Supplementary Material

# Supplementary Figures and Tables

## Supplementary Figures

Chart

Description automatically generated

**Supplementary Figure 1.** Component plot in rotated space extracted by PCA from Congo Basin sediment samples.

Chart, diagram

Description automatically generated

**Supplementary Figure 2.** Component plot in rotated space extracted by PCA from Peru Margin sediment samples.

Chart

Description automatically generated

**Supplementary Figure 3.** Component plot in rotated space extracted by PCA from Amazon Fan sediment samples.

**Supplementary Figure 4.** Regression analysis of the C/N ratios and Hg concentrations of Congo Basin sediment samples.

**Supplementary Figure 5.** Regression analysis of the C/N ratios and Hg concentrations of Peru Margin sediment samples.

**Supplementary Figure 6.** Regression analysis of the C/N ratios and Hg concentrations of Amazon Fan sediment samples.

## Supplementary Tables

**Supplementary Table 1.** Correlation matrix of Congo Basin sediment samples.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Al** | **Si** | **S** | **Cl** | **K** | **Ca** | **Ti** | **Mn** | **Fe** | **Ni** | **Cu** | **Zn** | **Br** | **Rb** | **Sr** | **Y** | **Zr** | **Pb** | **Hg** | **C** | **N** |
| **Al** | 1.00 | 0.94 | 0.74 | 0.83 | 0.80 | 0.60 | 0.88 | 0.68 | -0.30 | -0.27 | -0.22 | -0.16 | -0.12 | -0.22 | -0.06 | -0.16 | -0.27 | 0.00 | 0.08 | 0.05 | 0.13 |
| **Si** | 0.94 | 1.00 | 0.73 | 0.90 | 0.88 | 0.59 | 0.93 | 0.68 | -0.32 | -0.27 | -0.25 | -0.14 | -0.11 | -0.15 | -0.06 | -0.16 | -0.30 | -0.03 | 0.06 | 0.07 | 0.06 |
| **S** | 0.74 | 0.73 | 1.00 | 0.60 | 0.64 | 0.63 | 0.75 | 0.61 | -0.20 | -0.17 | -0.20 | -0.18 | -0.24 | -0.21 | -0.05 | -0.14 | -0.16 | -0.02 | 0.04 | -0.10 | 0.11 |
| **Cl** | 0.83 | 0.90 | 0.60 | 1.00 | 0.74 | 0.68 | 0.78 | 0.69 | -0.20 | -0.23 | -0.15 | 0.05 | 0.14 | -0.23 | 0.12 | -0.23 | -0.51 | 0.09 | 0.13 | 0.27 | 0.09 |
| **K** | 0.80 | 0.88 | 0.64 | 0.74 | 1.00 | 0.24 | 0.94 | 0.37 | -0.26 | -0.20 | -0.19 | -0.09 | -0.19 | 0.26 | -0.17 | -0.05 | 0.05 | -0.08 | -0.28 | 0.04 | -0.18 |
| **Ca** | 0.60 | 0.59 | 0.63 | 0.68 | 0.24 | 1.00 | 0.41 | 0.80 | -0.06 | -0.14 | -0.10 | 0.04 | 0.18 | -0.63 | 0.35 | -0.31 | -0.69 | 0.09 | 0.55 | 0.15 | 0.35 |
| **Ti** | 0.88 | 0.93 | 0.75 | 0.78 | 0.94 | 0.41 | 1.00 | 0.59 | -0.24 | -0.20 | -0.21 | -0.18 | -0.19 | 0.00 | -0.17 | -0.10 | -0.04 | -0.03 | -0.09 | -0.01 | 0.03 |
