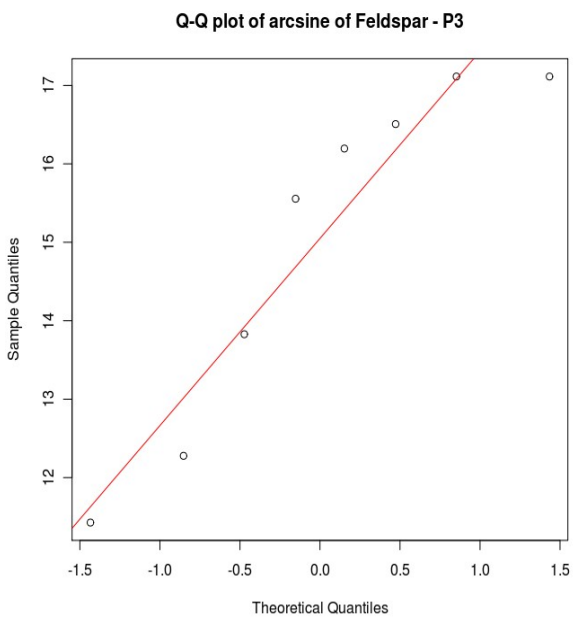




Arcsine of Feldspar

Shapiro-Wilk normality test . data: Feldspara . W = 0.8692, p-value = 0.1481.
The hypothesis that the sample is from a normal distribution is not rejected.



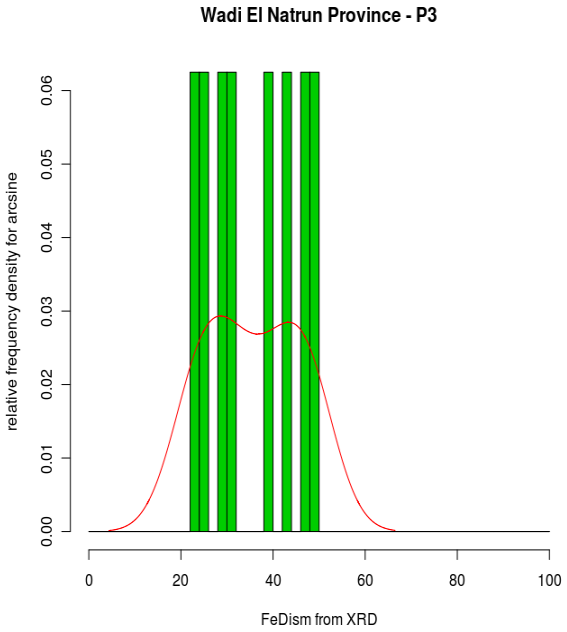


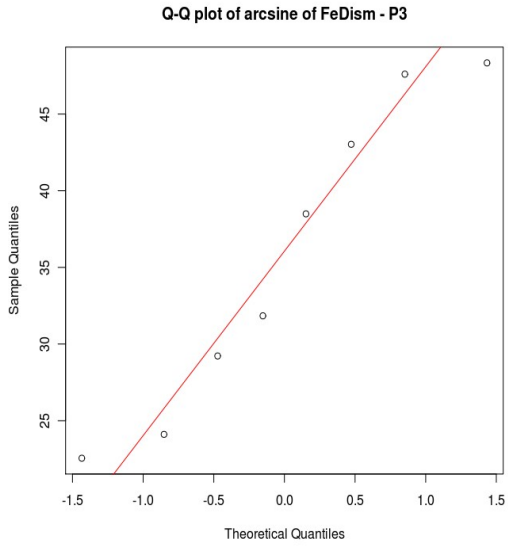
Arcsine of Gypsum

Shapiro-Wilk normality test . data: Gypsuma . W = 0.4184 , p-value = 1.047e-06.
The hypothesis that the sample is from a normal distribution is rejected.

Arcsine of FeDism

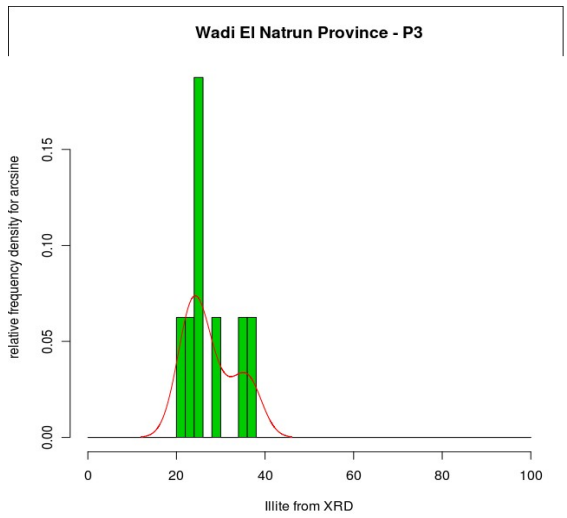
Shapiro-Wilk normality test . data: FeDisma . W = ,0.9175 p-value = 0.41.
The hypothesis that the sample is from a normal distribution is not rejected.

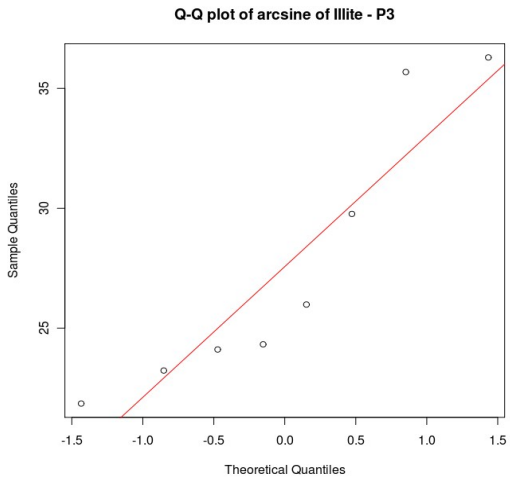




Arcsine of Illite

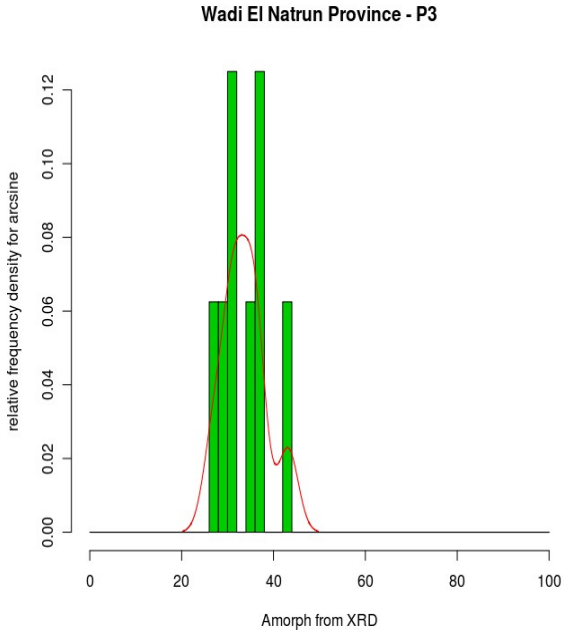
Shapiro-Wilk normality test . data: Illitea . W = 0.8481, p-value = 0.0912
The hypothesis that the sample is from a normal distribution is not rejected.

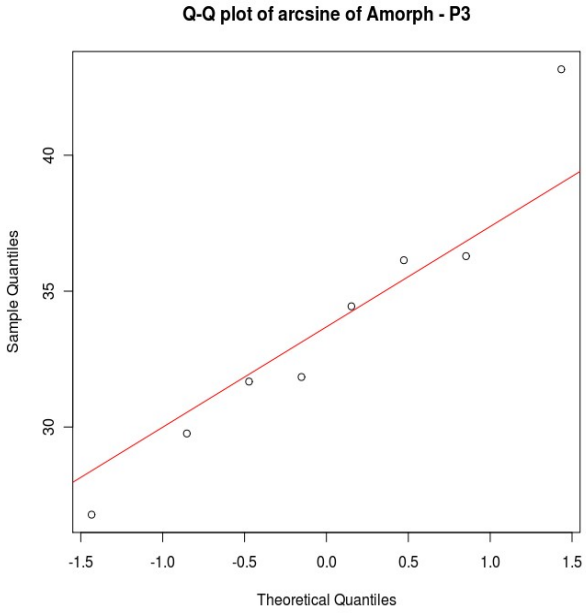




Arcsine of Amorph

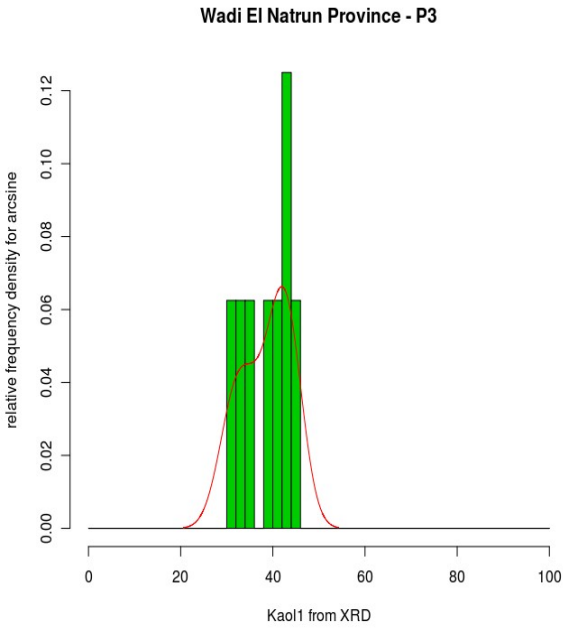
Shapiro-Wilk normality test . data: Amorpha . W = ,0.9591 p-value = 0.8016.
The hypothesis that the sample is from a normal distribution is not rejected.

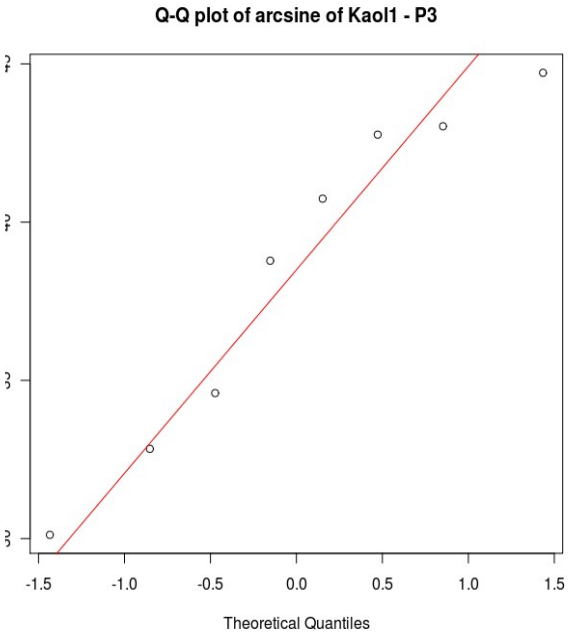




Arcsine of Kaol1

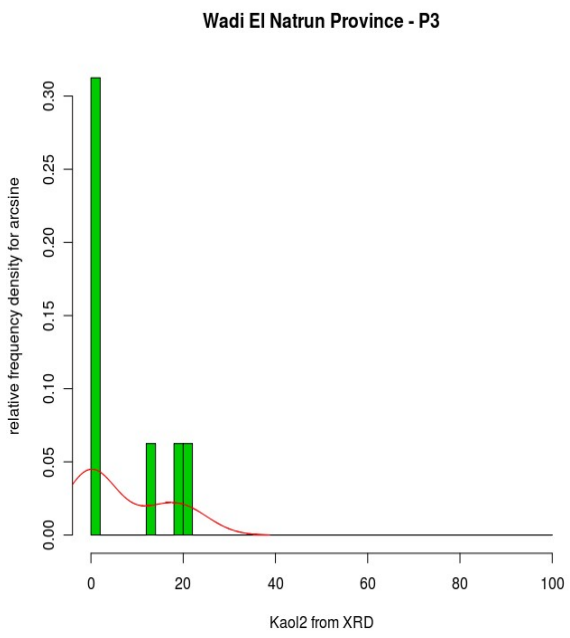
Shapiro-Wilk normality test . data: Kaol1a . W = 0.9246, p-value = 0.4687.
The hypothesis that the sample is from a normal distribution is not rejected.

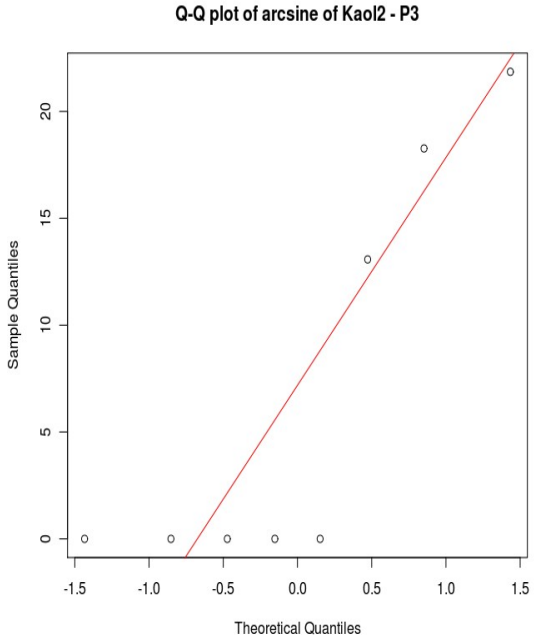




Arcsine of Kaol2

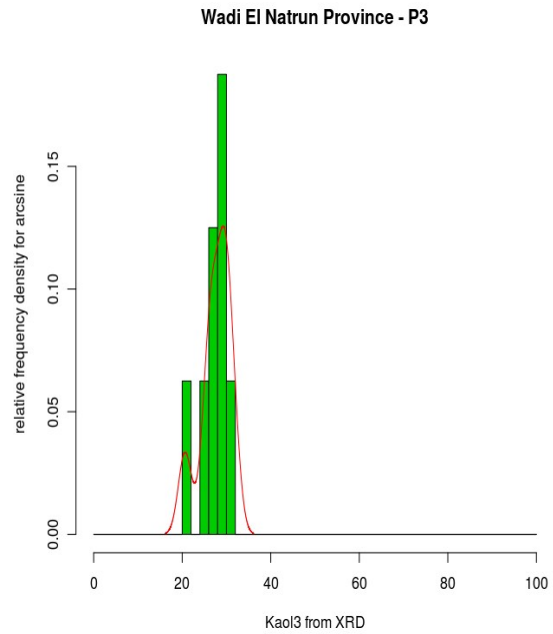
Shapiro-Wilk normality test . data: Kaol2a . W = 0.7212, p-value =0.003903 .
The hypothesis that the sample is from a normal distribution is rejected.

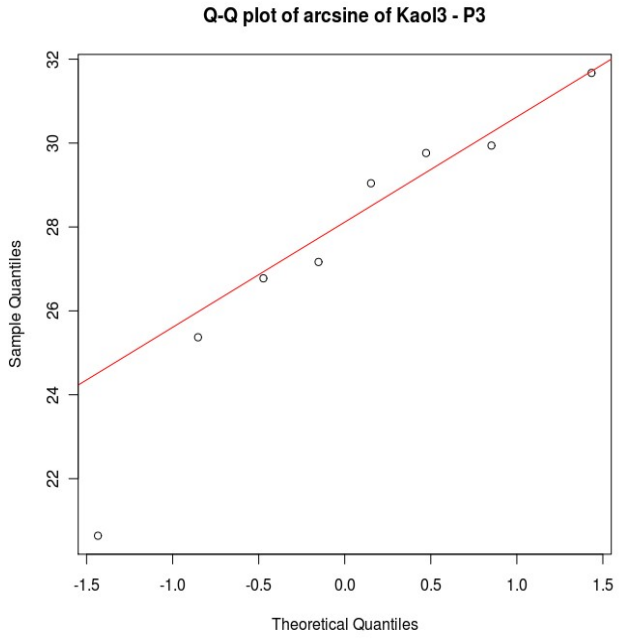




Arcsine of Kaol3

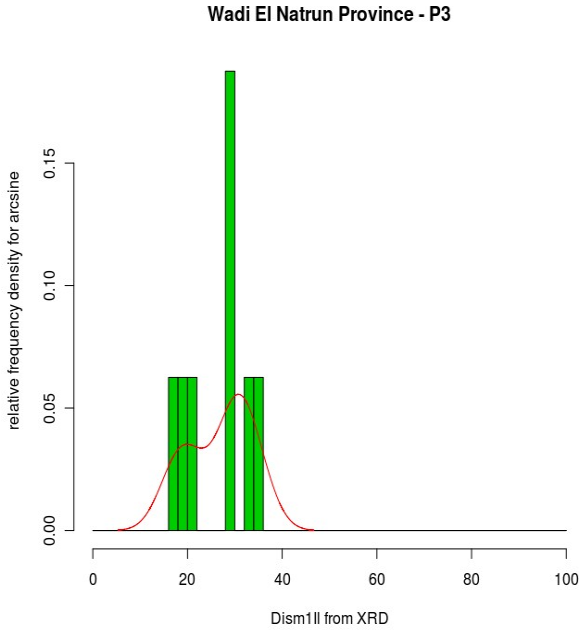
Shapiro-Wilk normality test . data: Kaol3a . W = ,0.9215 p-value =0.4424 .
The hypothesis that the sample is from a normal distribution is not rejected.

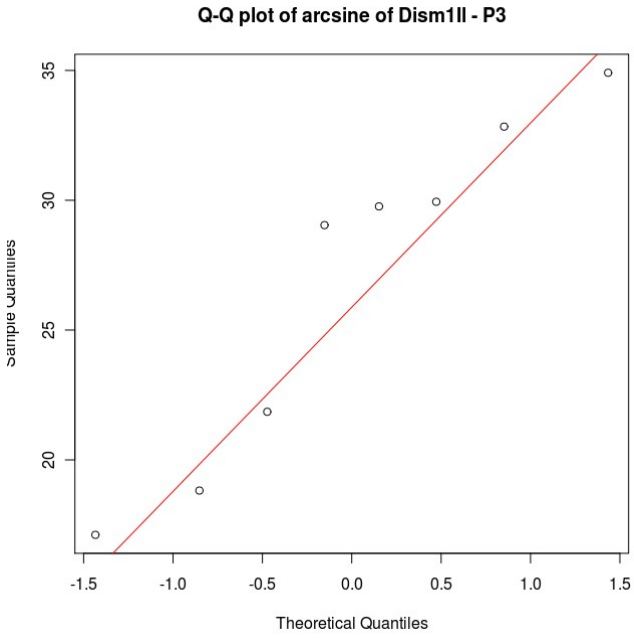




Arcsine of Dism1Il

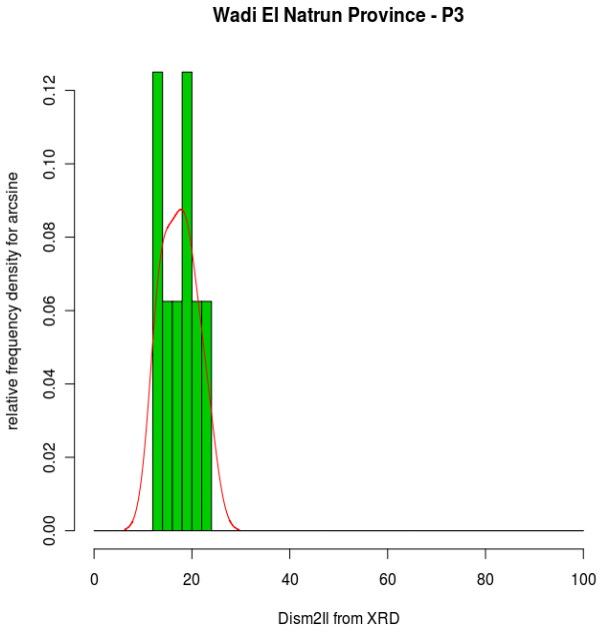
Shapiro-Wilk normality test . data: Dism1Ila . W = 0.9014, p-value = 0.2973.
The hypothesis that the sample is from a normal distribution is not rejected.

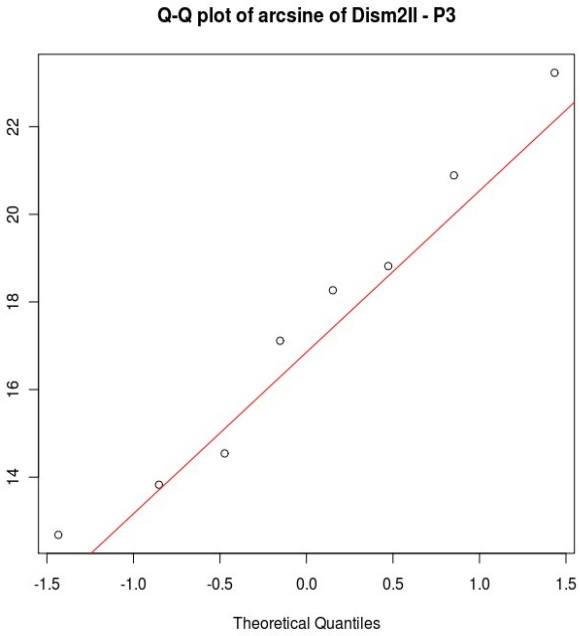




Arcsine of Dism2Il

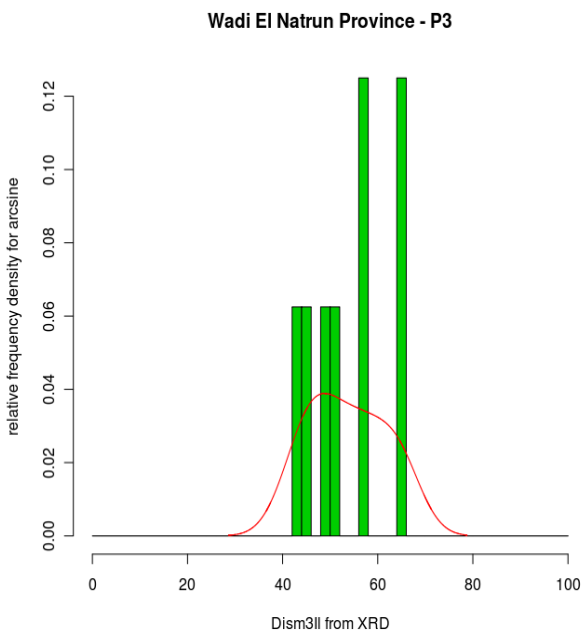
Shapiro-Wilk normality test . data: Dism2Ila . W = 0.9645, p-value = 0.8517.
The hypothesis that the sample is from a normal distribution is not rejected.

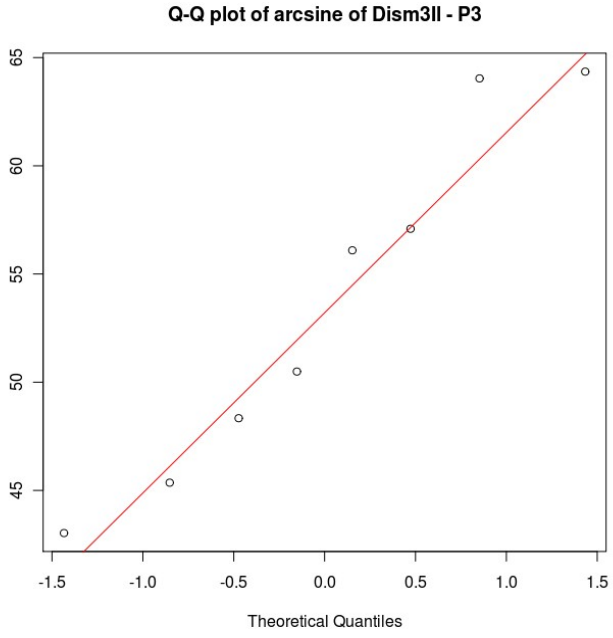




Arcsine of Dism3Il

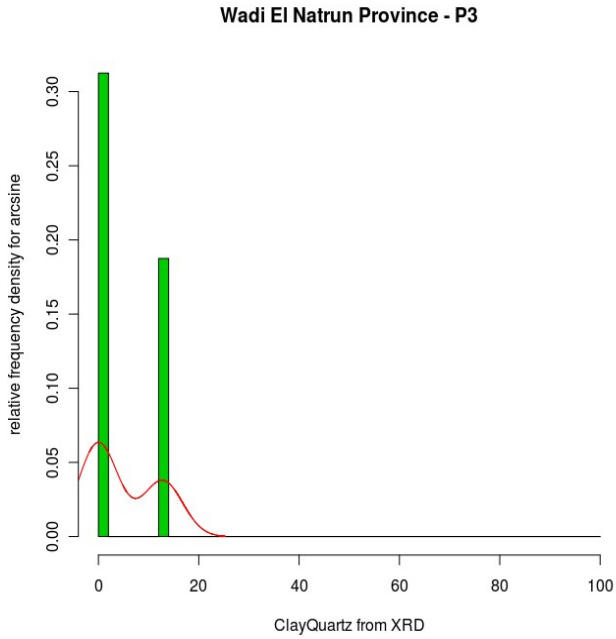
Shapiro-Wilk normality test . data: Dism3Ila . W = 0.9278, p-value = 0.4967.
The hypothesis that the sample is from a normal distribution is not rejected.

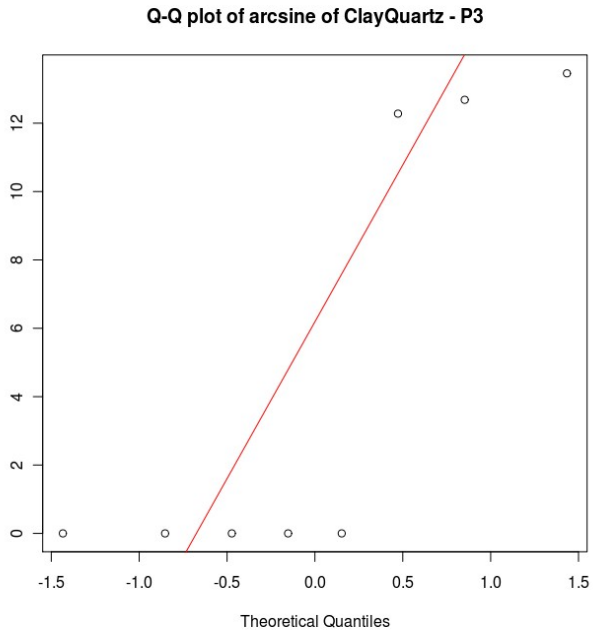




Arcsine of ClayQuartz

Shapiro-Wilk normality test . data: ClayQuartza . W = 0.6639, p-value = 0.999873.
The hypothesis that the sample is from a normal distribution is rejected.



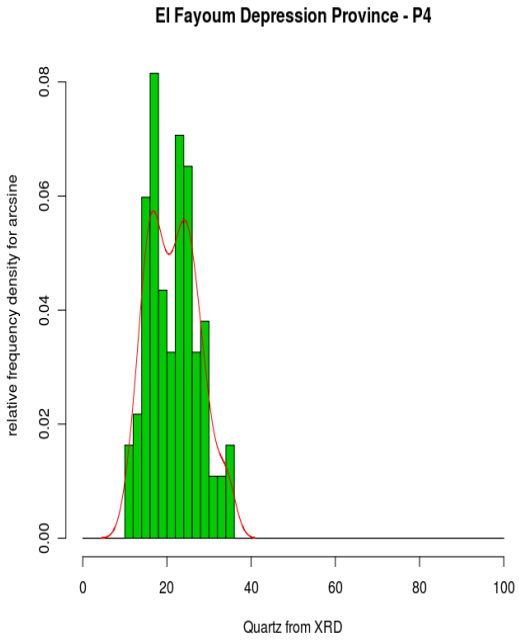


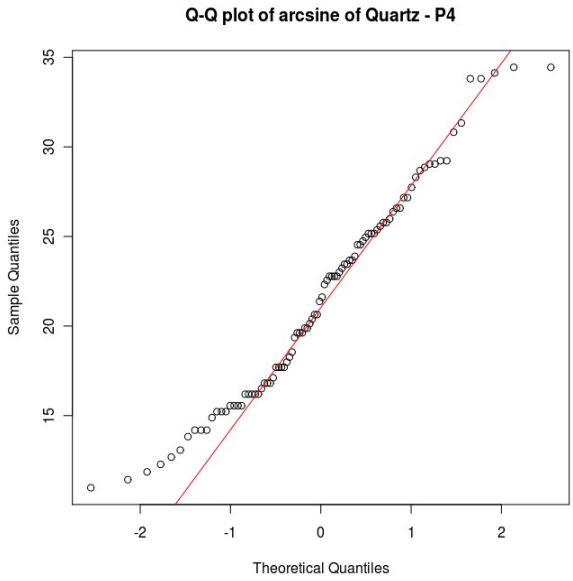
El Fayoum Depression

P4 comprised 92 samples from 7 quarries.

Arcsine of Quartz

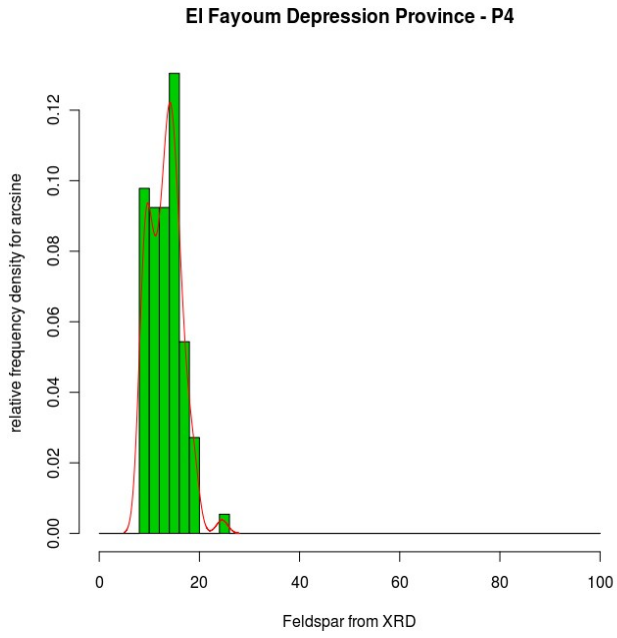
Shapiro-Wilk normality test . data: Quartza . W = 0.9792, p-value =0.03322 .
The hypothesis that the sample is from a normal distribution is rejected.

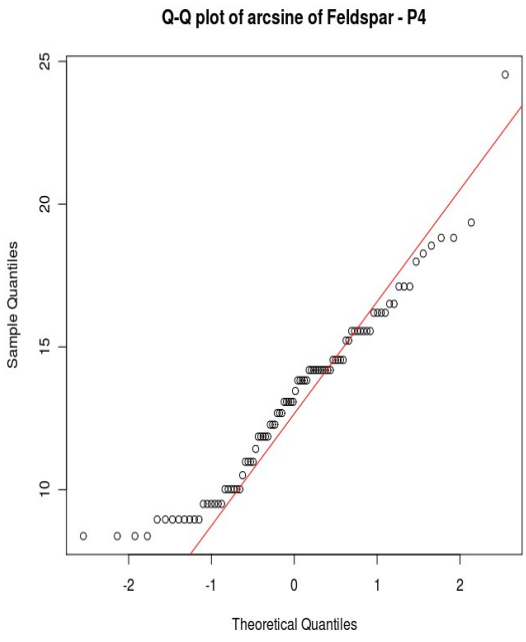




Feldspar

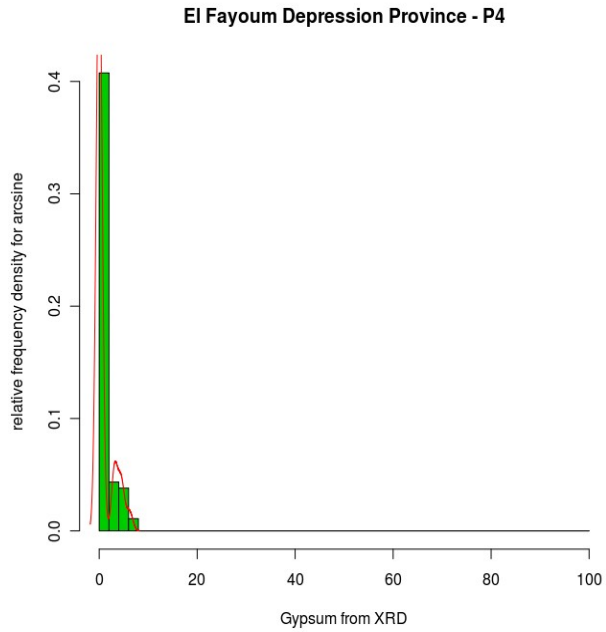
Shapiro-Wilk normality test . data: Feldspara . W = 0.954, p-value = 0.002626.
The hypothesis that the sample is from a normal distribution is rejected.

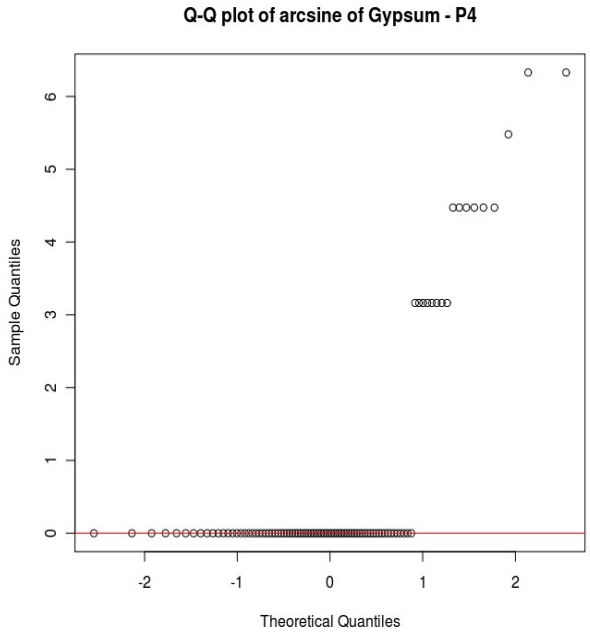




Arcsine of Gypsum

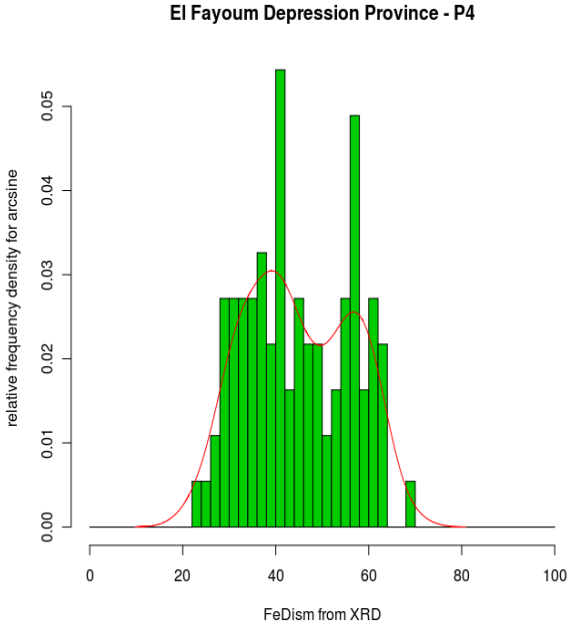
Shapiro-Wilk normality test . data: Gypsuma . W = 0.5065, p-value = 4.743e-16.
The hypothesis that the sample is from a normal distribution is rejected.

