

Appendix 1. Bulk chemical compositions of amphibolites and greenstones

| Area | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | SH | KB | KB | KB | NNC | NNC | OG | OG | BK |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 50.43 | 50.28 | 49.02 | 50.57 | 49.81 | 50.00 | 50.67 | 49.71 | 48.94 |
| TiO ₂ | 1.01 | 1.34 | 0.98 | 1.20 | 1.10 | 1.12 | 1.37 | 1.61 | 1.26 |
| Al ₂ O ₃ | 15.85 | 16.51 | 18.47 | 15.77 | 15.43 | 15.95 | 16.19 | 16.02 | 15.82 |
| Fe ₂ O ₃ * | 9.26 | 9.97 | 8.70 | 9.67 | 9.90 | 9.37 | 10.08 | 10.95 | 10.42 |
| MnO | 0.16 | 0.16 | 0.17 | 0.20 | 0.20 | 0.17 | 0.19 | 0.26 | 0.17 |
| MgO | 8.99 | 8.87 | 8.31 | 8.93 | 9.48 | 9.40 | 7.51 | 9.20 | 9.15 |
| CaO | 11.82 | 9.39 | 11.49 | 10.96 | 12.02 | 10.78 | 10.05 | 8.95 | 11.25 |
| Na ₂ O | 2.41 | 3.71 | 2.66 | 2.57 | 2.51 | 3.26 | 3.12 | 3.36 | 2.37 |
| K ₂ O | 0.31 | 0.03 | 0.05 | 0.07 | 0.04 | 0.08 | 0.27 | 0.04 | 0.33 |
| P ₂ O ₅ | 0.04 | 0.15 | 0.09 | 0.09 | 0.02 | 0.07 | 0.11 | 0.09 | 0.09 |
| LOI | 0.59 | 0.61 | 0.41 | 0.40 | 0.58 | 0.43 | 0.84 | 0.48 | 0.64 |
| Total | 100.87 | 101.01 | 100.34 | 100.42 | 101.08 | 100.62 | 100.41 | 100.66 | 100.44 |
| FeO** | 8.33 | 8.97 | 7.83 | 8.70 | 8.91 | 8.43 | 9.07 | 9.85 | 9.38 |
| Elements (ppm) | | | | | | | | | |
| Sc | 36.36 | 39.36 | 34.06 | 36.88 | 37.27 | 36.19 | 36.09 | 41.02 | 37.36 |
| V | 235.32 | 276.46 | 222.07 | 265.53 | 251.40 | 254.07 | 270.28 | 314.26 | 265.73 |
| Cr | 373.13 | 334.35 | 353.04 | 331.12 | 397.48 | 359.87 | 258.74 | 296.62 | 228.29 |
| Ni | 121.37 | 109.44 | 106.04 | 102.53 | 127.39 | 144.97 | 91.64 | 111.18 | 144.69 |
| Cu | 5.79 | n.d. | 13.53 | 15.73 | 5.08 | 43.96 | 233.77 | 250.98 | 42.49 |
| Zn | 50.98 | 41.65 | 60.00 | 88.10 | 58.61 | 136.25 | 78.88 | 167.40 | 79.79 |
| Ga | 14.29 | 16.21 | 15.46 | 15.83 | 14.57 | 15.61 | 18.55 | 18.88 | 14.81 |
| Rb | 5.45 | 1.87 | 2.48 | 0.95 | 2.72 | 2.42 | 7.18 | 3.54 | 5.43 |
| Sr | 137.53 | 124.97 | 122.00 | 103.53 | 115.40 | 129.36 | 168.27 | 116.94 | 138.72 |
| Y | 20.84 | 27.98 | 21.95 | 31.34 | 24.15 | 24.46 | 30.98 | 36.50 | 27.55 |
| Zr | 62.25 | 84.03 | 59.11 | 69.82 | 57.84 | 71.02 | 94.82 | 103.86 | 78.55 |
| Nb | 0.94 | 1.36 | 1.19 | 1.91 | 0.46 | 2.10 | 1.33 | 1.29 | 0.70 |
| Ba | 58.67 | 27.64 | 22.47 | 37.43 | 26.10 | 36.97 | 58.57 | 33.65 | 49.26 |
| La | 1.70 | 3.23 | 0.64 | 2.67 | 1.68 | 2.67 | 5.19 | 2.96 | 2.13 |
