|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Supplementary Table S2 Whole-rock major- (wt%), trace- (ppm) and rare earth (ppm) element compositions for the samples. | | | | | | | | | | | | | | | | | | | |
| Sample No | HS-1 | HS-3 | HS-5 | HS-9 | HS-9P | HS-10 | HS-12 | HS-282 | HS-284 | HS-286 | HS-288 | HS-32 | HS-34 | HS-36 | GSR1 | GSR1 | GSR3 | GSR3 |  |
| Rock type | Rhyolite | | | Monzogranite | | | | Moyite | | | | | | | Measured | Reference | Measured | Reference | Detection limits |
| Major oxides (wt%) | | | | | | | | | | | | | | | | | | | |
| SiO2 | 78.74 | 74.37 | 75.12 | 74.93 |  | 74.83 | 74.72 | 72.70 | 72.40 | 72.37 | 72.18 | 74.92 |  | 74.66 | 72.97 | 72.83 | 44.64 | 44.64 | 0.01 |
| Al2O3 | 8.95 | 9.98 | 10.05 | 12.88 |  | 13.15 | 12.84 | 13.62 | 13.48 | 13.45 | 13.30 | 12.89 |  | 12.75 | 13.40 | 13.4 | 13.84 | 13.83 | 0.01 |
| CaO | 0.33 | 0.57 | 0.43 | 0.32 |  | 0.31 | 0.36 | 0.48 | 0.39 | 0.42 | 0.43 | 0.29 |  | 0.45 | 1.55 | 1.55 | 8.80 | 8.81 | 0.01 |
| Fe2O3T | 2.54 | 2.81 | 2.77 | 0.98 |  | 0.98 | 0.95 | 1.79 | 1.64 | 1.78 | 1.74 | 1.24 |  | 1.15 | 2.14 | 2.14 | 13.37 | 13.40 | 0.01 |
| K2O | 4.51 | 7.30 | 7.18 | 3.86 |  | 3.71 | 3.85 | 4.02 | 4.14 | 4.11 | 4.10 | 3.75 |  | 4.15 | 4.94 | 5.01 | 2.29 | 2.32 | 0.01 |
| MgO | 0.08 | 0.06 | 0.12 | 0.07 |  | 0.09 | 0.05 | 0.27 | 0.20 | 0.23 | 0.24 | 0.19 |  | 0.22 | 0.42 | 0.42 | 7.73 | 7.77 | 0.01 |
| MnO | 0.08 | 0.09 | 0.10 | 0.04 |  | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |  | 0.04 | 0.06 | 0.06 | 0.17 | 0.17 | 0.01 |
| Na2O | 3.06 | 1.64 | 2.00 | 5.16 |  | 5.45 | 5.32 | 5.29 | 5.21 | 5.12 | 5.10 | 4.95 |  | 4.95 | 3.09 | 3.13 | 3.35 | 3.38 | 0.01 |
| P2O5 | 0.02 | 0.01 | 0.01 | 0.01 |  | 0.01 | 0.01 | 0.05 | 0.04 | 0.05 | 0.05 | 0.03 |  | 0.02 | 0.09 | 0.09 | 0.96 | 0.95 | 0.01 |
| TiO2 | 0.19 | 0.20 | 0.21 | 0.03 |  | 0.03 | 0.03 | 0.17 | 0.15 | 0.16 | 0.15 | 0.18 |  | 0.18 | 0.29 | 0.29 | 2.38 | 2.37 | 0.01 |
| LOI | 0.75 | 2.82 | 1.86 | 1.33 |  | 1.18 | 1.57 | 1.68 | 2.03 | 1.52 | 2.52 | 0.78 |  | 1.35 |  |  |  |  |  |
| TOTAL | 99.26 | 99.86 | 99.84 | 99.60 |  | 99.78 | 99.73 | 100.10 | 99.70 | 99.25 | 99.84 | 99.25 |  | 99.92 |  |  |  |  |  |
| Na2O + K2O | 7.57 | 8.94 | 9.18 | 9.02 |  | 9.16 | 9.17 | 9.31 | 9.35 | 9.23 | 9.20 | 8.70 |  | 9.10 |  |  |  |  |  |
| A/CNK | 0.85 | 0.86 | 0.85 | 0.97 |  | 0.97 | 0.95 | 0.98 | 0.98 | 0.99 | 0.98 | 1.01 |  | 0.95 |  |  |  |  |  |