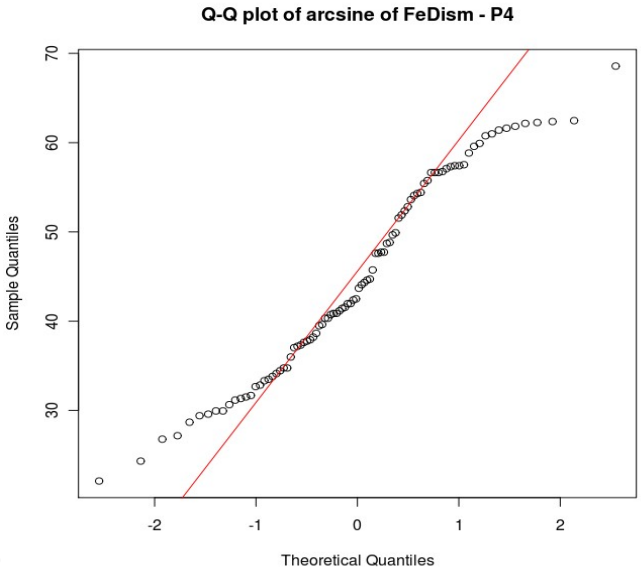




Arcsine of FeDism

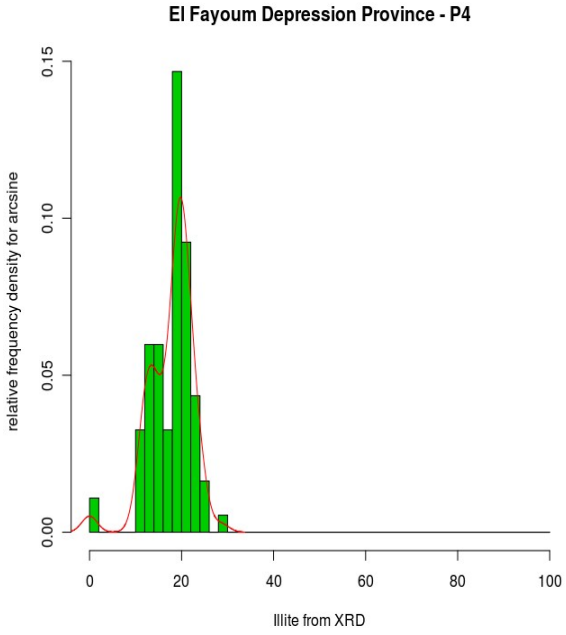
Shapiro-Wilk normality test . data: FeDisma . W = 0.9623, p-value =0.009257 .
The hypothesis that the sample is from a normal distribution is rejected.

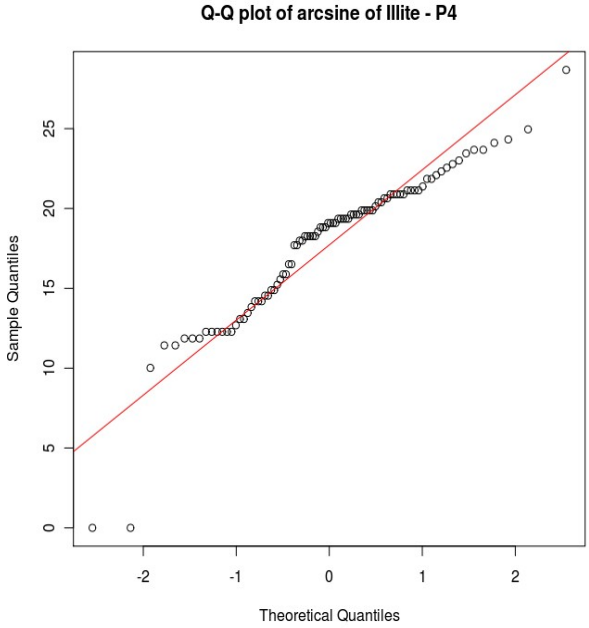




Arcsine of Illite

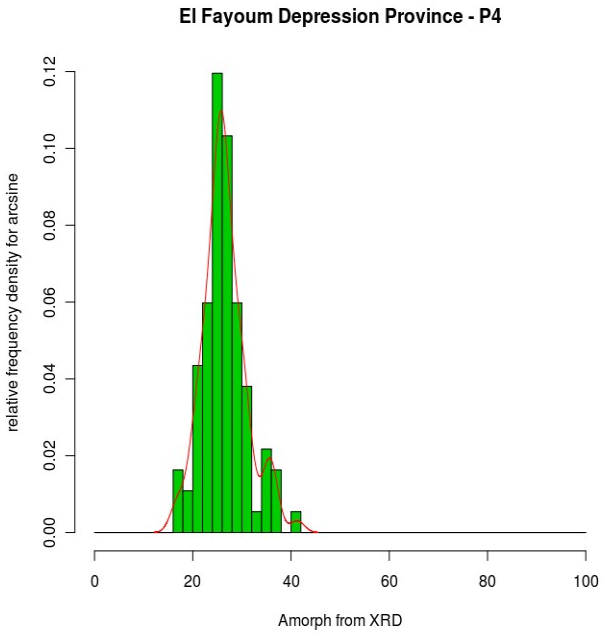
Shapiro-Wilk normality test . data: Illitea . W = 0.9117, p-value = 1.148e-05 .
The hypothesis that the sample is from a normal distribution is rejected.

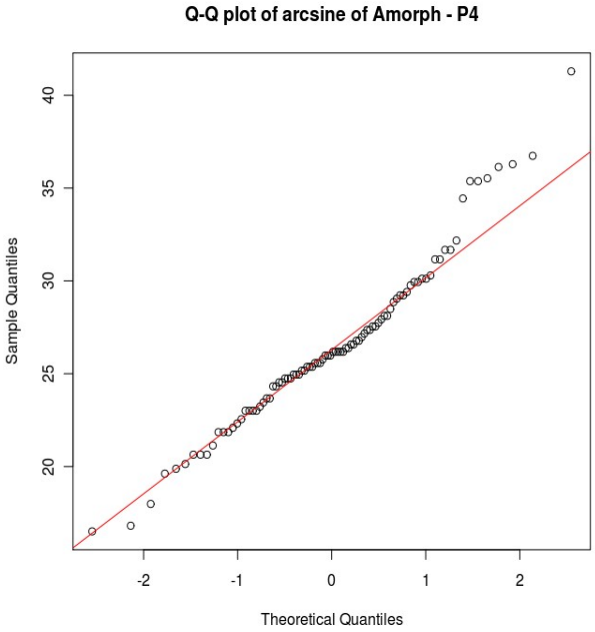




Arcsine of Amorph

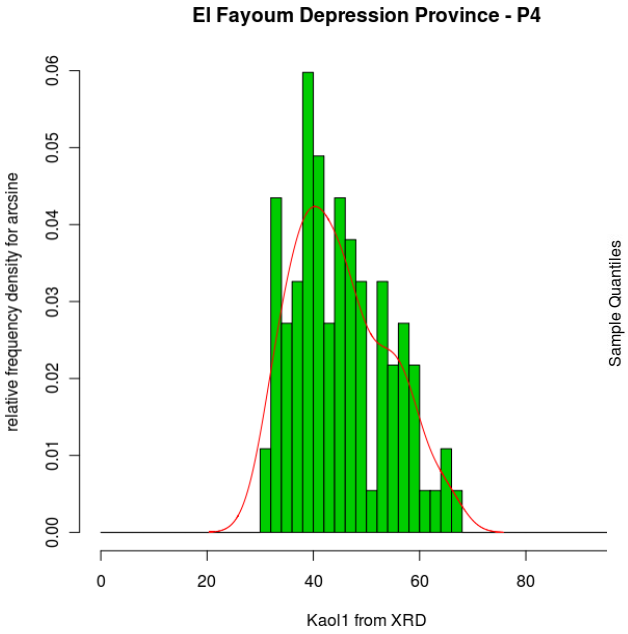
Shapiro-Wilk normality test . data: Amorpha . W = 0.9677, p-value = 0.02197.
The hypothesis that the sample is from a normal distribution is rejected.

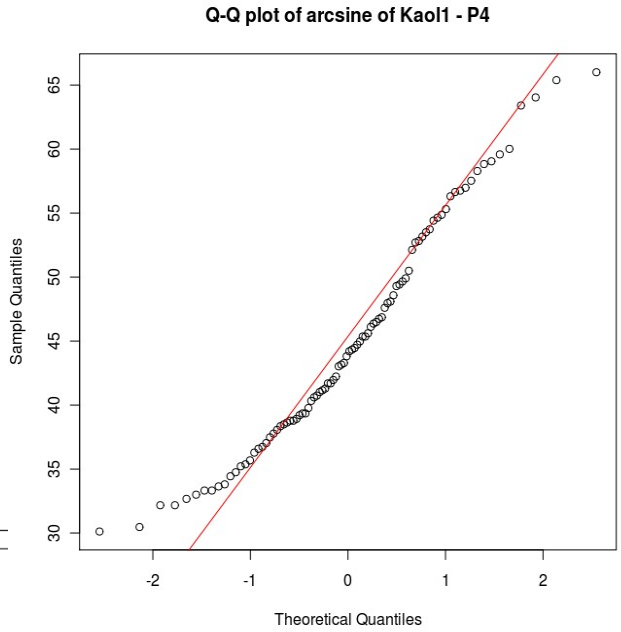




Arcsine of Kaol1

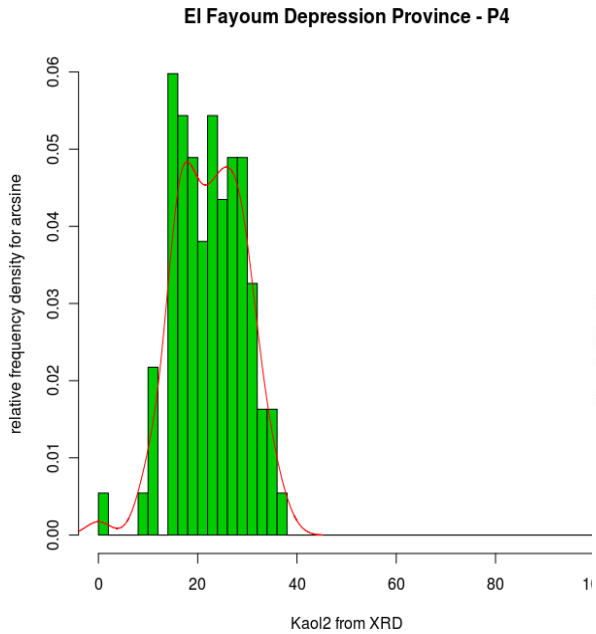
Shapiro-Wilk normality test . data: Kaol1a . W = 0.9637, p-value = 0.01163.
The hypothesis that the sample is from a normal distribution is rejected.

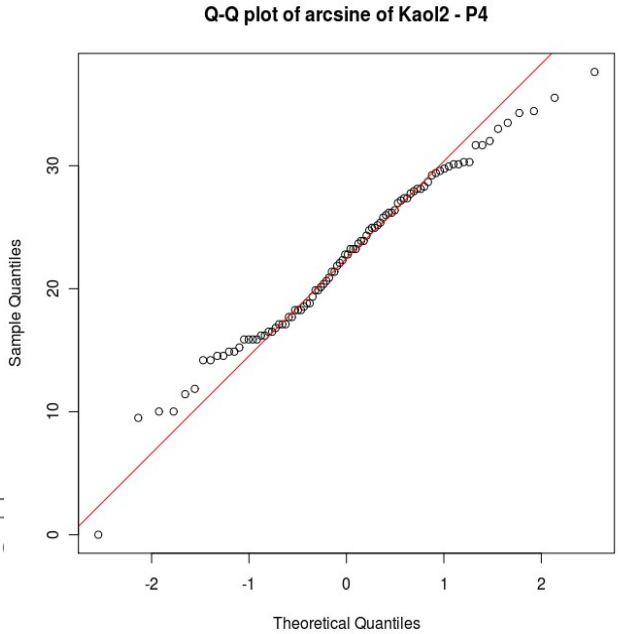




Arcsine of Kaol2

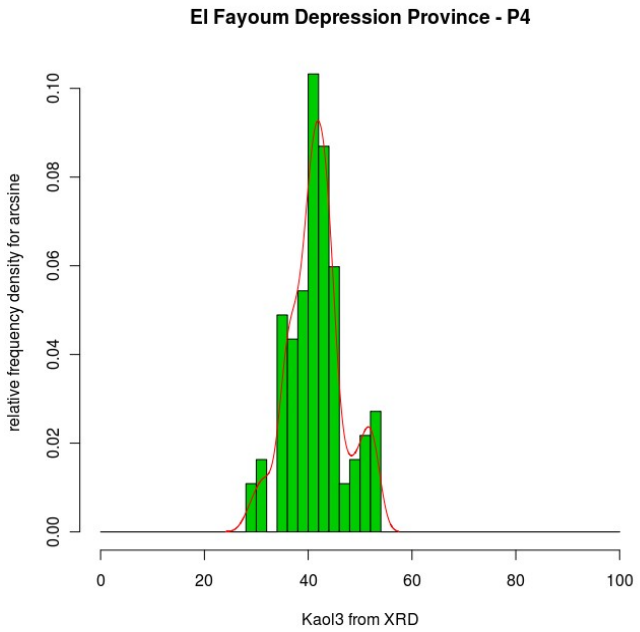
Shapiro-Wilk normality test . data: Kaol2a . W = 0.9847, p-value = 0.3571 .
The hypothesis that the sample is from a normal distribution is not rejected.

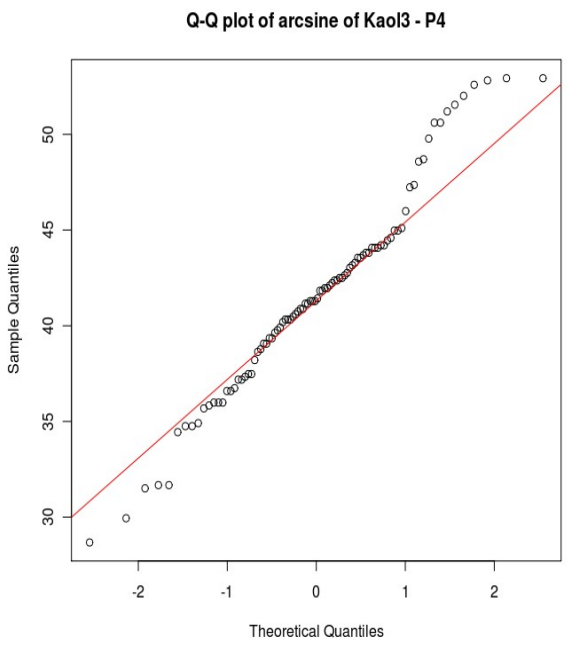




Arcsine of Kaol3

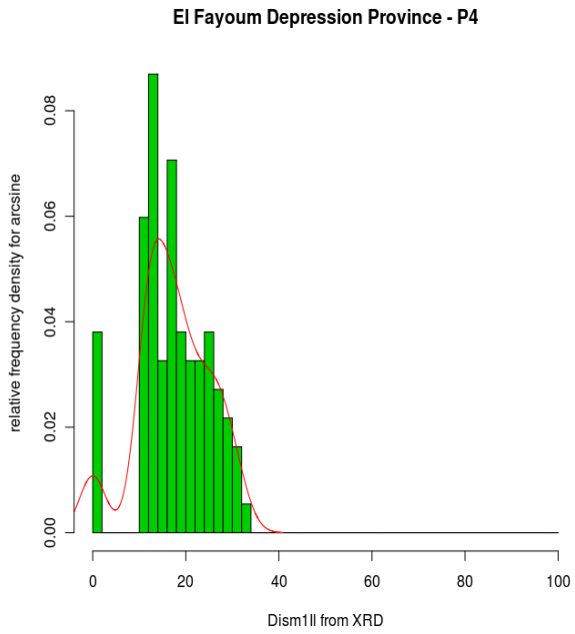
Shapiro-Wilk normality test . data: Kaol3a . W = 0.9741, p-value = 0.06332.
The hypothesis that the sample is from a normal distribution is not rejected.

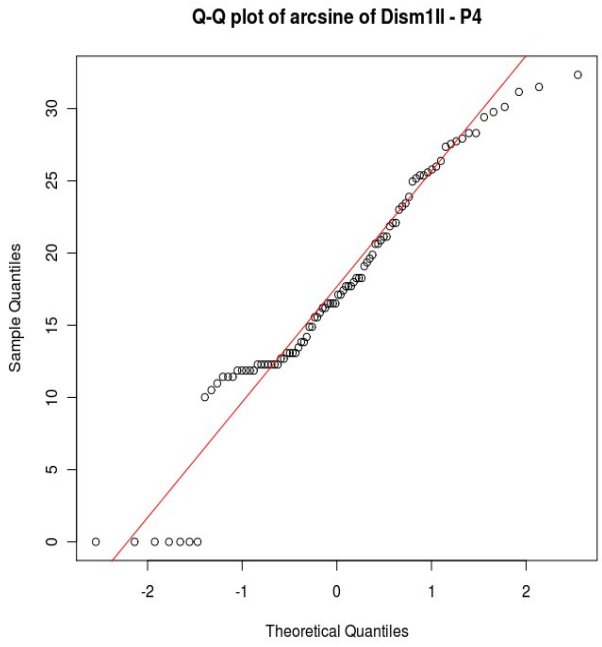




Arcsine of Dism1Il

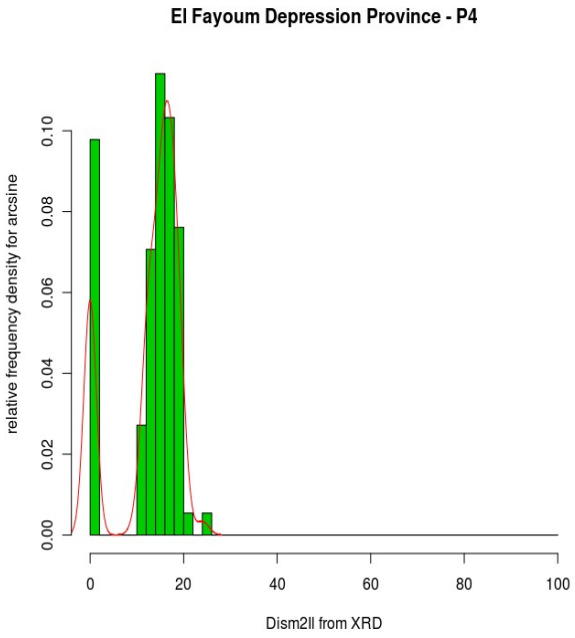
Shapiro-Wilk normality test . data: Dism1Ila . W = 0.9513, p-value = 0.001761
The hypothesis that the sample is from a normal distribution is rejected.

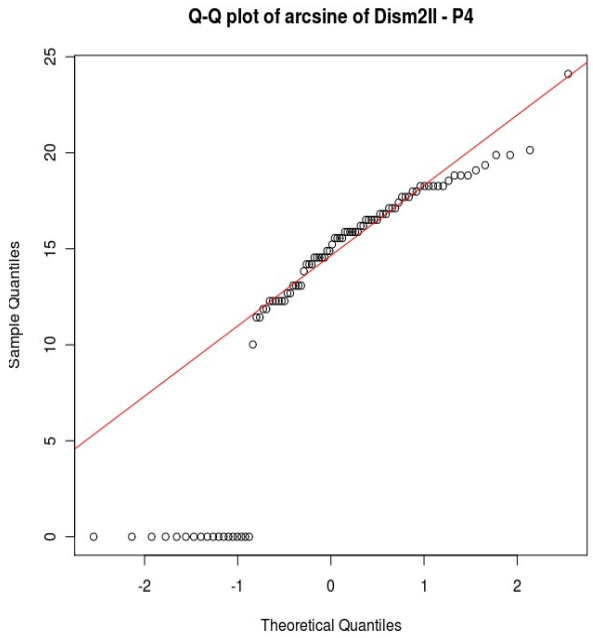




Arcsine of Dism2Il

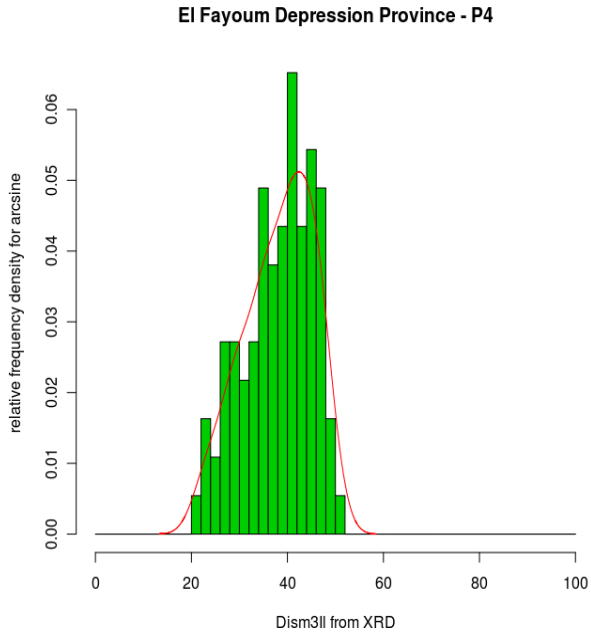
Shapiro-Wilk normality test . data: Dism2Ila . W =0.7863 , p-value = 3.107e-10
The hypothesis that the sample is from a normal distribution is rejected.

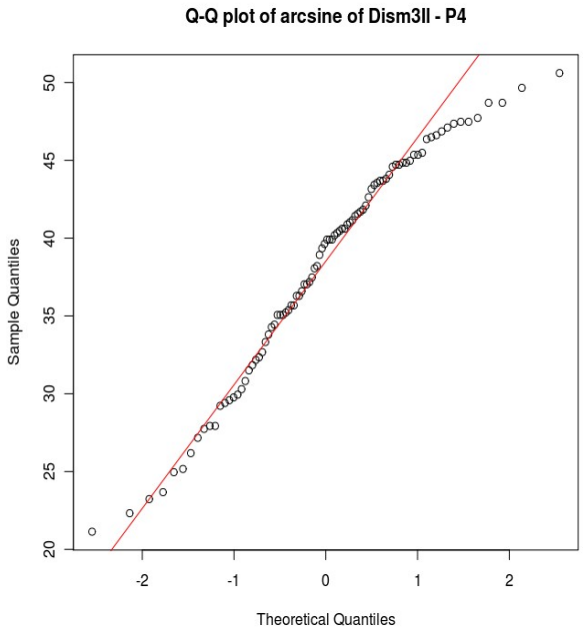




Arcsine of Dism3Il

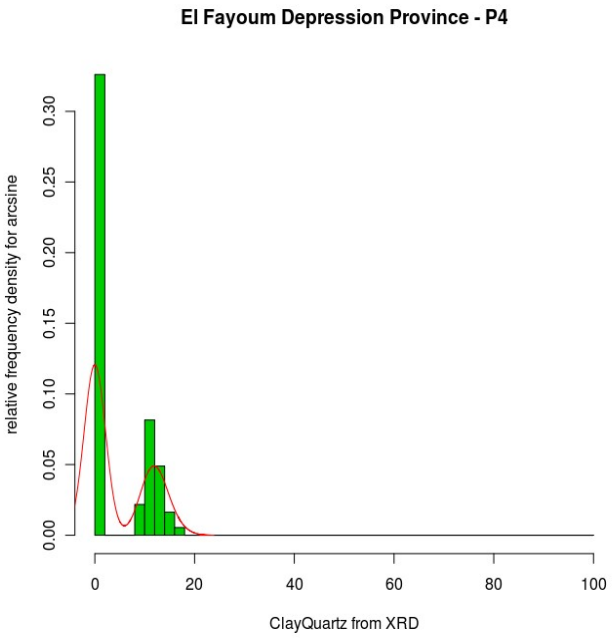
Shapiro-Wilk normality test . data: Dism3Ila . W = 0.9648, p-value = 0.01372.
The hypothesis that the sample is from a normal distribution is rejected.





Arcsine of ClayQuartz

Shapiro-Wilk normality test . data: ClayQuartza . W = 0.673, p-value =5.225e-13.
The hypothesis that the sample is from a normal distribution is rejected.



APPENDIX SEVEN: Analysis of individual quarries

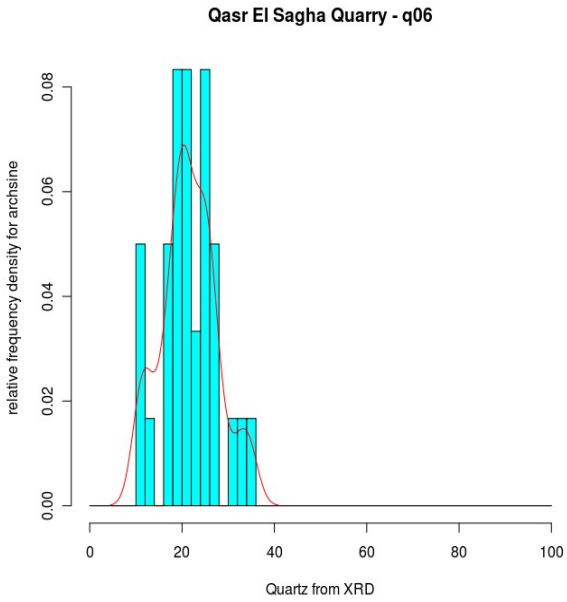
The reason El Fayoum Depression Province P4 variables are failing the Shapiro-Wilk test is thought to be due to areal, and probably stratigraphic change of sample locations. The 92 samples came from 7 quarries. In order to understand the sample variability and check to see if the distributions are suitable for multivariate analysis the quarries were examined independently. Quarry 10 with only 2 samples from 1 location, and quarry 11 with only 4 samples from two locations were removed from the data-frame, leaving quarries 6, 7, 8, 9, and 12 for analysis.

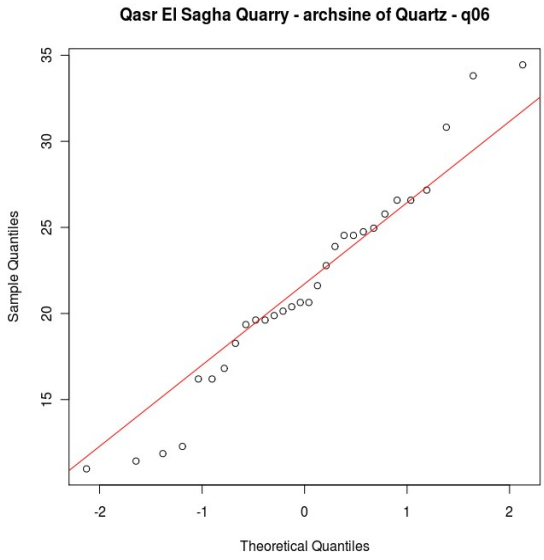
Qasr El Sagha Quarry – q06

Q06 has 30 samples.

Arcsine of Quartz

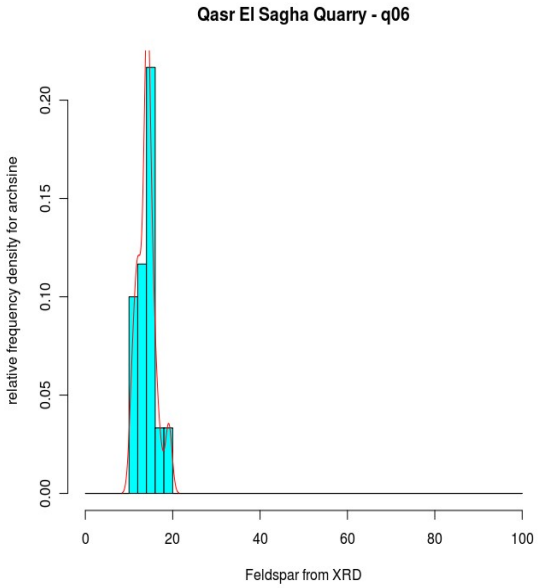
Shapiro-Wilk normality test : data: Quartza , W = 0.9672, p-value = 0.4647 . The hypothesis that the sample is from a normal distribution is not rejected.

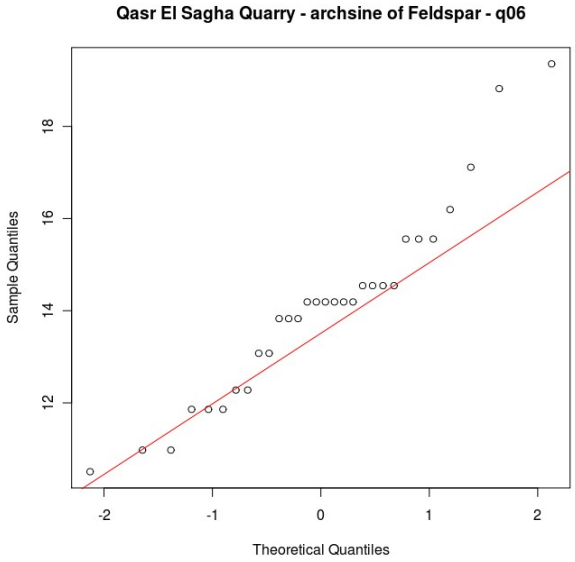




Arcsine of Feldspar

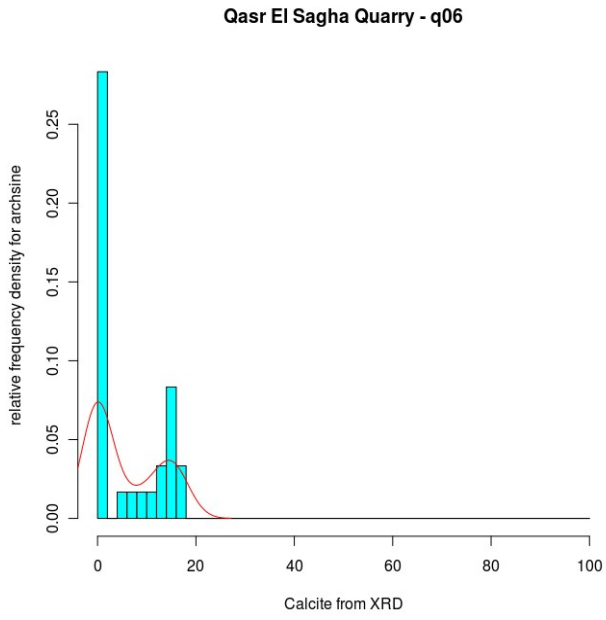
Shapiro-Wilk normality test : data: Feldspara , W = 0.9419, p-value = 0.1024 . The hypothesis that the sample is from a normal distribution is not rejected.

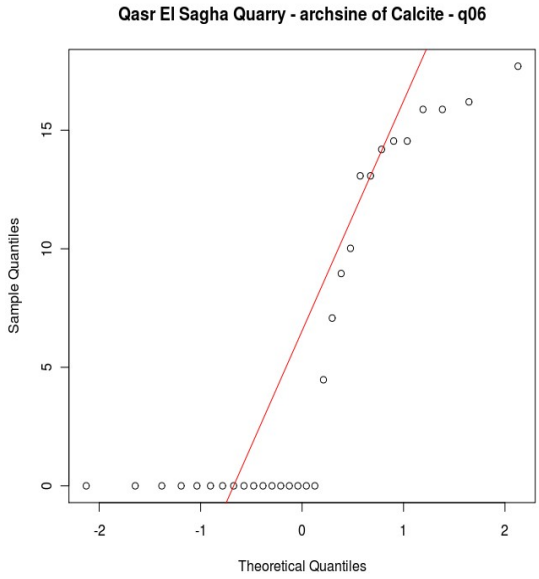




Arcsine of Calcite

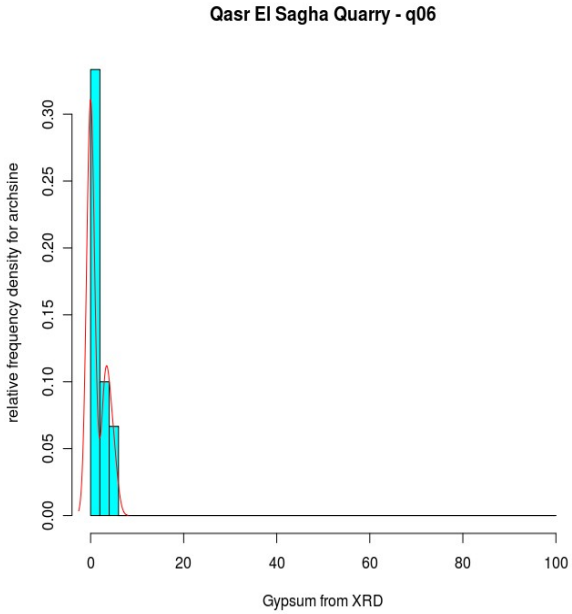
Shapiro-Wilk normality test : data: Calcitea , W = 0.7335, p-value = 4.986e-06 . The hypothesis that the sample is from a normal distribution is rejected.