| Ce | 12.14 | 10.74 | 10.41 | 16.21 | 4.79 | 10.31 | 13.83 | 12.55 | 6.63 |
| Nd | 6.62 | 8.73 | 6.03 | 10.36 | 6.13 | 7.79 | 9.27 | 10.20 | 8.85 |
| Yb | 3.73 | 4.06 | 3.94 | 4.42 | 3.39 | 2.07 | 3.61 | 3.38 | 3.14 |
| Hf | 0.67 | 1.62 | 1.28 | 1.17 | 1.22 | 0.64 | 2.01 | 2.16 | 1.74 |
| Pb | 2.39 | 0.15 | 0.38 | 0.69 | 0.50 | 2.34 | 0.83 | 0.73 | 2.05 |
| Th | 10.17 | 2.60 | 2.39 | 3.45 | 5.24 | 1.64 | 3.44 | 6.62 | 2.38 |
| U | n.d. | n.d. | 0.80 | 0.02 | 0.20 | 0.52 | 0.59 | 0.05 | 0.39 |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 1.82 | 0.18 | 0.29 | 0.40 | 0.21 | 0.45 | 1.60 | 0.25 | 1.98 |
| ab | 20.42 | 31.39 | 22.49 | 21.73 | 21.20 | 27.60 | 26.42 | 28.41 | 20.04 |
| an | 31.51 | 28.30 | 38.32 | 31.30 | 30.76 | 28.66 | 29.36 | 28.51 | 31.55 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 21.90 | 14.11 | 14.76 | 18.35 | 23.44 | 19.81 | 16.27 | 12.50 | 19.34 |
| wo | 11.23 | 7.22 | 7.56 | 9.39 | 12.01 | 10.17 | 8.28 | 6.38 | 9.89 |
| en | 6.59 | 4.16 | 4.41 | 5.44 | 7.01 | 6.04 | 4.47 | 3.61 | 5.64 |
| fs | 4.09 | 2.74 | 2.79 | 3.52 | 4.43 | 3.60 | 3.52 | 2.51 | 3.82 |
| hy | 11.14 | 3.09 | 6.54 | 17.06 | 7.49 | 1.05 | 12.78 | 8.43 | 8.30 |
| en | 6.87 | 1.86 | 4.01 | 10.37 | 4.59 | 0.66 | 7.14 | 4.98 | 4.95 |
| fs | 4.27 | 1.23 | 2.53 | 6.70 | 2.90 | 0.39 | 5.63 | 3.45 | 3.35 |
| ol | 10.56 | 19.45 | 14.59 | 7.73 | 14.28 | 19.39 | 9.27 | 17.73 | 14.95 |
| fo | 6.27 | 11.27 | 8.61 | 4.52 | 8.42 | 11.70 | 4.96 | 10.04 | 8.55 |
| fa | 4.29 | 8.18 | 5.99 | 3.22 | 5.86 | 7.68 | 4.31 | 7.68 | 6.39 |
| il | 1.92 | 2.54 | 1.86 | 2.27 | 2.08 | 2.13 | 2.61 | 3.06 | 2.40 |
| ap | 0.08 | 0.35 | 0.20 | 0.20 | 0.04 | 0.16 | 0.24 | 0.21 | 0.20 |
| X _{Mg} | 0.658 | 0.638 | 0.654 | 0.647 | 0.655 | 0.665 | 0.596 | 0.625 | 0.635 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X_{Mg}=Mg/(Mg+Fe). n.d.; not determined. n.a.; not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt. Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipetsotsu area, Ot: Okutokachi area, Oc: Ochiai area. SH: Shunbetsu river, KB: Koibokushushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sasshibichari river, NO: Nishuomanai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinnosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipetsotsu river, OA: Ochiaino-sawa river, SI: Shitsopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix 1. Continued.

