**Fluvial sedimentology of the river Ethiope sediments, Niger Delta, Southern Nigeria** *(Supplementary Document)*

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**Supplementary Materials A**: Results of flow velocity measurement of the river Ethiope

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| **Location/GPS reading** | **Distance traversed by float (m)** | **Average Time (s)** | **Flow velocity (m/s)** | **Approximate width (m) at point of measurement** | **Approximate depth (m) at point of measurement** |
| ***Umutu***  N 05° 54’51.20”  E 06° 10’ 12.60” | 10.00 | 12.20 | 0.81 | 11.80 | 01.40 |
| ***Obinomba***  N 05° 51’42.10”  E 06° 10’ 02.0” | 12.00 | 42.00 | 0.29 | 40.00 | 05.00 |
| ***Obiaruku***  N 05° 51’ 12.60”  E 06° 08’ 42.50” | 10.00 | 17.75 | 0.56 | 28.40 | 08.00 |
| ***Abraka***  N 05° 49’ 27.20”  E 06° 06’ 29.70” | 10.00 | 11.50 | 0.87 | 25.00 | 10.00 |

**Supplementary Materials B:** Results of the pebble morphometric study of the river Ethiope sediments

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| S/N | L (mm) | I (mm) | S (mm) | S/L | S/I | I/L | L-I | L-S | FI | OPI | Ѱp | Roundness (%) |
| 1 | 52.40 | 34.80 | 12.70 | 0.51 | 0.36 | 0.77 | 17.60 | 39.70 | 57.80 | -0.00 | 0.45 | 40 |
| 2 | 47.00 | 35.40 | 22.90 | 0.52 | 0.65 | 0.77 | 11.60 | 24.10 | 73.40 | -0.00 | 0.68 | 50 |
| 3 | 53.90 | 38.00 | 24.30 | 0.52 | 0.64 | 0.77 | 15.90 | 29.60 | 74.60 | 0.00 | 0.66 | 30 |
| 4 | 43.80 | 33.00 | 31.50 | 0.52 | 0.95 | 0.77 | 10.80 | 12.30 | 96.60 | 0.00 | 0.88 | 30 |
| 5 | 45.90 | 44.60 | 30.90 | 0.52 | 0.69 | 0.77 | 1.300 | 15.00 | 70.20 | 0.00 | 0.78 | 40 |
| 6 | 45.40 | 31.80 | 26.00 | 0.51 | 0.82 | 0.77 | 13.60 | 19.40 | 87.20 | 0.00 | 0.78 | 40 |
| 7 | 49.10 | 38.00 | 22.80 | 0.51 | 0.60 | 0.77 | 11.10 | 26.30 | 69.00 | 0.00 | 0.65 | 30 |
| 8 | 58.30 | 53.20 | 32.70 | 0.51 | 0.61 | 0.76 | 5.10 | 25.60 | 64.80 | 0.00 | 0.7 | 30 |
| 9 | 53.20 | 36.00 | 20.80 | 0.51 | 0.58 | 0.75 | 17.20 | 32.40 | 71.40 | 0.00 | 0.61 | 50 |
| 10 | 62.40 | 41.70 | 35.80 | 0.51 | 0.86 | 0.76 | 20.70 | 26.60 | 90.50 | 0.00 | 0.79 | 50 |
| 11 | 53.30 | 39.80 | 30.00 | 0.51 | 0.75 | 0.76 | 13.50 | 23.30 | 81.60 | 0.00 | 0.75 | 50 |
| 12 | 41.00 | 39.30 | 24.30 | 0.51 | 0.62 | 0.76 | 1.70 | 16.70 | 63.40 | 0.00 | 0.72 | 50 |
| 13 | 55.00 | 41.40 | 41.00 | 0.50 | 0.99 | 0.74 | 13.60 | 14.00 | 99.30 | 0.00 | 0.90 | 30 |