| A/NK | 0.90 | 0.94 | 0.91 | 1.02 |  | 1.01 | 0.99 | 1.04 | 1.03 | 1.04 | 1.04 | 1.06 |  | 1.01 |  |  |  |  |  |
| Mg# | 5.87 | 4.06 | 7.90 | 12.40 |  | 15.39 | 9.44 | 23.01 | 19.46 | 20.38 | 21.46 | 23.29 |  | 27.48 |  |  |  |  |  |
| Trace elements (ppm) | | | | | | | | | | | | | | | | | | | |
| Li | 28.06 | 11.63 | 23.05 | 110.84 | 109.65 | 106.65 | 97.76 | 9.03 | 7.01 | 8.11 |  | 3.33 | 13.56 | 3.80 | 132.37 | 131.00 | 9.58 | 9.50 | 0.027 |
| Be | 2.96 | 1.02 | 2.81 | 13.65 | 13.34 | 12.21 | 12.09 | 3.15 | 2.90 | 3.06 |  | 2.16 | 1.97 | 2.21 | 11.98 | 12.40 | 2.37 | 2.50 | 0.0076 |
| Sc | 1.17 | 13.97 | 1.45 | 0.31 | 0.24 | 0.28 | 0.21 | 2.23 | 1.58 | 1.69 |  | 2.80 | 5.37 | 2.82 | 5.44 | 6.10 | 14.80 | 15.20 | 0.016 |
| V | 4.77 | 108.29 | 8.00 | 1.48 | 1.18 | 1.77 | 0.02 | 4.48 | 3.03 | 3.20 |  | 3.49 | 53.72 | 3.48 | 19.46 | 24.00 | 164.03 | 167.00 | 0.01 |
| Cr | 0.92 | 56.54 | 9.04 | 5.59 | 2.94 | 8.93 | 9.71 | 6.61 | 9.24 | 8.29 |  | 0.54 | 5.98 | 4.08 | 11.35 | 5.00 | 141.94 | 134.00 | 0.188 |
| Co | 0.26 | 16.60 | 0.16 | 0.08 | 0.01 | 0.10 | 0.04 | 0.99 | 0.68 | 0.72 |  | 0.55 | 6.95 | 0.52 | 2.75 | 3.40 | 47.04 | 46.50 | 0.0187 |
| Ni | 2.47 | 32.13 | 4.30 | 1.76 | 0.82 | 5.14 | 7.45 | 2.94 | 5.75 | 6.07 |  | 0.86 | 6.71 | 3.12 | 7.84 | 2.30 | 142.37 | 140.00 | 0.05 |
| Cu | 5.42 | 38.79 | 4.10 | 1.38 | 2.05 | 1.87 | 2.27 | 4.07 | 2.91 | 2.91 |  | 3.50 | 10.27 | 3.62 | 3.38 | 3.20 | 58.60 | 48.60 | 0.117 |
| Zn | 95.35 | 63.27 | 85.67 | 95.58 | 103.86 | 90.30 | 85.99 | 36.00 | 44.05 | 37.64 |  | 26.46 | 65.91 | 14.93 | 21.57 | 28.00 | 158.48 | 150.00 | 0.167 |
| Ga | 18.59 | 17.80 | 19.39 | 31.51 | 30.93 | 29.12 | 28.65 | 20.29 | 17.99 | 17.91 |  | 17.32 | 20.35 | 16.41 | 19.97 | 19.00 | 25.94 | 24.80 | 0.0046 |
| Rb | 85.78 | 31.84 | 118.33 | 188.32 | 185.07 | 164.56 | 174.26 | 66.50 | 64.94 | 63.78 |  | 66.01 | 39.48 | 72.84 | 457.82 | 466.00 | 38.92 | 37.00 | 0.0035 |
| Sr | 37.18 | 582.80 | 47.87 | 7.10 | 6.68 | 10.45 | 10.38 | 79.41 | 93.44 | 75.86 |  | 208.28 | 361.70 | 178.25 | 106.03 | 106.00 | 1125.33 | 1100.00 | 0.0058 |
| Y | 59.31 | 20.95 | 65.99 | 86.21 | 84.95 | 76.20 | 85.29 | 32.93 | 28.16 | 28.68 |  | 26.16 | 27.15 | 28.18 | 61.09 | 62.00 | 22.39 | 22.00 | 0.0039 |
| Cs | 1.60 | 0.48 | 0.99 | 11.30 | 11.06 | 9.28 | 10.07 | 1.53 | 1.56 | 1.56 |  | 0.49 | 0.58 | 0.52 | 37.20 | 38.40 | 0.40 | 0.49 | 0.0006 |
| Ba | 579.90 | 812.06 | 592.11 | 5.25 | 3.87 | 4.52 | 3.20 | 313.29 | 278.50 | 275.68 |  | 467.40 | 378.29 | 526.30 | 342.22 | 343.00 | 530.98 | 526.00 | 0.164 |