| Area | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | BK | SS | SS | NO | NO | NO | NO | NO | NO |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 48.82 | 49.72 | 50.12 | 49.67 | 49.71 | 50.15 | 49.60 | 49.74 | 51.50 |
| TiO ₂ | 0.95 | 1.12 | 1.19 | 1.16 | 0.96 | 1.09 | 1.30 | 1.00 | 1.03 |
| Al ₂ O ₃ | 18.63 | 15.94 | 17.87 | 16.85 | 15.53 | 14.50 | 15.48 | 15.95 | 14.52 |
| Fe ₂ O ₃ * | 8.12 | 9.48 | 8.87 | 9.45 | 9.97 | 9.86 | 10.13 | 8.78 | 9.05 |
| MnO | 0.13 | 0.17 | 0.17 | 0.16 | 0.17 | 0.18 | 0.16 | 0.14 | 0.14 |
| MgO | 8.47 | 9.50 | 8.15 | 7.95 | 7.53 | 8.65 | 8.00 | 8.15 | 8.03 |
| CaO | 12.01 | 10.93 | 11.69 | 10.65 | 11.23 | 10.68 | 11.37 | 10.64 | 9.95 |
| Na ₂ O | 2.49 | 2.73 | 2.78 | 3.11 | 2.94 | 3.12 | 2.52 | 3.40 | 3.33 |
| K ₂ O | 0.21 | 0.24 | 0.05 | 0.40 | 0.00 | 0.13 | 0.16 | 0.19 | 0.24 |
| P ₂ O ₅ | 0.06 | 0.08 | 0.07 | 0.09 | 0.09 | 0.08 | 0.12 | 0.13 | 0.06 |
| LOI | 0.78 | 0.66 | 0.74 | 0.78 | 0.71 | 0.61 | 0.54 | 0.79 | 1.25 |
| Total | 100.68 | 100.58 | 101.71 | 100.26 | 98.84 | 99.05 | 99.37 | 98.92 | 99.11 |
| FeO** | 7.31 | 8.53 | 7.98 | 8.50 | 8.97 | 8.88 | 9.11 | 7.90 | 8.14 |
| Elements (ppm) | | | | | | | | | |
| Sc | 32.52 | 34.64 | 36.70 | 35.46 | n.a. | n.a. | n.a. | n.a. | n.a. |
| V | 222.45 | 238.48 | 240.95 | 252.11 | 235.11 | 242.20 | 263.42 | 223.24 | 246.36 |
| Cr | 324.51 | 350.01 | 278.73 | 346.66 | 320.40 | 329.10 | 314.80 | 324.90 | 300.90 |
| Ni | 106.57 | 132.67 | 120.54 | 133.80 | 105.48 | 86.20 | 127.69 | 150.18 | 114.11 |
| Cu | 73.73 | 27.62 | 22.75 | 40.75 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Zn | 60.14 | 73.55 | 86.62 | 81.38 | 59.28 | 57.10 | 58.98 | 58.41 | 63.17 |
| Ga | 16.67 | 16.67 | 17.17 | 17.41 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Rb | 4.52 | 0.71 | 2.73 | 9.71 | 2.84 | 2.84 | 3.93 | 4.91 | 5.21 |
| Sr | 144.60 | 145.02 | 164.99 | 170.59 | 88.94 | 95.78 | 111.26 | 133.65 | 97.59 |
| Y | 21.26 | 24.94 | 26.05 | 25.64 | 19.01 | 20.84 | 25.18 | 19.52 | 21.92 |
| Zr | 51.29 | 70.56 | 73.40 | 70.80 | 45.65 | 50.39 | 59.90 | 50.27 | 50.33 |
| Nb | 1.99 | 3.13 | 1.64 | 2.25 | 2.02 | 1.83 | 2.23 | 2.39 | 2.10 |
| Ba | 42.16 | 46.81 | 35.45 | 69.69 | 2.80 | 12.00 | n.d. | 28.60 | 43.30 |
