**Supplementary Data**

**Assessment of metal pollution in the surface sediments of a dried lake in Schirmacher Oasis, East Antarctica**

**Table S1**: Pearson’s coefficients for the parameters used in the study (n=25). Significant correlations (p<0.05) are highlighted in bold.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | Al | As | Ba | Ca | Co | Cr | Fe | Li | Mg | Mn | Ni | Pb | Sr | Zn | Na | Sand | Silt | Clay | TOC | TIC |
| Al | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| As | 0.08 | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Ba | **0.73** | 0.24 | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Ca | **0.60** | 0.07 | **0.60** | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Co | 0.22 | 0.28 | 0.33 | 0.07 | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Cr | 0.21 | 0.27 | 0.28 | -0.05 | **0.98** | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Fe | 0.27 | 0.33 | 0.36 | 0.09 | **0.98** | **0.98** | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Li | 0.39 | 0.35 | **0.57** | 0.11 | **0.87** | **0.87** | **0.87** | **1.00** |   |   |   |   |   |   |   |   |   |   |   |   |
| Mg | 0.35 | 0.33 | **0.48** | 0.13 | **0.95** | **0.95** | **0.95** | **0.94** | **1.00** |   |   |   |   |   |   |   |   |   |   |   |
| Mn | 0.02 | 0.20 | 0.08 | -0.05 | **0.78** | **0.80** | **0.80** | **0.53** | **0.75** | **1.00** |   |   |   |   |   |   |   |   |   |   |
| Ni | -0.02 | 0.10 | 0.17 | -0.25 | **0.88** | **0.89** | **0.83** | **0.77** | **0.83** | **0.72** | **1.00** |   |   |   |   |   |   |   |   |   |
| Pb | 0.01 | 0.23 | **0.50** | 0.36 | 0.35 | 0.28 | 0.37 | 0.32 | 0.34 | 0.31 | 0.24 | **1.00** |   |   |   |   |   |   |   |   |
| Sr | **0.78** | 0.02 | **0.82** | **0.80** | 0.08 | 0.01 | 0.11 | 0.25 | 0.20 | -0.05 | -0.10 | 0.27 | **1.00** |   |   |   |   |   |   |   |
| Zn | **0.40** | 0.17 | 0.33 | 0.14 | **0.57** | **0.58** | **0.58** | **0.45** | **0.54** | **0.43** | **0.49** | 0.17 | 0.25 | **1.00** |   |   |   |   |   |   |
| Na | **0.62** | 0.34 | **0.61** | **0.81** | -0.09 | -0.16 | -0.02 | 0.12 | 0.01 | -0.26 | **-0.42** | 0.28 | **0.68** | 0.01 | **1.00** |   |   |   |   |   |
| Sand | -0.12 | -0.03 | -0.25 | -0.04 | -0.01 | 0.01 | 0.01 | -0.18 | -0.05 | 0.20 | -0.08 | -0.12 | -0.31 | -0.18 | -0.06 | **1.00** |   |   |   |   |
| Silt | 0.20 | 0.15 | **0.45** | 0.22 | 0.24 | 0.21 | 0.23 | 0.36 | 0.30 | -0.02 | 0.21 | 0.38 | **0.42** | **0.42** | 0.15 | **-0.87** | **1.00** |   |   |   |
| Clay | -0.09 | -0.20 | -0.26 | -0.28 | -0.39 | -0.37 | **-0.40** | -0.23 | -0.39 | -0.37 | -0.20 | -0.39 | -0.08 | -0.35 | -0.12 | **-0.54** | 0.05 | **1.00** |   |   |
| TOC | 0.24 | 0.10 | 0.35 | 0.00 | **0.82** | **0.82** | **0.80** | **0.78** | **0.79** | **0.54** | **0.79** | 0.20 | 0.06 | **0.55** | -0.13 | -0.14 | 0.30 | -0.23 | **1.00** |   |
| TIC | 0.31 | 0.13 | 0.27 | -0.09 | **0.74** | **0.78** | **0.74** | **0.73** | **0.72** | **0.45** | **0.69** | 0.03 | 0.04 | **0.55** | -0.15 | -0.10 | 0.20 | -0.14 | **0.84** | **1.00** |

**Table S2**: Loading data along with variance for the significant principal components. Significant components have been highlighted in bold.