| **Mn** | 0.68 | 0.68 | 0.61 | 0.69 | 0.37 | 0.80 | 0.59 | 1.00 | -0.19 | -0.21 | -0.22 | -0.15 | 0.08 | -0.66 | 0.10 | -0.24 | -0.58 | 0.12 | 0.56 | 0.13 | 0.41 |
| **Fe** | -0.30 | -0.32 | -0.20 | -0.20 | -0.26 | -0.06 | -0.24 | -0.19 | 1.00 | 0.73 | 0.76 | 0.70 | 0.64 | 0.30 | 0.62 | 0.30 | 0.22 | 0.41 | -0.09 | -0.03 | -0.09 |
| **Ni** | -0.27 | -0.27 | -0.17 | -0.23 | -0.20 | -0.14 | -0.20 | -0.21 | 0.73 | 1.00 | 0.68 | 0.55 | 0.55 | 0.31 | 0.53 | 0.34 | 0.24 | 0.26 | -0.10 | 0.10 | -0.05 |
| **Cu** | -0.22 | -0.25 | -0.20 | -0.15 | -0.19 | -0.10 | -0.21 | -0.22 | 0.76 | 0.68 | 1.00 | 0.60 | 0.58 | 0.32 | 0.54 | 0.34 | 0.16 | 0.29 | -0.06 | 0.13 | -0.10 |
| **Zn** | -0.16 | -0.14 | -0.18 | 0.05 | -0.09 | 0.04 | -0.18 | -0.15 | 0.70 | 0.55 | 0.60 | 1.00 | 0.70 | 0.34 | 0.71 | 0.21 | -0.09 | 0.37 | -0.07 | 0.24 | -0.16 |
| **Br** | -0.12 | -0.11 | -0.24 | 0.14 | -0.19 | 0.18 | -0.19 | 0.08 | 0.64 | 0.55 | 0.58 | 0.70 | 1.00 | 0.03 | 0.81 | 0.09 | -0.23 | 0.36 | 0.18 | 0.59 | 0.10 |
| **Rb** | -0.22 | -0.15 | -0.21 | -0.23 | 0.26 | -0.63 | 0.00 | -0.66 | 0.30 | 0.31 | 0.32 | 0.34 | 0.03 | 1.00 | 0.04 | 0.34 | 0.67 | -0.04 | -0.71 | -0.09 | -0.61 |
| **Sr** | -0.06 | -0.06 | -0.05 | 0.12 | -0.17 | 0.35 | -0.17 | 0.10 | 0.62 | 0.53 | 0.54 | 0.71 | 0.81 | 0.04 | 1.00 | 0.15 | -0.23 | 0.24 | 0.27 | 0.39 | 0.07 |
| **Y** | -0.16 | -0.16 | -0.14 | -0.23 | -0.05 | -0.31 | -0.10 | -0.24 | 0.30 | 0.34 | 0.34 | 0.21 | 0.09 | 0.34 | 0.15 | 1.00 | 0.38 | -0.06 | -0.26 | -0.12 | -0.25 |
| **Zr** | -0.27 | -0.30 | -0.16 | -0.51 | 0.05 | -0.69 | -0.04 | -0.58 | 0.22 | 0.24 | 0.16 | -0.09 | -0.23 | 0.67 | -0.23 | 0.38 | 1.00 | -0.09 | -0.58 | -0.33 | -0.27 |
| **Pb** | 0.00 | -0.03 | -0.02 | 0.09 | -0.08 | 0.09 | -0.03 | 0.12 | 0.41 | 0.26 | 0.29 | 0.37 | 0.36 | -0.04 | 0.24 | -0.06 | -0.09 | 1.00 | 0.04 | 0.02 | 0.06 |
| **Hg** | 0.08 | 0.06 | 0.04 | 0.13 | -0.28 | 0.55 | -0.09 | 0.56 | -0.09 | -0.10 | -0.06 | -0.07 | 0.18 | -0.71 | 0.27 | -0.26 | -0.58 | 0.04 | 1.00 | 0.22 | 0.49 |
| **C** | 0.05 | 0.07 | -0.10 | 0.27 | 0.04 | 0.15 | -0.01 | 0.13 | -0.03 | 0.10 | 0.13 | 0.24 | 0.59 | -0.09 | 0.39 | -0.12 | -0.33 | 0.02 | 0.22 | 1.00 | 0.15 |
| **N** | 0.13 | 0.06 | 0.11 | 0.09 | -0.18 | 0.35 | 0.03 | 0.41 | -0.09 | -0.05 | -0.10 | -0.16 | 0.10 | -0.61 | 0.07 | -0.25 | -0.27 | 0.06 | 0.49 | 0.15 | 1.00 |