| La | 0.63 | 3.93 | 0.57 | 2.15 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Ce | 5.72 | 10.34 | 9.86 | 9.96 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Nd | 6.27 | 7.03 | 8.07 | 5.58 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Yb | 1.74 | 3.64 | 3.10 | 2.82 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Hf | 0.94 | 1.24 | 0.52 | 1.22 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Pb | 1.98 | 1.41 | 0.69 | 1.28 | n.a. | n.a. | n.a. | n.a. | n.a. |
| Th | 9.35 | 3.39 | 7.08 | 7.88 | n.a. | n.a. | n.a. | n.a. | n.a. |
| U | n.d. | 0.46 | n.d. | 0.08 | n.a. | n.a. | n.a. | n.a. | n.a. |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 1.23 | 1.44 | 0.30 | 2.36 | - | 0.79 | 0.95 | 1.15 | 1.43 |
| ab | 21.09 | 23.13 | 23.54 | 26.30 | 24.89 | 26.40 | 21.35 | 28.80 | 28.18 |
| an | 39.02 | 30.51 | 36.13 | 30.84 | 29.18 | 25.17 | 30.43 | 27.68 | 23.96 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 16.35 | 18.87 | 17.44 | 17.53 | 21.33 | 22.31 | 20.63 | 19.75 | 20.45 |
| wo | 8.40 | 9.68 | 8.93 | 8.95 | 10.84 | 11.40 | 10.51 | 10.11 | 10.45 |
| en | 5.05 | 5.75 | 5.19 | 5.03 | 5.80 | 6.46 | 5.79 | 5.85 | 5.97 |
| fs | 2.90 | 3.43 | 3.32 | 3.55 | 4.70 | 4.45 | 4.32 | 3.79 | 4.03 |
| hy | 3.98 | 6.96 | 8.01 | 2.56 | 9.38 | 7.19 | 13.61 | 1.26 | 13.65 |
| en | 2.53 | 4.36 | 4.88 | 1.50 | 5.18 | 4.26 | 7.79 | 0.76 | 8.14 |
| fs | 1.45 | 2.60 | 3.13 | 1.06 | 4.20 | 2.93 | 5.82 | 0.49 | 5.50 |
| ol | 15.45 | 15.75 | 12.24 | 16.54 | 10.33 | 13.34 | 8.10 | 16.41 | 7.19 |
| fo | 9.47 | 9.50 | 7.17 | 9.30 | 5.46 | 7.58 | 4.44 | 9.58 | 4.12 |
| fa | 5.98 | 6.25 | 5.06 | 7.24 | 4.87 | 5.76 | 3.65 | 6.83 | 3.07 |
| il | 1.81 | 2.12 | 2.25 | 2.20 | 1.82 | 2.06 | 2.47 | 1.90 | 1.96 |
| ap | 0.15 | 0.19 | 0.17 | 0.20 | 0.20 | 0.18 | 0.28 | 0.31 | 0.13 |
| X _{Mg} | 0.674 | 0.665 | 0.645 | 0.625 | 0.599 | 0.635 | 0.610 | 0.647 | 0.637 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X_{Mg}=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipesotsu area, Ot: Okutokachi area, Oc: Ochiai area, Sh: Shunbetsu river, KB: Koibokushushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sasshibichari river, NO: Nishuomanai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinnosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipesotsu river, OA: Ochiaino-sawa river, SI: Shiisopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix 1. Continued.