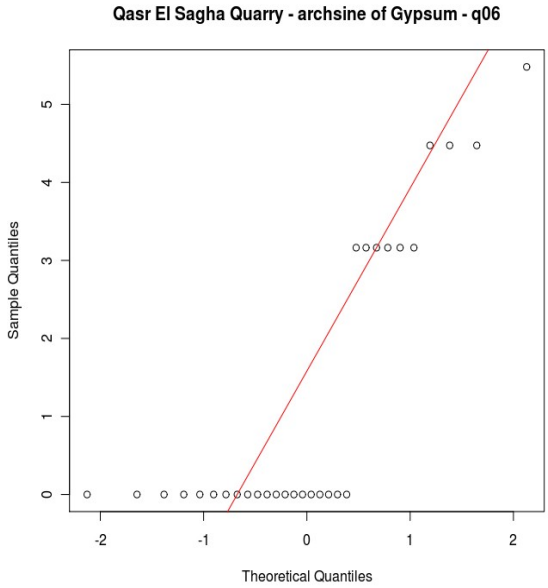




Arcsine of Gypsum

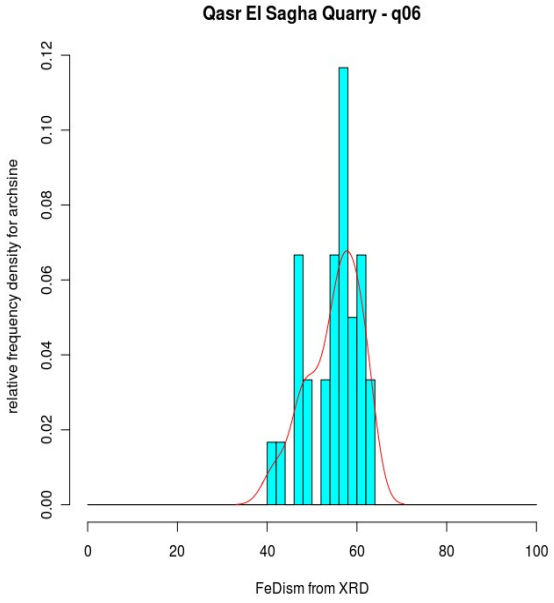
Shapiro-Wilk normality test : data: Gypsuma , W = 0.6703, p-value = 0.5923e-07 . The hypothesis that the sample is from a normal distribution is rejected.

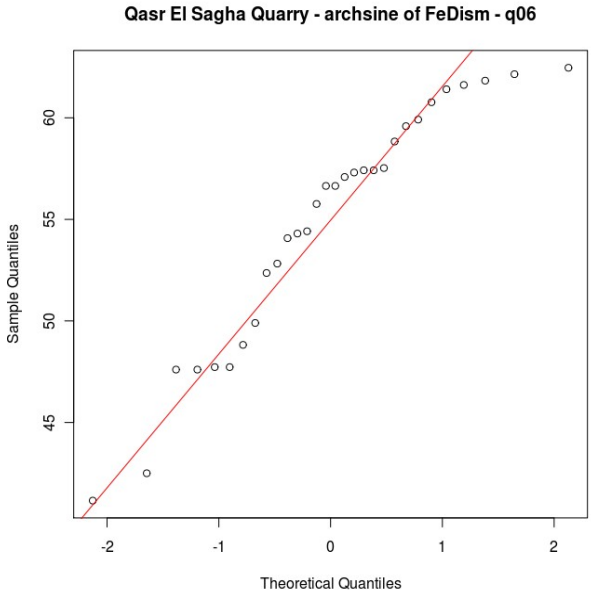




Arcsine of FeDism

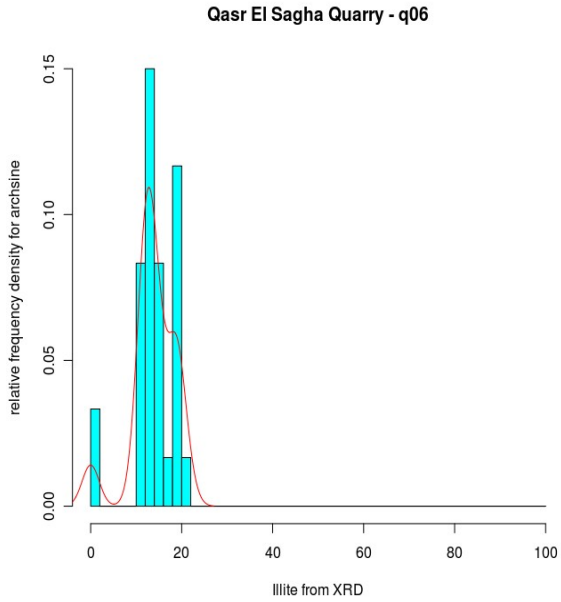
Shapiro-Wilk normality test : data: FeDisma , W = 0.9259, p-value = 0.03830 . The hypothesis that the sample is from a normal distribution is rejected.

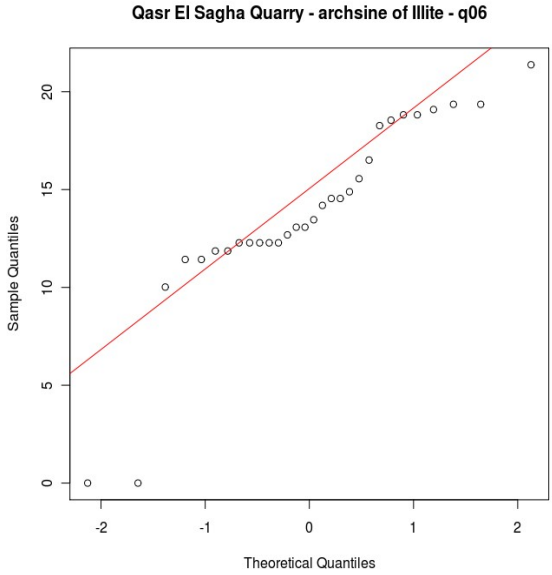




Arcsine of Illite

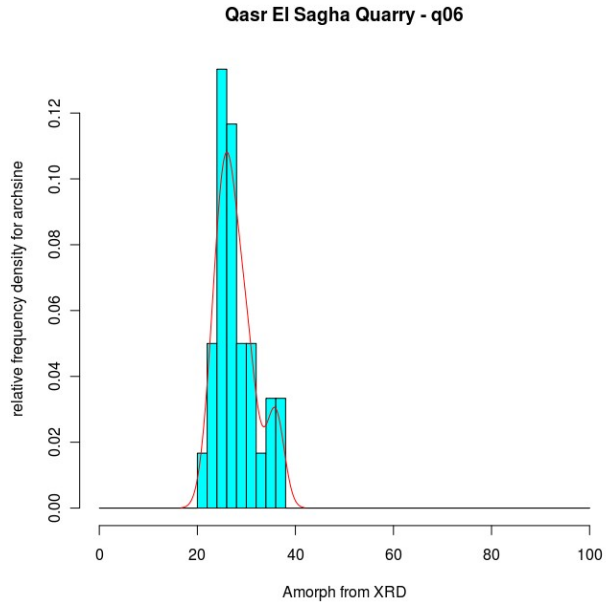
Shapiro-Wilk normality test : data: Illitea , W =08518 , p-value = 0.0006761 . The hypothesis that the sample is from a normal distribution is rejected.

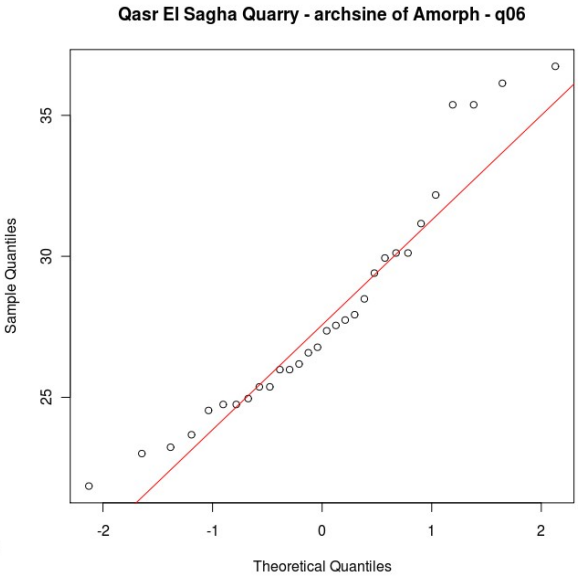




Arcsine of Amorph

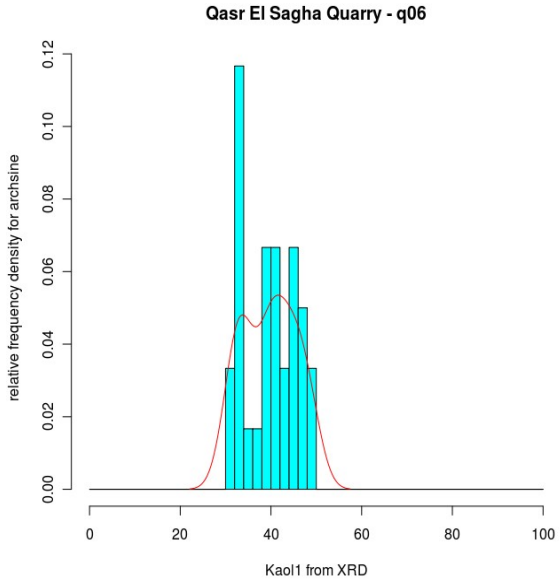
Shapiro-Wilk normality test : data: Amorpha , W = 0.9224, p-value = 0.03102. The hypothesis that the sample is from a normal distribution is rejected.

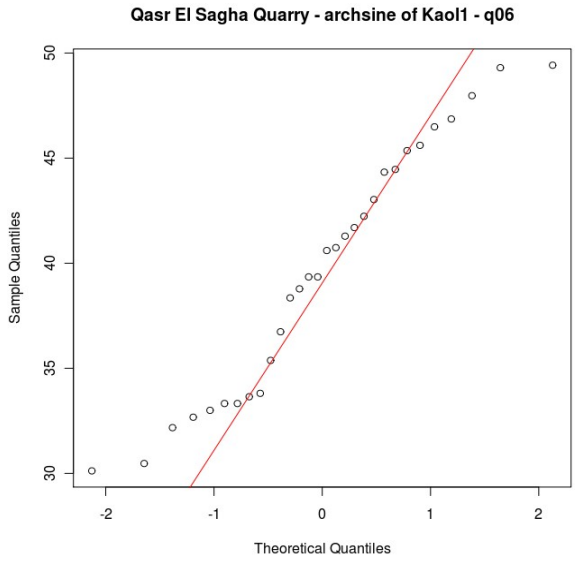




Arcsine of Kaol1

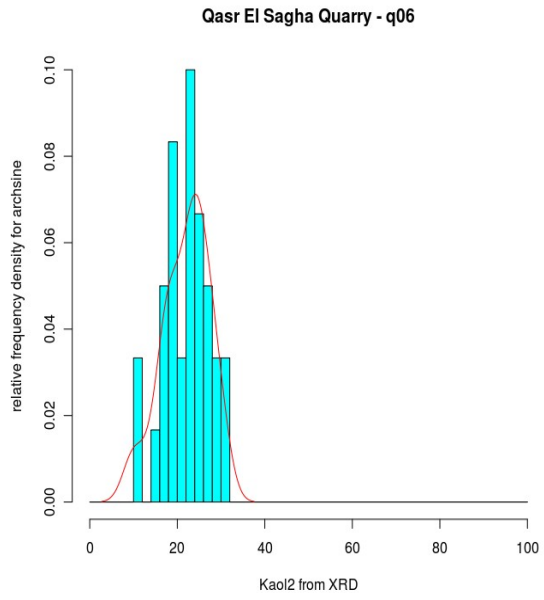
Shapiro-Wilk normality test : data: Kaol1a , W = 0.949, p-value =0.1590 . The hypothesis that the sample is from a normal distribution is not rejected.

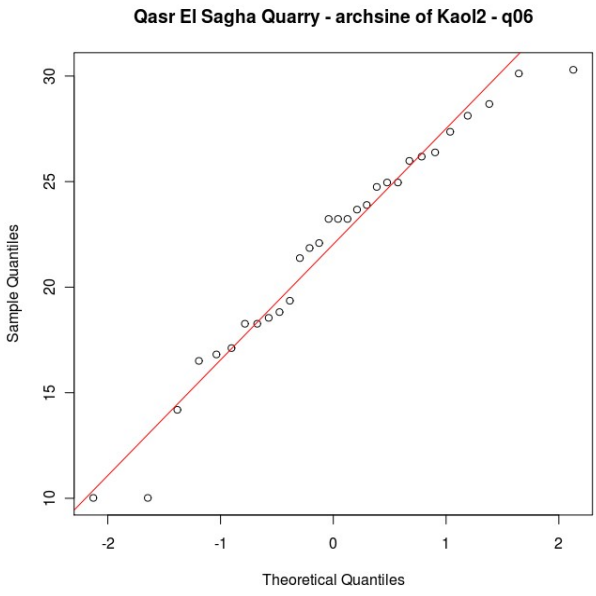




Arcsine of Kaol2

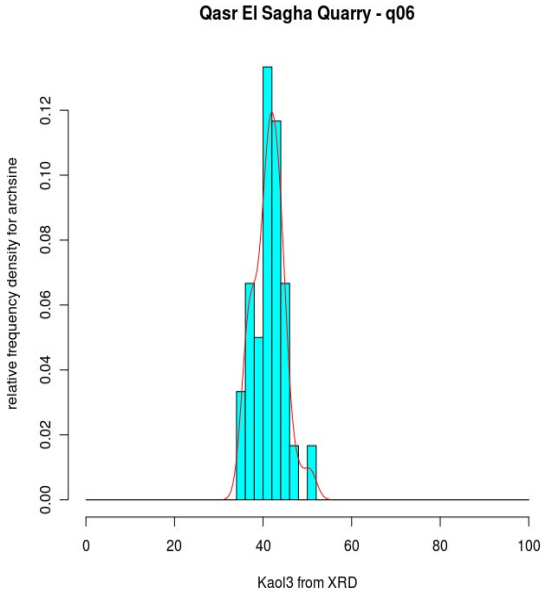
Shapiro-Wilk normality test : data: Kaol2a , W =0.9582 , p-value = 0.2792. The hypothesis that the sample is from a normal distribution is not rejected.

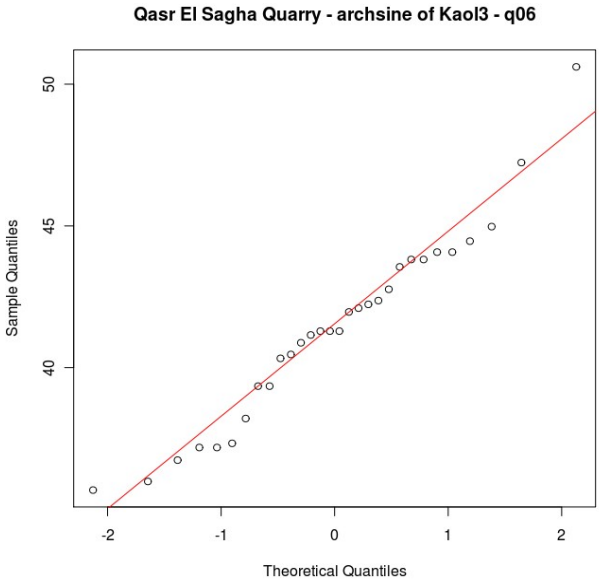




Arcsine of Kaol3

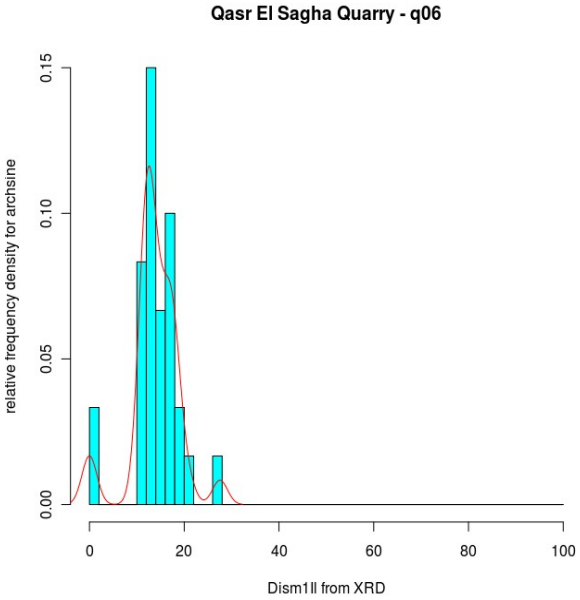
Shapiro-Wilk normality test : data: Kaol3a , W =0.9635 , p-value =0.3797 . The hypothesis that the sample is from a normal distribution is not rejected.

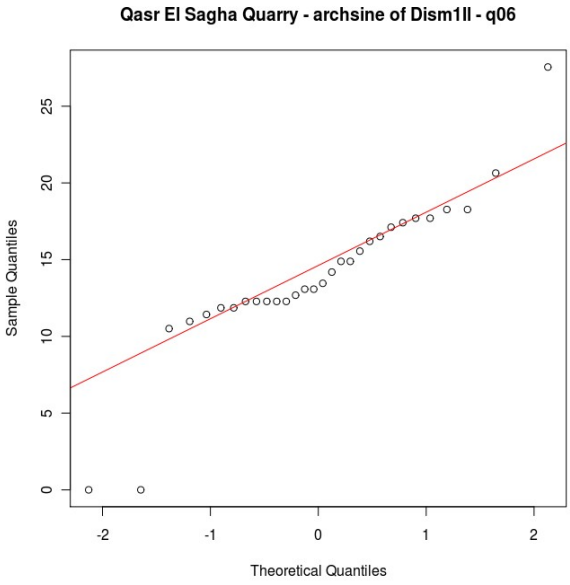




Arcsine of Dism1Il

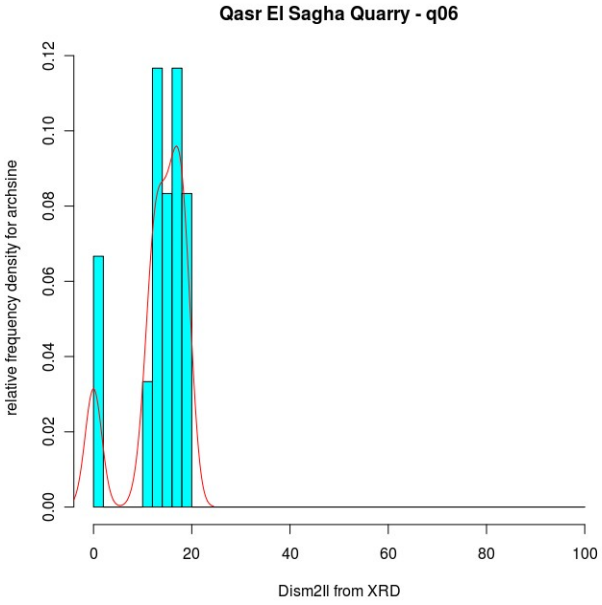
Shapiro-Wilk normality test : data: Dism1Ila , W =0.8717 , p-value =0.001832 . The hypothesis that the sample is from a normal distribution is rejected.

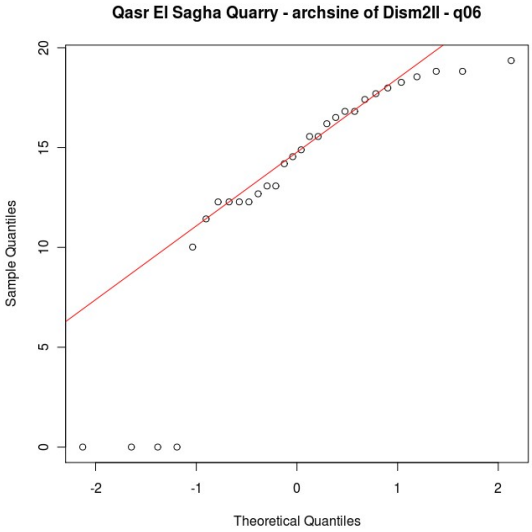




Arcsine of Dism2Il

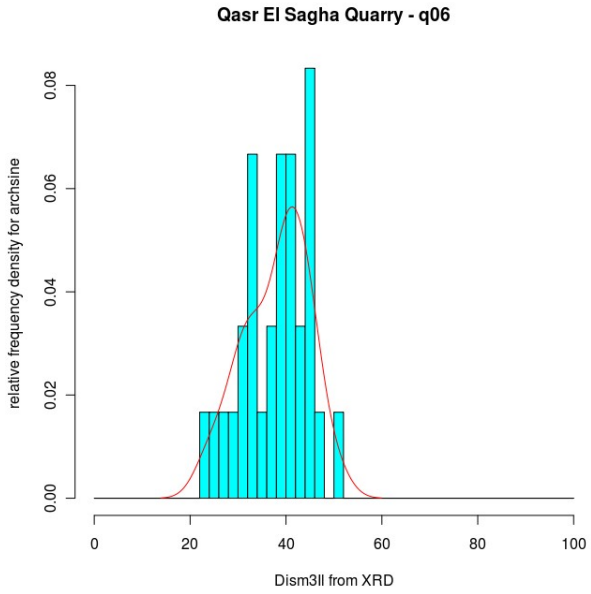
Shapiro-Wilk normality test : data: Dism2Ila , W = 07753, p-value = 3.583-05. The hypothesis that the sample is from a normal distribution is rejected.

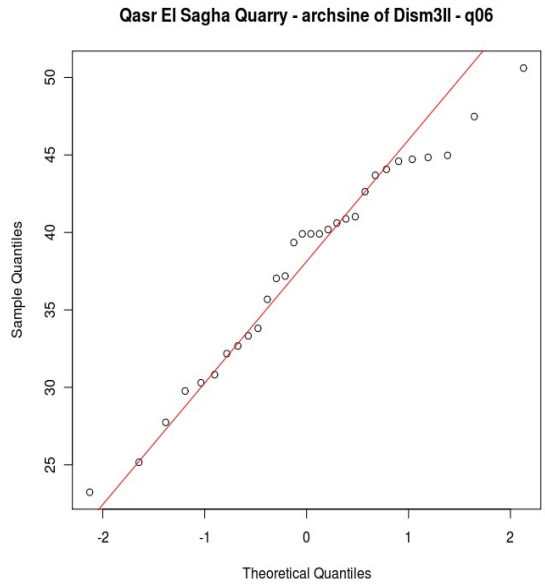




Arcsine of Dism3Il

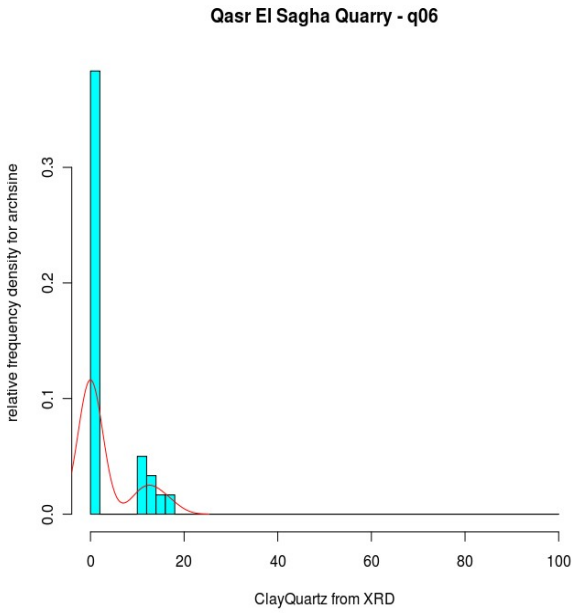
Shapiro-Wilk normality test : data: Dism3Ila , W = 0.9675, p-value = 0.4733 . The hypothesis that the sample is from a normal distribution is not rejected.

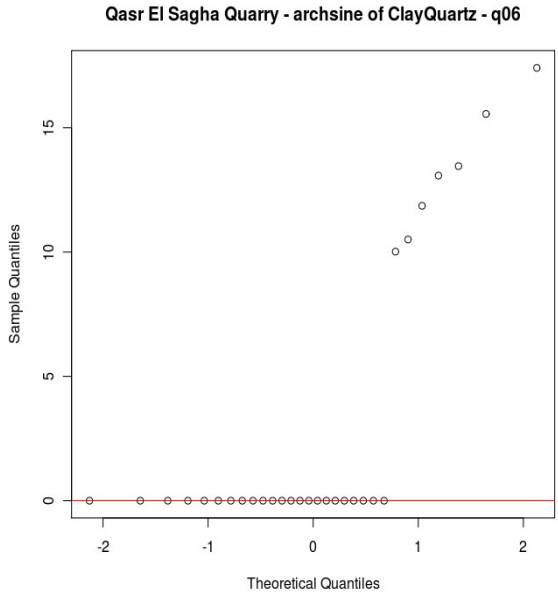




Arcsine of ClayQuartz

Shapiro-Wilk normality test : data: ClayQuartza , W = 0.5721, p-value =3.3883-08 . The hypothesis that the sample is from a normal distribution is rejected.



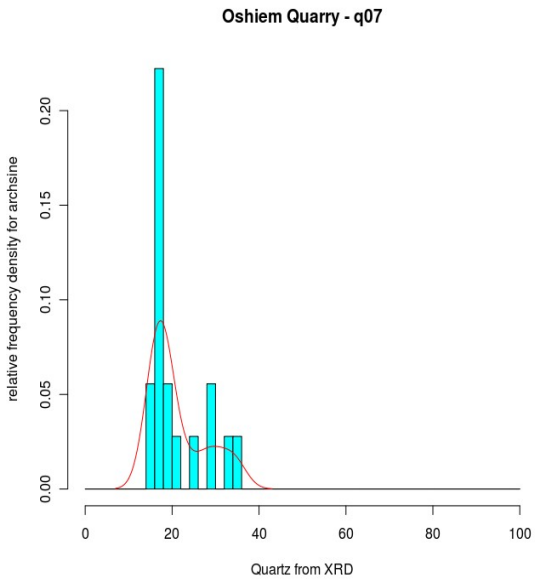


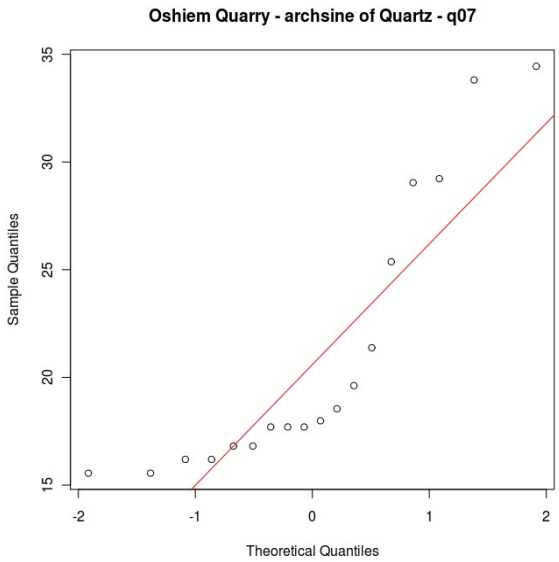
Kom Oshiem Quarry – q07

Q07 has 18 samples. Calcite and Gypsum had insufficient samples to analyze.

Arcsine of Quartz

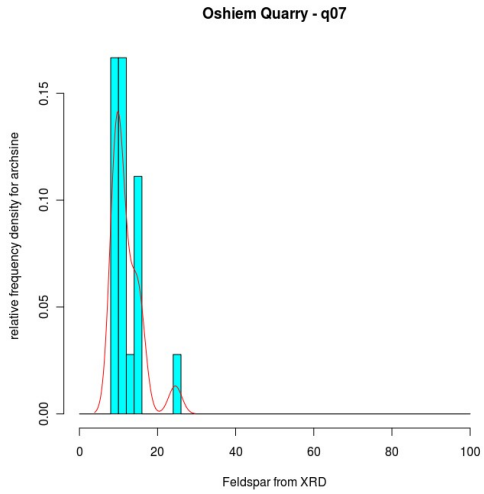
Shapiro-Wilk normality test : data: Quartza , W =0.7846 , p-value =0.0009286 . The hypothesis that the sample is from a normal distribution is rejected.

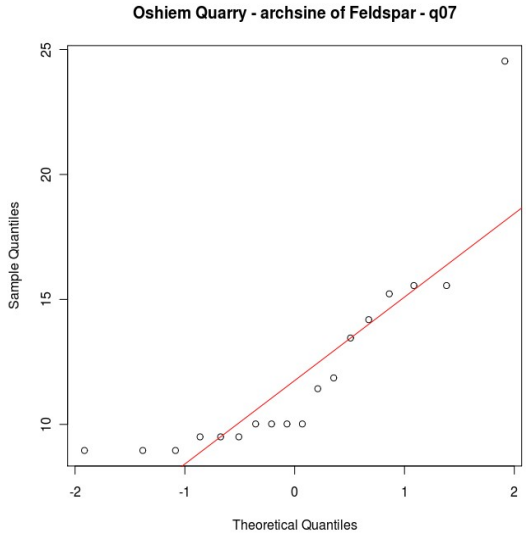




Arcsine of Feldspar

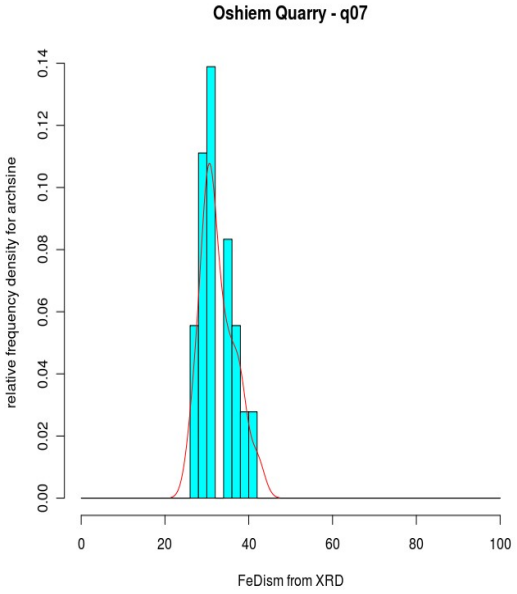
Shapiro-Wilk normality test : data: Feldspara , W =0.752 , p-value = 0.0003442 . The hypothesis that the sample is from a normal distribution is rejected.

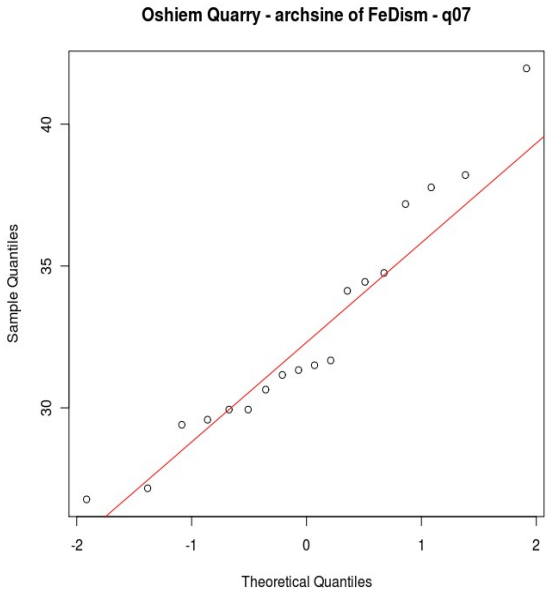




Arcsine of FeDism

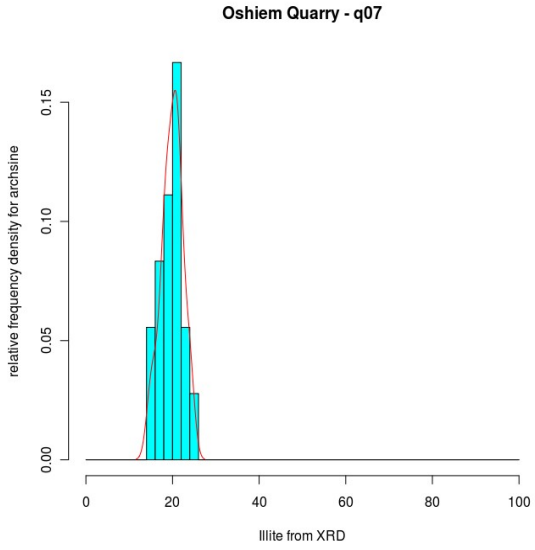
Shapiro-Wilk normality test : data: FeDisma , W = 0.9378, p-value =0.2657 . The hypothesis that the sample is from a normal distribution is not rejected.

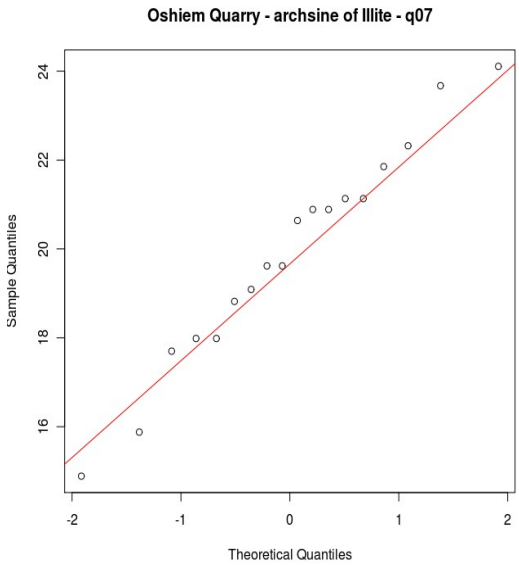




Arcsine of Illite

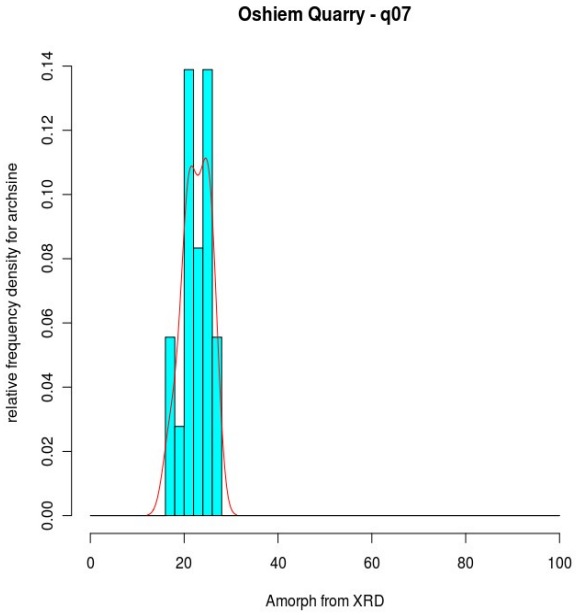
Shapiro-Wilk normality test : data: Illitea , W =0.9768 , p-value = 0.9117. The hypothesis that the sample is from a normal distribution is not rejected.