|  |  |  |
| --- | --- | --- |
|  | PC 1 | PC 2 |
| Al | 0.39 | **0.70** |
| As | 0.32 | 0.14 |
| Ba | 0.53 | **0.74** |
| Ca | 0.17 | **0.83** |
| Co | **0.96** | -0.19 |
| Cr | **0.95** | -0.27 |
| Fe | **0.96** | -0.14 |
| Li | **0.92** | 0.05 |
| Mg | **0.97** | -0.06 |
| Mn | **0.72** | -0.35 |
| Ni | **0.83** | -0.43 |
| Pb | 0.41 | 0.30 |
| Sr | 0.26 | **0.88** |
| Zn | **0.66** | 0.08 |
| Na | 0.04 | **0.87** |
| Sand | -0.12 | -0.32 |
| Silt | 0.38 | 0.41 |
| Clay | -0.40 | -0.04 |
| TOC | **0.85** | -0.17 |
| TIC | **0.78** | -0.20 |
| Eigenvalue | 8.63 | 4.17 |
| %variance | 43.16 | 20.86 |

**Table S3**: Range of environmental pollution indices

|  |  |
| --- | --- |
| **EF** | **Degree of enrichment** |
| <2 | Minimal enrichment |
| 2-5 | Moderate enrichment |
| 5-20 | Significant enrichment |
| 20-40 | Very high enrichment |
| >40 | Extremely high enrichment |
| **CF** | **Degree of contamination** |
| <1 | Low contamination |
| 1-3 | Moderate contamination |
| 3-6 | Considerable contamination |
| >6 | Very high contamination |
| **Igeo** | **Level of contamination** |
| <0 | No to weak contamination |
| 0 to 1 | Weak to moderate contamination |
| 1 to 2 | Moderate contamination |
| 2 to 3 | Moderate to strong contamination |
| 3 to 4 | strong contamination |
| 4 to 5 | strong to extreme contamination |
| >5 | extreme contamination |
| $$E\_{r}^{i}$$ | **Ecological risk posed by individual metals** |
| <40 | Low risk |
| 40 - 80 | Moderate risk |
| 80 - 160 | Considerable risk |
| 160 - 320 | High risk |
| > 320 | Very high risk |
| **PERI** | **Overall ecological risk** |
| < 150 | Low risk |
| 150 - 300 | Moderate risk |
| 300 - 600 | Considerable risk |
| > 600 | Very high risk |