| Area | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB | CHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | NO | NO | SM | SM | HB | HB | SG | SG | SG |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 49.35 | 51.70 | 50.63 | 50.56 | 50.02 | 48.13 | 49.89 | 49.64 | 50.04 |
| TiO ₂ | 1.53 | 1.14 | 1.09 | 1.25 | 1.05 | 1.32 | 1.19 | 1.09 | 1.12 |
| Al ₂ O ₃ | 15.11 | 14.95 | 15.77 | 15.84 | 15.17 | 16.31 | 15.65 | 14.90 | 16.38 |
| Fe ₂ O ₃ * | 11.33 | 9.54 | 9.26 | 9.88 | 8.82 | 10.58 | 9.64 | 9.76 | 10.20 |
| MnO | 0.17 | 0.16 | 0.18 | 0.16 | 0.14 | 0.16 | 0.16 | 0.17 | 0.18 |
| MgO | 7.78 | 8.55 | 8.50 | 8.40 | 8.71 | 8.65 | 8.94 | 8.50 | 8.24 |
| CaO | 10.69 | 10.62 | 11.47 | 9.80 | 11.29 | 11.32 | 11.20 | 11.29 | 9.75 |
| Na ₂ O | 3.11 | 3.61 | 3.09 | 3.88 | 2.44 | 2.49 | 3.24 | 2.65 | 3.34 |
| K ₂ O | 0.07 | 0.15 | 0.06 | 0.13 | 0.25 | 0.23 | 0.03 | 0.17 | 0.07 |
| P ₂ O ₅ | 0.10 | 0.07 | 0.08 | 0.07 | 0.08 | 0.09 | 0.04 | 0.08 | 0.07 |
| LOI | 0.68 | 0.70 | 0.57 | 0.62 | 0.58 | 1.29 | 0.37 | 0.60 | 0.64 |
| Total | 99.92 | 101.18 | 100.69 | 100.58 | 98.55 | 100.58 | 100.35 | 98.84 | 100.04 |
| FeO** | 10.20 | 8.58 | 8.33 | 8.89 | 7.94 | 9.52 | 8.67 | 8.78 | 9.18 |
| Elements (ppm) | | | | | | | | | |
| Sc | n.a. | 41.77 | 37.60 | 38.02 | n.a. | 35.22 | 40.10 | n.a. | 35.99 |
| V | 310.73 | 253.43 | 243.31 | 280.60 | 223.16 | 264.63 | 254.77 | 261.16 | 244.39 |
| Cr | 251.50 | 299.62 | 357.70 | 365.43 | 268.80 | 326.98 | 382.40 | 347.50 | 367.07 |
| Ni | 116.50 | 90.32 | 91.19 | 117.25 | 164.34 | 151.54 | 115.47 | 103.28 | 128.11 |
| Cu | n.a. | 62.78 | 60.34 | 60.13 | n.a. | 119.39 | 30.54 | n.a. | 28.03 |
| Zn | 72.74 | 44.78 | 75.32 | 74.33 | 57.11 | 82.10 | 60.16 | 51.71 | 54.47 |
| Ga | n.a. | 14.72 | 15.34 | 15.32 | n.a. | 15.41 | 14.58 | n.a. | 15.51 |
| Rb | 2.72 | 3.97 | 3.71 | 3.35 | 3.16 | 5.93 | 1.05 | 3.36 | 1.94 |
| Sr | 100.08 | 132.51 | 135.63 | 112.47 | 81.92 | 153.52 | 116.72 | 116.12 | 135.52 |
| Y | 30.00 | 25.40 | 25.33 | 28.73 | 19.82 | 29.13 | 25.42 | 20.98 | 24.64 |
| Zr | 66.35 | 65.64 | 61.36 | 80.17 | 51.81 | 81.45 | 75.93 | 45.10 | 65.59 |
| Nb | 2.25 | 1.20 | 2.11 | 2.92 | 2.45 | 2.13 | 0.90 | 2.46 | 1.37 |
| Ba | n.d. | 53.08 | 34.81 | 35.35 | 23.00 | 69.82 | 28.27 | 18.50 | 29.12 |
| La | n.a. | 2.47 | 2.85 | 3.14 | n.a. | 0.76 | 1.40 | n.a. | 4.29 |
| Ce | n.a. | 8.38 | 9.51 | 6.84 | n.a. | 6.99 | 9.13 | n.a. | 8.43 |