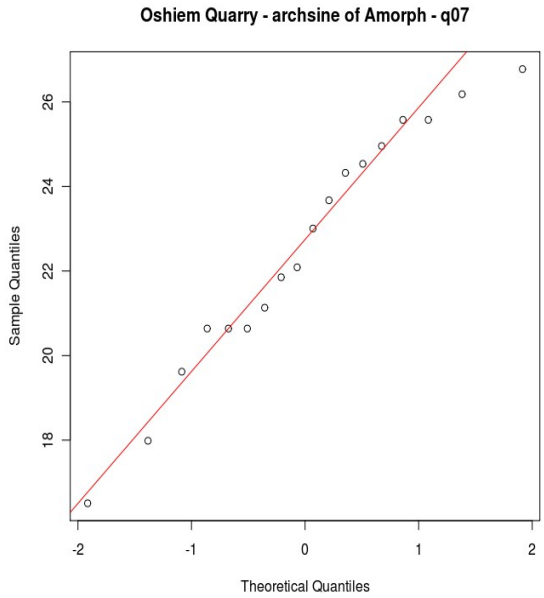




Arcsine of Amorph

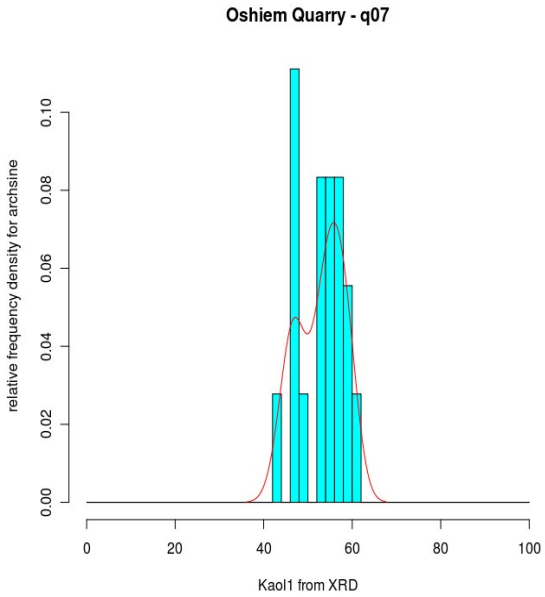
Shapiro-Wilk normality test : data: Amorpha , W =0.96 , p-value = 0.6016 . The hypothesis that the sample is from a normal distribution is not rejected.

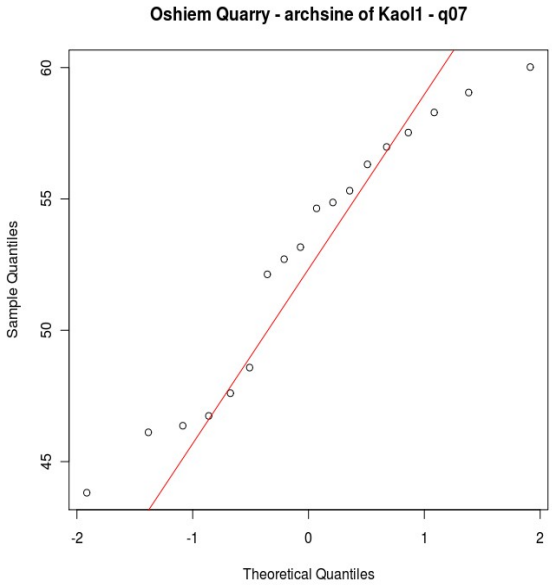




Arcsine of Kaol1

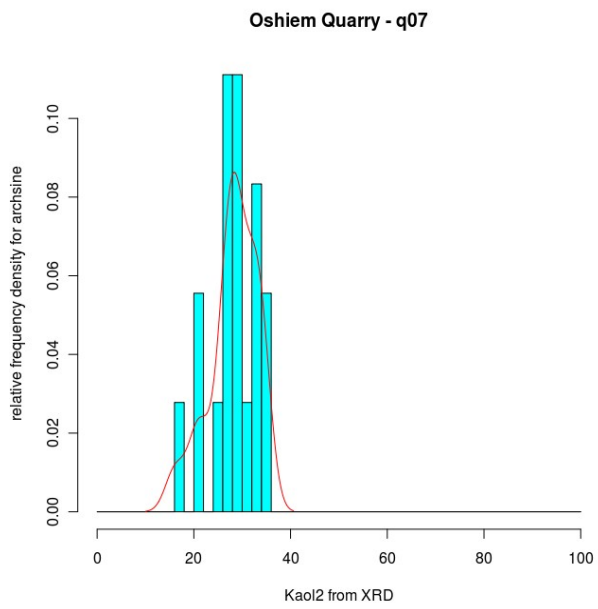
Shapiro-Wilk normality test : data: Kaol1a , W = 0.9318, p-value =0.2091 . The hypothesis that the sample is from a normal distribution is not rejected.

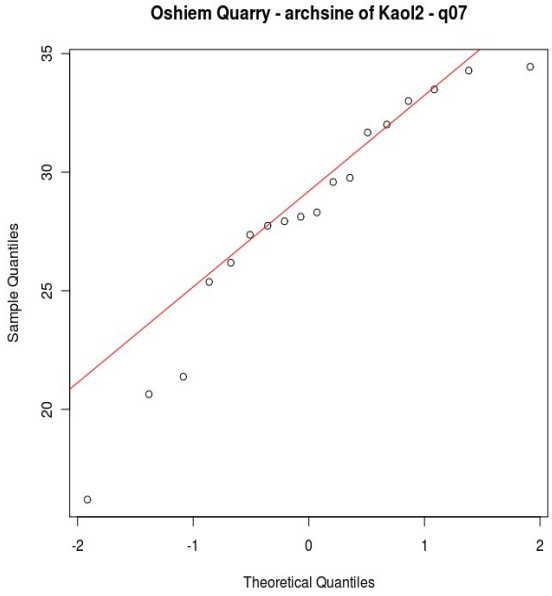




Arcsine of Kaol2

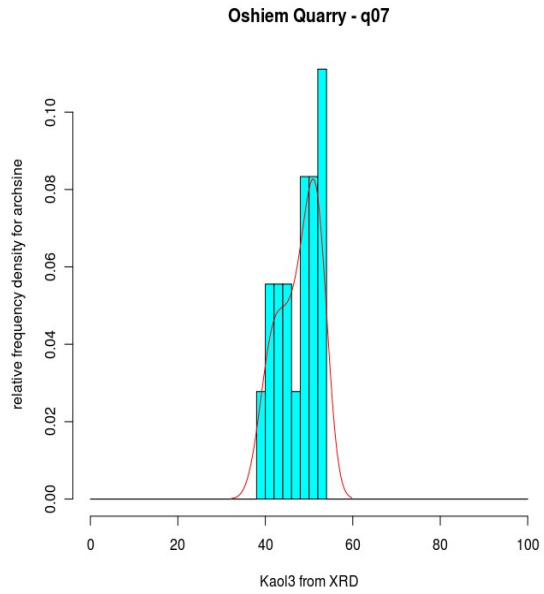
Shapiro-Wilk normality test : data: Kaol2a , W =0.9252 , p-value = 0.1597 . The hypothesis that the sample is from a normal distribution is not rejected.

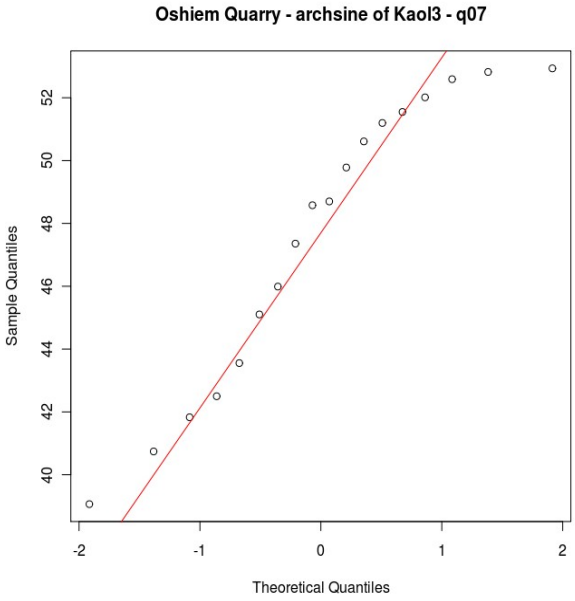




Arcsine of Kaol3

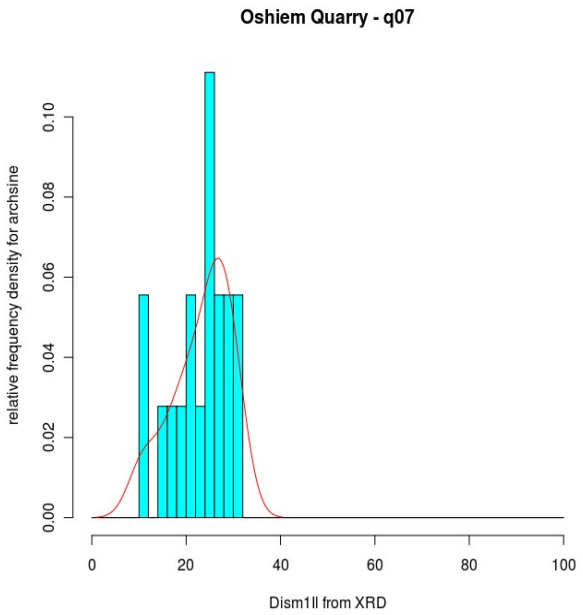
Shapiro-Wilk normality test : data: Kaol3a , W = 0.9166, p-value =0.1128 . The hypothesis that the sample is from a normal distribution is not rejected.

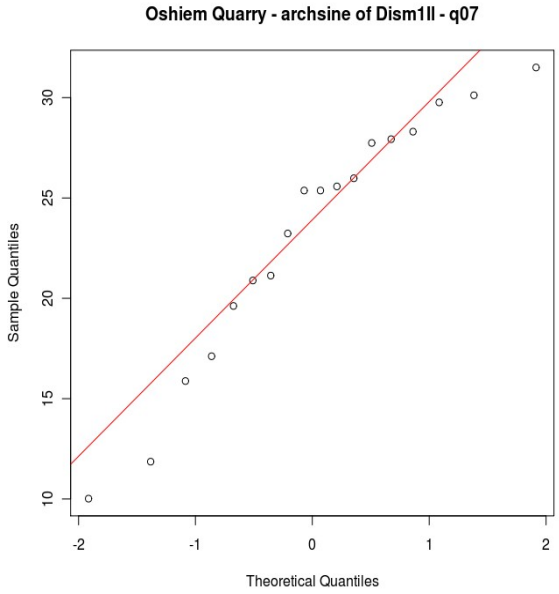




Arcsine of Dism1Il

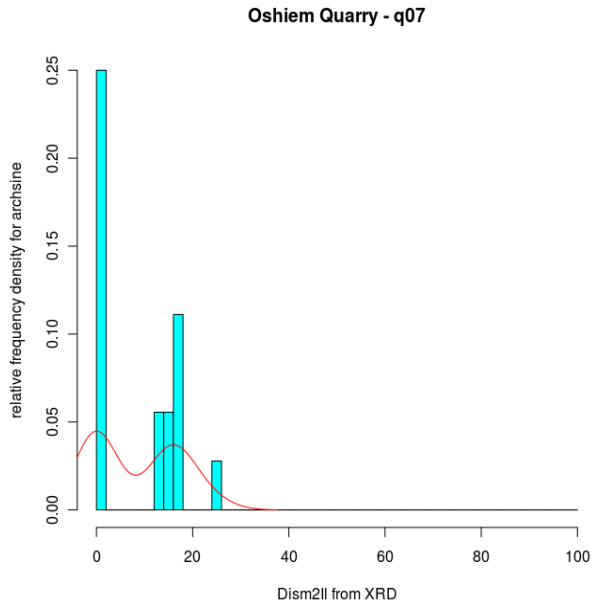
Shapiro-Wilk normality test : data: Dism1Ila , W = 0.9301, p-value = 0.1947. The hypothesis that the sample is from a normal distribution is not rejected.

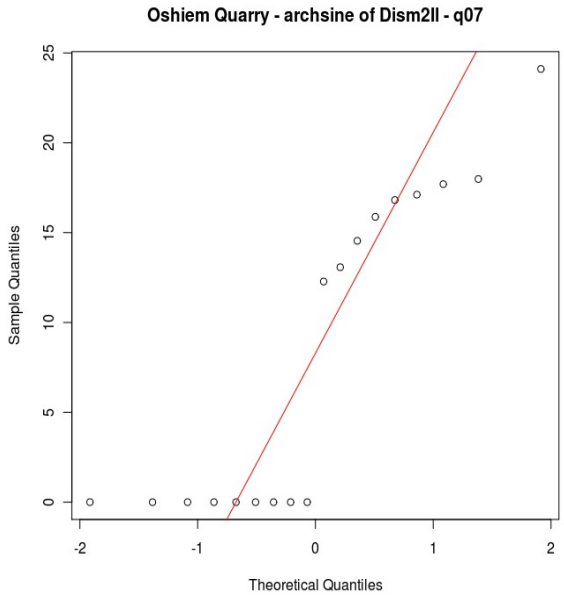




Arcsine of Dism2Il

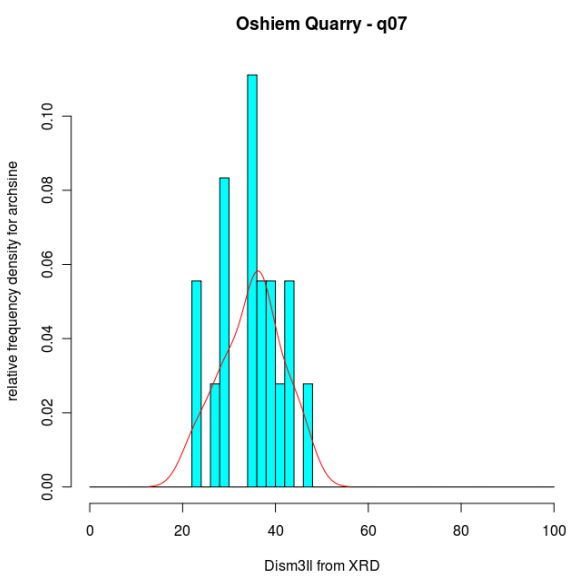
Shapiro-Wilk normality test : data: Dism2Ila , W = 0.7779, p-value = 0.0007538 . The hypothesis that the sample is from a normal distribution is rejected.

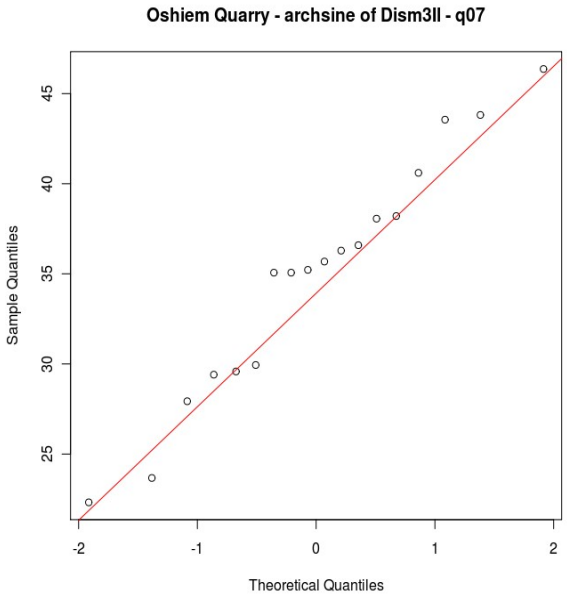




Arcsine of Dism3Il

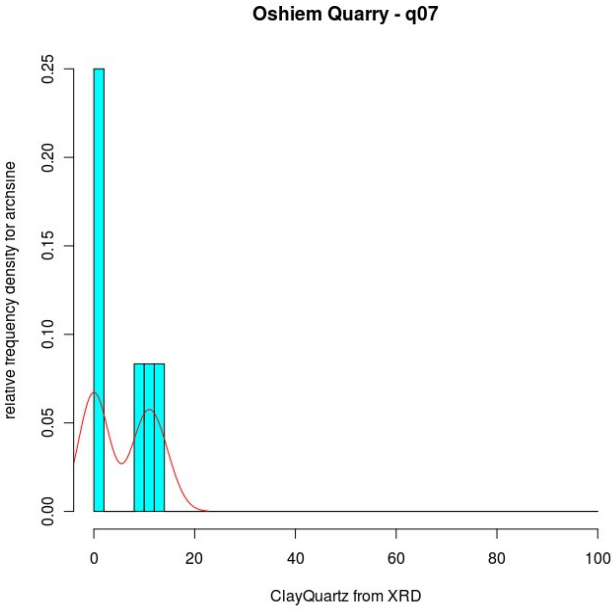
Shapiro-Wilk normality test : data: Dism3Ila , W = 0.965, p-value = 0.6993 . The hypothesis that the sample is from a normal distribution is not rejected.

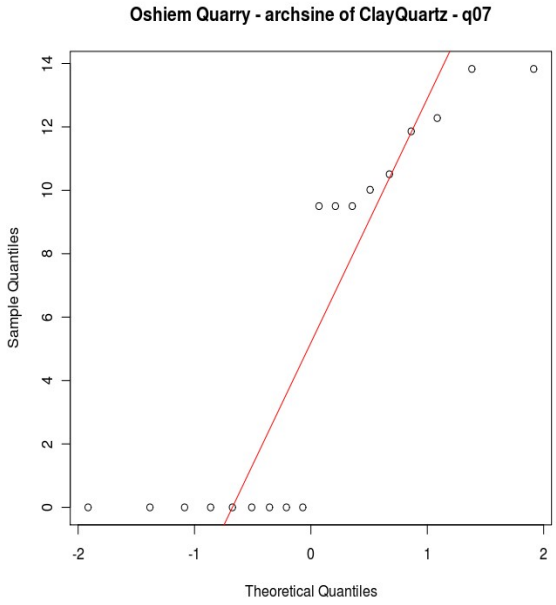




Arcsine of ClayQuartz

Shapiro-Wilk normality test : data: ClayQuartza , W =0.7525 , p-value = 0.0003492 . The hypothesis that the sample is from a normal distribution is rejected.



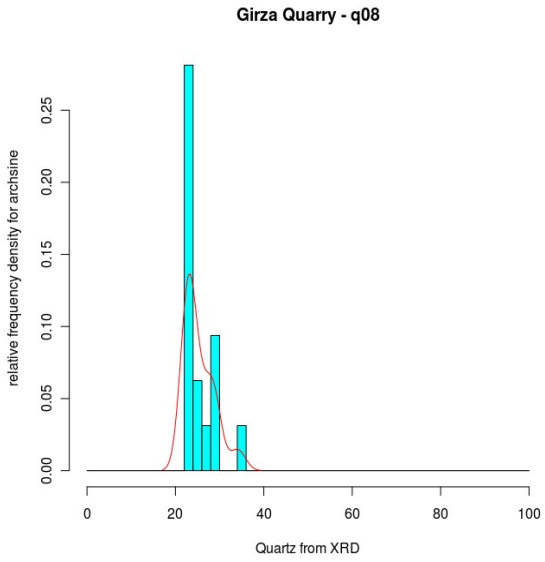


Girza Quarry – q08

Q08 has 16 samples. Gypsum and ClayQuartz have too variable values to analyze.

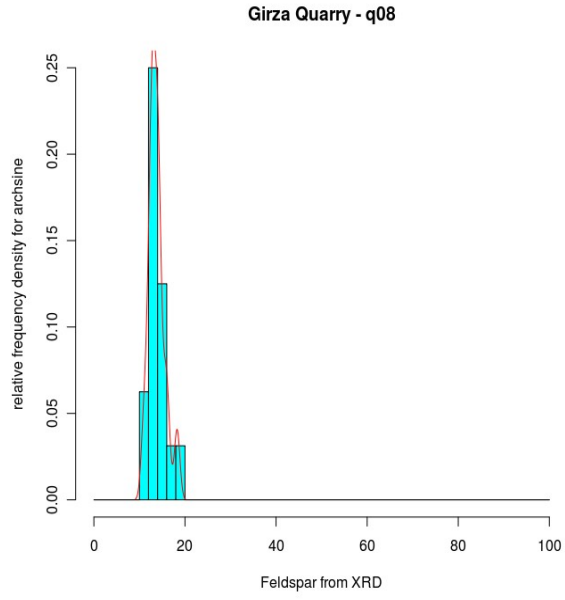
Arcsine of Quartz

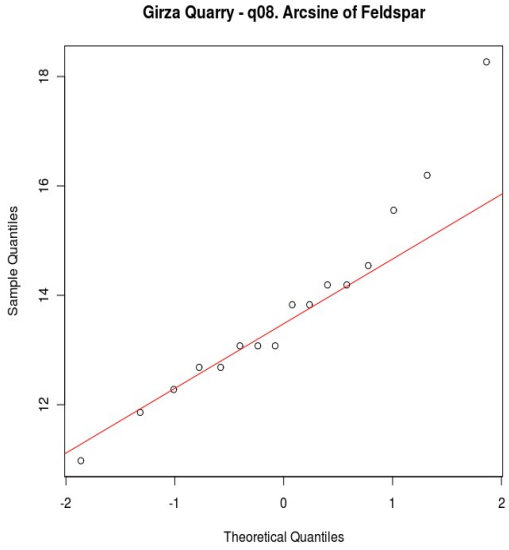
Shapiro-Wilk normality test : data: Quartza , W = 0.8214, p-value = 0.005311 . The hypothesis that the sample is from a normal distribution is rejected.



Arcsine of Feldspar

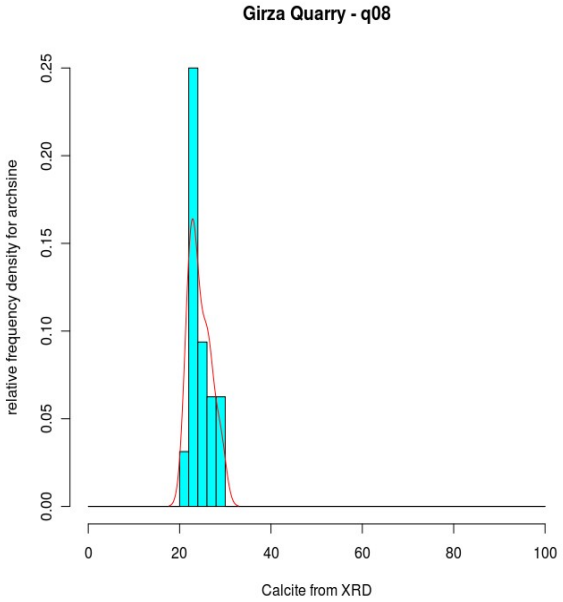
Shapiro-Wilk normality test : data: Feldspara , W = 0.9373, p-value =0.3170 . The hypothesis that the sample is from a normal distribution is not rejected.

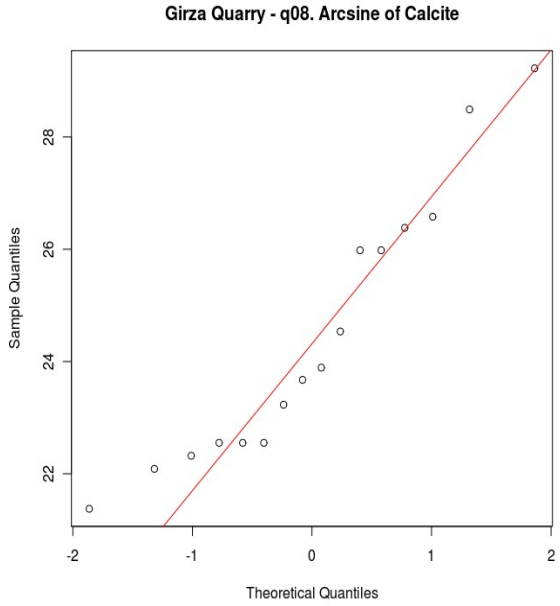




Arcsine of Calcite

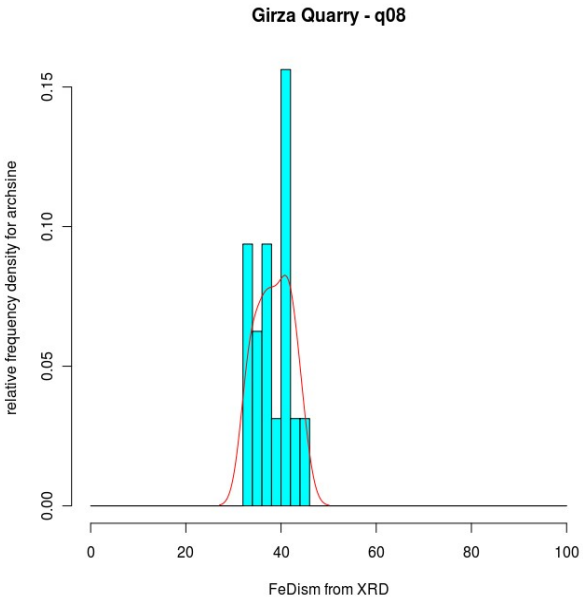
Shapiro-Wilk normality test : data: Calcitea , W = 0.9156, p-value = 0.1431 . The hypothesis that the sample is from a normal distribution is not rejected.

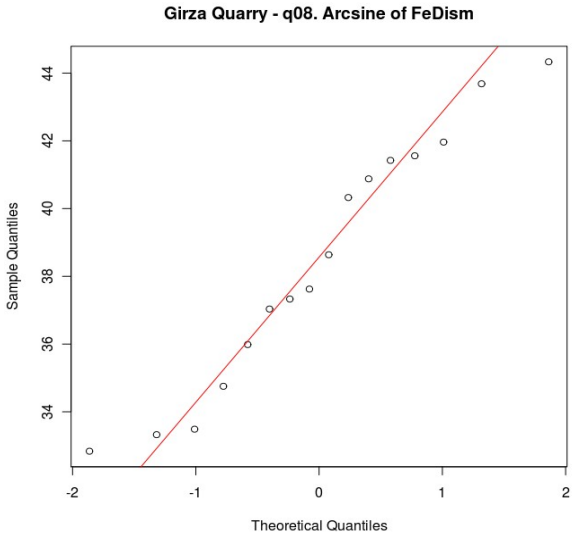




Arcsine of FeDism

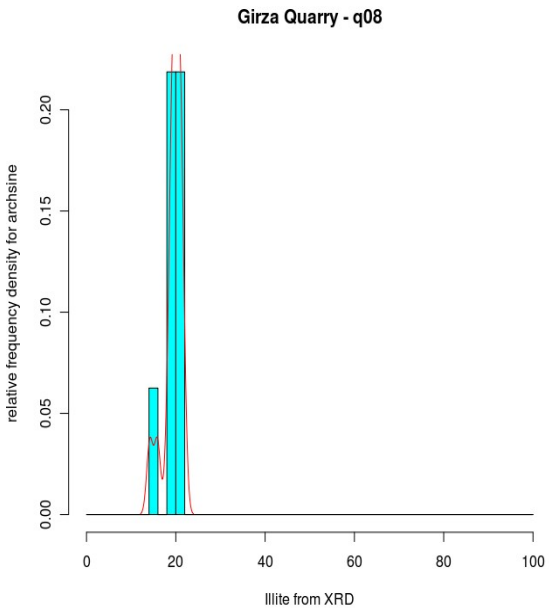
Shapiro-Wilk normality test : data: FeDisma , W = 0.9471, p-value = 0.4445 . The hypothesis that the sample is from a normal distribution is not rejected.

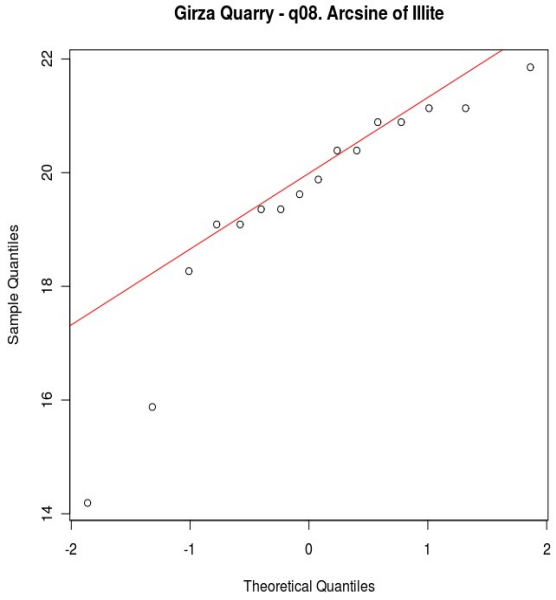




Arcsine of Illite

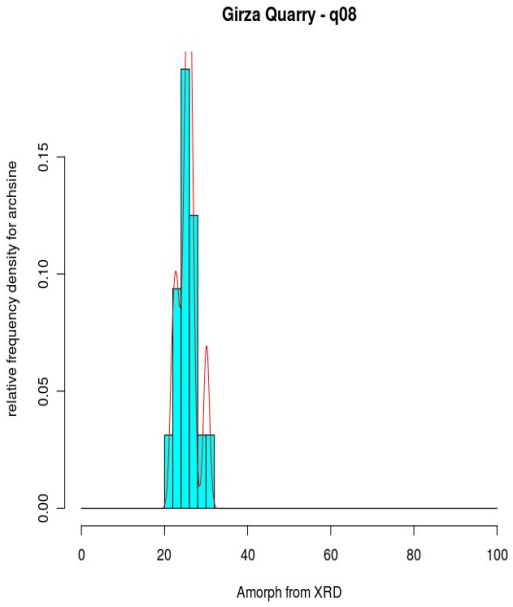
Shapiro-Wilk normality test : data: Illitea , W =0.8465 , p-value = 0.01210 . The hypothesis that the sample is from a normal distribution is rejected.

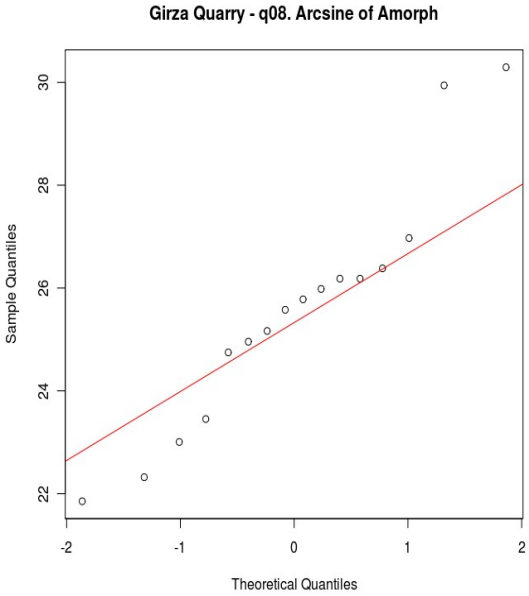




Arcsine of Amorph

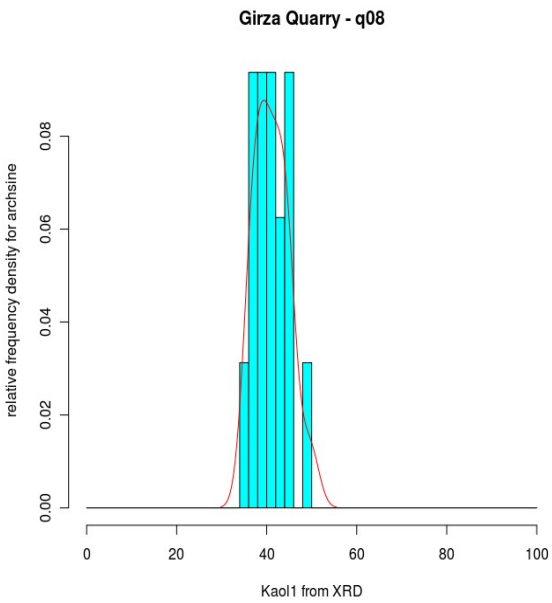
Shapiro-Wilk normality test : data: Amorpha , W = 0.9328, p-value =0.2697 . The hypothesis that the sample is from a normal distribution is not rejected.

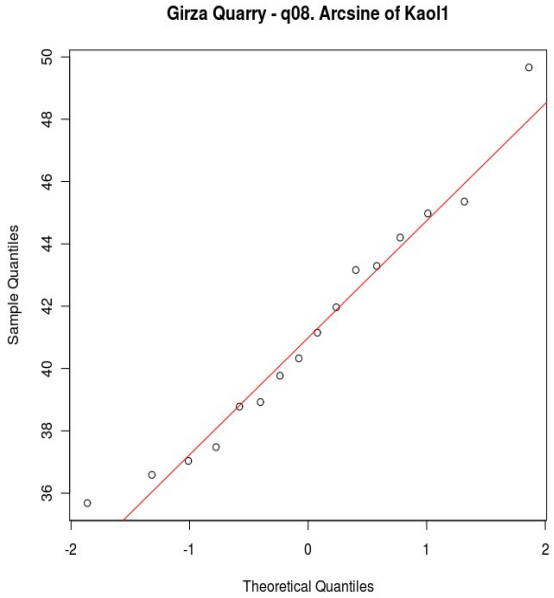




Arcsine of Kaol1

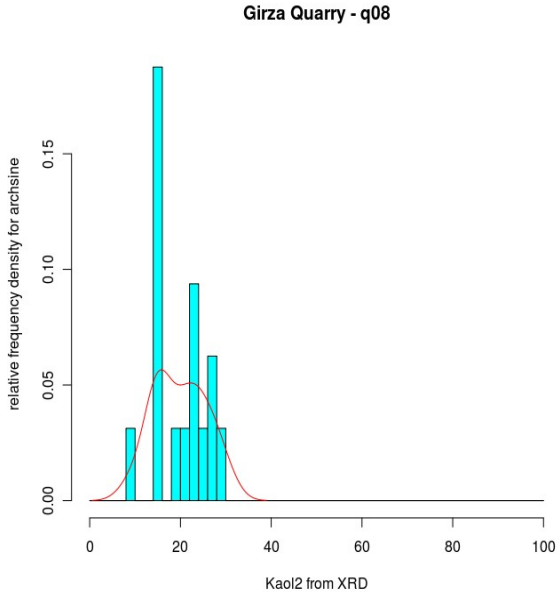
Shapiro-Wilk normality test : data: Kaol1a , W = 0.9637, p-value = 0.73 . The hypothesis that the sample is from a normal distribution is not rejected.