| Tl | 0.62 | 0.15 | 0.81 | 0.91 | 0.90 | 0.79 | 0.85 | 0.29 | 0.28 | 0.28 |  | 0.30 | 0.29 | 0.33 | 1.84 | 1.93 | 0.02 | 0.12 | 0.0042 |
| Pb | 14.39 | 8.90 | 12.38 | 38.80 | 38.62 | 35.78 | 36.37 | 11.23 | 11.20 | 9.44 |  | 13.64 | 7.02 | 12.82 | 31.13 | 31.00 | 4.41 | 4.70 | 0.067 |
| Bi | 0.35 | 0.11 | 0.93 | 0.51 | 0.50 | 0.39 | 1.68 | 0.03 | 1.20 | 1.17 |  | 0.08 | 0.04 | 0.04 | 0.51 | 0.53 | 0.01 | 0.05 | 0.0047 |
| Th | 5.13 | 4.67 | 5.84 | 12.66 | 12.48 | 11.67 | 11.97 | 5.12 | 4.70 | 4.73 |  | 4.82 | 2.41 | 5.65 | 52.97 | 54.00 | 6.06 | 6.00 | 0.001 |
| U | 1.13 | 1.47 | 1.57 | 2.73 | 2.69 | 2.04 | 1.77 | 2.01 | 2.04 | 2.26 |  | 1.82 | 0.92 | 2.21 | 18.93 | 18.80 | 1.40 | 1.40 | 0.0006 |
| Nb | 8.99 | 5.20 | 10.61 | 38.89 | 38.18 | 36.21 | 36.46 | 10.69 | 9.48 | 9.85 |  | 7.02 | 5.10 | 6.25 | 40.52 | 40.00 | 69.32 | 68.00 | 0.0029 |
| Ta | 0.68 | 0.44 | 0.78 | 4.32 | 4.28 | 4.07 | 4.16 | 0.88 | 0.88 | 0.87 |  | 0.62 | 0.46 | 0.63 | 7.04 | 7.20 | 4.40 | 4.30 | 0.004 |
| Zr | 446.36 | 151.41 | 506.16 | 149.36 | 145.44 | 128.05 | 140.91 | 190.53 | 185.98 | 177.83 |  | 202.94 | 314.86 | 212.87 | 168.24 | 167.00 | 275.86 | 277.00 | 0.0888 |
| Hf | 11.95 | 4.07 | 13.62 | 9.63 | 9.59 | 8.54 | 9.31 | 6.17 | 6.05 | 5.86 |  | 6.36 | 7.80 | 6.72 | 6.26 | 6.30 | 6.48 | 6.50 | 0.0041 |
| La | 26.22 | 18.27 | 32.65 | 4.24 | 4.10 | 3.90 | 4.59 | 20.42 | 16.93 | 17.79 |  | 23.02 | 20.10 | 25.91 | 56.04 | 54.00 | 57.79 | 56.00 | 0.008 |
| Ce | 79.99 | 40.55 | 80.14 | 19.72 | 19.40 | 18.60 | 18.70 | 44.93 | 37.96 | 41.49 |  | 51.61 | 46.01 | 53.08 | 108.62 | 108.00 | 108.58 | 105.00 | 0.012 |
| Pr | 9.64 | 5.19 | 10.99 | 2.67 | 2.64 | 2.44 | 2.85 | 6.60 | 5.49 | 5.68 |  | 6.38 | 6.20 | 6.97 | 12.85 | 12.70 | 13.37 | 13.20 | 0.0017 |
| Nd | 42.06 | 20.97 | 48.88 | 13.96 | 13.56 | 12.33 | 14.66 | 27.57 | 23.10 | 23.59 |  | 25.03 | 26.22 | 27.03 | 46.74 | 47.00 | 55.36 | 54.00 | 0.0048 |
| Sm | 10.10 | 4.64 | 11.36 | 6.18 | 5.94 | 5.39 | 6.37 | 6.19 | 5.12 | 5.27 |  | 4.94 | 5.36 | 5.14 | 10.13 | 9.70 | 10.54 | 10.20 | 0.0009 |
| Eu | 2.10 | 1.47 | 2.22 | 0.13 | 0.13 | 0.12 | 0.13 | 0.87 | 0.74 | 0.72 |  | 0.70 | 1.50 | 0.69 | 0.88 | 0.85 | 3.32 | 3.20 | 0.0003 |
| Gd | 9.49 | 4.15 | 10.41 | 6.52 | 6.30 | 5.66 | 6.58 | 5.59 | 4.69 | 4.88 |  | 4.35 | 4.74 | 4.66 | 9.19 | 9.30 | 8.91 | 8.50 | 0.011 |
| Tb | 1.85 | 0.70 | 1.99 | 1.83 | 1.76 | 1.63 | 1.82 | 1.04 | 0.86 | 0.88 |  | 0.77 | 0.84 | 0.81 | 1.64 | 1.65 | 1.24 | 1.20 | 0.0002 |
