**Supplementary figure A.1** Diagram highlightingthestratigraphic classification of Shillong Group of rocks by different workers.

**Supplementary figure A.2** The interpretive lithological map of the part of Shillong Basin shows the spatial continuity of the lithopackage and regional structures. Units outside the mapped area have been extrapolated using regional geological traverses and control points (black triangles).

Supplementary Table 1. Lateral facies variation of the bottom conglomerate

|  |
| --- |
| Compositional variation of the conglomerate |
|  |   | Zone-I | Zone-II | Zone-III | Zone-IV |
| Clast | Composition | quartzo-feldspathic, vein quartz | vein quartz | vein quartz, biotite gneiss and granite gneiss  | quartz-mica schist, biotite gneiss, vein quartz |
| Size | 1 mm to >20 cm | 5 mm to >5 cm. | <5 mm to >7 cm | 5 mm to 1mt |
| Shape | modified by shearing | tabular, triangular, rhombic | triangular, rhombic, elliptical, oval | triangular, rhombic, elliptical, oval |
| Sorting | poorly | very poorly | poorly | very poorly |
| Roundness | modified by shearing | angular, sub-angular, sub round | angular, sub-angular, sub round | angular, sub-angular, sub round |
| Spehricity | modified by shearing | low sphericity | moderate to low | moderate to low |
| Proportion | vein quartz (>95%) | angular vein quartz clasts are dominated | gneiss (2-3%), rest vein quartz | gneiss (>5% and < 10%) |
| Matrix | Composition | siliceous | siliceous and ferruginous  | argillaceous | argillaceous |

Supplementary Table 2. Bulk rock chemistry by Khonglah *et al*., (2002).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Rock type*** | Tuff | Carb. phyllite | Qtz | Phy. tuff | Phy. schist | Tuff | Qtz | Qtz | Qtz | Cong | Qtz | Qtz | Qtz |
| **Sample no.** | 24 | 357A | 380 | 417 | 181 | V.A. | 33 | 49 | 151 | 88 | 90 | 201 | 221 |
| **SiO2 (%)** | 61.7 | 63.4 | 57.2 | 59.1 | 57.6 | 34 | 73.7 | 71.5 | 50 | 76.3 | 70.8 | 62.7 | 73.7 |
| **TiO2 (%)** | 0.89 | 0.79 | 0.59 | 1.08 | 0.84 | 2.13 | 0.2 | 0.38 | 0.95 | 0.23 | 0.22 | 0.72 | 0.7 |
| **Al2O3 (%)** | 20.44 | 20.73 | 25.03 | 24.86 | 22.27 | 29.6 | 13.88 | 14.5 | 25.57 | 11.33 | 14.27 | 17.05 | 12.45 |
| **Fe2O3(T)(%)** | 5.81 | 4.51 | 4.59 | 2.98 | 7.91 | 22.67 | 2.13 | 2.72 | 5.51 | 2.49 | 2.9 | 5.43 | 3.35 |
| **MnO (%)** | 0.05 | 0.03 | 0.02 | 0.02 | 0.08 | 0.03 | 0.01 | 0.02 | 0.04 | 0.01 | 0.05 | 0.04 | 0.08 |
| **MgO (%)** | 0.66 | 0.8 | 0.46 | 0.51 | 0.73 | <0.01 | 0.62 | 1.16 | 2.07 | 0.27 | 1.05 | 3.21 | 1.8 |
| **CaO (%)** | 0.05 | 0.05 | 0.05 | 0.02 | 0.02 | 0.05 | 0.06 | 0.02 | 0.08 | 0.03 | 0.2 | 0.3 | 0.16 |
| **Na2O (%)** | 0.36 | 0.2 | 0.17 | 0.2 | 0.23 | 0.05 | 0.15 | 0.18 | 0.18 | 0.15 | 3.92 | 0.98 | 0.18 |
| **K2O (%)** | 5.86 | 4.69 | 8.65 | 6.63 | 4.34 | 0.05 | 6.34 | 7.1 | 10.65 | 6.93 | 3.74 | 6.34 | 4.63 |
| **P2O5 (%)** | 0.06 | 0.05 | 0.02 | 0.04 | 0.13 | 0.06 | 0.03 | 0.09 | 0.13 | 0.13 | 0.03 | 0.09 | 0.11 |
| **LOI (%)** | 3.71 | 4.25 | 2.76 | 4.06 | 5.43 | 11.03 | 2.39 | 1.87 | 4.29 | 1.62 | 2.14 | 2.17 | 2.02 |
| **Ba (ppm)** | 1960 | 820 | 487 | 1613 | 891 | 419 | 836 | 604 | 1687 | 878 | 678 | 915 | 588 |
| **Co (ppm)** | 19 | 8 | 5 | 16 | 15 | 32 | 5 | 7 | 14 | 5 | 4 | 13 | 9 |
| **Cr (ppm)** | 50 | 83 | <15 | 48 | 70 | 40 | 40 | 66 | 246 | <15 | <15 | 85 | 79 |
| **Cu (ppm)** | 20 | 10 | 3 | 15 | 14 | 18 | 12 | 7 | 13 | 4 | 8 | 13 | 4 |
| **Ga (ppm)** | 28 | 18 | 27 | 24 | 20 | 28 | 16 | 18 | 28 | 15 | 22 | 20 | 16 |
| **Nb (ppm)** | 22 | 20 | 19 | 30 | 17 | 6 | 10 | 13 | 20 | 14 | 20 | 17 | 12 |
| **Ni (ppm)** | 22 | 12 | 2 | 9 | 20 | 148 | 12 | 13 | 45 | 11 | 4 | 30 | 12 |
| **Pb (ppm)** | 54 | 15 | 4 | 26 | 15 | 16 | 24 | 10 | 8 | 8 | 7 | 22 | 8 |
| **Rb (ppm)** | 300 | 170 | 329 | 342 | 157 | 7 | 228 | 280 | 541 | 213 | 117 | 360 | 178 |
| **Sc (ppm)** | 16 | 16 | 9 | 15 | 16 | 46 | 6 | 7 | 22 | 5 | 3 | 16 | 8 |
| **Sr (ppm)** | 38 | 23 | 5 | 8 | 8 | 20 | 40 | 28 | 26 | 18 | 31 | 24 | 10 |
| **Th (ppm)** | 28 | 19 | 9 | 50 | 20 | 2 | 8 | 14 | 26 | 9 | 16 | 15 | 18 |
| **V (ppm)** | 88 | 125 | <20 | 65 | 75 | 304 | 31 | 29 | 78 | 24 | <20 | 76 | 38 |
| **Y (ppm)** | 45 | 20 | 38 | 60 | 26 | 5 | 30 | 42 | 30 | 50 | 65 | 40 | 30 |
| **Zn (ppm)** | 75 | 50 | 84 | 69 | 25 | 98 | 30 | 42 | 39 | 23 | 34 | 95 | 40 |
| **Zr (ppm)** | 322 | 248 | 355 | 583 | 180 | 67 | 111 | 475 | 264 | 244 | 400 | 140 | 356 |