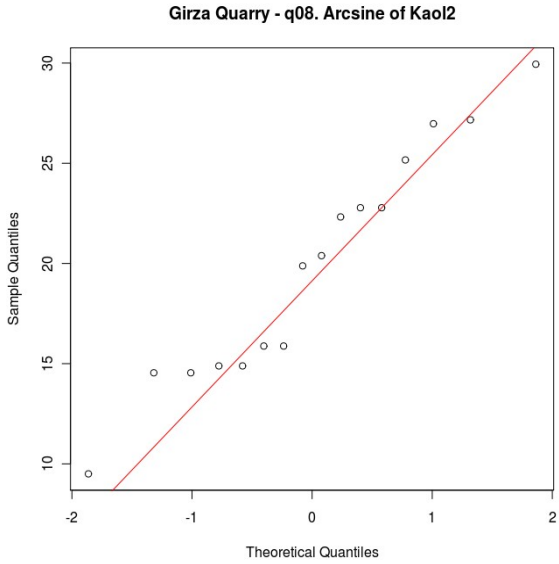




Arcsine of Kaol2

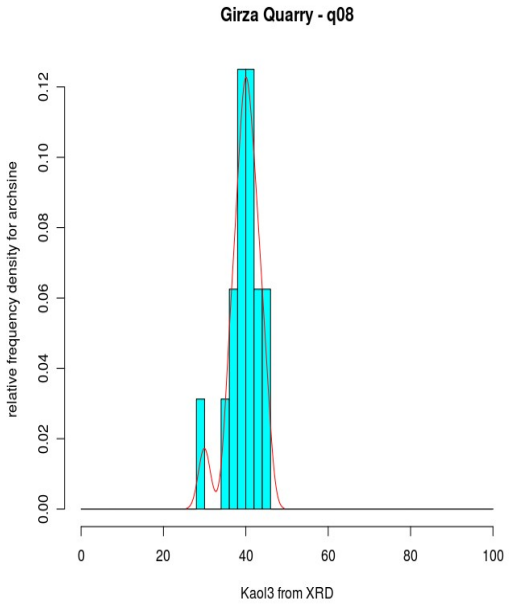
Shapiro-Wilk normality test : data: Kaol2a , W = 0.9501 , p-value = 0.4906 . The hypothesis that the sample is from a normal distribution is not rejected.

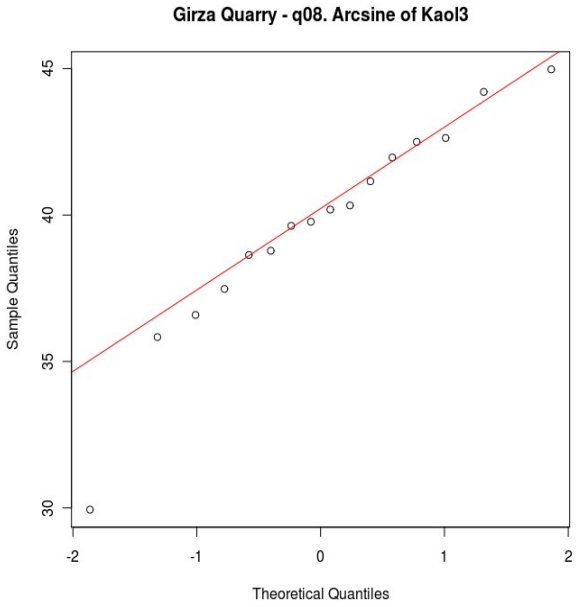




Arcsine of Kaol3

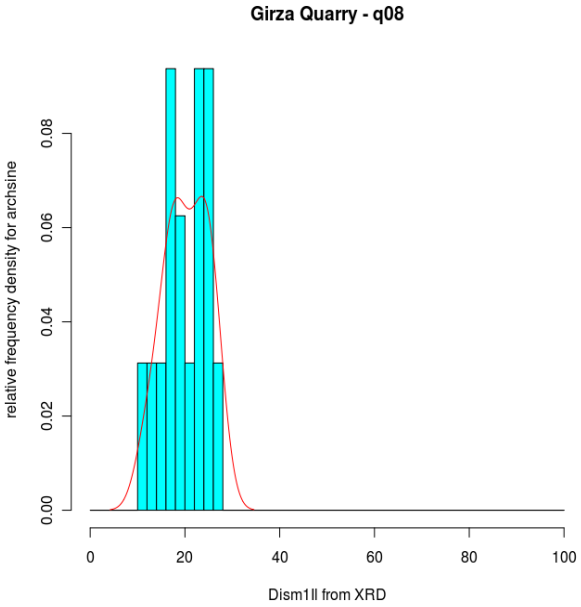
Shapiro-Wilk normality test : data: Kaol3a , W = 0.9316, p-value = 0.2588 . The hypothesis that the sample is from a normal distribution is not rejected.

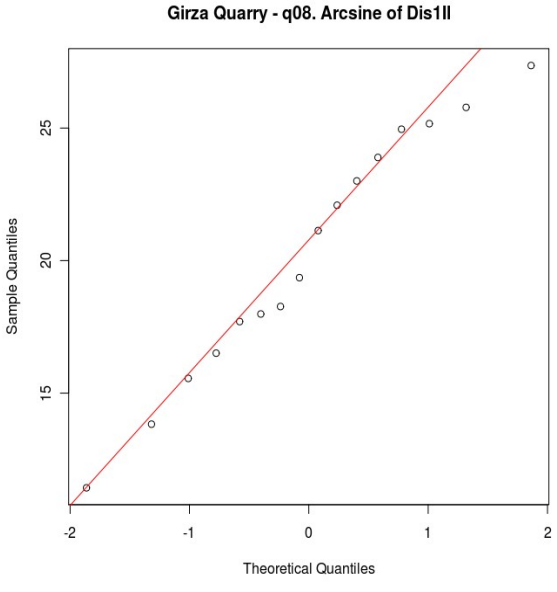




Arcsine of Dism1Il

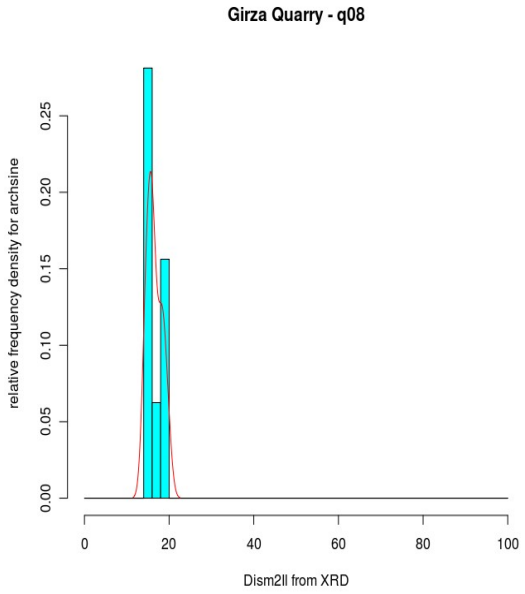
Shapiro-Wilk normality test : data: Dism1Ila , W = 0.9684, p-value = 0.8114 . The hypothesis that the sample is from a normal distribution is not rejected.





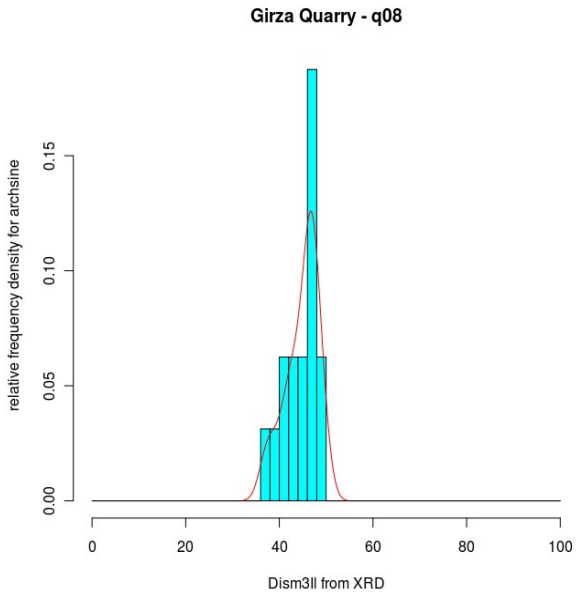
Arcsine of Dism2Il

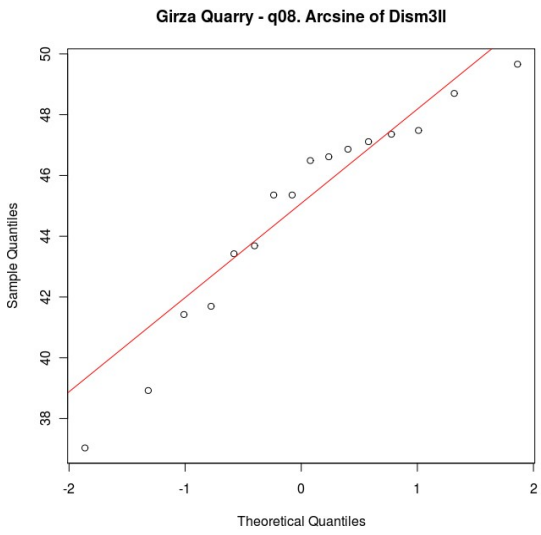
Shapiro-Wilk normality test : data: Dism2Ila , W = 0.9267, p-value = 0.2157 . The hypothesis that the sample is from a normal distribution is not rejected.



Arcsine of Dism3Il

Shapiro-Wilk normality test : data: Dism3Ila , W = 0.9238, p-value = 0.1944 . The hypothesis that the sample is from a normal distribution is not rejected.

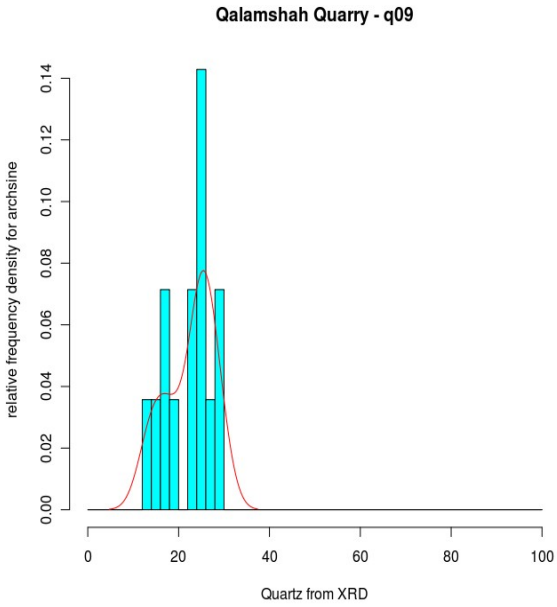


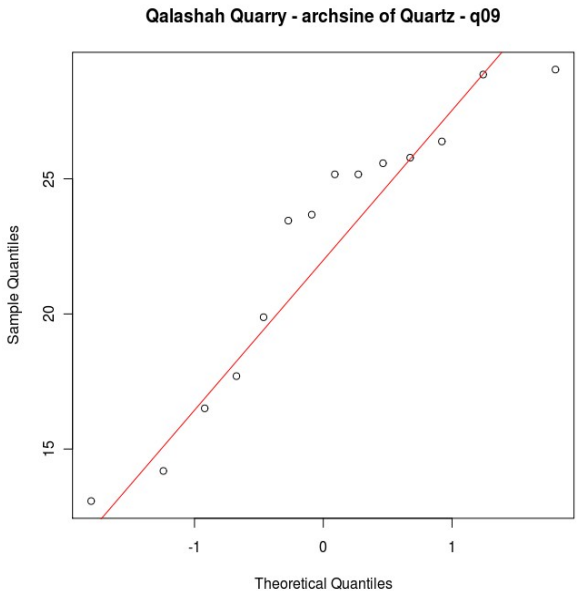


Qalamshah Quarry – q09

Q09 has 14 samples. Calcite, Gypsum and ClayQuartz have insufficient samples for analysis.

Arcsine of Quartz

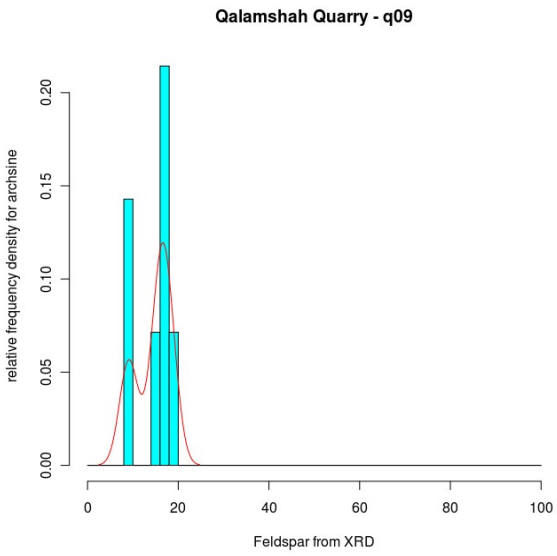


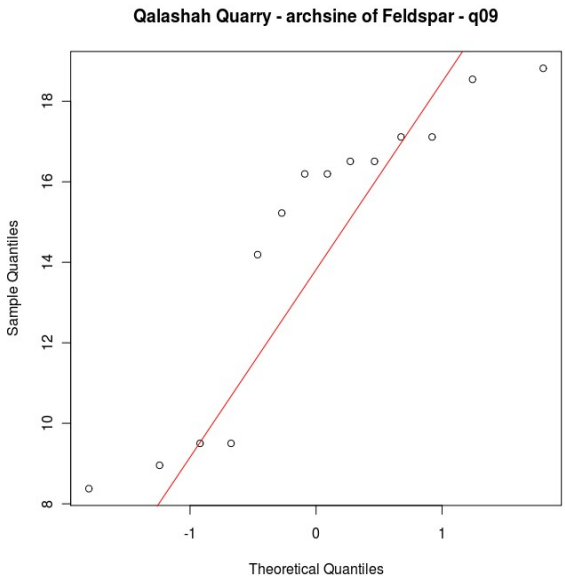


Shapiro-Wilk normality test : data: Quartza , W = 0.9036, p-value = 0.1271 . The hypothesis that the sample is from a normal distribution is not rejected.

Arcsine of Feldspar

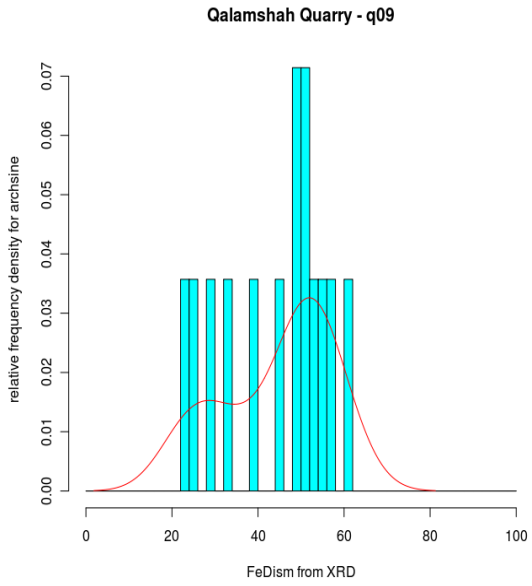
Shapiro-Wilk normality test : data: Feldspara , W = 0.833, p-value = 0.01317 . The hypothesis that the sample is from a normal distribution is rejected.

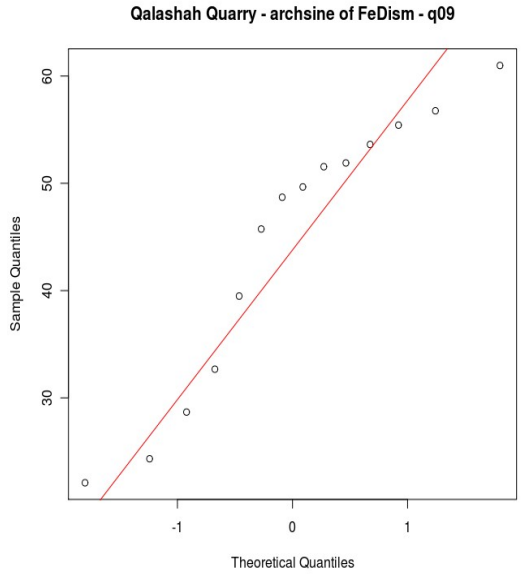




Arcsine of FeDism

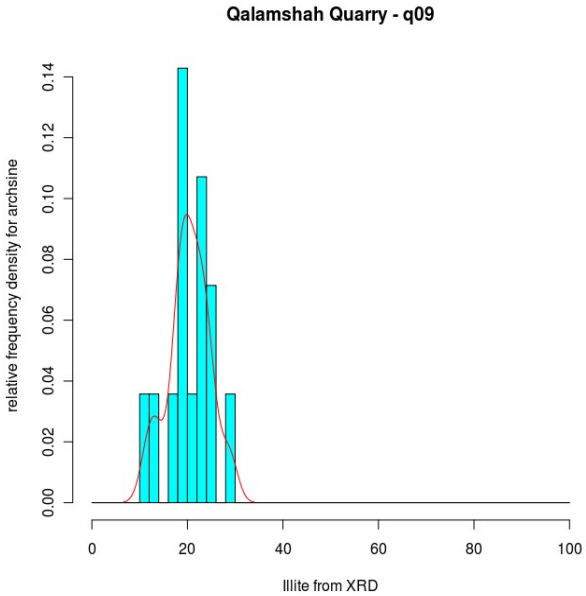
Shapiro-Wilk normality test : data: FeDisma , W = 0.9023 , p-value = 0.1217 . The hypothesis that the sample is from a normal distribution is not rejected.

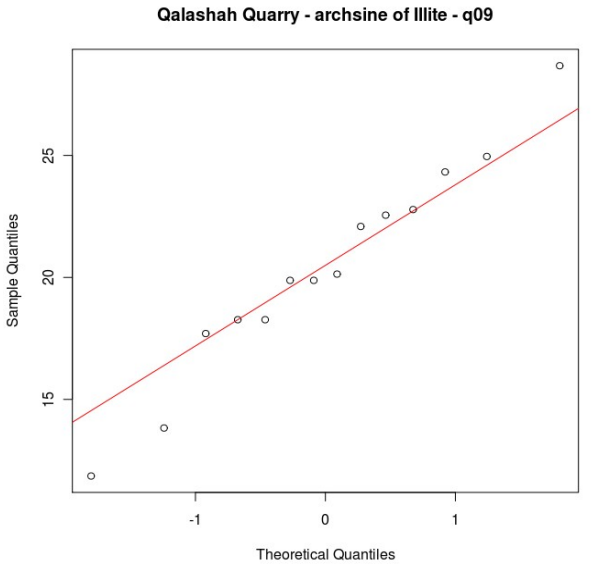




Arcsine of Illite

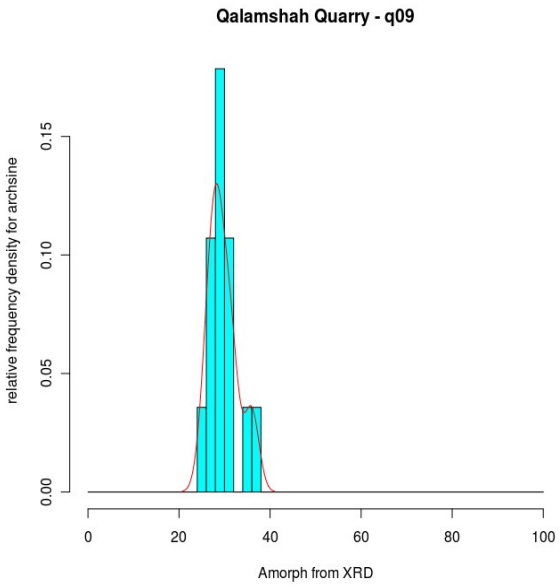
Shapiro-Wilk normality test : data: Illitea , W = 0.9778, p-value = 0.96. The hypothesis that the sample is from a normal distribution is not rejected.

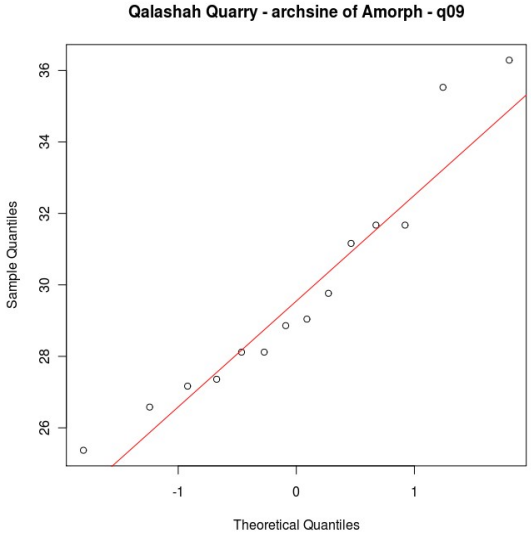




Arcsine of Amorph

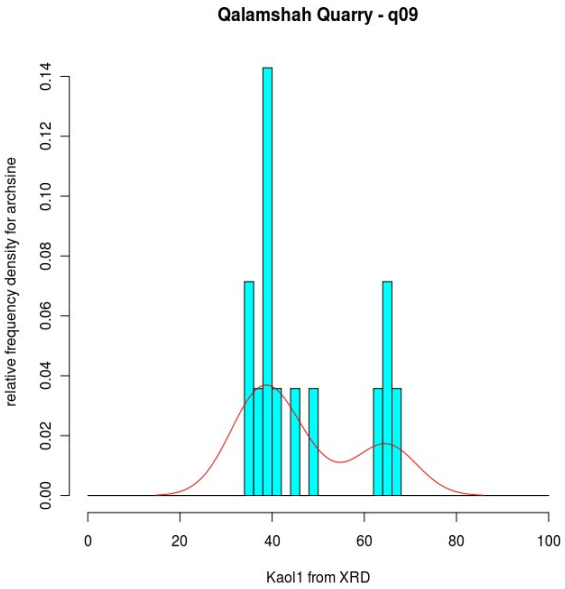
Shapiro-Wilk normality test : data: Amorpha , W = 0.9194, p-value = 0.2154 . The hypothesis that the sample is from a normal distribution is not rejected.

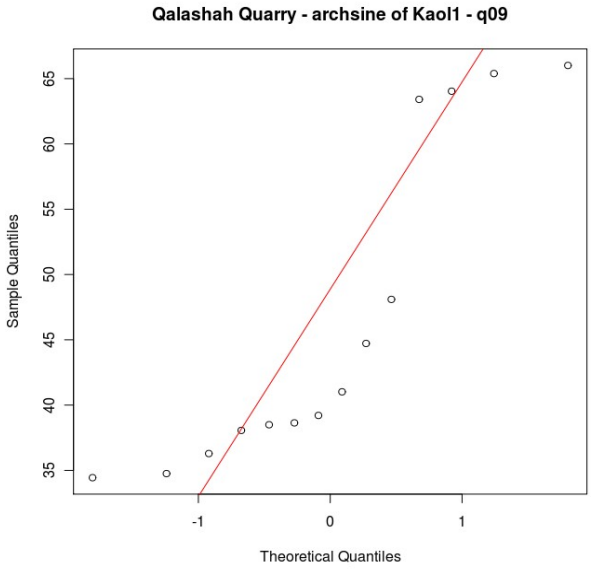




Arcsine of Kaol1

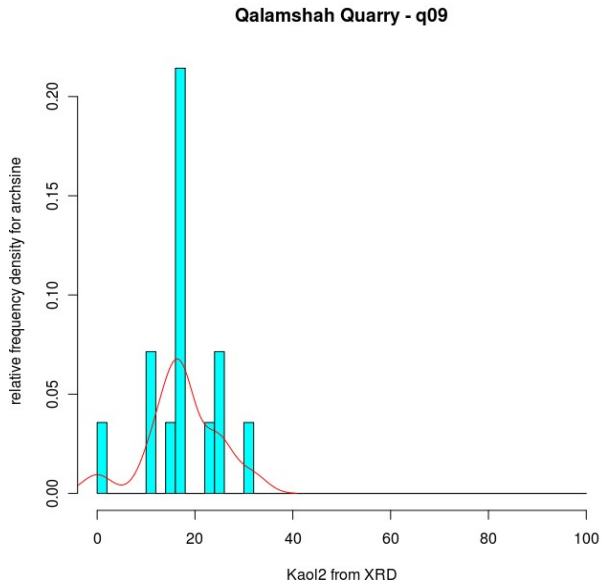
Shapiro-Wilk normality test : data: Kaol1a , W = 0.7906, p-value = 0.003826 . The hypothesis that the sample is from a normal distribution is rejected.

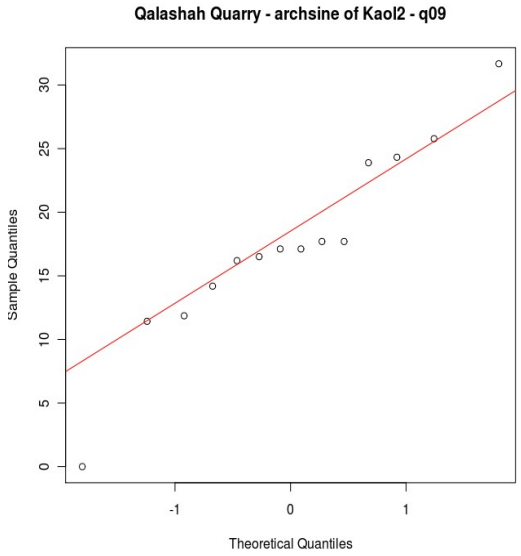




Arcsine of Kaol2

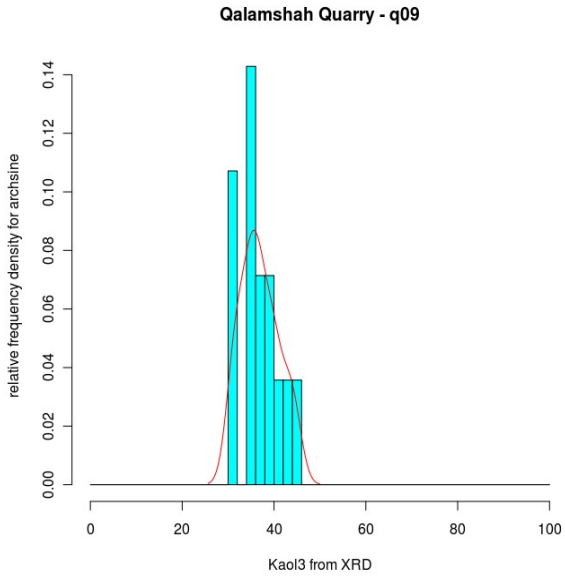
Shapiro-Wilk normality test : data: Kaol2a , W = 0.94, p-value = 0.4187 . The hypothesis that the sample is from a normal distribution is not rejected.

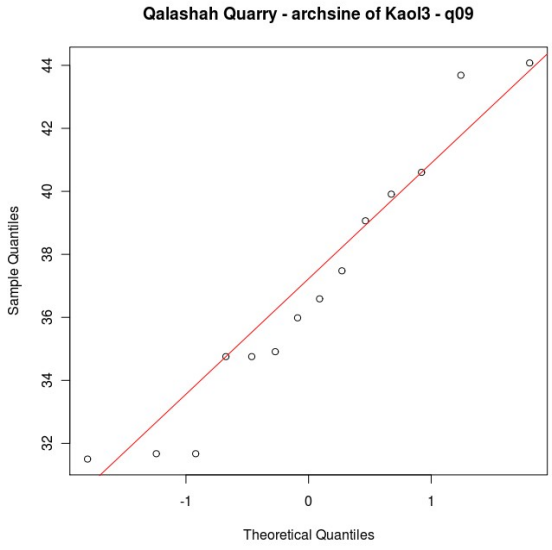




Arcsine of Kaol3

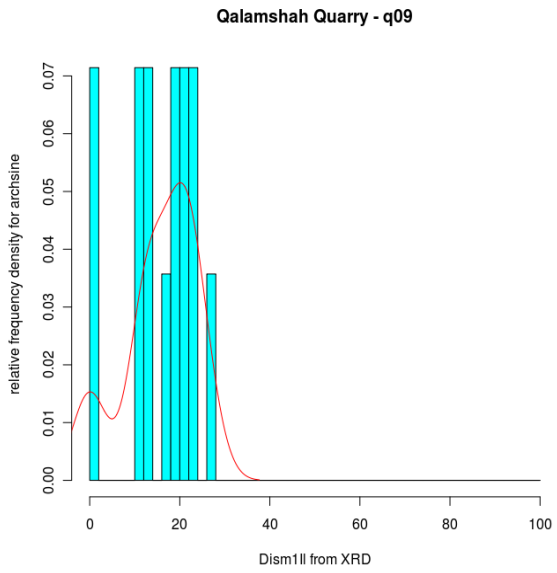
Shapiro-Wilk normality test : data: Kaol3a , W = 0.9353, p-value = 0.3617 . The hypothesis that the sample is from a normal distribution is not rejected.

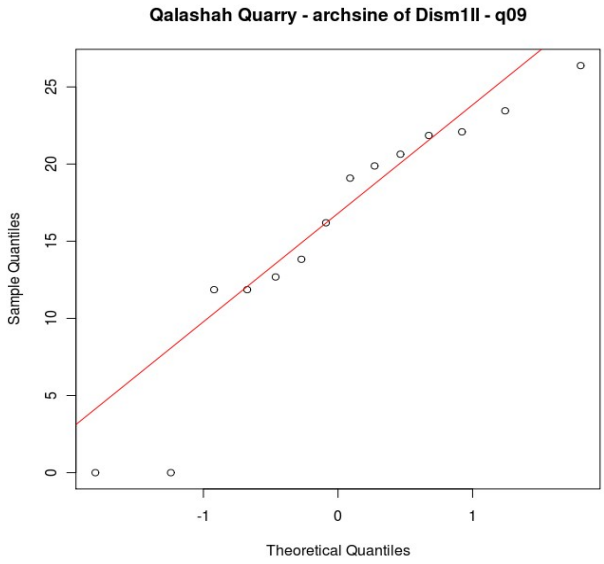




Arcsine of Dism1Il

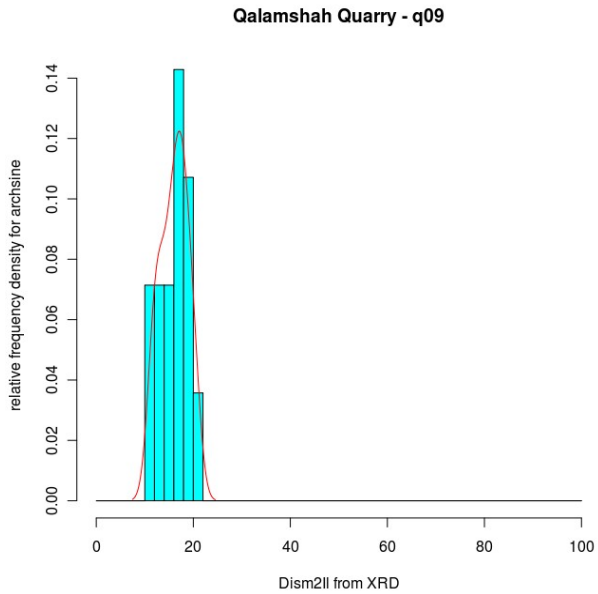
Shapiro-Wilk normality test : data: Dism1Ila , W = 0.8954, p-value = 0.09666 . The hypothesis that the sample is from a normal distribution is not rejected.

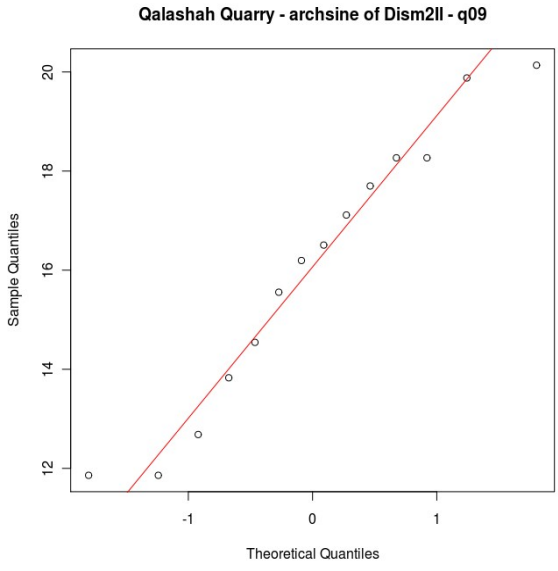




Arcsine of Dism2Il

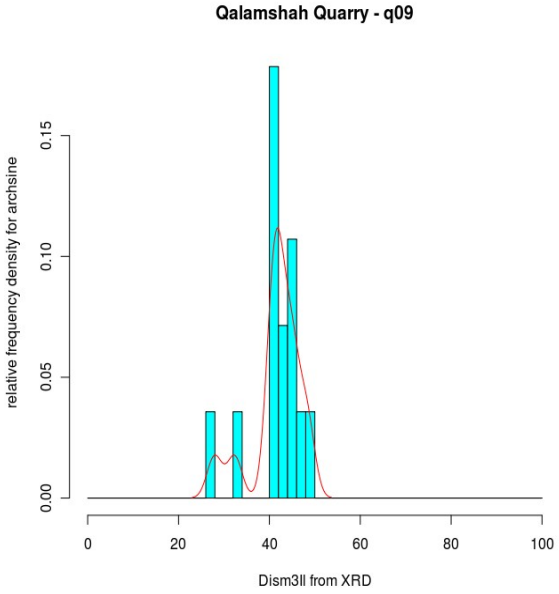
Shapiro-Wilk normality test : data: Dism2Ila , W = 0.9473, p-value = 0.5198 . The hypothesis that the sample is from a normal distribution is not rejected.