| Dy | 11.94 | 4.15 | 12.95 | 14.23 | 13.98 | 12.80 | 14.32 | 6.48 | 5.52 | 5.56 |  | 5.11 | 5.20 | 5.26 | 10.54 | 10.20 | 5.63 | 5.60 | 0.0006 |
| Ho | 2.52 | 0.86 | 2.81 | 3.33 | 3.27 | 2.97 | 3.30 | 1.38 | 1.20 | 1.20 |  | 1.10 | 1.10 | 1.14 | 2.05 | 2.05 | 0.93 | 0.88 | 0.0001 |
| Er | 7.10 | 2.30 | 7.62 | 9.91 | 9.88 | 8.74 | 9.63 | 3.82 | 3.39 | 3.44 |  | 3.13 | 3.13 | 3.20 | 6.59 | 6.50 | 2.10 | 2.00 | 0.0009 |
| Tm | 1.04 | 0.33 | 1.15 | 1.57 | 1.56 | 1.42 | 1.57 | 0.58 | 0.52 | 0.52 |  | 0.49 | 0.48 | 0.50 | 1.03 | 1.06 | 0.26 | 0.28 | 0.00015 |
| Yb | 6.75 | 2.10 | 7.49 | 10.36 | 10.27 | 9.52 | 10.49 | 3.93 | 3.55 | 3.53 |  | 3.30 | 3.16 | 3.51 | 7.48 | 7.40 | 1.40 | 1.50 | 0.0006 |
| Lu | 1.04 | 0.33 | 1.15 | 1.63 | 1.61 | 1.47 | 1.67 | 0.62 | 0.57 | 0.55 |  | 0.52 | 0.50 | 0.54 | 1.15 | 1.15 | 0.19 | 0.19 | 0.0001 |
| La/Yb | 3.88 | 8.70 | 4.36 | 0.41 | 0.40 | 0.41 | 0.44 | 5.20 | 4.77 | 5.04 |  | 6.98 | 6.36 | 7.38 |  |  |  |  |  |
| Sr/Y | 0.63 | 27.82 | 0.73 | 0.08 | 0.08 | 0.14 | 0.12 | 2.41 | 3.32 | 2.65 |  | 7.96 | 13.32 | 6.33 |  |  |  |  |  |
| LaN | 38.56 | 26.86 | 48.02 | 6.24 | 6.03 | 5.73 | 6.75 | 30.02 | 24.90 | 26.16 |  | 33.86 | 29.56 | 38.10 |  |  |  |  |  |
| YbN | 13.69 | 4.25 | 15.19 | 21.02 | 20.84 | 19.31 | 21.28 | 7.98 | 7.19 | 7.16 |  | 6.70 | 6.41 | 7.12 |  |  |  |  |  |
| (La/Yb)N | 2.82 | 6.32 | 3.16 | 0.30 | 0.29 | 0.30 | 0.32 | 3.76 | 3.46 | 3.66 |  | 5.06 | 4.61 | 5.35 |  |  |  |  |  |
| (Dy/Yb)N | 1.18 | 1.32 | 1.16 | 0.92 | 0.91 | 0.90 | 0.91 | 1.10 | 1.04 | 1.05 |  | 1.04 | 1.10 | 1.00 |  |  |  |  |  |
| δEu | 0.66 | 1.03 | 0.62 | 0.06 | 0.07 | 0.07 | 0.06 | 0.45 | 0.46 | 0.44 |  | 0.46 | 0.91 | 0.43 |  |  |  |  |  |
| LOI = loss on ignition.  A/CNK = molecular Al2O3/(CaO+Na2O+K2O), A/NK = molecular Al2O3/(Na2O+K2O).  Mg# = 100 × molecular Mg2+ / (Mg2+ + Fe2+), calculated by assuming TFeO = 0.9 × TFe2O3.  Eu anomalies (δEu) are calculated by EuN/(SmN × GdN)1/2, where "N" indicates chondrite-normalized values (Sun and McDonough, 1989).  The national geological standard reference samples (Granite GSR1 and Basalt GSR3) were used for the purpose of analytical quality control. | | | | | | | | | | | | | | | | | | | |

**References**

Sun, S.S., McDonough, W.F., 1989. Chemical and isotopic systematics of oceanic basalts, implications for mantle composition and processes: Geological Society, London, Special Publication, v. 42, p. 313–345. doi: 10.1144/GSL.SP.1989.042.01.19.