**Supplementary Table 2.** Correlation matrix of Peru Margin sediment samples.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Al** | **Si** | **S** | **Cl** | **K** | **Ca** | **Ti** | **Mn** | **Fe** | **Ni** | **Cu** | **Zn** | **As** | **Br** | **Rb** | **Sr** | **Y** | **Zr** | **Pb** | **Hg** | **C** | **N** |
| **Al** | 1.00 | 0.57 | 0.51 | 0.05 | 0.60 | 0.65 | 0.57 | 0.55 | -0.16 | -0.21 | -0.21 | -0.15 | -0.16 | -0.34 | -0.26 | 0.48 | 0.18 | 0.19 | 0.04 | -0.26 | -0.21 | -0.21 |
| **Si** | 0.57 | 1.00 | 0.16 | -0.33 | 0.79 | 0.19 | 0.61 | 0.74 | -0.35 | -0.70 | -0.60 | -0.70 | -0.49 | -0.75 | -0.54 | 0.36 | 0.45 | 0.65 | 0.32 | -0.65 | -0.78 | -0.79 |
| **S** | 0.51 | 0.16 | 1.00 | 0.71 | -0.05 | 0.57 | -0.02 | -0.12 | 0.00 | 0.36 | 0.46 | 0.22 | 0.34 | 0.03 | -0.43 | 0.25 | -0.43 | -0.45 | -0.16 | -0.12 | 0.28 | 0.24 |
| **Cl** | 0.05 | -0.33 | 0.71 | 1.00 | -0.57 | 0.29 | -0.55 | -0.66 | 0.08 | 0.69 | 0.80 | 0.55 | 0.58 | 0.62 | -0.16 | -0.07 | -0.84 | -0.86 | -0.35 | 0.28 | 0.72 | 0.70 |
| **K** | 0.60 | 0.79 | -0.05 | -0.57 | 1.00 | 0.18 | 0.94 | 0.96 | -0.13 | -0.66 | -0.67 | -0.52 | -0.53 | -0.68 | -0.04 | 0.34 | 0.75 | 0.79 | 0.43 | -0.38 | -0.72 | -0.70 |
| **Ca** | 0.65 | 0.19 | 0.57 | 0.29 | 0.18 | 1.00 | 0.10 | 0.09 | -0.35 | -0.08 | -0.03 | -0.09 | -0.09 | -0.16 | -0.45 | 0.83 | 0.05 | -0.03 | -0.48 | -0.25 | -0.03 | -0.04 |
| **Ti** | 0.57 | 0.61 | -0.02 | -0.55 | 0.94 | 0.10 | 1.00 | 0.96 | 0.05 | -0.50 | -0.56 | -0.34 | -0.44 | -0.58 | 0.16 | 0.19 | 0.70 | 0.69 | 0.48 | -0.23 | -0.58 | -0.56 |
| **Mn** | 0.55 | 0.74 | -0.12 | -0.66 | 0.96 | 0.09 | 0.96 | 1.00 | -0.07 | -0.66 | -0.70 | -0.52 | -0.56 | -0.70 | 0.01 | 0.25 | 0.75 | 0.81 | 0.43 | -0.38 | -0.75 | -0.72 |
| **Fe** | -0.16 | -0.35 | 0.00 | 0.08 | -0.13 | -0.35 | 0.05 | -0.07 | 1.00 | 0.58 | 0.54 | 0.69 | 0.68 | 0.30 | 0.61 | -0.48 | -0.22 | -0.27 | 0.41 | 0.43 | 0.34 | 0.34 |
| **Ni** | -0.21 | -0.70 | 0.36 | 0.69 | -0.66 | -0.08 | -0.50 | -0.66 | 0.58 | 1.00 | 0.91 | 0.87 | 0.77 | 0.79 | 0.38 | -0.44 | -0.72 | -0.85 | -0.16 | 0.64 | 0.90 | 0.89 |