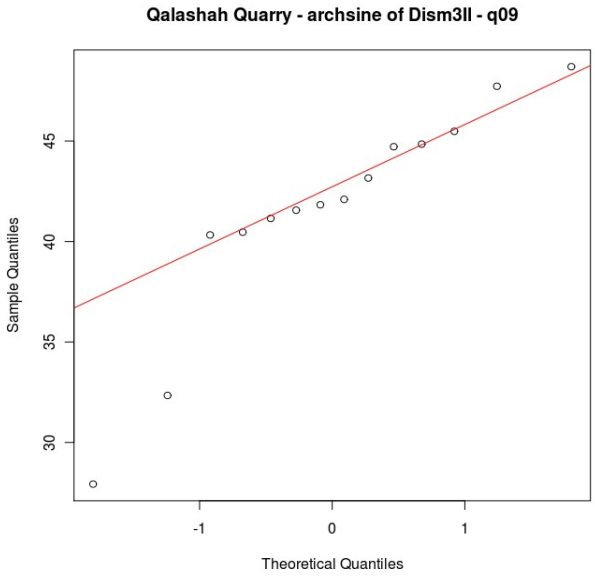




Arcsine of Dism3Il

Shapiro-Wilk normality test : data: Dism3Ila , W = 0.8644, p-value = 0.03509 . The hypothesis that the sample is from a normal distribution is rejected.



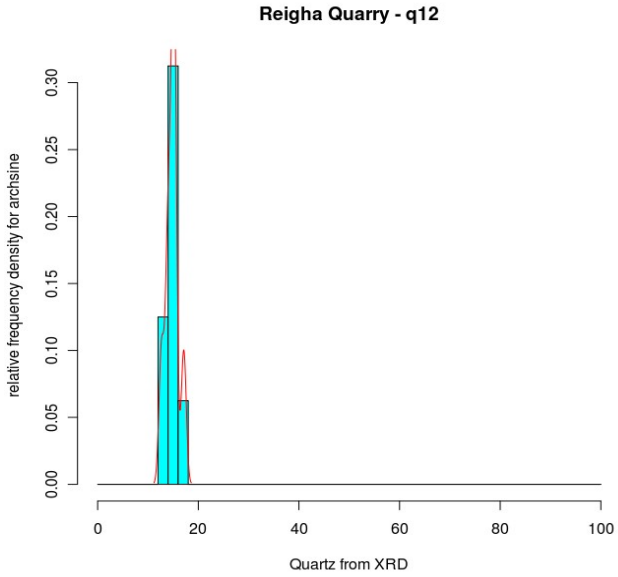


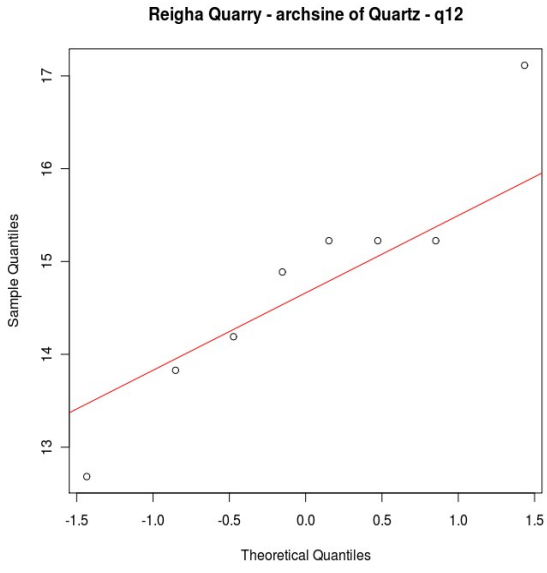
Reigha Quarry - q12

Q12 has 8 samples. Gypsum has too few values to be analyzed.

Arcsine of Quartz

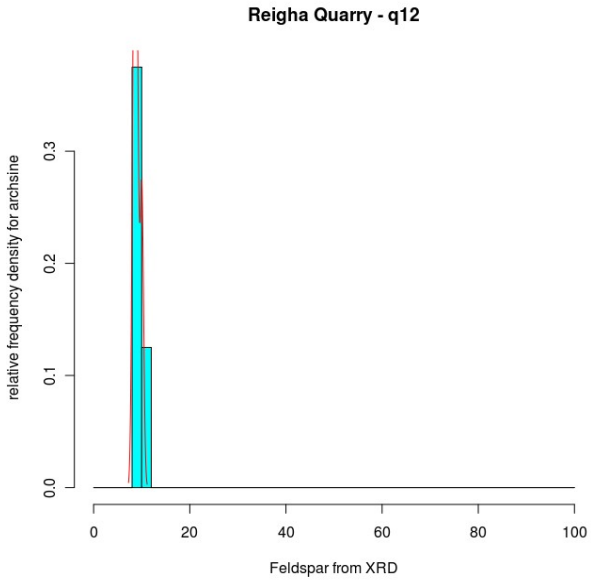
Shapiro-Wilk normality test : data: Quartza , W = 0.9436, p-value = 0.6472 . The hypothesis that the sample is from a normal distribution is not rejected.

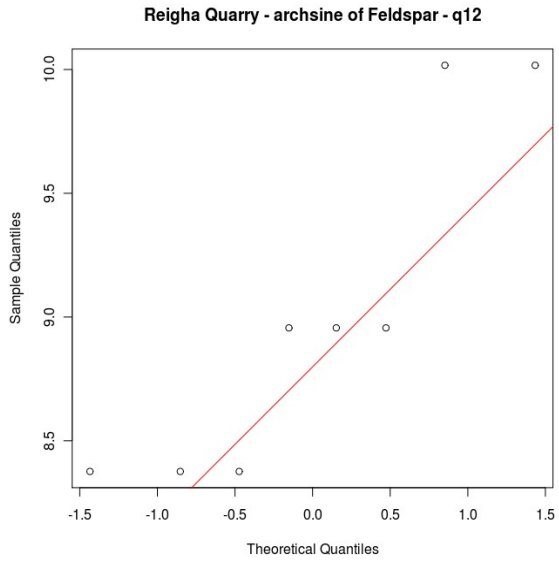




Arcsine of Feldspar

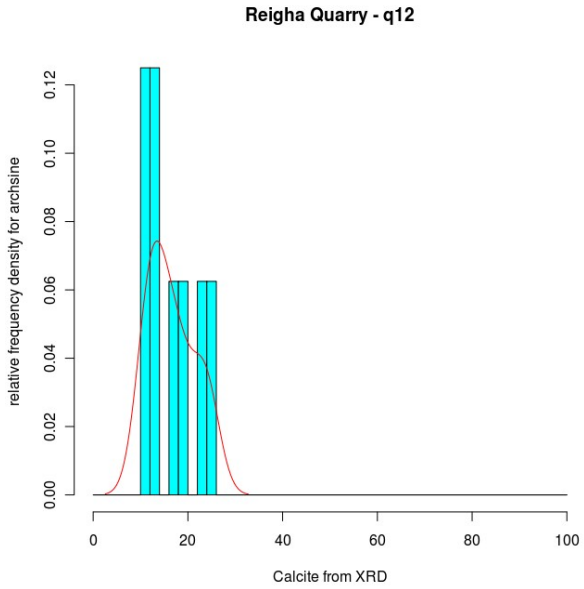
Shapiro-Wilk normality test : data: Feldspara , W = 0.8029, p-value = 0.03077 . The hypothesis that the sample is from a normal distribution is rejected.

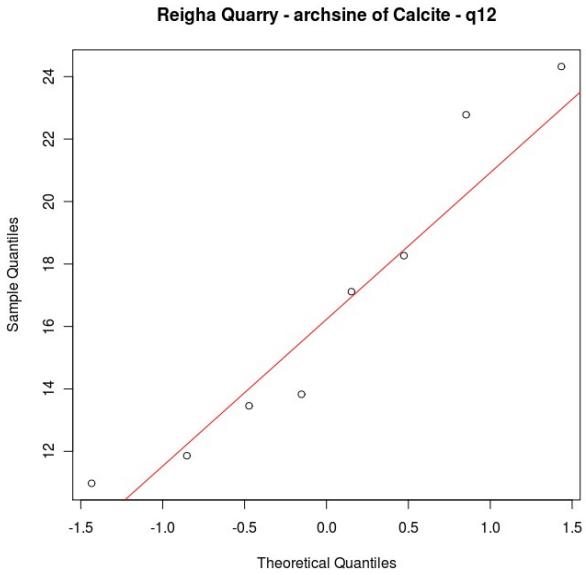




Arcsine of Calcite

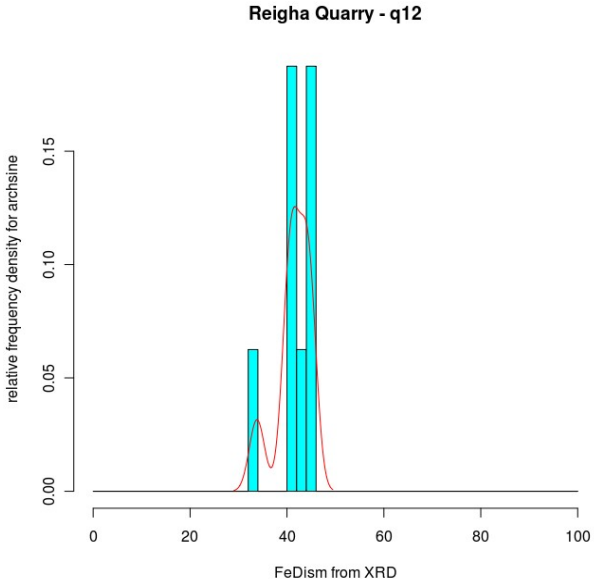
Shapiro-Wilk normality test : data: Calcitea , W = 0.914, p-value = 0.38829. The hypothesis that the sample is from a normal distribution is not rejected.

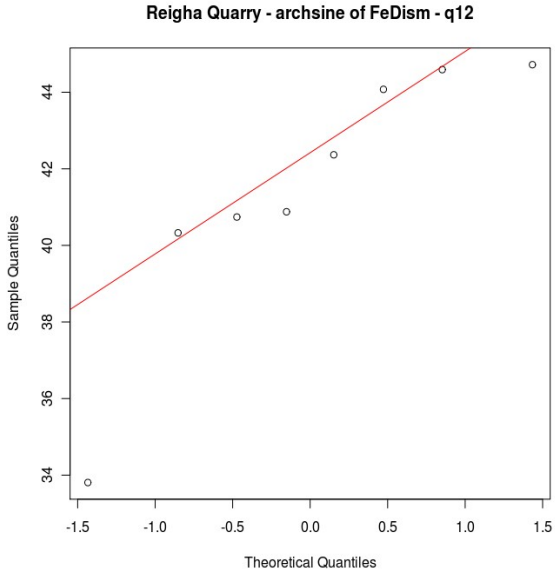




Arcsine of FeDism

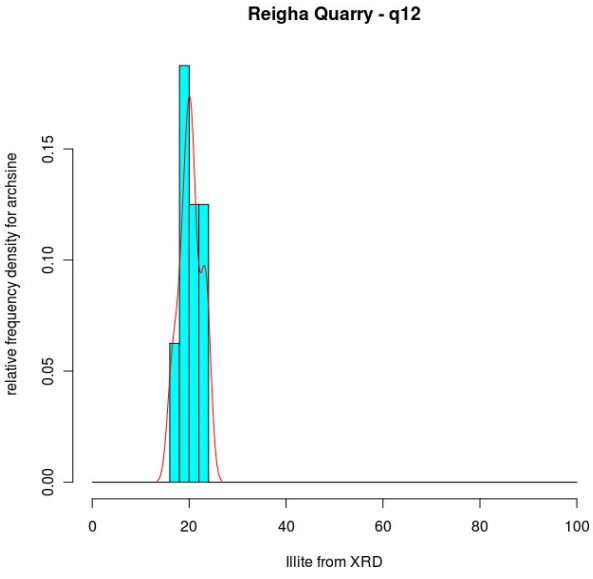
Shapiro-Wilk normality test : data: FeDisma , W = 0.8367, p-value = 0.06964. The hypothesis that the sample is from a normal distribution is not rejected.

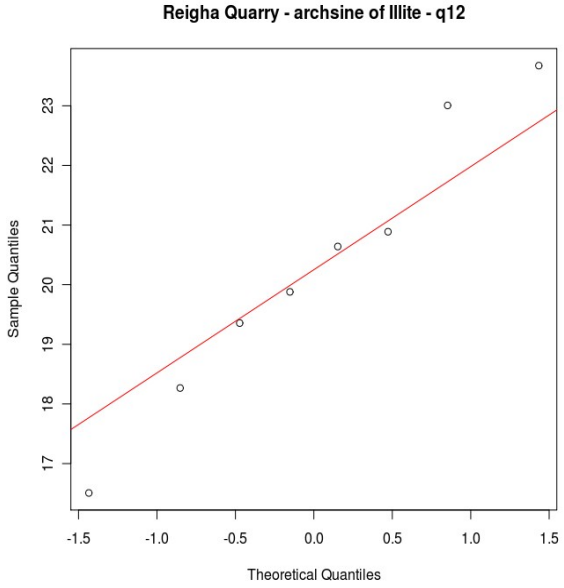




Arcsine of Illite

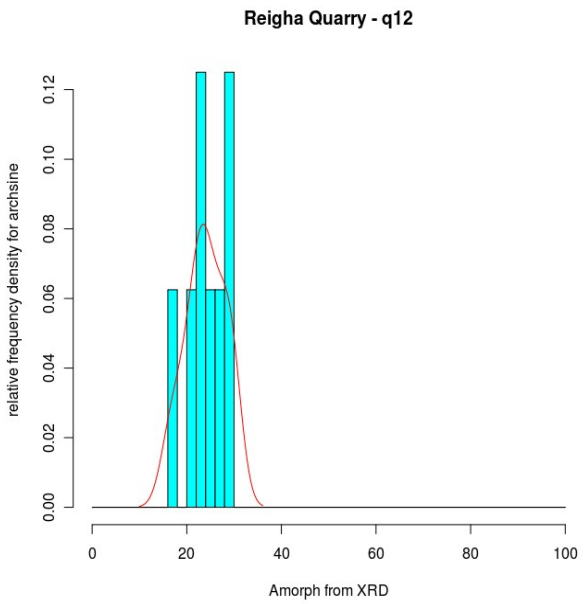
Shapiro-Wilk normality test : data: Illitea , W = 0.9749, p-value = 0.9337 . The hypothesis that the sample is from a normal distribution is not rejected.

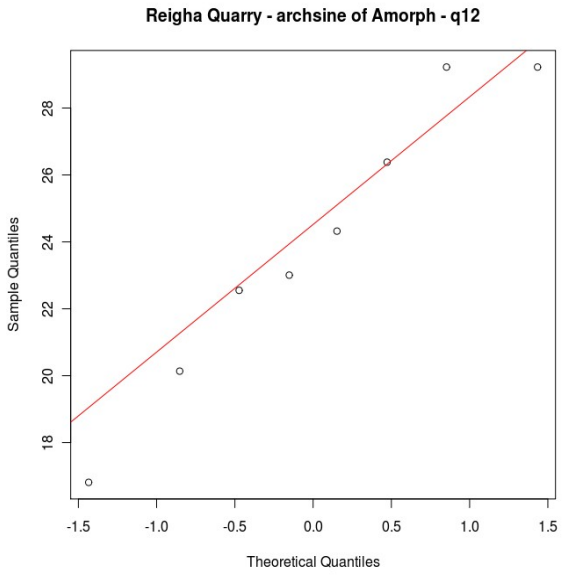




Arcsine of Amorph

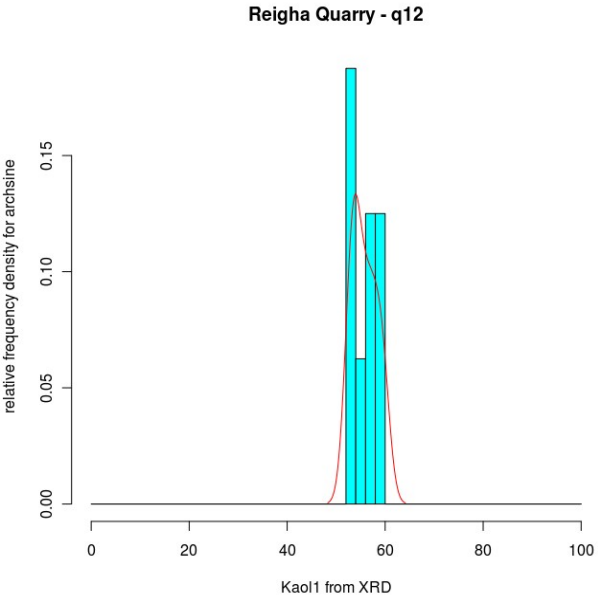
Shapiro-Wilk normality test : data: Amorpha , W = 0.9526 , p-value = 0.7379 . The hypothesis that the sample is from a normal distribution is not rejected.

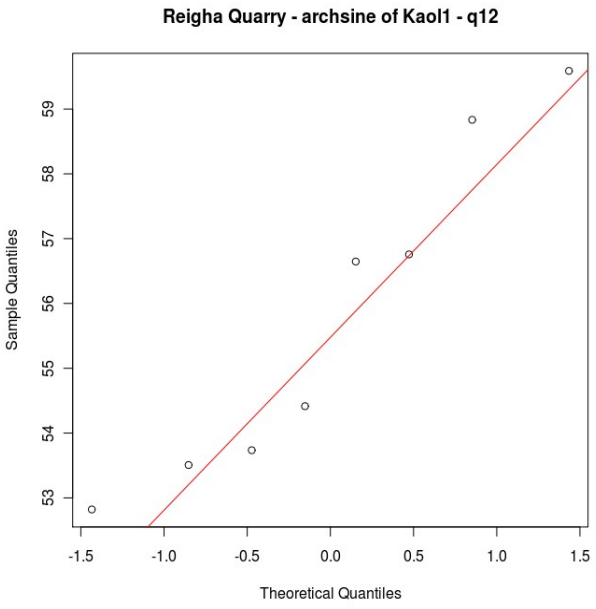




Arcsine of Kaol1

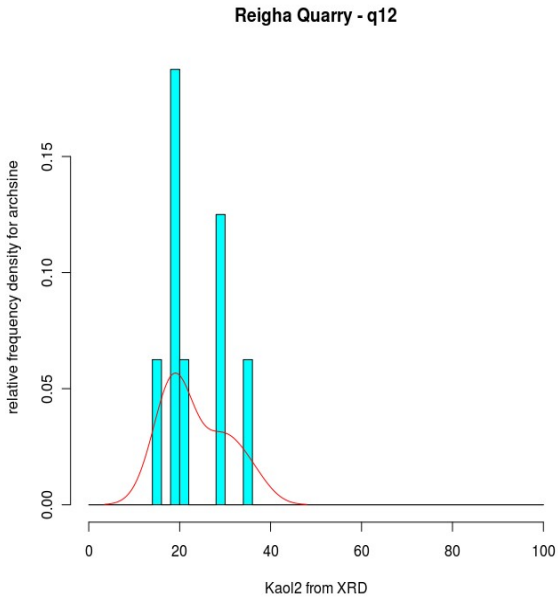
Shapiro-Wilk normality test : data: Kaol1a , W = 0.91, p-value = 0.354 . The hypothesis that the sample is from a normal distribution is not rejected.

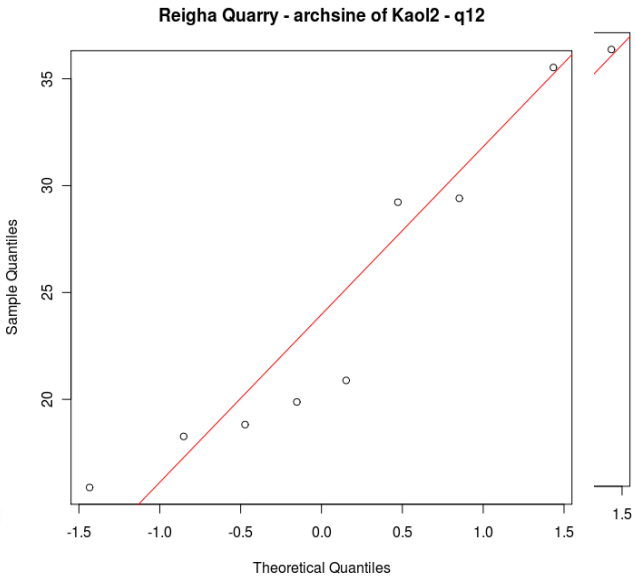




Arcsine of Kaol2

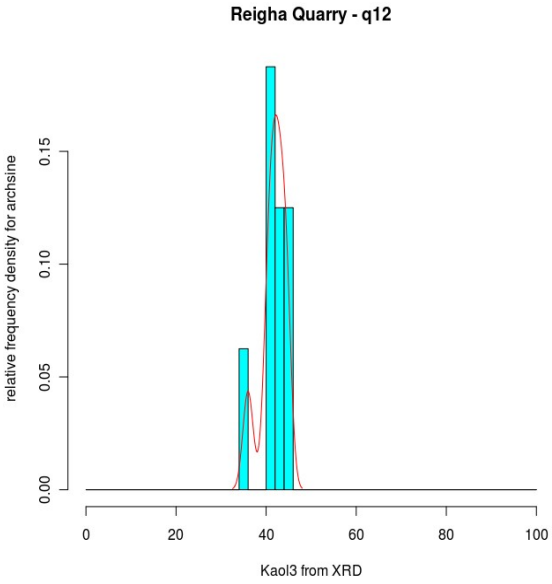
Shapiro-Wilk normality test : data: Kaol2a , W = 0.8804, p-value = 0.1898. The hypothesis that the sample is from a normal distribution is not rejected.

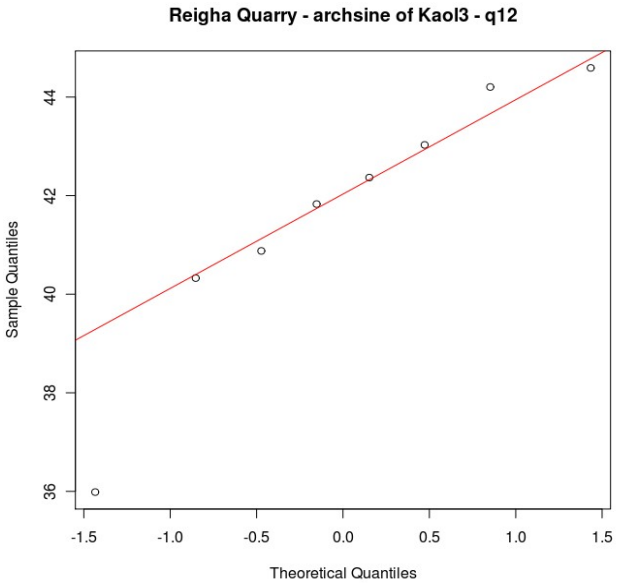




Arcsine of Kaol3

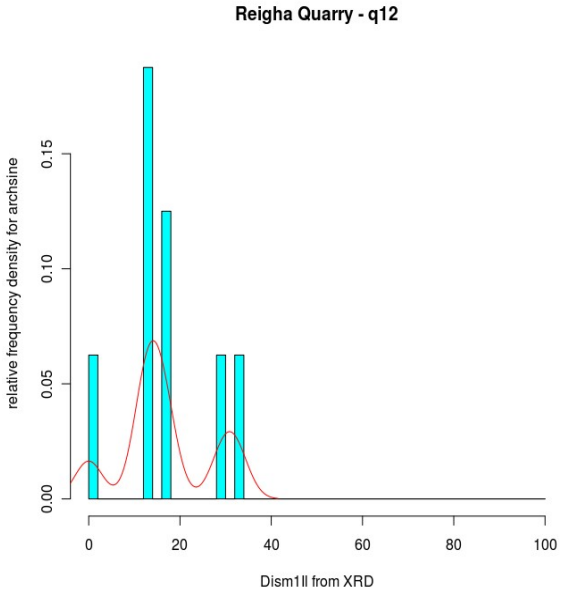
Shapiro-Wilk normality test : data: Kaol3a , W = 0.8989, p-value = 0.2822. The hypothesis that the sample is from a normal distribution is not rejected.

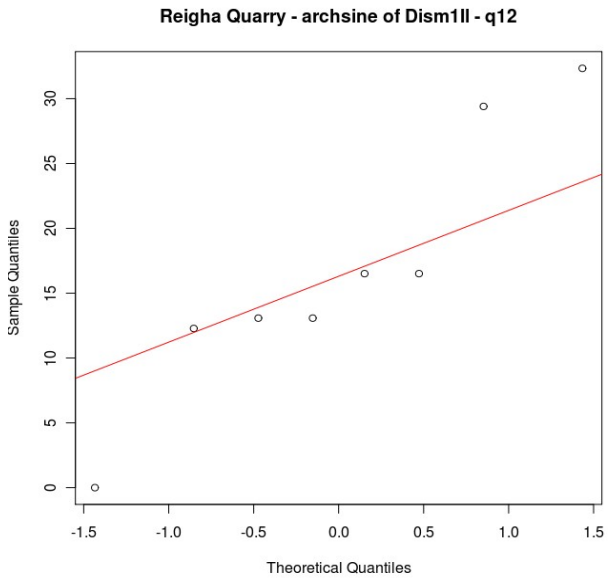




Arcsine of Dism1Il

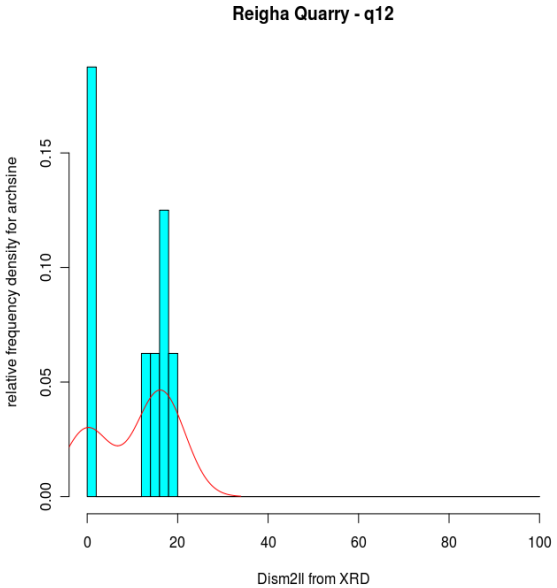
Shapiro-Wilk normality test : data: Dism1Ila , W = 0.9094, p-value = 0.3499 . The hypothesis that the sample is from a normal distribution is not rejected.

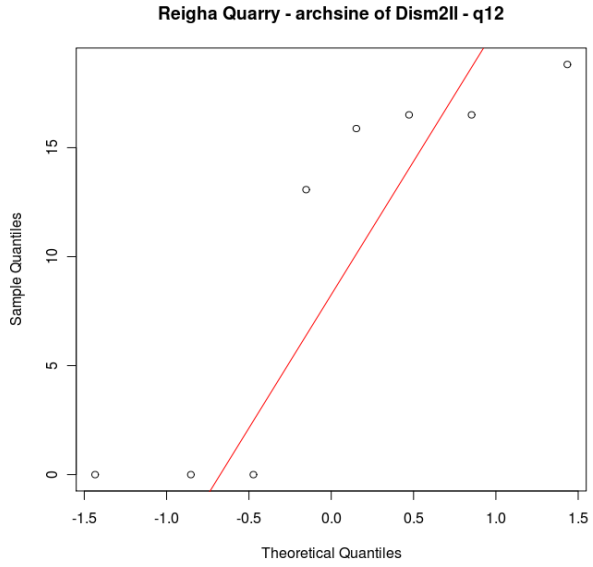




Arcsine of Dism2Il

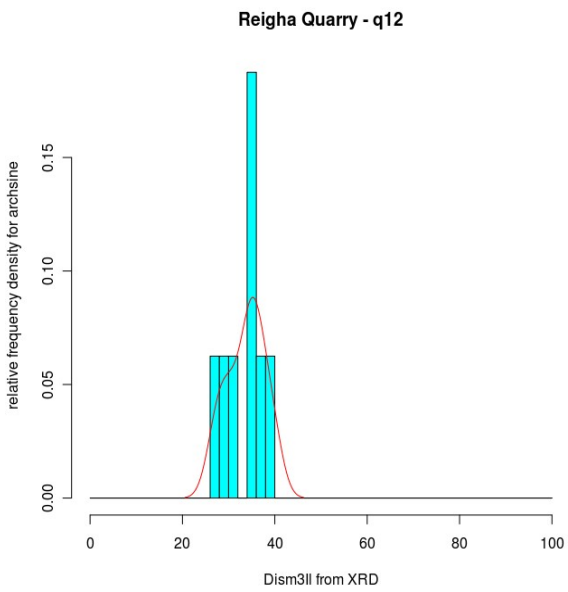
Shapiro-Wilk normality test : data: Dism2Ila , W = 0.763, p-value = 0.01136 . The hypothesis that the sample is from a normal distribution is rejected.

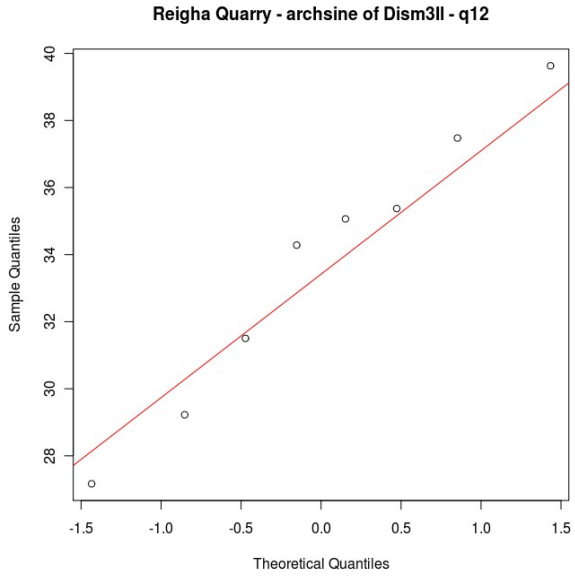




Arcsine of Dism3Il

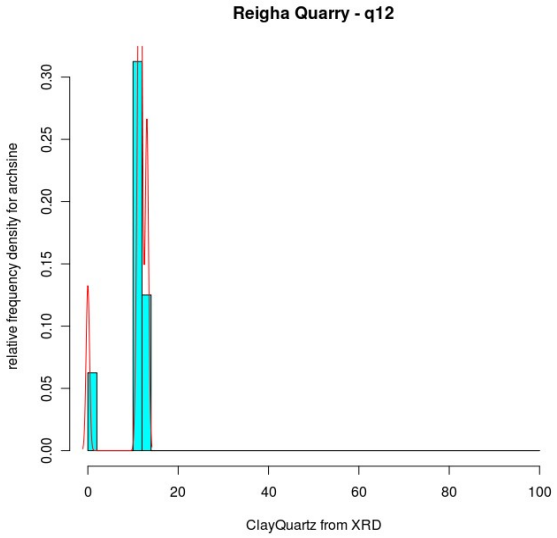
Shapiro-Wilk normality test : data: Dism3Ila , W = 0.9629, p-value = 0.8924. The hypothesis that the sample is from a normal distribution is not rejected.

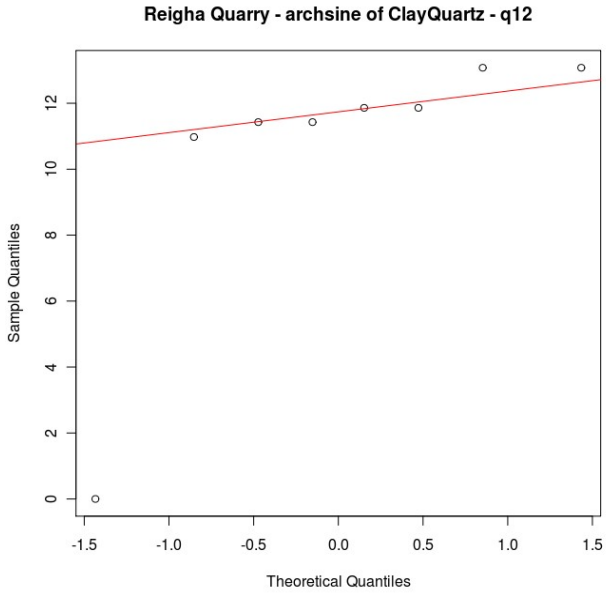




Arcsine of ClayQuartz

Shapiro-Wilk normality test : data: ClayQuartza , W = 0.5829, p-value = 0.0001001. The hypothesis that the sample is from a normal distribution is rejected.





APPENDIX EIGHT: ***DFA of the Provinces***

Untransformed Data-frame.