| 14 | 41.80 | 35.80 | 23.40 | 0.49 | 0.65 | 0.74 | 06.00 | 18.40 | 70.30 | 0.00 | 0.72 | 45 |
| 15 | 44.30 | 33.70 | 17.80 | 0.49 | 0.53 | 0.74 | 10.60 | 26.50 | 64.10 | 0.00 | 0.60 | 40 |
| 16 | 48.60 | 31.90 | 18.40 | 0.49 | 0.58 | 0.74 | 16.70 | 30.20 | 72.20 | 0.00 | 0.60 | 40 |
| 17 | 39.00 | 36.40 | 13.20 | 0.49 | 0.36 | 0.74 | 2.60 | 25.80 | 40.50 | 0.01 | 0.50 | 60 |
| 18 | 40.60 | 30.00 | 16.10 | 0.50 | 0.54 | 0.74 | 10.60 | 24.50 | 65.80 | 0.00 | 0.60 | 50 |
| 19 | 36.90 | 34.40 | 24.80 | 0.50 | 0.72 | 0.74 | 2.50 | 12.10 | 74.00 | 0.00 | 0.79 | 30 |
| 20 | 44.80 | 34.70 | 18.30 | 0.50 | 0.53 | 0.74 | 10.10 | 26.50 | 63.40 | 0.00 | 0.60 | 50 |
| 21 | 41.90 | 30.40 | 26.00 | 0.50 | 0.86 | 0.74 | 11.50 | 15.90 | 89.50 | 0.00 | 0.81 | 30 |
| 22 | 45.60 | 39.20 | 16.00 | 0.50 | 0.41 | 0.74 | 6.40 | 29.60 | 49.10 | 0.00 | 0.52 | 40 |
| 23 | 37.80 | 23.80 | 21.00 | 0.50 | 0.88 | 0.73 | 14.00 | 16.80 | 92.60 | 0.00 | 0.79 | 50 |
| 24 | 39.70 | 34.30 | 25.90 | 0.50 | 0.76 | 0.74 | 5.40 | 13.80 | 78.80 | 0.00 | 0.79 | 45 |
| 25 | 39.00 | 34.60 | 22.00 | 0.49 | 0.64 | 0.73 | 4.40 | 17.00 | 67.70 | 0.00 | 0.71 | 50 |
| 26 | 51.60 | 34.80 | 12.80 | 0.49 | 0.37 | 0.73 | 16.80 | 38.80 | 57.40 | 0.00 | 0.45 | 50 |
| 27 | 43.70 | 33.90 | 21.80 | 0.50 | 0.64 | 0.73 | 9.80 | 21.90 | 72.30 | 0.00 | 0.68 | 40 |
| 28 | 38.70 | 31.50 | 18.70 | 0.50 | 0.59 | 0.73 | 7.20 | 20.00 | 66.90 | 0.00 | 0.66 | 30 |
| 29 | 43.80 | 32.90 | 25.00 | 0.50 | 0.76 | 0.73 | 10.90 | 18.80 | 82.00 | 0.00 | 0.76 | 40 |
| 30 | 40.20 | 39.50 | 25.40 | 0.50 | 0.64 | 0.73 | 0.70 | 14.80 | 64.90 | 0.00 | 0.74 | 60 |
| 31 | 45.30 | 39.00 | 23.10 | 0.50 | 0.59 | 0.73 | 6.30 | 22.20 | 64.90 | 0.00 | 0.67 | 40 |
| 32 | 53.50 | 37.80 | 33.90 | 0.49 | 0.90 | 0.72 | 15.70 | 19.60 | 92.70 | 0.00 | 0.83 | 40 |
| 33 | 46.30 | 34.20 | 31.70 | 0.49 | 0.93 | 0.72 | 12.10 | 14.60 | 94.60 | 0.00 | 0.86 | 40 |
| 34 | 39.00 | 28.10 | 22.30 | 0.49 | 0.79 | 0.72 | 10.90 | 16.70 | 85.10 | 0.00 | 0.77 | 40 |
| 35 | 42.90 | 37.40 | 23.90 | 0.49 | 0.64 | 0.72 | 5.50 | 19.00 | 68.50 | 0.00 | 0.71 | 30 |
| 36 | 36.90 | 30.30 | 26.80 | 0.48 | 0.88 | 0.72 | 6.60 | 10.10 | 90.50 | 0.00 | 0.86 | 30 |
| 37 | 47.90 | 32.30 | 14.10 | 0.48 | 0.44 | 0.72 | 15.60 | 33.80 | 62.00 | 0.00 | 0.50 | 50 |
| 38 | 47.30 | 34.60 | 23.70 | 0.48 | 0.68 | 0.72 | 12.70 | 23.60 | 77.00 | 0.00 | 0.70 | 30 |
| 39 | 57.10 | 46.00 | 24.60 | 0.48 | 0.53 | 0.72 | 11.10 | 32.50 | 62.50 | 0.00 | 0.61 | 50 |