| Nd | n.a. | 5.25 | 7.14 | 8.35 | n.a. | 8.25 | 6.94 | n.a. | 8.43 |
| Yb | n.a. | 2.59 | 3.94 | 3.26 | n.a. | 3.13 | 3.47 | n.a. | 3.66 |
| Hf | n.a. | 0.72 | 1.64 | 1.15 | n.a. | 1.36 | 1.52 | n.a. | 0.83 |
| Pb | n.a. | 2.11 | 1.20 | 0.61 | n.a. | 1.37 | 0.30 | n.a. | 0.40 |
| Th | n.a. | 5.87 | 9.06 | 2.79 | n.a. | 4.38 | 3.06 | n.a. | 4.12 |
| U | n.a. | 0.29 | 0.35 | 0.39 | n.a. | 0.11 | n.d. | n.a. | 0.54 |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 0.43 | 0.92 | 0.33 | 0.75 | 1.47 | 1.38 | 0.19 | 0.98 | 0.41 |
| ab | 26.31 | 30.54 | 26.18 | 31.88 | 20.64 | 21.04 | 27.40 | 22.42 | 28.27 |
| an | 27.04 | 24.15 | 28.99 | 25.40 | 29.72 | 32.65 | 28.08 | 28.27 | 29.48 |
| ne | - | - | - | 0.53 | - | - | - | - | - |
| di | 20.83 | 22.93 | 22.34 | 18.64 | 20.96 | 18.73 | 22.21 | 22.23 | 15.08 |
| wo | 10.57 | 11.73 | 11.43 | 9.52 | 10.75 | 9.55 | 11.37 | 11.35 | 7.69 |
| en | 5.54 | 6.73 | 6.60 | 5.38 | 6.36 | 5.32 | 6.61 | 6.43 | 4.23 |
| fs | 4.73 | 4.48 | 4.31 | 3.74 | 3.84 | 3.86 | 4.23 | 4.45 | 3.16 |
| hy | 5.80 | 3.62 | 5.72 | - | 15.52 | 4.69 | 0.26 | 10.81 | 7.44 |
| en | 3.13 | 2.17 | 3.46 | - | 9.67 | 2.72 | 0.16 | 6.39 | 4.26 |
| fs | 2.67 | 1.45 | 2.26 | - | 5.84 | 1.97 | 0.10 | 4.42 | 3.18 |
| ol | 14.54 | 15.06 | 13.39 | 19.24 | 6.60 | 17.00 | 18.53 | 10.30 | 15.39 |
| fo | 7.50 | 8.69 | 7.78 | 10.89 | 3.96 | 9.45 | 10.86 | 5.85 | 8.44 |
| fa | 7.05 | 6.38 | 5.60 | 8.35 | 2.64 | 7.55 | 7.67 | 4.46 | 6.95 |
| il | 2.90 | 2.16 | 2.07 | 2.37 | 2.00 | 2.51 | 2.27 | 2.08 | 2.13 |
| ap | 0.24 | 0.16 | 0.18 | 0.15 | 0.19 | 0.22 | 0.09 | 0.19 | 0.17 |
| X _{Mg} | 0.576 | 0.640 | 0.645 | 0.627 | 0.662 | 0.618 | 0.647 | 0.633 | 0.615 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X_{Mg}=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shinokawa area, Tm: Tomuraushi area, Np: Nipetsotsu area, Ot: Okutokachi area, Oc: Ochiai area, SH: Shirobetsu river, KB: Koibokushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sashibichari river, NO: Nishuonmai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shiroshimomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinnosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashuesabetsu river, ON: Omrushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipetsotsu river, OA: Ochiaino-sawa river, SK: Shitsopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix 1. Continued.