Call:

lda(Province ~ Quartz + FeDism + Illite + Kaol2 + Kaol3 + Dismll1 +

Dismll3, data = amoP, prior = c(1, 1, 1, 1)/4)

Prior probabilities of groups:

p1	p2	p3	p4
0.25	0.25	0.25	0.25

Group means:

	Quartz	FeDism	Illite	Kaol2	Kaol3	Dismll1	Dismll3
p1	4.056	9.295	3.513	5.553	18.240	5.254	15.04
p2	2.804	37.826	3.798	3.681	9.047	2.136	15.96
p3	5.771	14.028	7.290	1.379	7.706	7.280	25.86
p4	4.893	19.594	3.329	5.382	16.513	3.530	14.24

Coefficients of linear discriminants:

	LD1	LD2	LD3
Quartz	0.01001	0.156334	0.39086
FeDism	0.15043	-0.090295	0.08132
Illite	0.54825	0.001673	0.33496
Kaol2	0.01103	-0.084397	0.09874
Kaol3	-0.08441	-0.023660	0.19671
Dismll1	0.26046	0.120375	-0.06529
Dismll3	0.11129	0.045471	0.06265

Proportion of trace:

LD1 LD2 LD3

0.7028 0.2848 0.0124

> amoP_pred<-predict(amoPlda)

> amoP_pred$class

[1] p1 p4 p1 p1 p1 p1 p1 p1 p4 p1 p1 p1 p1 p1 p2 p2 p2 p2 p2 p2 p2 p2 p2 p2 p3 p3 p3 p3 p3 p3 p3 p3 p3 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4

[52] p4 p1 p4 p4 p4 p4 p1 p4 p4 p4 p4 p4 p4 p4 p4 p1 p1 p4 p4 p1 p1 p1 p1 p1 p1 p1 p1 p1 p4 p4 p1 p4 p4 p4 p4 p4 p1 p4 p1 p4 p4 p4 p1 p4 p4 p4 p4 p4 p4 p4 p1

[103] p1 p4 p1 p4 p4 p4 p4 p2 p4 p2 p4 p4 p4 p4 p4 p1 p1 p4 p4 p4 p1 p4 p4

Levels: p1 p2 p3 p4

> amoP_pred$posterior

	p1	p2	p3	p4
1	8.566e-01	2.877e-08	2.686e-09	1.434e-01
2	4.623e-01	2.390e-05	1.563e-05	5.376e-01
3	7.950e-01	1.238e-06	4.108e-08	2.050e-01
4	6.060e-01	4.667e-06	3.356e-06	3.939e-01
5	7.652e-01	1.755e-06	3.052e-07	2.348e-01
6	7.486e-01	8.117e-06	1.478e-06	2.514e-01
7	9.216e-01	1.061e-07	9.405e-08	7.840e-02
8	8.820e-01	2.485e-07	2.081e-07	1.180e-01
9	4.536e-01	2.405e-05	2.083e-05	5.464e-01
10	7.836e-01	1.308e-07	4.630e-09	2.164e-01
11	8.247e-01	7.608e-06	3.623e-05	1.753e-01
12	9.400e-01	2.736e-08	1.101e-08	6.001e-02
13	9.019e-01	5.072e-08	1.538e-09	9.812e-02

14 8.209e-01 5.693e-07 1.767e-08 1.791e-01

15 8.750e-08 9.993e-01 6.578e-04 8.591e-05

16 3.107e-10 9.985e-01 1.515e-03 2.505e-06

17 1.660e-03 9.127e-01 2.366e-03 8.324e-02

18 1.346e-05 9.939e-01 4.226e-03 1.900e-03

19 2.433e-06 9.983e-01 1.219e-05 1.639e-03

20 2.209e-09 9.996e-01 3.496e-04 5.359e-06

21 1.465e-04 9.840e-01 2.163e-05 1.582e-02

22 1.683e-08 9.999e-01 2.897e-05 2.955e-05

23 3.395e-03 7.529e-01 2.570e-05 2.437e-01

24 3.335e-08 9.919e-01 8.065e-03 3.197e-05

25 2.389e-04 5.030e-02 9.403e-01 9.124e-03

26 8.156e-10 3.173e-06 1.000e+00 1.027e-08

27 6.642e-08 1.452e-04 9.999e-01 9.132e-07

28 8.225e-02 3.625e-02 6.463e-01 2.352e-01

29 1.317e-06 5.760e-04 9.994e-01 1.961e-05

30 1.548e-03 9.712e-02 8.507e-01 5.067e-02

31 8.469e-06 7.372e-03 9.923e-01 2.938e-04

32 6.343e-10 1.757e-06 1.000e+00 8.828e-08

33 1.443e-16 2.256e-08 1.000e+00 1.161e-13

34 1.400e-02 1.935e-01 7.512e-06 7.925e-01

35 5.318e-02 3.538e-02 2.423e-07 9.114e-01

36 1.225e-01 7.219e-03 1.146e-06 8.703e-01

37 1.945e-01 1.094e-02 2.608e-06 7.946e-01

38 2.664e-02 3.205e-02 2.875e-06 9.413e-01

39 1.846e-02 2.525e-02 1.076e-06 9.563e-01

40 1.019e-02 1.724e-01 1.771e-06 8.174e-01

41 3.105e-02 5.716e-02 3.430e-06 9.118e-01

42 8.808e-02 1.135e-03 1.796e-08 9.108e-01

43 1.772e-02 4.569e-02 2.244e-06 9.366e-01

44 8.469e-02 1.105e-03 4.972e-07 9.142e-01

45 1.132e-02 9.387e-02 2.301e-05 8.948e-01

46 3.592e-02 1.056e-03 9.303e-08 9.630e-01

47 5.087e-02 1.130e-03 4.529e-07 9.480e-01

48 5.777e-02 1.403e-03 3.511e-05 9.408e-01

49 3.408e-02 6.361e-03 2.040e-06 9.596e-01

50 1.877e-02 4.088e-01 5.585e-05 5.724e-01

51 6.291e-02 6.072e-02 1.429e-04 8.762e-01

52 1.419e-01 3.207e-04 1.489e-05 8.578e-01

53 5.616e-01 2.559e-05 8.863e-08 4.384e-01

54 3.610e-01 4.721e-06 1.258e-07 6.390e-01

55 1.278e-01 1.635e-03 7.700e-05 8.705e-01

56 2.030e-01 4.273e-04 7.408e-08 7.966e-01

57 5.813e-02 4.130e-02 2.122e-05 9.005e-01

58 6.651e-01 1.081e-05 2.502e-06 3.348e-01

59 3.511e-01 8.199e-05 2.482e-07 6.488e-01

60 1.547e-01 4.057e-04 2.469e-06 8.449e-01

61 6.894e-02 1.871e-04 1.698e-06 9.309e-01

62 5.439e-02 1.002e-04 7.395e-07 9.455e-01

63 3.322e-02 6.254e-05 3.784e-07 9.667e-01

64 3.559e-01 7.342e-05 6.987e-07 6.440e-01

65 3.344e-01 3.299e-05 4.330e-07 6.656e-01

66 4.563e-01 1.689e-06 2.835e-09 5.437e-01

67 8.546e-01 1.273e-09 2.537e-13 1.454e-01

68 5.309e-01 2.120e-05 4.340e-06 4.691e-01

69 4.976e-01 8.560e-06 1.097e-06 5.024e-01

70 3.696e-01 4.248e-07 3.288e-10 6.304e-01

71 5.278e-01 9.167e-09 1.622e-10 4.722e-01

72 5.972e-01 2.548e-05 1.050e-06 4.028e-01

73 5.692e-01 8.586e-06 1.102e-06 4.308e-01

74 6.334e-01 8.284e-07 1.243e-08 3.666e-01

75 6.317e-01 2.879e-05 1.644e-05 3.682e-01

76 6.145e-01 5.450e-06 1.351e-07 3.855e-01

77 7.467e-01 4.313e-07 2.323e-08 2.533e-01

78 6.891e-01 4.801e-07 3.714e-05 3.108e-01

79 5.267e-01 1.101e-07 1.679e-05 4.733e-01

80 3.434e-01 1.827e-06 1.948e-07 6.565e-01

81 4.388e-01 2.698e-07 2.441e-07 5.612e-01

82 6.004e-01 9.673e-06 1.683e-04 3.995e-01

83 2.880e-01 3.333e-06 4.390e-05 7.120e-01

84 3.175e-01 9.658e-04 4.268e-04 6.811e-01

85 3.638e-01 2.719e-04 2.750e-04 6.356e-01

86 4.754e-01 1.562e-05 5.296e-05 5.245e-01

87 3.082e-01 1.488e-03 7.567e-03 6.828e-01

88 5.271e-01 3.458e-06 9.762e-07 4.729e-01

89 2.314e-01 2.614e-05 2.938e-05 7.686e-01

90 5.550e-01 3.199e-06 1.426e-05 4.450e-01

91 4.648e-01 1.808e-05 7.435e-06 5.351e-01

92 3.680e-01 9.765e-04 1.768e-02 6.134e-01

93 1.317e-01 3.763e-03 7.010e-04 8.639e-01

94 5.182e-01 7.739e-05 3.395e-04 4.814e-01

95 1.883e-01 4.385e-04 2.205e-04 8.111e-01

96 2.306e-01 3.145e-03 1.768e-02 7.486e-01

97 2.805e-01 1.195e-04 2.399e-05 7.194e-01

98 6.942e-02 1.071e-02 2.318e-04 9.196e-01

99 1.178e-02 3.115e-02 4.375e-04 9.566e-01

100 1.956e-02 1.149e-01 3.523e-04 8.652e-01

101 1.205e-02 2.911e-01 4.840e-04 6.963e-01

102 9.078e-01 2.186e-06 2.764e-06 9.216e-02

103 9.434e-01 6.603e-06 8.041e-05 5.647e-02

104 3.420e-01 2.199e-02 4.425e-02 5.918e-01

105 7.413e-01 2.590e-04 7.394e-05 2.583e-01

106 3.194e-01 2.473e-04 9.727e-03 6.706e-01

107 6.599e-02 1.978e-02 1.130e-02 9.029e-01

108 6.731e-02 4.666e-04 8.498e-07 9.322e-01

109 2.591e-01 7.470e-03 7.469e-03 7.259e-01

110 5.832e-03 5.167e-01 2.086e-02 4.566e-01

111 1.565e-02 4.367e-03 1.921e-05 9.800e-01

112 1.696e-03 9.172e-01 6.712e-07 8.107e-02

113 3.809e-02 2.673e-01 4.344e-06 6.946e-01

114 7.793e-02 5.795e-02 5.011e-04 8.636e-01

115 2.945e-01 2.942e-05 2.135e-07 7.055e-01

116 1.410e-02 7.043e-03 2.775e-05 9.788e-01

117 1.345e-02 6.298e-04 2.192e-08 9.859e-01

118 6.019e-01 1.549e-04 8.320e-07 3.980e-01

119 5.604e-01 2.305e-05 6.113e-08 4.396e-01

120 4.460e-01 3.591e-04 1.328e-06 5.537e-01

121 1.744e-01 2.773e-02 7.931e-04 7.971e-01

122 4.587e-01 9.557e-03 1.670e-03 5.300e-01

123 7.141e-01 1.306e-05 2.471e-09 2.859e-01

124 3.607e-01 7.344e-05 2.349e-07 6.392e-01

125 3.012e-01 2.589e-05 4.067e-10 6.988e-01

Classification of Unknown samples

> predict(amoPlda,blind)

$class

[1] p4 p1 p4 p4 p4

All assignments are correct.

Levels: p1 p2 p3 p4

$posterior

p1 p2 p3 p4

1 0.163250 1.584e-02 6.202e-05 0.8208

2 0.761251 6.938e-08 1.012e-08 0.2387

3 0.023425 3.028e-02 2.834e-07 0.9463

4 0.293972 4.137e-04 2.106e-04 0.7054

5 0.008314 6.278e-05 4.565e-09 0.9916

$x

LD1 LD2 LD3

1 -1.030 -0.7913 -0.6162

2 -3.337 0.5978 0.6809

3 -1.427 -2.3027 0.6349

4 -1.252 0.4596 0.2892

5 -2.363 -1.7223 3.9125

Transformed data-frame

tamoPlda

Call:

lda(Province ~ Quartzt + FeDismt + Illitet + Kaol2t + Kaol3t +

Dismll1t + Dismll3t, data = amoP, prior = c(1, 1, 1, 1)/4)

Prior probabilities of groups:

p1	p2	p3	p4
0.25	0.25	0.25	0.25

Group means:

	Quartzt	FeDismt	Illitet	Kaol2t	Kaol3t	Dismll1t	Dismll3t
p1	0.2018	0.3088	0.1860	0.2322	0.4406	0.2257	0.3973
p2	0.1672	0.6619	0.1826	0.1887	0.3026	0.1201	0.4069
p3	0.2380	0.3730	0.2685	0.0775	0.2796	0.2674	0.5306
p4	0.2157	0.4488	0.1778	0.2246	0.4160	0.1732	0.3815

Coefficients of linear discriminants:

	LD1	LD2	LD3
Quartzt	-2.181	6.022	16.4509
FeDismt	9.576	-7.738	7.5018
Illitet	14.084	-2.326	12.9249
Kaol2t	-2.298	-6.058	0.5618
Kaol3t	-11.577	-3.212	13.3273
Dismll1t	8.247	3.515	0.2927
Dismll3t	4.045	1.155	3.4249

Proportion of trace:

LD1 LD2 LD3

0.6686 0.3183 0.0131

> tamoP_pred<-predict(tamoPlda)

> tamoP_pred$class

[1] p1 p1 p1 p1 p1 p1 p1 p1 p4 p1 p1 p1 p1 p1 p2 p2 p2 p2 p2 p2 p2 p2 p2 p2 p3 p3 p3 p3 p3 p3 p3 p3 p3 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p2 p4

[52] p4 p4 p4 p4 p4 p4 p1 p4 p4 p4 p4 p4 p4 p4 p4 p1 p1 p1 p4 p1 p1 p1 p1 p1 p1 p1 p1 p1 p4 p4 p1 p4 p4 p4 p1 p4 p4 p4 p1 p4 p4 p4 p4 p4 p4 p4 p4 p4 p4 p2 p1

[103] p1 p1 p1 p4 p4 p4 p3 p4 p4 p2 p4 p4 p4 p4 p4 p1 p4 p4 p4 p4 p4 p4 p4

Levels: p1 p2 p3 p4

> tamoP_pred$posterior

	p1	p2	p3	p4
1	8.661e-01	1.140e-07	1.037e-07	1.339e-01
2	5.003e-01	2.925e-05	2.639e-05	4.996e-01
3	7.216e-01	2.208e-05	6.014e-06	2.784e-01
4	6.345e-01	9.597e-06	6.095e-05	3.654e-01
5	7.565e-01	9.679e-06	1.160e-05	2.435e-01
6	7.481e-01	3.092e-05	1.303e-05	2.519e-01
7	9.159e-01	3.207e-07	2.847e-06	8.409e-02
8	9.262e-01	2.522e-07	7.453e-07	7.382e-02
9	4.203e-01	5.554e-05	8.061e-05	5.795e-01
10	7.691e-01	1.119e-06	2.900e-07	2.309e-01
11	8.231e-01	5.474e-06	1.919e-05	1.769e-01
12	9.457e-01	7.885e-08	2.318e-07	5.431e-02
13	8.896e-01	5.158e-07	1.081e-07	1.104e-01
14	7.529e-01	8.149e-06	1.416e-06	2.471e-01

15 1.110e-07 9.976e-01 2.253e-03 1.039e-04

16 7.138e-08 9.997e-01 1.344e-04 1.345e-04

17 1.145e-03 9.077e-01 8.128e-03 8.307e-02

18 1.802e-06 9.970e-01 2.656e-03 3.139e-04

19 2.770e-05 9.884e-01 2.014e-05 1.160e-02

20 4.506e-09 9.995e-01 4.864e-04 9.846e-06

21 3.329e-02 6.354e-01 1.614e-04 3.311e-01

22 6.446e-08 9.999e-01 5.565e-05 7.110e-05

23 4.034e-03 7.030e-01 1.125e-04 2.929e-01

24 1.326e-08 9.962e-01 3.742e-03 1.044e-05

25 1.942e-04 1.092e-01 8.798e-01 1.079e-02

26 3.768e-07 4.516e-06 1.000e+00 4.347e-07

27 3.260e-05 7.147e-03 9.926e-01 1.757e-04

28 3.915e-03 4.709e-02 9.314e-01 1.761e-02

29 9.920e-07 1.960e-04 9.998e-01 1.464e-05

30 4.383e-05 6.305e-03 9.925e-01 1.196e-03

31 9.629e-06 1.619e-02 9.833e-01 4.859e-04

32 4.249e-06 1.250e-06 1.000e+00 1.072e-05

33 1.398e-11 2.448e-07 1.000e+00 3.312e-10

34 1.249e-02 3.017e-01 6.495e-06 6.858e-01

35 3.546e-01 1.875e-03 3.118e-08 6.436e-01

36 1.345e-01 1.830e-02 2.997e-06 8.472e-01

37 1.159e-01 8.756e-02 8.564e-05 7.964e-01

38 2.809e-02 1.912e-02 2.070e-06 9.528e-01

39 2.141e-02 1.990e-02 3.477e-06 9.587e-01

40 1.461e-02 4.541e-02 7.722e-07 9.400e-01

41 2.361e-02 8.950e-02 1.053e-04 8.868e-01

42 7.426e-02 3.200e-03 3.564e-07 9.225e-01

43 2.378e-02 3.088e-02 3.893e-06 9.453e-01

44 7.197e-02 3.218e-03 2.070e-05 9.248e-01

45 1.743e-02 6.770e-02 2.347e-05 9.148e-01

46 4.208e-02 1.031e-03 4.814e-07 9.569e-01

47 4.714e-02 5.768e-03 2.042e-05 9.471e-01

48 5.206e-02 3.145e-03 1.102e-04 9.447e-01

49 4.400e-02 1.099e-02 7.376e-06 9.450e-01

50 4.448e-03 7.623e-01 3.447e-04 2.329e-01

51 3.816e-02 1.541e-01 9.325e-04 8.068e-01

52 1.302e-01 1.163e-03 5.820e-05 8.685e-01

53 4.573e-01 2.219e-04 6.940e-06 5.425e-01

54 3.030e-01 2.024e-05 1.931e-06 6.970e-01

55 9.152e-02 4.369e-03 2.230e-03 9.019e-01

56 1.269e-01 2.796e-03 2.529e-06 8.703e-01

57 5.893e-02 8.341e-02 7.028e-05 8.576e-01

58 5.949e-01 7.712e-05 1.780e-04 4.049e-01

59 3.439e-01 2.289e-04 2.029e-06 6.559e-01

60 1.041e-01 6.441e-04 9.509e-06 8.953e-01

61 6.127e-02 3.002e-04 6.134e-06 9.384e-01

62 4.243e-01 1.045e-05 1.204e-07 5.757e-01

63 6.053e-02 1.069e-04 7.800e-07 9.394e-01

64 3.763e-01 1.766e-04 1.084e-06 6.235e-01

65 4.301e-01 6.142e-05 6.822e-07 5.699e-01

66 4.451e-01 6.955e-06 2.732e-08 5.549e-01

67 8.849e-01 5.571e-09 1.125e-11 1.151e-01

68 5.822e-01 2.417e-05 9.754e-06 4.178e-01

69	5.779e-01	5.845e-06	5.603e-07	4.221e-01
70	3.758e-01	1.491e-06	3.464e-09	6.242e-01
71	6.384e-01	1.822e-08	7.395e-10	3.616e-01
72	6.609e-01	7.248e-05	6.239e-06	3.390e-01
73	6.346e-01	7.417e-06	7.738e-07	3.654e-01
74	7.287e-01	6.761e-07	2.288e-08	2.713e-01
75	6.644e-01	4.409e-05	3.438e-05	3.355e-01
76	6.503e-01	8.691e-06	3.853e-07	3.497e-01
77	8.533e-01	1.769e-07	1.459e-08	1.467e-01
78	7.960e-01	5.358e-07	1.462e-04	2.038e-01
79	6.962e-01	1.521e-07	1.202e-05	3.037e-01
80	4.236e-01	2.443e-06	7.389e-07	5.764e-01
81	4.741e-01	2.894e-06	5.931e-06	5.259e-01
82	6.151e-01	4.966e-05	8.339e-03	3.765e-01
83	3.321e-01	2.473e-05	2.514e-04	6.676e-01
84	2.380e-01	3.069e-03	1.326e-03	7.576e-01
85	2.461e-01	1.162e-03	3.541e-03	7.492e-01
86	5.176e-01	2.335e-05	1.903e-04	4.822e-01
87	2.145e-01	1.832e-02	1.101e-01	6.571e-01
88	4.669e-01	4.022e-05	2.790e-05	5.330e-01
89	2.557e-01	1.017e-04	7.702e-05	7.441e-01
90	5.635e-01	9.297e-06	1.791e-04	4.363e-01
91	3.797e-01	7.247e-05	1.599e-04	6.201e-01
92	2.957e-01	1.681e-03	2.965e-02	6.729e-01
93	9.829e-02	1.191e-02	1.578e-03	8.882e-01
94	4.639e-01	2.563e-04	1.760e-03	5.341e-01
95	1.723e-01	8.636e-04	2.978e-04	8.265e-01

96 1.561e-01 7.515e-03 4.953e-02 7.869e-01

97 2.034e-01 7.193e-04 3.670e-04 7.955e-01

98 8.315e-02 1.167e-02 6.613e-05 9.051e-01

99 1.052e-02 4.318e-02 2.015e-03 9.443e-01

100 1.334e-02 3.565e-01 1.149e-03 6.290e-01

101 6.956e-03 5.580e-01 2.878e-03 4.321e-01

102 9.355e-01 5.832e-06 7.851e-05 6.437e-02

103 9.336e-01 4.649e-05 5.549e-03 6.081e-02

104 4.371e-01 2.803e-02 1.133e-01 4.216e-01

105 6.204e-01 5.311e-03 8.751e-03 3.655e-01

106 2.217e-01 1.116e-03 1.328e-01 6.444e-01

107 5.034e-02 2.893e-02 1.276e-02 9.080e-01

108 8.094e-02 4.881e-04 4.255e-06 9.186e-01

109 2.910e-02 1.050e-02 8.341e-01 1.263e-01

110 8.192e-03 3.905e-01 2.288e-02 5.785e-01

111 2.880e-02 5.121e-04 1.691e-06 9.707e-01

112 1.302e-03 9.400e-01 6.263e-06 5.865e-02

113 3.240e-02 2.951e-01 2.653e-05 6.725e-01

114 1.077e-01 4.093e-02 7.692e-05 8.513e-01

115 3.192e-01 3.958e-05 1.899e-07 6.807e-01

116 1.459e-02 6.194e-03 6.615e-05 9.792e-01

117 2.752e-02 6.091e-04 7.241e-08 9.719e-01

118 5.313e-01 2.649e-03 6.705e-05 4.659e-01

119 3.925e-01 3.787e-04 6.121e-06 6.072e-01

120 3.098e-01 5.015e-03 8.521e-05 6.851e-01

121 1.178e-01 6.570e-02 7.285e-04 8.157e-01

122 2.527e-01 4.131e-02 8.448e-03 6.975e-01

```
123 4.804e-01 8.744e-04 2.513e-06 5.187e-01
124 2.483e-01 5.086e-04 9.664e-06 7.511e-01
125 3.928e-01 3.369e-05 3.152e-10 6.072e-01
> predict(tamoPlda,blind)
$class
[1] p4 p1 p4 p4 p4
Levels: p1 p2 p3 p4
```

All assignments are correct.

```
$posterior
        p1          p2          p3      p4
1 0.14615 1.148e-01 3.996e-04 0.7386
2 0.79427 1.465e-07 5.233e-08 0.2057
3 0.03815 6.258e-03 8.087e-08 0.9556
4 0.22788 1.146e-03 8.885e-04 0.7701
5 0.02609 9.198e-06 2.422e-10 0.9739

$x
       LD1      LD2      LD3
1 -0.6381 -1.1002 -1.2223
2 -3.3863  0.3795  0.5103
3 -1.9091 -2.4701  0.6174
4 -1.0776  0.2562  0.6814
5 -3.3133 -2.2351  3.2709
```

APPENDIX EIGHT: DFA of the Quarries

Untransformed Data-frame

Call:

```
lda(Quarry ~ Quartz + Calcite + FeDism + Illite + Kaol2 + Kaol3 +
    DismII1 + DismII3, data = amoQ, prior = c(1, 1, 1, 1, 1,
    1, 1, 1)/8)
```

Prior probabilities of groups:

q01	q04	q05	q06	q07	q08	q09	q10
0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125

Group means:

	Quartz	Calcite	FeDism	Illite	Kaol2	Kaol3	DismII1	DismII3
q01	4.056	0.00000	9.295	3.513	5.553	18.240	5.254	15.044
q04	2.804	0.00000	37.826	3.798	3.681	9.047	2.136	15.959
q05	5.771	0.00000	14.028	7.290	1.379	7.706	7.280	25.864
q06	4.891	0.76648	27.344	2.108	4.991	16.249	2.168	14.046
q07	4.722	0.05211	10.417	3.966	7.931	21.121	5.605	11.988
q08	6.382	5.91680	14.169	3.774	4.174	15.009	4.228	18.856
q09	5.187	0.00000	19.436	4.257	3.546	13.131	3.017	16.536
q10	3.123	2.45579	21.142	3.693	6.160	16.256	3.493	9.966

Coefficients of linear discriminants:

	LD1	LD2	LD3	LD4	LD5	LD6	LD7
Quartz	-0.181101	0.16853	-0.14541	-0.13913	-0.25800	0.234963	0.127095
Calcite	-0.822052	0.67400	0.41552	0.13897	0.01695	-0.030217	0.001087
FeDism	0.127483	0.07186	0.12445	0.04761	-0.14272	-0.005091	0.027741
Illite	0.189187	0.31469	-0.02475	0.52479	-0.36064	0.347010	-0.103030
Kaol2	-0.146487	-0.06866	0.05680	0.19448	-0.21259	-0.010316	-0.253978
Kaol3	-0.251523	-0.05857	0.04169	0.01199	-0.28211	0.008946	0.021415

```
Dismll1  0.060045  0.24827 -0.08164  0.17539 -0.11031 -0.221416  0.269175
Dismll3  0.004757  0.16900 -0.02174 -0.06928 -0.17061 -0.077867 -0.115896


Proportion of trace:
   LD1    LD2    LD3    LD4    LD5    LD6    LD7
0.5566 0.2685 0.1373 0.0206 0.0136 0.0031 0.0003
> amoQ_pred<-predict(amoQlda)
> amoQ_pred$class
  [1] q01 q07 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q04 q04 q04 q04 q04 q04 q04 q04
q04 q04 q05 q05 q05 q09 q05 q05 q05 q05 q05 q06 q06 q06 q06 q10
 [39] q06 q06 q06 q10 q06 q06 q06 q06 q06 q06 q06 q09 q06 q06 q06 q01 q06 q06 q06 q09 q06 q07
q06 q06 q06 q07 q07 q07 q07 q07 q07 q07 q07 q07 q07 q07 q01 q07
 [77] q07 q01 q07 q07 q01 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q09
q09 q09 q09 q01 q09 q09 q09 q09 q09 q06 q09 q09 q09 q10 q10 q07
[115] q07 q06 q06 q10 q08 q10 q10 q10 q10 q10 q10
Levels: q01 q04 q05 q06 q07 q08 q09 q10
> amoQ_pred$posterior
          q01       q04       q05       q06       q07       q08       q09       q10
1   8.660e-01 5.406e-15 3.740e-13 1.881e-03 1.299e-01 1.025e-11 1.404e-03 8.284e-04
2   4.215e-01 1.286e-12 1.173e-09 3.360e-03 5.595e-01 2.863e-10 4.760e-03 1.086e-02
3   9.162e-01 4.176e-11 6.992e-11 4.391e-03 2.218e-02 2.780e-14 5.241e-02 4.832e-03
4   8.155e-01 2.764e-11 9.257e-09 6.284e-03 7.127e-02 5.286e-12 1.008e-01 6.206e-03
5   9.103e-01 6.664e-12 2.721e-10 1.774e-03 5.298e-02 2.531e-13 3.037e-02 4.620e-03
6   8.184e-01 2.619e-12 2.099e-10 1.765e-03 1.665e-01 6.355e-12 4.990e-03 8.310e-03
7   9.439e-01 2.073e-14 1.900e-11 7.015e-04 5.314e-02 1.537e-11 1.092e-03 1.197e-03
8   6.823e-01 5.696e-16 2.481e-12 8.121e-05 3.163e-01 3.211e-11 1.469e-04 1.187e-03
9   7.215e-01 6.436e-11 5.831e-08 4.292e-02 1.692e-01 1.693e-09 5.704e-02 9.293e-03
10  6.749e-01 8.024e-15 9.045e-14 5.923e-04 3.208e-01 4.453e-13 9.176e-04 2.863e-03
11  8.032e-01 2.359e-13 3.618e-09 1.244e-03 1.891e-01 1.629e-09 1.025e-03 5.446e-03
12  9.752e-01 2.549e-14 1.137e-11 4.199e-03 1.913e-02 1.859e-10 1.154e-03 3.536e-04
13  9.503e-01 6.228e-14 4.387e-13 2.582e-03 4.424e-02 1.473e-12 1.891e-03 9.597e-04
14  9.332e-01 3.502e-12 1.083e-11 8.094e-03 4.574e-02 1.088e-12 9.459e-03 3.510e-03
```

15 2.204e-15 1.000e+00 1.894e-07 8.411e-08 1.466e-18 3.308e-27 1.304e-06 6.006e-12

16 8.214e-17 1.000e+00 1.000e-06 3.576e-09 1.228e-18 5.452e-28 3.421e-07 3.481e-12

17 1.099e-06 8.807e-01 2.941e-05 6.581e-02 3.976e-09 1.411e-17 5.345e-02 5.957e-05

18 3.282e-10 9.985e-01 7.043e-05 3.570e-05 3.485e-13 8.485e-22 1.390e-03 3.013e-08

19 6.010e-13 1.000e+00 2.703e-10 2.877e-06 2.818e-15 5.215e-28 2.229e-05 3.923e-09

20 7.461e-17 1.000e+00 3.938e-08 8.911e-09 1.945e-19 2.636e-28 6.347e-08 1.904e-12

21 5.001e-12 9.998e-01 1.545e-09 1.258e-04 9.415e-16 1.187e-24 3.374e-05 1.013e-09

22 1.364e-16 1.000e+00 9.541e-10 8.701e-08 2.150e-19 5.115e-28 6.081e-08 1.745e-12

23 6.699e-09 9.887e-01 5.981e-09 1.212e-03 4.418e-12 2.385e-24 1.009e-02 6.756e-07

24 3.383e-14 9.999e-01 7.569e-05 1.493e-07 4.532e-17 2.453e-24 8.091e-06 3.072e-11

25 4.181e-07 1.045e-03 9.602e-01 3.049e-04 6.763e-10 1.606e-14 3.842e-02 4.275e-07

26 1.465e-14 3.959e-11 1.000e+00 6.103e-14 1.920e-18 2.426e-19 7.195e-09 6.288e-16

27 1.726e-11 1.287e-08 1.000e+00 3.106e-10 9.117e-15 2.266e-16 1.075e-06 1.840e-12

28 1.502e-04 1.135e-04 2.950e-01 3.802e-04 3.237e-08 6.134e-15 7.043e-01 4.628e-06

29 1.050e-09 1.830e-06 9.999e-01 2.273e-08 4.615e-13 1.309e-17 1.027e-04 6.812e-10

30 3.857e-07 5.333e-03 7.457e-01 2.557e-04 1.499e-10 1.635e-16 2.487e-01 2.180e-07

31 6.783e-09 9.330e-05 9.983e-01 1.478e-06 5.906e-12 8.930e-17 1.579e-03 9.360e-09

32 2.037e-13 2.749e-12 1.000e+00 4.071e-13 2.561e-15 1.323e-17 1.778e-07 2.529e-14

33 4.054e-22 3.161e-14 1.000e+00 2.596e-20 1.366e-24 5.477e-24 9.808e-14 1.543e-21

34 1.780e-04 3.546e-04 6.721e-10 9.450e-01 1.350e-04 4.830e-14 2.135e-02 3.298e-02

35 9.003e-05 1.450e-04 4.492e-12 9.945e-01 9.797e-06 2.259e-16 3.276e-03 1.968e-03

36 1.090e-03 3.489e-06 4.396e-10 9.725e-01 7.040e-05 2.795e-11 1.351e-02 1.280e-02

37 1.867e-03 1.304e-05 1.885e-09 8.476e-01 4.335e-05 8.177e-11 3.034e-02 1.201e-01

38 1.709e-04 7.071e-06 7.640e-10 3.393e-01 5.548e-05 8.843e-10 2.298e-02 6.375e-01

39 9.571e-05 7.386e-07 1.496e-11 8.566e-01 2.157e-04 6.862e-10 1.309e-03 1.417e-01

40 1.295e-05 8.468e-05 8.408e-11 5.895e-01 6.957e-06 8.713e-11 5.678e-03 4.047e-01

41 2.020e-05 7.480e-06 3.752e-10 6.082e-01 2.722e-06 5.459e-08 3.223e-03 3.886e-01

42 4.922e-04 1.177e-09 3.940e-14 1.623e-01 9.650e-04 1.541e-08 2.559e-04 8.360e-01

43 3.794e-05 1.662e-06 9.020e-11 9.124e-01 3.570e-05 1.222e-08 1.515e-03 8.596e-02

44 7.359e-04 5.986e-07 7.572e-10 8.800e-01 3.972e-05 2.669e-09 3.188e-02 8.735e-02

45 4.141e-05 5.870e-06 5.534e-09 9.448e-01 3.299e-05 4.435e-08 4.766e-03 5.038e-02

46 5.481e-04 1.378e-07 5.044e-12 9.756e-01 5.135e-04 6.508e-12 4.902e-03 1.839e-02

47 1.179e-03 5.796e-05 1.818e-09 5.877e-01 3.685e-05 4.003e-16 4.063e-01 4.738e-03

48 5.041e-03 1.479e-06 4.326e-07 7.491e-01 5.208e-04 1.345e-11 2.436e-01 1.811e-03

49 1.060e-03 2.477e-05 2.275e-09 9.106e-01 1.870e-04 2.735e-14 8.453e-02 3.607e-03

50 5.691e-05 2.778e-01 1.943e-07 2.282e-01 5.128e-07 9.931e-19 4.921e-01 1.755e-03

51 4.436e-04 2.559e-03 1.127e-06 6.603e-01 4.795e-06 7.344e-15 3.356e-01 1.107e-03

52 7.721e-02 6.947e-08 1.903e-07 6.545e-01 1.115e-02 1.818e-10 2.501e-01 6.985e-03

53 6.621e-02 5.983e-07 3.071e-09 4.749e-01 1.354e-04 2.221e-14 4.575e-01 1.302e-03

54 4.816e-01 4.532e-10 6.878e-10 2.735e-01 6.194e-02 1.906e-11 1.743e-01 8.702e-03

55 3.938e-03 1.156e-05 2.046e-06 5.638e-01 4.455e-05 8.624e-13 4.312e-01 9.730e-04