| 40 | 36.00 | 31.00 | 18.00 | 0.49 | 0.58 | 0.72 | 5.00 | 18.00 | 63.90 | 0.00 | 0.66 | 40 |
| **Explanations:** L= long axis; I= intermediate axis; S= short axis; S/L= flatness ratio; I/L= elongation ratio; FI= flatness index; OPI= oblate-prolate index; Ѱp= maximum projection sphericity index (M.P.S.I) | | | | | | | | | | | | |

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| Supplementary Materials B: Results of the pebble morphometric study of the river Ethiope sediments *(continued)* | | | | | | | | | | | | |
| S/N | L (mm) | I (mm) | S (mm) | S/L | S/I | I/L | L-I | L-S | FI | OPI | Ѱp | Roundness (%) |
| 41 | 36.10 | 27.30 | 22.80 | 0.48 | 0.84 | 0.71 | 8.80 | 13.30 | 87.50 | 0.00 | 0.81 | 30 |
| 42 | 41.40 | 29.50 | 26.80 | 0.48 | 0.91 | 0.71 | 11.90 | 14.60 | 93.50 | 0.00 | 0.84 | 30 |
| 43 | 47.40 | 31.40 | 26.40 | 0.48 | 0.84 | 0.71 | 16.00 | 21.00 | 89.50 | 0.00 | 0.78 | 40 |
| 44 | 42.10 | 29.40 | 2.010 | 0.48 | 0.07 | 0.71 | 12.70 | 40.10 | 34.90 | 0.02 | 0.15 | 40 |
| 45 | 32.90 | 29.30 | 22.00 | 0.49 | 0.75 | 0.71 | 3.60 | 10.90 | 77.80 | 0.00 | 0.79 | 30 |
| 46 | 35.30 | 28.00 | 20.00 | 0.48 | 0.71 | 0.71 | 7.30 | 15.30 | 77.30 | 0.00 | 0.74 | 50 |
| 47 | 33.40 | 31.50 | 17.80 | 0.48 | 0.57 | 0.71 | 1.90 | 15.60 | 59.00 | 0.01 | 0.67 | 50 |
| 48 | 42.30 | 31.30 | 17.00 | 0.48 | 0.54 | 0.70 | 11.00 | 25.30 | 66.20 | 0.00 | 0.60 | 40 |
| 49 | 20.90 | 13.20 | 8.200 | 0.48 | 0.62 | 0.70 | 7.70 | 12.70 | 76.10 | 0.01 | 0.62 | 40 |
| 50 | 42.80 | 35.70 | 23.40 | 0.48 | 0.66 | 0.70 | 7.10 | 19.40 | 71.30 | 0.00 | 0.71 | 30 |
| 51 | 44.70 | 37.50 | 27.20 | 0.48 | 0.73 | 0.70 | 7.20 | 17.50 | 77.00 | 0.00 | 0.76 | 40 |
| 52 | 42.00 | 36.90 | 23.20 | 0.48 | 0.63 | 0.69 | 5.10 | 18.80 | 67.40 | 0.00 | 0.70 | 40 |
| 53 | 54.50 | 28.00 | 15.80 | 0.47 | 0.56 | 0.69 | 26.50 | 38.70 | 77.60 | 0.00 | 0.55 | 50 |
| 54 | 49.00 | 34.70 | 24.00 | 0.48 | 0.69 | 0.70 | 14.30 | 25.00 | 78.20 | 0.00 | 0.70 | 60 |
| 55 | 34.00 | 26.30 | 23.80 | 0.48 | 0.90 | 0.70 | 7.70 | 10.20 | 92.60 | 0.00 | 0.86 | 50 |
| 56 | 43.80 | 32.40 | 15.40 | 0.48 | 0.48 | 0.69 | 11.40 | 28.40 | 61.20 | 0.00 | 0.55 | 60 |
| 57 | 41.80 | 35.00 | 23.00 | 0.48 | 0.66 | 0.69 | 6.80 | 18.80 | 71.30 | 0.00 | 0.71 | 40 |
| 58 | 46.00 | 31.00 | 16.90 | 0.48 | 0.55 | 0.69 | 15.00 | 29.10 | 69.30 | 0.00 | 0.59 | 35 |
| 59 | 28.80 | 27.20 | 1.68 | 0.48 | 0.06 | 0.69 | 1.60 | 27.10 | 11.40 | -0.09 | 0.15 | 30 |