| **Cu** | -0.21 | -0.60 | 0.46 | 0.80 | -0.67 | -0.03 | -0.56 | -0.70 | 0.54 | 0.91 | 1.00 | 0.82 | 0.79 | 0.68 | 0.21 | -0.37 | -0.83 | -0.88 | -0.14 | 0.45 | 0.85 | 0.83 |
| **Zn** | -0.15 | -0.70 | 0.22 | 0.55 | -0.52 | -0.09 | -0.34 | -0.52 | 0.69 | 0.87 | 0.82 | 1.00 | 0.69 | 0.75 | 0.54 | -0.40 | -0.58 | -0.69 | -0.03 | 0.70 | 0.83 | 0.83 |
| **As** | -0.16 | -0.49 | 0.34 | 0.58 | -0.53 | -0.09 | -0.44 | -0.56 | 0.68 | 0.77 | 0.79 | 0.69 | 1.00 | 0.52 | 0.30 | -0.39 | -0.65 | -0.71 | -0.01 | 0.39 | 0.67 | 0.65 |
| **Br** | -0.34 | -0.75 | 0.03 | 0.62 | -0.68 | -0.16 | -0.58 | -0.70 | 0.30 | 0.79 | 0.68 | 0.75 | 0.52 | 1.00 | 0.50 | -0.44 | -0.65 | -0.76 | -0.33 | 0.80 | 0.86 | 0.89 |
| **Rb** | -0.26 | -0.54 | -0.43 | -0.16 | -0.04 | -0.45 | 0.16 | 0.01 | 0.61 | 0.38 | 0.21 | 0.54 | 0.30 | 0.50 | 1.00 | -0.55 | 0.05 | -0.11 | 0.20 | 0.67 | 0.40 | 0.45 |
| **Sr** | 0.48 | 0.36 | 0.25 | -0.07 | 0.34 | 0.83 | 0.19 | 0.25 | -0.48 | -0.44 | -0.37 | -0.40 | -0.39 | -0.44 | -0.55 | 1.00 | 0.38 | 0.37 | -0.35 | -0.46 | -0.43 | -0.43 |
| **Y** | 0.18 | 0.45 | -0.43 | -0.84 | 0.75 | 0.05 | 0.70 | 0.75 | -0.22 | -0.72 | -0.83 | -0.58 | -0.65 | -0.65 | 0.05 | 0.38 | 1.00 | 0.89 | 0.26 | -0.26 | -0.76 | -0.74 |
| **Zr** | 0.19 | 0.65 | -0.45 | -0.86 | 0.79 | -0.03 | 0.69 | 0.81 | -0.27 | -0.85 | -0.88 | -0.69 | -0.71 | -0.76 | -0.11 | 0.37 | 0.89 | 1.00 | 0.38 | -0.45 | -0.90 | -0.88 |
| **Pb** | 0.04 | 0.32 | -0.16 | -0.35 | 0.43 | -0.48 | 0.48 | 0.43 | 0.41 | -0.16 | -0.14 | -0.03 | -0.01 | -0.33 | 0.20 | -0.35 | 0.26 | 0.38 | 1.00 | -0.09 | -0.32 | -0.31 |
| **Hg** | -0.26 | -0.65 | -0.12 | 0.28 | -0.38 | -0.25 | -0.23 | -0.38 | 0.43 | 0.64 | 0.45 | 0.70 | 0.39 | 0.80 | 0.67 | -0.46 | -0.26 | -0.45 | -0.09 | 1.00 | 0.65 | 0.69 |
| **C** | -0.21 | -0.78 | 0.28 | 0.72 | -0.72 | -0.03 | -0.58 | -0.75 | 0.34 | 0.90 | 0.85 | 0.83 | 0.67 | 0.86 | 0.40 | -0.43 | -0.76 | -0.90 | -0.32 | 0.65 | 1.00 | 1.00 |
| **N** | -0.21 | -0.79 | 0.24 | 0.70 | -0.70 | -0.04 | -0.56 | -0.72 | 0.34 | 0.89 | 0.83 | 0.83 | 0.65 | 0.89 | 0.45 | -0.43 | -0.74 | -0.88 | -0.31 | 0.69 | 1.00 | 1.00 |