Supplementary Table 3. Bulk rock chemistry by Das & Bhardwaj (2017).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Rock type*** | Qtz | Qtz | Qtz | Qtz | Qtz | Phyllite | Phyllite | Phyllite |
| **Sample no.** | AS/07 | AS/27 | AS/33 | AS/55 | AS/90 | AS/93 | AS/113 | AS/31 |
| **SiO2 (%)** | 89.33 | 90.76 | 82.45 | 86.74 | 95.08 | 67 | 60.04 | 65.07 |
| **TiO2 (%)** | 0.28 | 0.29 | 0.2 | 0.18 | 0.12 | 0.82 | 0.88 | 0.41 |
| **Al2O3 (%)** | 5.47 | 5.31 | 11.55 | 8.13 | 1.4 | 16 | 24.29 | 16.92 |
| **Fe2O3(T)(%)** | 0.88 | 0.76 | 1.04 | 1.01 | 0.62 | 5.76 | 4.25 | 5.84 |
| **MnO (%)** | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| **MgO (%)** | 0.1 | 0.25 | 0.31 | 0.11 | 0.13 | 2.7 | 0.68 | 0.87 |
| **CaO (%)** | 0.15 | 0.04 | 0.02 | 0.01 | 0.1 | 0.01 | 0.03 | 0.02 |
| **Na2O (%)** | 0.06 | 0.05 | 0.1 | 0.23 | 0.01 | 0.15 | 0.21 | 0.09 |
| **K2O (%)** | 1.64 | 0.87 | 2.75 | 1.56 | 0.52 | 4.79 | 6.59 | 4.82 |
| **P2O5 (%)** | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 | 0.03 | 0.03 | 0.07 |
| **LOI (%)** | 0.89 | 0.84 | 0.94 | 1.24 | 0.02 | 2.35 | 2.85 | 3.27 |
| **Ba (ppm)** | 286 | 94 | 231 | 248 | 81 | 660 | 1112 | 571 |
| **Co (ppm)** | 3 | <1 | 1 | 2 | 2 | 14 | <1 | 12 |
| **Cr (ppm)** | <15 | 75 | 19 | 22 | <15 | 109 | 60 | 50 |
| **Cu (ppm)** | 10 | 17 | 10 | 6 | 8 | 8 | 7 | 12 |
| **Ga (ppm)** | 22 | 7 | 9 | 8 | 19 | 19 | 34 | 24 |
| **Nb (ppm)** | 6 | 5 | 8 | 7 | 5 | 10 | 27 | 14 |
| **Ni (ppm)** | <2 | <2 | <2 | <2 | <2 | 33 | 4 | 20 |
| **Pb (ppm)** | 4 | <2 | 12 | <2 | 15 | 9 | 4 | 15 |
| **Rb (ppm)** | 102 | 19 | 114 | 92 | 25 | 178 | 284 | 397 |
| **Sc (ppm)** | 8 | 8 | 6 | 5 | <3.5 | 6 | 18 | 18 |
| **Sr (ppm)** | <5 | 6 | 12 | 19 | 10 | 19 | 34 | 19 |
| **Th (ppm)** | 14 | 18 | 12 | 14 | 9 | 19 | 40 | 7 |
| **V (ppm)** | <20 | <20 | <20 | <20 | <20 | 133 | 67 | 56 |
| **Y (ppm)** | 22 | 10 | 23 | 8 | 11 | 42 | 64 | 30 |
| **Zn (ppm)** | 24 | 22 | 30 | 18 | 58 | 65 | <10 | 74 |
| **Zr (ppm)** | 410 | 140 | 176 | 201 | 97 | 304 | 590 | 188 |