| 60 | 47.90 | 40.30 | 22.00 | 0.50 | 0.55 | 0.68 | 7.60 | 25.90 | 61.80 | 0.00 | 0.63 | 50 |
| 61 | 41.00 | 32.50 | 13.60 | 0.50 | 0.42 | 0.67 | 8.50 | 27.40 | 53.90 | 0.00 | 0.52 | 50 |
| 62 | 72.30 | 26.20 | 20.00 | 0.50 | 0.76 | 0.67 | 46.10 | 52.30 | 91.40 | 0.00 | 0.60 | 35 |
| 63 | 14.30 | 12.10 | 7.22 | 0.52 | 0.60 | 0.69 | 2.23 | 7.12 | 65.90 | -0.02 | 0.67 | 45 |
| 64 | 12.70 | 10.10 | 6.13 | 0.52 | 0.61 | 0.69 | 2.59 | 6.59 | 68.60 | -0.01 | 0.66 | 50 |
| 65 | 11.30 | 9.41 | 9.12 | 0.53 | 0.97 | 0.69 | 1.92 | 2.21 | 97.40 | 0.04 | 0.92 | 25 |
| 66 | 11.40 | 6.14 | 5.82 | 0.52 | 0.95 | 0.68 | 5.30 | 5.62 | 97.20 | 0.07 | 0.78 | 20 |
| 67 | 12.70 | 9.62 | 5.51 | 0.52 | 0.57 | 0.69 | 3.11 | 7.22 | 67.70 | -0.01 | 0.63 | 50 |
| 68 | 12.10 | 7.93 | 4.54 | 0.52 | 0.57 | 0.69 | 4.20 | 7.59 | 72.10 | 0.01 | 0.60 | 40 |
| 69 | 30.10 | 10.80 | 9.74 | 0.53 | 0.90 | 0.69 | 19.3 | 20.40 | 96.40 | 0.01 | 0.66 | 20 |
| 70 | 21.90 | 9.73 | 8.71 | 0.53 | 0.90 | 0.70 | 12.2 | 13.20 | 95.40 | 0.02 | 0.71 | 15 |
| 71 | 11.30 | 10.50 | 7.92 | 0.54 | 0.75 | 0.71 | 0.81 | 3.41 | 77.10 | -0.03 | 0.81 | 40 |
| 72 | 13.60 | 9.52 | 6.43 | 0.54 | 0.68 | 0.70 | 4.12 | 7.21 | 77.30 | 0.01 | 0.68 | 30 |
| 73 | 12.20 | 8.93 | 6.74 | 0.54 | 0.75 | 0.70 | 3.31 | 5.50 | 82.10 | 0.01 | 0.75 | 50 |
| 74 | 27.10 | 20.70 | 13.5 | 0.54 | 0.65 | 0.70 | 6.40 | 13.61 | 73.40 | 0.00 | 0.69 | 50 |
| 75 | 14.90 | 13.80 | 10.71 | 0.54 | 0.77 | 0.70 | 1.09 | 4.20 | 79.10 | -0.01 | 0.82 | 40 |
| 76 | 14.50 | 9.22 | 6.84 | 0.53 | 0.74 | 0.70 | 5.31 | 7.69 | 83.60 | 0.02 | 0.70 | 60 |
| 77 | 12.90 | 7.93 | 6.33 | 0.53 | 0.80 | 0.70 | 5.01 | 6.61 | 87.60 | 0.03 | 0.73 | 30 |
| 78 | 15.00 | 14.30 | 10.34 | 0.54 | 0.72 | 0.70 | 0.72 | 4.70 | 73.50 | -0.02 | 0.79 | 60 |
| 79 | 20.50 | 15.20 | 12.74 | 0.53 | 0.84 | 0.69 | 5.29 | 7.79 | 87.80 | 0.01 | 0.80 | 40 |
| Explanations: L= long axis; I= intermediate axis; S= short axis; S/L= flatness ratio; I/L= elongation ratio; FI= flatness index; OPI= oblate-prolate index; Ѱp= maximum projection sphericity index (M.P.S.I) | | | | | | | | | | | | |

**Supplementary Materials B:** Results of the pebble morphometric study of the river Ethiope sediments *(continued)*

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| S/N | L (mm) | I (mm) | S (mm) | S/L | S/I | I/L | L-I | L-S | FI | OPI | Ѱp | Roundness (%) |