**Table S4**: Concentrations of studied metals (in ppm) for each sample along with the mean and standard deviation.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Al | As | Ba | Ca | Co | Cr | Fe | Li | Mg | Mn | Ni | Pb | Sr | Zn | Na |
| DLS\_1 | 68132.83 | 4.00 | 1023.38 | 29178.18 | 32.93 | 69.35 | 24999.89 | 13.90 | 7150.93 | 394.96 | 19.71 | 21.17 | 211.51 | 155.05 | 21831.58 |
| DLS\_2 | 53816.09 | 5.40 | 747.48 | 26352.05 | 24.31 | 50.74 | 19507.32 | 7.68 | 4861.99 | 336.71 | 13.10 | 18.06 | 156.68 | 111.58 | 19322.61 |
| DLS\_3 | 60359.75 | 6.16 | 1060.12 | 27593.21 | 31.06 | 65.64 | 23620.16 | 12.55 | 7493.04 | 471.63 | 19.66 | 20.08 | 218.69 | 136.08 | 20171.11 |
| DLS\_4 | 57060.21 | 7.23 | 790.85 | 24599.00 | 24.23 | 55.75 | 22217.37 | 9.12 | 5990.27 | 429.44 | 9.39 | 20.12 | 149.77 | 116.31 | 20349.15 |
| DLS\_5 | 62625.41 | 5.67 | 889.06 | 26308.01 | 36.89 | 76.26 | 26435.97 | 14.92 | 9329.31 | 492.37 | 22.39 | 16.85 | 187.25 | 165.95 | 20190.46 |
| DLS\_6 | 53469.76 | 7.41 | 766.45 | 22654.78 | 27.07 | 61.84 | 23097.63 | 11.49 | 4676.99 | 320.94 | 14.86 | 17.43 | 140.68 | 136.76 | 20907.48 |
| DLS\_7 | 55532.06 | 5.54 | 763.01 | 29039.83 | 38.46 | 73.63 | 26841.11 | 13.16 | 7808.28 | 458.96 | 21.45 | 17.92 | 174.37 | 196.09 | 19576.29 |
| DLS\_8 | 62945.61 | 6.81 | 943.53 | 25230.57 | 44.64 | 95.34 | 30392.54 | 18.98 | 10568.94 | 505.69 | 31.97 | 18.58 | 192.86 | 222.33 | 20001.98 |
| DLS\_9 | 40681.04 | 3.53 | 547.74 | 19357.67 | 22.99 | 45.86 | 17280.29 | 6.45 | 3004.43 | 323.88 | 26.28 | 17.75 | 122.24 | 119.28 | 14993.18 |
| DLS\_10 | 50236.90 | 10.11 | 713.08 | 23911.07 | 36.34 | 74.84 | 25781.36 | 12.72 | 7407.62 | 475.48 | 19.54 | 20.12 | 143.57 | 177.28 | 19848.29 |
| DLS\_11 | 57922.16 | 5.10 | 739.01 | 21664.26 | 29.62 | 64.91 | 22270.00 | 9.61 | 6111.94 | 410.59 | 19.59 | 16.16 | 150.75 | 142.03 | 17215.76 |
| DLS\_12 | 60104.25 | 6.00 | 740.40 | 24940.53 | 22.29 | 48.21 | 20149.70 | 5.72 | 2944.54 | 374.94 | 10.92 | 15.50 | 186.20 | 194.27 | 19457.66 |
| DLS\_13 | 66010.64 | 5.28 | 848.10 | 27875.26 | 26.47 | 52.72 | 21068.09 | 8.99 | 5147.99 | 367.24 | 13.55 | 15.43 | 206.40 | 129.56 | 21271.07 |
| DLS\_14 | 64374.98 | 4.99 | 827.87 | 22013.06 | 42.68 | 92.85 | 29645.07 | 15.44 | 9152.79 | 500.81 | 30.99 | 16.47 | 162.67 | 191.72 | 16824.17 |
| DLS\_15 | 62763.79 | 3.52 | 689.37 | 24966.62 | 17.86 | 42.47 | 17401.99 | 7.03 | 3673.68 | 378.01 | 9.75 | 15.33 | 180.80 | 88.42 | 19420.33 |
| DLS\_16 | 52249.49 | 3.45 | 521.35 | 23295.56 | 29.56 | 67.20 | 23094.08 | 4.89 | 4783.07 | 473.37 | 16.81 | 16.43 | 135.71 | 230.21 | 16160.15 |
| DLS\_17 | 65773.26 | 4.37 | 845.42 | 23778.92 | 42.58 | 97.93 | 29677.40 | 15.31 | 9788.67 | 516.42 | 30.21 | 17.34 | 168.80 | 366.25 | 18663.34 |
| DLS\_18 | 69918.23 | 6.87 | 1008.21 | 28169.74 | 20.34 | 41.38 | 17881.03 | 8.97 | 4810.57 | 283.69 | 9.39 | 15.87 | 213.89 | 275.43 | 21628.80 |
| DLS\_19 | 61528.74 | 6.18 | 970.20 | 23902.78 | 19.09 | 40.64 | 17886.98 | 8.49 | 3875.71 | 309.07 | 7.95 | 18.55 | 200.31 | 179.34 | 19371.42 |
| DLS\_20 | 68239.77 | 8.65 | 836.94 | 28787.84 | 31.28 | 62.91 | 24477.72 | 9.26 | 6155.51 | 423.35 | 14.18 | 18.94 | 204.33 | 242.75 | 22077.12 |
| DLS\_21 | 50414.25 | 5.91 | 676.53 | 21821.33 | 28.84 | 66.17 | 23299.44 | 8.22 | 6190.01 | 563.70 | 26.00 | 18.10 | 147.99 | 202.58 | 16617.25 |
| DLS\_22 | 54195.76 | 7.03 | 681.50 | 24833.95 | 34.72 | 73.91 | 25274.04 | 9.56 | 7509.41 | 507.37 | 21.94 | 17.19 | 169.74 | 176.05 | 18384.67 |
| DLS\_23 | 64204.03 | 8.86 | 965.05 | 23495.75 | 51.35 | 117.29 | 34551.69 | 24.34 | 13895.72 | 522.62 | 41.91 | 18.11 | 181.08 | 285.51 | 17834.09 |
| DLS\_24 | 58320.55 | 3.01 | 827.43 | 27315.97 | 29.35 | 59.73 | 22726.21 | 10.71 | 6185.26 | 379.82 | 16.98 | 19.37 | 211.19 | 214.17 | 19883.46 |
| DLS\_25 | 63420.36 | 6.26 | 1116.72 | 28889.45 | 44.20 | 88.90 | 30581.71 | 14.64 | 9713.83 | 545.49 | 30.05 | 24.95 | 214.51 | 282.54 | 20363.57 |
| **Mean**  | **59372.00** | **5.89** | **821.55** | **25199.02** | **31.57** | **67.46** | **24006.35** | **11.29** | **6729.22** | **430.66** | **25.74** | **18.07** | **177.28** | **189.50** | **19294.60** |
| **Standard Deviation** | **6883.01** | **1.77** | **150.64** | **2684.74** | **8.85** | **19.50** | **4549.81** | **4.43** | **2623.50** | **80.65** | **21.15** | **2.15** | **28.61** | **65.56** | **1831.69** |



**Figure S1**: Spatial distribution of %sand, %silt, %clay along with TOC (%) and TIC (%)



**Figure S2**: Eir, PERI and PLI



**Figure S3**: Chemical Index of weathering (CIW) for the sediments of lake L55



**Figure S4**: Scatter plot for the principal component analysis