| Area | CHMB | CHMB | CHMB | CHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | MM | NOB | SC | MS | MK | MK | PN | PN | PN |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 51.55 | 50.09 | 51.52 | 50.08 | 50.49 | 47.55 | 48.87 | 49.70 | 51.41 |
| TiO ₂ | 0.96 | 1.85 | 1.17 | 0.99 | 1.14 | 1.11 | 1.17 | 1.08 | 0.84 |
| Al ₂ O ₃ | 14.90 | 17.66 | 15.43 | 15.22 | 15.30 | 18.86 | 15.79 | 15.79 | 15.80 |
| Fe ₂ O ₃ * | 8.80 | 10.68 | 9.46 | 9.60 | 9.16 | 9.28 | 9.44 | 8.67 | 7.71 |
| MnO | 0.13 | 0.16 | 0.16 | 0.16 | 0.18 | 0.19 | 0.16 | 0.14 | 0.12 |
| MgO | 7.78 | 5.84 | 7.17 | 7.90 | 8.04 | 8.10 | 8.07 | 8.03 | 7.19 |
| CaO | 11.14 | 9.63 | 9.87 | 10.34 | 10.25 | 11.71 | 11.92 | 11.59 | 10.96 |
| Na ₂ O | 2.97 | 3.54 | 3.07 | 3.12 | 3.14 | 2.47 | 2.31 | 2.70 | 3.20 |
| K ₂ O | 0.04 | 0.56 | 0.45 | 0.12 | 0.18 | 0.15 | 0.05 | 0.02 | 0.19 |
| P ₂ O ₅ | 0.08 | 0.28 | 0.11 | 0.06 | 0.06 | 0.09 | 0.10 | 0.11 | 0.08 |
| LOI | 0.47 | 0.80 | 0.91 | 0.62 | 0.79 | 0.81 | 0.46 | 0.46 | 0.62 |
| Total | 98.82 | 101.09 | 99.31 | 98.22 | 98.74 | 100.32 | 98.34 | 98.29 | 98.12 |
| FeO** | 7.92 | 9.61 | 8.51 | 8.64 | 8.25 | 8.35 | 8.50 | 7.80 | 6.94 |
| Elements (ppm) | | | | | | | | | |
| Sc | n.a. | n.a. | n.a. | n.a. | n.a. | 30.84 | n.a. | n.a. | n.a. |
| V | 223.69 | 267.63 | 264.13 | 224.05 | 243.37 | 233.38 | 254.77 | 212.17 | 172.80 |
| Cr | 345.60 | 101.20 | 286.80 | 348.30 | 307.60 | 382.14 | 318.30 | 315.00 | 352.80 |
| Ni | 93.26 | 43.33 | 125.13 | 99.34 | 139.81 | 162.11 | 106.00 | 127.76 | 148.62 |
| Cu | n.a. | n.a. | n.a. | n.a. | n.a. | 231.85 | n.a. | n.a. | n.a. |
| Zn | 23.98 | 64.25 | 67.91 | 44.11 | 118.37 | 88.14 | 46.37 | 35.44 | 30.12 |
| Ga | n.a. | n.a. | n.a. | n.a. | n.a. | 15.57 | n.a. | n.a. | n.a. |
| Rb | 2.73 | 6.66 | 7.76 | 1.59 | 3.97 | 3.91 | 1.13 | 1.59 | 3.93 |
| Sr | 115.49 | 295.67 | 170.94 | 111.54 | 161.88 | 161.54 | 109.62 | 122.67 | 123.41 |
| Y | 19.21 | 21.39 | 26.08 | 17.65 | 28.23 | 23.58 | 22.65 | 17.28 | 18.00 |
| Zr | 51.02 | 133.99 | 68.17 | 51.70 | 68.78 | 72.64 | 53.43 | 64.16 | 60.71 |
| Nb | 2.06 | 9.99 | 2.82 | 2.41 | 3.38 | 2.16 | 2.63 | 2.59 | 2.81 |
| Ba | 11.90 | 78.50 | 84.00 | 22.90 | 24.10 | 49.79 | 8.80 | n.d. | 51.20 |
| La | n.a. | n.a. | n.a. | n.a. | n.a. | 2.11 | n.a. | n.a. | n.a. |
| Ce | n.a. | n.a. | n.a. | n.a. | n.a. | 6.18 | n.a. | n.a. | n.a. |
| Nd | n.a. | n.a. | n.a. | n.a. | n.a. | 6.31 | n.a. | n.a. | n.a. |
| Yb | n.a. | n.a. | n.a. | n.a. | n.a. | 2.35 | n.a. | n.a. | n.a. |