56 1.042e-01 1.480e-06 2.854e-11 4.197e-01 1.899e-02 4.483e-16 2.822e-01 1.749e-01

57 8.108e-04 5.240e-04 5.144e-08 8.676e-01 2.793e-05 1.598e-14 1.287e-01 2.386e-03

58 1.512e-01 3.713e-08 6.481e-07 1.834e-01 2.050e-04 8.158e-12 6.648e-01 3.603e-04

59 7.736e-02 4.344e-08 6.099e-10 8.517e-01 3.537e-03 4.257e-12 6.186e-02 5.504e-03

60 1.184e-01 2.424e-09 6.364e-11 2.065e-01 4.274e-01 5.808e-12 1.027e-02 2.375e-01

61 2.640e-02 1.031e-08 1.396e-09 8.797e-01 3.226e-02 8.115e-11 4.930e-02 1.230e-02

62 7.353e-03 2.814e-08 2.639e-09 9.294e-01 2.138e-03 2.405e-11 5.935e-02 1.775e-03

63 5.039e-03 8.446e-09 7.126e-10 9.442e-01 4.381e-03 3.434e-11 4.457e-02 1.829e-03

64 7.503e-02 2.431e-13 3.392e-13 3.622e-03 9.076e-01 7.800e-11 9.413e-05 1.361e-02

65 7.302e-02 6.492e-14 3.450e-13 1.853e-03 9.193e-01 7.990e-11 1.269e-04 5.742e-03

66 3.692e-02 5.656e-16 6.874e-17 7.645e-04 9.589e-01 2.966e-12 7.501e-06 3.451e-03

67 5.496e-02 4.114e-20 3.470e-22 2.553e-05 9.446e-01 4.806e-15 3.125e-07 4.005e-04

68 3.443e-01 7.142e-13 5.376e-11 1.751e-03 6.342e-01 1.752e-11 1.828e-03 1.792e-02

69 2.512e-02 7.625e-17 1.449e-14 6.480e-05 9.730e-01 1.200e-10 2.584e-06 1.862e-03

70 1.418e-02 1.296e-17 3.594e-18 1.487e-03 9.773e-01 7.147e-09 1.424e-06 7.040e-03

71 1.937e-03 4.107e-23 2.792e-21 1.391e-06 9.980e-01 1.500e-11 3.246e-09 2.997e-05

72 4.326e-01 1.098e-12 1.187e-11 1.001e-03 5.488e-01 2.123e-12 1.577e-03 1.602e-02

73 5.351e-02 2.802e-16 5.452e-14 9.350e-05 9.438e-01 1.006e-10 6.587e-06 2.570e-03

74 1.301e-02 9.628e-19 4.242e-18 4.638e-06 9.857e-01 1.731e-13 2.369e-07 1.244e-03

75 6.145e-01 1.863e-12 1.103e-09 1.318e-03 3.679e-01 4.326e-11 3.742e-03 1.255e-02

76 8.024e-02 1.516e-15 6.198e-15 1.001e-04 9.118e-01 6.232e-13 1.823e-05 7.790e-03

77 1.056e-02 2.402e-20 3.001e-18 1.108e-06 9.891e-01 3.865e-12 2.847e-08 3.193e-04

78 8.997e-01 1.581e-13 9.013e-07 2.286e-03 4.392e-02 1.720e-08 5.379e-02 2.866e-04

79 3.340e-01 2.055e-17 3.288e-09 3.690e-04 6.649e-01 2.961e-06 5.616e-04 1.171e-04

80 3.359e-01 3.112e-13 1.763e-11 6.097e-03 6.425e-01 2.094e-11 9.169e-03 6.396e-03

81 5.277e-01 2.155e-14 6.962e-11 1.346e-03 4.578e-01 2.952e-11 1.109e-02 2.067e-03

82 2.870e-10 8.481e-24 1.440e-14 3.710e-11 4.306e-11 1.000e+00 1.143e-11 7.208e-08

83 5.803e-21 1.328e-40 1.490e-28 4.736e-22 1.094e-18 1.000e+00 4.189e-25 9.202e-16

84 2.666e-08 1.218e-18 4.023e-13 1.541e-07 2.354e-08 1.000e+00 8.083e-10 3.642e-05

85 1.159e-06 1.952e-17 1.163e-11 2.193e-06 6.917e-07 9.995e-01 5.174e-08 5.327e-04

86 1.847e-09 3.846e-24 3.679e-16 3.472e-10 6.097e-09 1.000e+00 4.000e-12 3.056e-07

87 3.516e-12 6.084e-25 2.778e-16 3.959e-13 1.425e-11 1.000e+00 3.656e-14 1.902e-07

88 7.367e-17 1.988e-33 3.101e-25 4.890e-17 3.955e-16 1.000e+00 3.655e-20 4.292e-12

89 3.666e-15 2.779e-31 1.585e-22 1.981e-15 1.942e-13 1.000e+00 2.320e-18 5.454e-11

90 3.605e-15 1.229e-32 6.194e-23 2.995e-16 3.835e-14 1.000e+00 8.842e-19 2.201e-11

91 1.773e-13 1.255e-29 3.096e-22 3.700e-14 4.133e-12 1.000e+00 4.365e-17 7.909e-09

92 2.582e-09 1.516e-20 3.135e-12 1.959e-09 1.798e-09 1.000e+00 8.748e-11 1.379e-06

93 1.502e-08 9.975e-19 1.372e-13 8.888e-08 1.179e-07 9.998e-01 5.822e-10 1.592e-04

94 8.801e-11 1.069e-24 2.058e-16 1.514e-11 1.597e-10 1.000e+00 2.616e-13 9.936e-08

95 2.122e-11 5.968e-24 3.000e-17 7.967e-11 2.891e-10 1.000e+00 1.415e-13 1.240e-07

96 3.895e-09 1.087e-18 1.905e-11 1.722e-08 2.374e-09 1.000e+00 7.285e-10 7.165e-06

97 2.802e-08 2.428e-20 6.999e-15 4.040e-08 7.810e-08 9.999e-01 5.586e-10 9.690e-05

98 7.772e-04 1.223e-04 1.127e-05 1.090e-01 5.905e-06 2.382e-14 8.898e-01 2.108e-04

99 3.890e-04 2.941e-04 2.781e-06 2.250e-01 7.647e-05 7.852e-15 7.697e-01 4.517e-03

100 7.266e-04 1.487e-03 3.540e-06 3.285e-01 6.167e-05 1.626e-14 6.653e-01 3.876e-03

101 1.339e-05 1.477e-01 1.278e-05 2.769e-01 6.372e-08 7.912e-17 5.752e-01 1.232e-04

102 9.111e-01 5.762e-11 3.303e-08 4.355e-04 3.375e-03 5.347e-14 8.390e-02 1.176e-03

103 4.624e-01 6.632e-09 4.331e-05 7.270e-04 6.894e-05 7.900e-14 5.365e-01 2.362e-04

104 6.909e-03 6.811e-06 5.938e-04 4.841e-04 2.342e-05 7.585e-16 9.913e-01 6.822e-04

105 9.179e-02 6.798e-07 2.910e-06 3.237e-03 8.431e-05 8.912e-16 9.034e-01 1.441e-03

106 2.715e-02 3.540e-08 2.666e-03 1.317e-02 1.240e-04 1.233e-10 9.567e-01 1.692e-04

107 3.545e-03 2.359e-05 7.510e-04 3.853e-01 1.094e-04 1.452e-10 6.093e-01 1.015e-03

108 1.064e-03 9.818e-07 1.784e-09 9.458e-01 6.773e-05 3.277e-13 5.254e-02 5.524e-04

109 4.286e-04 9.369e-05 8.249e-04 6.698e-03 1.378e-07 1.564e-15 9.919e-01 2.495e-05

110 3.409e-05 2.251e-02 8.370e-04 9.425e-02 8.965e-07 6.373e-15 8.821e-01 3.159e-04

111 2.665e-03 8.307e-06 4.476e-08 4.621e-01 2.580e-03 6.586e-14 5.153e-01 1.733e-02

112 4.784e-09 9.840e-05 1.120e-11 8.032e-03 9.370e-11 5.078e-07 3.577e-05 9.918e-01

113 1.161e-06 1.545e-05 3.668e-10 8.975e-02 2.197e-08 3.039e-06 9.260e-04 9.093e-01

114 1.362e-02 6.503e-10 8.329e-11 1.221e-03 7.224e-01 4.049e-13 3.721e-04 2.624e-01

115 6.778e-03 2.672e-16 2.968e-16 1.369e-04 9.895e-01 1.234e-11 8.831e-07 3.589e-03

116 4.758e-04 2.300e-05 7.975e-08 7.999e-01 1.726e-04 1.828e-13 1.967e-01 2.673e-03

117 8.751e-04 2.670e-07 7.540e-13 9.676e-01 3.929e-03 7.460e-15 1.101e-02 1.660e-02

118 2.376e-05 2.482e-18 1.675e-15 6.748e-07 8.786e-05 2.727e-01 3.556e-08 7.272e-01

119 9.619e-05 9.413e-18 7.300e-16 3.771e-05 3.382e-04 5.342e-01 1.240e-07 4.653e-01

120 1.470e-01 8.196e-08 3.212e-09 8.390e-02 5.873e-03 2.014e-11 2.309e-01 5.323e-01

121 2.711e-02 1.058e-08 2.379e-08 2.019e-02 4.580e-02 6.197e-09 5.007e-03 9.019e-01

122 1.457e-03 2.863e-11 8.852e-09 3.437e-04 3.547e-04 2.126e-05 1.547e-04 9.977e-01

123 1.834e-02 2.053e-11 6.119e-14 1.024e-02 1.065e-03 3.178e-09 9.495e-04 9.694e-01

124 8.653e-02 7.516e-10 1.772e-10 2.949e-01 1.645e-02 1.410e-07 2.361e-02 5.785e-01

125 2.617e-02 2.831e-13 7.628e-17 2.112e-02 3.533e-01 2.188e-09 5.436e-05 5.993e-01

> attach(blind)

> predict(amoQlda,blind)

$class

[1] q06 q07 q06 q08 q06

Levels: q01 q04 q05 q06 q07 q08 q09 q10

$posterior

	q01	q04	q05	q06	q07	q08	q09	q10
1	5.085e-02	2.493e-05	4.884e-07	5.054e-01	2.935e-03	1.269e-12	4.194e-01	2.146e-02
2	3.653e-01	1.198e-16	5.698e-14	1.722e-03	6.322e-01	2.566e-09	5.961e-05	7.336e-04
3	2.778e-05	9.376e-06	1.214e-11	9.285e-01	8.741e-06	8.531e-11	2.847e-03	6.863e-02
4	2.652e-08	4.755e-19	2.195e-13	1.860e-07	2.991e-08	1.000e+00	8.825e-10	1.921e-05
5	1.765e-03	2.027e-10	1.985e-14	7.825e-01	1.960e-01	4.021e-12	1.268e-03	1.847e-02

$x

	LD1	LD2	LD3	LD4	LD5	LD6	LD7
1	0.7829	-1.178	0.0643	-0.08697	-0.3310	-1.303881	-2.95695
2	-2.6769	-1.941	-1.2077	-1.19938	-1.1449	-0.968284	0.06869
3	0.1565	-0.851	2.9387	-0.70516	-0.5251	0.007627	-0.26025
4	-3.7399	2.936	1.1422	-0.89759	-0.6615	-1.079653	0.03455
5	-1.0793	-2.652	1.2843	-0.50662	-2.9783	2.261613	0.26159

TRANSFORMED DATA-FRAME

tamoQlda<-
lda(Quarry~Quartzt+Calcitet+FeDismt+Illitet+Kaol2t+Kaol3t+Dismll1t+Dismll3t,data=amoQ,prior=c(1,1,1,1,1,1,1,1)/8)

> tamoQlda

Call:

lda(Quarry ~ Quartzt + Calcitet + FeDismt + Illitet + Kaol2t +

Kaol3t + Dismll1t + Dismll3t, data = amoQ, prior = c(1, 1,

1, 1, 1, 1, 1, 1)/8)

Prior probabilities of groups:

q01	q04	q05	q06	q07	q08	q09	q10
0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125

Group means:

	Quartzt	Calcitet	FeDismt	Illitet	Kaol2t	Kaol3t	Dismll1t	Dismll3t
q01	0.2018	0.000000	0.3088	0.1860	0.2322	0.4406	0.2257	0.3973
q04	0.1672	0.000000	0.6619	0.1826	0.1887	0.3026	0.1201	0.4069
q05	0.2380	0.000000	0.3730	0.2685	0.0775	0.2796	0.2674	0.5306
q06	0.2155	0.055469	0.5485	0.1379	0.2196	0.4139	0.1389	0.3794
q07	0.2109	0.005389	0.3266	0.1992	0.2818	0.4761	0.2316	0.3485
q08	0.2535	0.244717	0.3846	0.1946	0.1985	0.3966	0.2024	0.4482
q09	0.2245	0.000000	0.4439	0.2037	0.1755	0.3691	0.1569	0.4161

q10 0.1706 0.128500 0.4707 0.1905 0.2407 0.4123 0.1546 0.3176

Coefficients of linear discriminants:

	LD1	LD2	LD3	LD4	LD5	LD6	LD7
Quartzt	-10.21844	-9.337	4.9990	-10.090	7.0779	-9.9300	2.7137
Calcitet	-15.99584	-14.175	-10.2282	2.978	-0.6293	1.0036	0.2532
FeDismt	10.11563	-2.826	-9.8417	-2.570	11.0240	-0.6722	3.4281
Illitet	4.63614	-8.657	-0.1119	9.716	21.1633	-12.2585	-2.6907
Kaol2t	-7.03420	3.838	-2.6934	1.304	10.9546	1.9721	-10.0656
Kaol3t	-19.27635	5.981	-2.0680	-9.157	11.6411	-3.8722	4.4601
Dismll1t	1.69338	-8.171	0.9060	3.145	8.0900	7.7068	8.8362
Dismll3t	0.06371	-9.831	0.4332	-10.211	7.7140	3.5237	-7.6350

Proportion of trace:

LD1	LD2	LD3	LD4	LD5	LD6	LD7
0.5749	0.2477	0.1428	0.0212	0.0083	0.0034	0.0017

```
> tamoQ_pred<-predict(tamoQlda)
> tamoQ_pred$class
 [1] q01 q07 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q01 q04 q04 q04 q04 q04 q04 q04 q04 q04
q04 q04 q05 q05 q05 q05 q05 q05 q05 q05 q05 q06 q06 q06 q06 q10
 [39] q06 q10 q10 q10 q06 q06 q06 q06 q06 q06 q06 q04 q09 q06 q06 q01 q09 q09 q06 q09 q06 q07
q06 q06 q06 q07 q07 q07 q07 q07 q07 q07 q07 q01 q07 q07 q01 q07
 [77] q07 q01 q07 q07 q07 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q08 q09
q09 q09 q09 q01 q01 q09 q09 q09 q09 q06 q09 q09 q09 q10 q10 q07
[115] q07 q06 q06 q10 q10 q10 q10 q10 q10 q10 q10
Levels: q01 q04 q05 q06 q07 q08 q09 q10
> tamoQ_pred$posterior
          q01       q04       q05       q06       q07       q08       q09       q10
1   8.067e-01 3.223e-15 2.177e-12 7.816e-04 1.912e-01 1.198e-09 9.224e-04 3.884e-04
2   3.854e-01 1.802e-13 3.532e-10 1.505e-03 6.079e-01 4.054e-08 2.203e-03 3.046e-03
3   8.572e-01 1.698e-10 2.816e-09 4.909e-03 7.735e-02 6.247e-11 5.374e-02 6.849e-03
4   8.008e-01 8.353e-12 3.697e-08 3.161e-03 1.374e-01 2.923e-09 5.497e-02 3.670e-03
```

5 8.344e-01 3.245e-12 1.532e-09 9.244e-04 1.476e-01 3.293e-10 1.385e-02 3.195e-03

6 7.470e-01 2.178e-12 4.237e-10 1.287e-03 2.442e-01 1.639e-09 3.546e-03 3.928e-03

7 8.999e-01 2.132e-14 7.589e-11 6.395e-04 9.754e-02 7.533e-10 9.821e-04 9.253e-04

8 6.418e-01 3.849e-17 7.952e-13 2.578e-05 3.579e-01 4.652e-09 3.994e-05 2.327e-04

9 6.585e-01 2.991e-11 6.031e-08 3.210e-02 2.585e-01 2.992e-07 4.587e-02 5.104e-03

10 5.495e-01 8.900e-15 1.022e-12 3.697e-04 4.479e-01 3.666e-10 5.907e-04 1.612e-03

11 7.040e-01 4.701e-14 1.493e-10 1.218e-03 2.919e-01 1.690e-08 5.431e-04 2.321e-03

12 9.671e-01 5.818e-14 3.781e-11 5.682e-03 2.568e-02 2.717e-09 1.249e-03 2.917e-04

13 9.079e-01 1.695e-13 5.737e-12 2.409e-03 8.712e-02 3.389e-10 1.787e-03 7.792e-04

14 8.630e-01 1.691e-11 2.355e-10 1.166e-02 1.090e-01 6.041e-10 1.219e-02 4.129e-03

15 8.752e-16 1.000e+00 2.511e-06 1.854e-08 1.255e-18 1.509e-24 1.572e-06 4.420e-12

16 2.256e-15 1.000e+00 1.101e-07 9.751e-09 1.647e-17 1.137e-25 4.811e-06 1.690e-11

17 4.002e-07 9.052e-01 1.113e-04 4.385e-02 4.078e-09 1.902e-15 5.083e-02 5.034e-05

18 3.528e-12 9.998e-01 5.610e-05 5.581e-07 5.573e-15 4.153e-21 1.125e-04 8.947e-10

19 1.701e-12 9.999e-01 3.732e-10 1.974e-06 1.682e-14 7.944e-26 6.622e-05 1.146e-08

20 7.134e-17 1.000e+00 2.660e-07 3.822e-09 3.762e-19 2.434e-25 1.263e-07 2.563e-12

21 2.406e-10 9.985e-01 4.647e-09 1.237e-03 1.621e-14 2.709e-22 2.163e-04 1.023e-08

22 2.290e-16 1.000e+00 6.558e-09 3.704e-08 5.475e-19 1.709e-25 1.570e-07 2.759e-12

23 2.766e-09 9.917e-01 2.169e-08 3.291e-04 7.307e-12 3.215e-22 7.947e-03 6.893e-07

24 6.785e-16 9.999e-01 8.891e-05 2.271e-09 6.634e-19 1.729e-23 1.404e-06 1.004e-12

25 2.301e-07 1.375e-03 9.533e-01 3.681e-04 1.289e-09 1.080e-11 4.491e-02 6.107e-07

26 1.317e-12 2.340e-10 1.000e+00 6.743e-13 2.545e-17 7.314e-18 4.013e-07 7.733e-15

27 1.960e-08 2.357e-06 9.995e-01 1.074e-07 1.480e-11 3.189e-13 4.973e-04 1.271e-09

28 6.880e-06 2.825e-04 8.737e-01 4.649e-05 5.515e-09 6.776e-13 1.260e-01 9.200e-07

29 4.959e-11 1.733e-06 9.999e-01 8.516e-09 1.779e-14 1.749e-16 5.398e-05 7.264e-11

30 2.102e-10 4.476e-04 9.967e-01 4.760e-07 3.710e-14 7.031e-17 2.806e-03 2.896e-10

31 3.650e-09 1.613e-04 9.977e-01 2.604e-06 1.099e-11 7.446e-14 2.145e-03 1.506e-08

32 2.179e-10 1.279e-12 1.000e+00 6.333e-12 6.770e-14 2.542e-14 1.163e-05 3.265e-13

33 9.072e-19 8.475e-13 1.000e+00 6.550e-18 5.689e-23 6.030e-21 8.538e-11 1.151e-19

34 1.399e-04 1.394e-04 4.961e-10 8.454e-01 1.056e-04 1.576e-10 1.662e-02 1.376e-01

35 2.497e-04 4.444e-05 2.516e-13 9.974e-01 2.908e-06 2.122e-16 1.730e-03 5.852e-04

36 5.267e-04 5.428e-07 1.658e-10 9.441e-01 4.574e-05 5.264e-08 4.220e-03 5.111e-02

37 2.222e-04 2.864e-06 3.678e-09 6.448e-01 1.375e-05 1.287e-07 4.605e-03 3.504e-01

38 6.689e-05 4.503e-08 3.288e-11 1.559e-01 4.678e-05 6.908e-07 3.131e-03 8.409e-01

39 6.563e-05 4.503e-09 7.005e-12 6.575e-01 1.751e-04 1.410e-05 2.775e-04 3.419e-01

40 9.203e-06 4.813e-07 3.500e-12 3.047e-01 7.697e-06 2.148e-08 1.357e-03 6.940e-01

41 6.619e-06 2.214e-07 1.419e-09 4.694e-01 1.500e-06 2.044e-05 9.134e-04 5.296e-01

42 1.340e-04 3.106e-11 4.508e-14 9.982e-02 3.310e-04 1.383e-05 4.203e-05 8.997e-01

43 3.518e-05 1.314e-08 2.853e-11 8.243e-01 3.335e-05 6.581e-05 4.427e-04 1.752e-01

44 2.229e-04 9.425e-09 1.642e-09 7.046e-01 3.627e-05 4.903e-05 4.085e-03 2.910e-01

45 4.286e-05 4.108e-08 1.284e-09 8.894e-01 3.133e-05 6.621e-04 1.418e-03 1.084e-01

46 5.386e-04 1.857e-09 5.302e-12 9.112e-01 7.808e-04 5.569e-07 1.461e-03 8.600e-02

47 1.070e-03 2.091e-05 1.962e-08 7.504e-01 1.491e-04 4.290e-11 1.742e-01 7.408e-02

48 4.875e-03 1.388e-06 1.131e-06 6.923e-01 8.158e-04 6.143e-09 3.003e-01 1.682e-03

49 1.302e-03 4.027e-05 1.457e-08 8.509e-01 1.915e-04 1.342e-11 1.449e-01 2.613e-03

50 9.578e-06 6.797e-01 2.096e-06 5.894e-02 2.737e-07 2.271e-16 2.605e-01 8.187e-04

51 2.068e-04 1.018e-02 9.676e-06 4.906e-01 4.718e-06 6.298e-13 4.980e-01 9.941e-04

52 6.121e-02 1.027e-07 4.810e-07 6.410e-01 1.174e-02 6.467e-08 2.814e-01 4.729e-03

53 2.773e-02 3.971e-06 8.126e-08 4.966e-01 1.770e-04 3.425e-12 4.740e-01 1.451e-03

54 4.202e-01 8.586e-10 5.118e-09 2.471e-01 9.834e-02 5.499e-09 2.266e-01 7.674e-03

55 1.335e-03 2.390e-05 4.743e-05 4.768e-01 2.664e-05 1.858e-10 5.211e-01 6.938e-04

56 5.375e-02 1.368e-05 6.533e-10 3.322e-01 2.213e-02 6.435e-14 3.756e-01 2.163e-01

57 6.538e-04 1.358e-03 2.552e-07 8.032e-01 2.536e-05 2.847e-12 1.932e-01 1.606e-03

58 5.541e-02 2.063e-07 1.542e-05 1.457e-01 1.664e-04 4.722e-10 7.984e-01 3.000e-04

59 5.212e-02 9.156e-08 2.078e-09 8.794e-01 3.053e-03 2.619e-10 6.202e-02 3.430e-03

60 9.263e-02 6.401e-09 1.584e-10 2.703e-01 3.741e-01 1.748e-10 1.918e-02 2.439e-01

61 3.139e-02 1.275e-08 6.671e-09 8.219e-01 3.385e-02 1.413e-08 1.041e-01 8.785e-03

62 2.006e-02 2.426e-09 7.402e-11 9.650e-01 6.024e-04 4.614e-10 1.373e-02 5.592e-04

63 8.518e-03 8.376e-09 8.711e-10 9.325e-01 4.420e-03 5.568e-09 5.268e-02 1.861e-03

64 2.073e-01 3.562e-12 1.669e-12 1.124e-02 7.701e-01 3.003e-09 6.719e-04 1.071e-02

65 2.301e-01 3.043e-13 1.597e-12 2.912e-03 7.635e-01 7.225e-09 6.155e-04 2.821e-03

66 9.820e-02 9.084e-15 1.661e-15 1.906e-03 8.967e-01 2.174e-10 5.158e-05 3.171e-03

67 1.306e-01 5.058e-19 1.200e-20 2.259e-05 8.690e-01 7.201e-14 1.113e-06 3.111e-04

68 3.646e-01 2.649e-13 2.710e-11 9.102e-04 6.266e-01 6.953e-10 1.202e-03 6.598e-03

69 6.927e-02 8.186e-17 5.918e-15 9.344e-05 9.298e-01 1.768e-09 6.750e-06 8.727e-04

70 2.911e-02 2.768e-18 1.858e-17 4.176e-03 9.332e-01 2.107e-04 1.999e-06 3.334e-02

71 1.093e-02 3.706e-22 1.896e-20 5.402e-06 9.890e-01 5.446e-10 2.347e-08 4.761e-05

72 5.318e-01 1.672e-12 4.738e-11 7.393e-04 4.599e-01 5.318e-10 1.911e-03 5.630e-03

73 1.177e-01 2.658e-16 2.667e-14 1.377e-04 8.811e-01 3.394e-09 1.389e-05 1.052e-03

74 3.311e-02 1.254e-18 3.076e-18 4.190e-06 9.660e-01 1.367e-12 4.154e-07 8.554e-04

75 5.481e-01 4.097e-13 4.047e-10 7.242e-04 4.456e-01 7.366e-09 1.800e-03 3.848e-03

76 1.202e-01 2.448e-15 6.188e-15 9.505e-05 8.751e-01 1.309e-11 2.478e-05 4.562e-03

77 4.324e-02 2.088e-20 1.631e-18 1.546e-06 9.566e-01 5.226e-11 7.755e-08 1.388e-04

78 9.020e-01 6.002e-15 2.393e-07 5.615e-04 8.579e-02 4.245e-06 1.153e-02 1.121e-04

79 3.879e-01 1.542e-18 1.451e-10 1.472e-04 6.116e-01 1.838e-04 1.495e-04 4.083e-05

80 3.449e-01 5.371e-14 1.438e-11 2.008e-03 6.467e-01 4.111e-09 4.402e-03 2.014e-03

81 4.327e-01 3.190e-14 2.342e-10 9.044e-04 5.589e-01 2.297e-08 5.438e-03 2.090e-03

82 2.353e-08 6.177e-22 5.768e-12 7.191e-09 1.542e-09 1.000e+00 1.571e-09 8.556e-07

83 1.580e-13 2.516e-32 1.273e-21 2.516e-14 1.861e-12 1.000e+00 3.702e-17 8.257e-11

84 5.591e-08 6.259e-19 2.398e-13 1.650e-06 4.050e-08 1.000e+00 1.908e-09 3.466e-05

85 2.902e-07 1.476e-18 4.675e-12 3.099e-06 1.859e-07 9.999e-01 1.760e-08 1.152e-04

86 2.713e-08 2.564e-24 8.706e-16 6.052e-09 3.610e-08 1.000e+00 3.726e-11 6.104e-07

87 1.787e-09 2.895e-21 5.581e-13 1.288e-09 2.026e-09 1.000e+00 7.052e-11 7.516e-06

88 1.446e-10 6.438e-26 1.643e-18 3.322e-10 1.300e-10 1.000e+00 3.687e-13 9.491e-08

89 3.199e-11 1.534e-27 2.662e-19 2.925e-11 2.399e-10 1.000e+00 3.270e-14 9.745e-09

90 1.389e-10 2.688e-28 1.552e-18 1.908e-11 2.829e-10 1.000e+00 6.045e-14 1.445e-08

91 2.647e-09 3.434e-25 1.071e-17 1.818e-09 1.306e-08 1.000e+00 2.099e-12 3.465e-06

92 8.102e-09 4.022e-21 1.009e-12 2.330e-08 5.061e-09 1.000e+00 2.366e-10 1.588e-06

93 2.763e-08 4.598e-19 9.992e-14 5.552e-07 1.080e-07 9.999e-01 1.371e-09 6.968e-05

94 5.307e-09 1.089e-23 2.862e-15 2.212e-09 5.861e-09 1.000e+00 1.454e-11 7.066e-07

95 1.596e-09 6.279e-23 2.619e-16 1.148e-08 7.157e-09 1.000e+00 1.178e-11 8.580e-07

96 8.039e-09 4.356e-19 1.293e-11 1.638e-07 4.484e-09 1.000e+00 1.833e-09 6.498e-06

97 1.131e-07 4.721e-20 5.013e-14 5.485e-07 2.161e-07 9.999e-01 3.061e-09 1.017e-04

98 5.729e-04 1.466e-04 2.326e-06 5.617e-02 7.572e-06 1.035e-12 9.430e-01 1.273e-04

99 3.798e-04 2.076e-04 1.383e-05 1.723e-01 1.502e-04 1.048e-11 8.197e-01 7.246e-03

100 2.908e-04 4.889e-03 3.305e-05 1.487e-01 2.403e-05 9.061e-12 8.446e-01 1.471e-03

101 7.350e-06 2.498e-01 1.778e-04 1.562e-01 8.058e-08 9.910e-14 5.937e-01 1.234e-04

102 9.654e-01 6.966e-12 7.239e-08 1.091e-04 1.583e-02 5.069e-11 1.795e-02 7.022e-04

103 6.254e-01 9.254e-09 4.031e-04 8.027e-04 7.681e-04 8.079e-11 3.720e-01 6.171e-04

104 1.742e-02 1.141e-05 1.316e-03 5.269e-04 1.221e-04 4.258e-13 9.793e-01 1.267e-03

105 5.443e-02 8.897e-06 1.066e-04 4.122e-03 2.802e-04 6.348e-13 9.379e-01 3.154e-03

106 1.523e-02 6.818e-08 1.693e-02 1.720e-02 2.067e-04 9.431e-08 9.502e-01 2.340e-04

107 2.559e-03 1.470e-05 5.931e-04 3.454e-01 1.687e-04 2.942e-08 6.504e-01 8.248e-04

108 1.378e-03 8.355e-07 8.601e-09 9.158e-01 9.946e-05 5.472e-11 8.222e-02 5.350e-04

109 9.147e-06 1.007e-03 4.007e-01 1.151e-03 2.880e-09 6.720e-14 5.971e-01 2.601e-06

110 2.039e-05 1.234e-02 1.200e-03 3.947e-02 6.524e-07 9.139e-13 9.468e-01 1.440e-04

111 5.637e-03 1.374e-06 4.175e-09 2.753e-01 3.971e-03 2.484e-12 7.047e-01 1.034e-02

112 1.312e-08 1.929e-03 1.894e-10 3.976e-02 1.716e-10 5.455e-10 3.663e-04 9.579e-01

113 1.072e-06 1.737e-05 8.535e-10 2.254e-01 2.235e-08 3.200e-07 1.898e-03 7.727e-01

114 5.463e-02 1.017e-08 7.911e-11 6.132e-03 6.341e-01 1.439e-11 3.331e-03 3.018e-01

115 3.153e-02 4.425e-15 1.099e-15 6.015e-04 9.638e-01 2.034e-10 1.046e-05 4.044e-03

116 6.754e-04 1.443e-05 3.393e-07 6.340e-01 2.953e-04 9.256e-11 3.622e-01 2.825e-03

117 2.747e-03 3.252e-07 2.570e-12 9.340e-01 6.700e-03 1.238e-12 2.142e-02 3.513e-02

118 1.778e-04 1.359e-16 1.426e-13 1.730e-05 2.874e-04 3.845e-02 5.581e-07 9.611e-01

119 2.799e-04 1.441e-16 3.221e-14 5.965e-04 6.591e-04 2.301e-01 9.717e-07 7.683e-01

120 1.183e-02 5.601e-09 3.905e-09 2.730e-02 2.050e-03 2.135e-07 1.315e-02 9.457e-01

121 3.600e-03 2.351e-10 8.507e-10 1.255e-02 1.103e-02 2.574e-05 4.229e-04 9.724e-01

122 1.761e-04 1.365e-12 4.108e-10 4.618e-04 1.656e-04 5.664e-04 1.478e-05 9.986e-01

123 8.099e-04 1.207e-11 4.601e-13 4.669e-03 1.697e-04 2.187e-07 8.458e-05 9.943e-01

124 1.242e-02 3.675e-11 2.747e-10 1.548e-01 5.408e-03 4.167e-04 3.161e-03 8.238e-01

125 2.410e-02 7.001e-14 1.806e-17 3.088e-02 1.032e-01 6.706e-07 4.504e-05 8.418e-01

```
> attach(blind)
> predict(tamoQlda,blind)
$class
```

[1] q09 q07 q06 q08 q06

Levels: q01 q04 q05 q06 q07 q08 q09 q10

$posterior

	q01	q04	q05	q06	q07	q08	q09	q10
1	1.439e-02	4.298e-04	5.751e-06	2.907e-01	4.506e-04	6.251e-11	6.888e-01	5.193e-03
2	4.592e-01	9.429e-17	7.614e-14	1.761e-03	5.387e-01	1.139e-07	6.541e-05	2.998e-04
3	3.596e-05	5.354e-08	4.774e-13	8.210e-01	1.464e-05	7.458e-08	8.916e-04	1.781e-01
4	6.253e-08	2.462e-19	2.381e-13	1.584e-06	4.813e-08	1.000e+00	2.643e-09	2.076e-05
5	1.198e-02	8.211e-11	1.629e-15	7.202e-01	2.472e-01	3.855e-11	4.489e-03	1.615e-02

$x

	LD1	LD2	LD3	LD4	LD5	LD6	LD7
1	1.144	0.9948	-0.0704	-0.4936	0.5674	1.5817	-2.43559
2	-2.908	1.5693	1.2843	-1.6950	0.2307	0.7897	0.08186
3	-0.708	1.0677	-3.1321	-1.0748	-0.7734	-0.6860	-0.69018
4	-3.441	-3.0142	-1.5046	-0.9857	0.2550	0.7479	0.25206
5	-1.442	3.3455	-1.0533	-1.9069	1.0874	-2.8120	-0.27373