| 80 | 17.04 | 15.70 | 11.32 | 0.53 | 0.72 | 0.69 | 1.69 | 6.10 | 74.70 | -0.01 | 0.78 | 60 |
| 81 | 14.10 | 12.10 | 8.21 | 0.53 | 0.68 | 0.68 | 1.98 | 5.90 | 72.20 | -0.01 | 0.73 | 60 |
| 83 | 12.30 | 9.94 | 4.43 | 0.52 | 0.45 | 0.68 | 2.39 | 7.90 | 55.30 | -0.04 | 0.54 | 30 |
| 84 | 15.80 | 8.34 | 6.53 | 0.52 | 0.78 | 0.67 | 7.46 | 9.27 | 88.50 | 0.03 | 0.69 | 40 |
| 85 | 14.30 | 12.00 | 7.860 | 0.53 | 0.65 | 0.68 | 2.32 | 6.48 | 71.00 | -0.01 | 0.71 | 40 |
| 86 | 15.10 | 14.20 | 11.34 | 0.53 | 0.80 | 0.67 | 0.86 | 3.74 | 80.90 | -0.02 | 0.84 | 50 |
| 87 | 21.80 | 16.10 | 10.24 | 0.52 | 0.64 | 0.66 | 5.72 | 11.54 | 73.30 | 0.00 | 0.67 | 50 |
| 88 | 12.90 | 10.80 | 8.220 | 0.52 | 0.76 | 0.66 | 2.04 | 4.66 | 79.70 | -0.01 | 0.79 | 40 |
| 89 | 21.30 | 16.90 | 16.42 | 0.52 | 0.97 | 0.65 | 4.48 | 4.92 | 97.90 | 0.01 | 0.91 | 60 |
| 90 | 26.50 | 24.40 | 18.98 | 0.50 | 0.78 | 0.65 | 2.16 | 7.56 | 79.70 | 0.00 | 0.82 | 50 |
| 91 | 18.00 | 16.70 | 12.65 | 0.49 | 0.76 | 0.63 | 1.26 | 5.35 | 77.30 | -0.01 | 0.81 | 60 |
| 92 | 16.10 | 15.40 | 13.84 | 0.48 | 0.90 | 0.61 | 0.64 | 2.24 | 90.00 | 0.00 | 0.92 | 45 |
| 93 | 15.50 | 13.60 | 10.44 | 0.46 | 0.77 | 0.60 | 1.82 | 5.02 | 79.30 | -0.01 | 0.80 | 60 |
| 94 | 14.90 | 13.70 | 10.68 | 0.45 | 0.78 | 0.58 | 1.22 | 4.21 | 79.90 | -0.01 | 0.82 | 40 |
| 95 | 16.20 | 15.00 | 14.24 | 0.44 | 0.95 | 0.57 | 1.24 | 2.00 | 95.30 | 0.00 | 0.94 | 60 |
| 96 | 12.80 | 11.90 | 10.00 | 0.41 | 0.84 | 0.55 | 0.94 | 2.80 | 85.50 | -0.01 | 0.87 | 50 |
| 97 | 16.20 | 14.00 | 13.84 | 0.40 | 0.99 | 0.53 | 2.20 | 2.40 | 98.80 | 0.02 | 0.94 | 40 |
| 98 | 14.10 | 12.50 | 11.00 | 0.37 | 0.88 | 0.51 | 1.61 | 3.06 | 89.70 | 0.00 | 0.88 | 50 |
| 99 | 12.70 | 11.10 | 10.24 | 0.35 | 0.92 | 0.49 | 1.57 | 2.41 | 93.40 | 0.01 | 0.91 | 40 |
| 100 | 14.10 | 12.20 | 9.04 | 0.32 | 0.74 | 0.47 | 1.89 | 5.06 | 77.50 | -0.01 | 0.78 | 45 |
| Min. | 10.40 | 6.14 | 1.68 | 0.32 | 0.06 | 0.47 | 0.64 | 2.00 | 11.40 | -0.09 | 0.15 | 15 |
| Max. | 72.30 | 53.20 | 41.00 | 0.54 | 0.99 | 0.77 | 46.10 | 52.30 | 99.30 | 0.07 | 0.94 | 60 |
| Ave. | 33.30 | 25.60 | 17.10 | 0.50 | 0.70 | 0.70 | 7.73 | 16.19 | 76.00 | 0.00 | 0.71 | 42.2 |
| Explanations: L= long axis; I= intermediate axis; S= short axis; S/L= flatness ratio; I/L= elongation ratio; FI= flatness index; OPI= oblate-prolate index; Ѱp= maximum projection sphericity index (M.P.S.I); Min.= minimum; Max.= maximum; Ave.= average | | | | | | | | | | | | |