**Supplementary Table 3.** Correlation matrix of Amazon Fan sediment samples.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Al** | **Si** | **S** | **Cl** | **K** | **Ca** | **Ti** | **Mn** | **Fe** | **Ni** | **Cu** | **Zn** | **As** | **Br** | **Rb** | **Sr** | **Y** | **Zr** | **Pb** | **Hg** | **C** | **N** |
| **Al** | 1.00 | 0.59 | -0.03 | 0.78 | 0.33 | 0.85 | -0.57 | 0.23 | -0.71 | -0.57 | -0.25 | -0.73 | 0.27 | -0.33 | -0.79 | 0.79 | -0.79 | -0.24 | -0.82 | -0.42 | 0.08 | -0.01 |
| **Si** | 0.59 | 1.00 | 0.32 | 0.66 | 0.84 | 0.22 | 0.26 | -0.10 | -0.27 | -0.30 | -0.28 | -0.25 | -0.05 | -0.23 | -0.17 | 0.13 | -0.10 | 0.06 | -0.19 | -0.09 | -0.09 | -0.06 |
| **S** | -0.03 | 0.32 | 1.00 | 0.22 | 0.52 | -0.24 | 0.38 | -0.03 | 0.13 | 0.06 | -0.16 | 0.13 | 0.06 | 0.21 | 0.27 | -0.32 | 0.27 | -0.09 | 0.24 | 0.23 | 0.06 | 0.00 |
| **Cl** | 0.78 | 0.66 | 0.22 | 1.00 | 0.49 | 0.56 | -0.27 | 0.05 | -0.47 | -0.45 | -0.28 | -0.50 | 0.13 | -0.04 | -0.50 | 0.46 | -0.55 | -0.26 | -0.57 | -0.15 | 0.09 | 0.08 |
| **K** | 0.33 | 0.84 | 0.52 | 0.49 | 1.00 | -0.02 | 0.49 | -0.01 | 0.01 | -0.01 | -0.11 | 0.07 | 0.03 | 0.01 | 0.15 | -0.12 | 0.15 | 0.13 | 0.07 | 0.02 | -0.15 | -0.10 |
| **Ca** | 0.85 | 0.22 | -0.24 | 0.56 | -0.02 | 1.00 | -0.84 | 0.24 | -0.75 | -0.61 | -0.20 | -0.81 | 0.37 | -0.48 | -0.95 | 0.98 | -0.94 | -0.19 | -0.92 | -0.63 | 0.02 | -0.12 |
| **Ti** | -0.57 | 0.26 | 0.38 | -0.27 | 0.49 | -0.84 | 1.00 | -0.30 | 0.63 | 0.46 | 0.07 | 0.71 | -0.35 | 0.30 | 0.85 | -0.86 | 0.90 | 0.33 | 0.84 | 0.48 | -0.10 | 0.03 |
| **Mn** | 0.23 | -0.10 | -0.03 | 0.05 | -0.01 | 0.24 | -0.30 | 1.00 | -0.15 | 0.25 | 0.29 | -0.17 | 0.35 | 0.07 | -0.20 | 0.22 | -0.26 | -0.22 | -0.23 | -0.11 | 0.01 | -0.03 |
| **Fe** | -0.71 | -0.27 | 0.13 | -0.47 | 0.01 | -0.75 | 0.63 | -0.15 | 1.00 | 0.77 | 0.41 | 0.89 | 0.06 | 0.70 | 0.84 | -0.71 | 0.73 | 0.29 | 0.82 | 0.41 | -0.01 | 0.06 |
| **Ni** | -0.57 | -0.30 | 0.06 | -0.45 | -0.01 | -0.61 | 0.46 | 0.25 | 0.77 | 1.00 | 0.62 | 0.81 | 0.08 | 0.69 | 0.73 | -0.59 | 0.61 | 0.12 | 0.69 | 0.36 | 0.06 | 0.20 |
| **Cu** | -0.25 | -0.28 | -0.16 | -0.28 | -0.11 | -0.20 | 0.07 | 0.29 | 0.41 | 0.62 | 1.00 | 0.55 | 0.01 | 0.47 | 0.31 | -0.12 | 0.19 | -0.02 | 0.28 | 0.33 | 0.02 | 0.18 |
| **Zn** | -0.73 | -0.25 | 0.13 | -0.50 | 0.07 | -0.81 | 0.71 | -0.17 | 0.89 | 0.81 | 0.55 | 1.00 | -0.13 | 0.68 | 0.92 | -0.77 | 0.81 | 0.26 | 0.87 | 0.51 | -0.03 | 0.15 |
| **As** | 0.27 | -0.05 | 0.06 | 0.13 | 0.03 | 0.37 | -0.35 | 0.35 | 0.06 | 0.08 | 0.01 | -0.13 | 1.00 | 0.19 | -0.23 | 0.37 | -0.30 | 0.27 | -0.23 | -0.28 | 0.06 | -0.04 |
| **Br** | -0.33 | -0.23 | 0.21 | -0.04 | 0.01 | -0.48 | 0.30 | 0.07 | 0.70 | 0.69 | 0.47 | 0.68 | 0.19 | 1.00 | 0.63 | -0.50 | 0.40 | -0.03 | 0.49 | 0.55 | 0.32 | 0.41 |
| **Rb** | -0.79 | -0.17 | 0.27 | -0.50 | 0.15 | -0.95 | 0.85 | -0.20 | 0.84 | 0.73 | 0.31 | 0.92 | -0.23 | 0.63 | 1.00 | -0.94 | 0.93 | 0.26 | 0.94 | 0.60 | -0.02 | 0.15 |
| **Sr** | 0.79 | 0.13 | -0.32 | 0.46 | -0.12 | 0.98 | -0.86 | 0.22 | -0.71 | -0.59 | -0.12 | -0.77 | 0.37 | -0.50 | -0.94 | 1.00 | -0.92 | -0.17 | -0.90 | -0.64 | -0.03 | -0.15 |
| **Y** | -0.79 | -0.10 | 0.27 | -0.55 | 0.15 | -0.94 | 0.90 | -0.26 | 0.73 | 0.61 | 0.19 | 0.81 | -0.30 | 0.40 | 0.93 | -0.92 | 1.00 | 0.39 | 0.93 | 0.53 | -0.04 | 0.09 |
| **Zr** | -0.24 | 0.06 | -0.09 | -0.26 | 0.13 | -0.19 | 0.33 | -0.22 | 0.29 | 0.12 | -0.02 | 0.26 | 0.27 | -0.03 | 0.26 | -0.17 | 0.39 | 1.00 | 0.34 | -0.08 | -0.20 | -0.08 |
| **Pb** | -0.82 | -0.19 | 0.24 | -0.57 | 0.07 | -0.92 | 0.84 | -0.23 | 0.82 | 0.69 | 0.28 | 0.87 | -0.23 | 0.49 | 0.94 | -0.90 | 0.93 | 0.34 | 1.00 | 0.53 | 0.01 | 0.13 |
| **Hg** | -0.42 | -0.09 | 0.23 | -0.15 | 0.02 | -0.63 | 0.48 | -0.11 | 0.41 | 0.36 | 0.33 | 0.51 | -0.28 | 0.55 | 0.60 | -0.64 | 0.53 | -0.08 | 0.53 | 1.00 | 0.29 | 0.34 |
| **C** | 0.08 | -0.09 | 0.06 | 0.09 | -0.15 | 0.02 | -0.10 | 0.01 | -0.01 | 0.06 | 0.02 | -0.03 | 0.06 | 0.32 | -0.02 | -0.03 | -0.04 | -0.20 | 0.01 | 0.29 | 1.00 | 0.62 |
| **N** | -0.01 | -0.06 | 0.00 | 0.08 | -0.10 | -0.12 | 0.03 | -0.03 | 0.06 | 0.20 | 0.18 | 0.15 | -0.04 | 0.41 | 0.15 | -0.15 | 0.09 | -0.08 | 0.13 | 0.34 | 0.62 | 1.00 |