| Hf | n.a. | n.a. | n.a. | n.a. | n.a. | 1.06 | n.a. | n.a. | n.a. |
| Pb | n.a. | n.a. | n.a. | n.a. | n.a. | 0.92 | n.a. | n.a. | n.a. |
| Th | n.a. | n.a. | n.a. | n.a. | n.a. | 5.40 | n.a. | n.a. | n.a. |
| U | n.a. | n.a. | n.a. | n.a. | n.a. | n.d. | n.a. | n.a. | n.a. |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 0.26 | 3.32 | 2.64 | 0.68 | 1.07 | 0.89 | 0.28 | 0.14 | 1.12 |
| ab | 25.12 | 29.93 | 25.96 | 26.44 | 26.60 | 20.90 | 19.52 | 22.83 | 27.05 |
| an | 27.19 | 30.65 | 27.00 | 27.16 | 27.09 | 39.92 | 32.58 | 30.90 | 28.19 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 22.51 | 12.64 | 17.43 | 19.45 | 19.07 | 14.38 | 21.17 | 21.10 | 20.92 |
| wo | 11.50 | 6.37 | 8.87 | 9.92 | 9.74 | 7.35 | 10.81 | 10.80 | 10.71 |
| en | 6.55 | 3.10 | 4.80 | 5.49 | 5.55 | 4.17 | 6.11 | 6.28 | 6.20 |
| fs | 4.46 | 3.17 | 3.76 | 4.05 | 3.77 | 2.86 | 4.25 | 4.02 | 4.01 |
| hy | 17.16 | 5.47 | 18.26 | 10.57 | 11.70 | 1.73 | 13.40 | 12.11 | 13.29 |
| en | 10.21 | 2.70 | 10.24 | 6.08 | 6.97 | 1.03 | 7.91 | 7.38 | 8.07 |
| fs | 6.95 | 2.77 | 8.02 | 4.49 | 4.73 | 0.70 | 5.49 | 4.73 | 5.22 |
| ol | 3.20 | 13.04 | 3.69 | 10.31 | 9.19 | 18.45 | 7.52 | 7.59 | 4.37 |
| fo | 1.83 | 6.13 | 1.98 | 5.69 | 5.26 | 10.50 | 4.26 | 4.45 | 2.55 |
| fa | 1.37 | 6.91 | 1.71 | 4.63 | 3.94 | 7.95 | 3.26 | 3.14 | 1.82 |
| il | 1.83 | 3.51 | 2.22 | 1.88 | 2.17 | 2.10 | 2.22 | 2.04 | 1.60 |
| ap | 0.19 | 0.66 | 0.25 | 0.14 | 0.14 | 0.20 | 0.24 | 0.26 | 0.18 |
| X Mg | 0.636 | 0.520 | 0.600 | 0.620 | 0.635 | 0.634 | 0.628 | 0.647 | 0.649 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X Mg=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipetsotsu area, Ot: Okutokachi area, Oc: Ochiai area, SH: Shunbetsu river, KB: Koibokushushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sasshibichari river, NO: Nishuomanai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinnosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipetsotsu river, OA: Ochiaino-sawa river, SI: Shiisopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix I. Continued.

| Area | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | PN | PN | PN | SN | SN | SN | MKT | MKT | MKT |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 49.21 | 50.33 | 50.65 | 51.86 | 52.81 | 51.56 | 49.12 | 51.73 | 49.36 |
| TiO ₂ | 0.96 | 1.19 | 0.93 | 1.44 | 1.30 | 0.77 | 2.68 | 1.82 | 2.09 |
| Al ₂ O ₃ | 15.59 | 15.50 | 16.68 | 15.62 | 13.63 | 16.00 | 13.98 | 14.43 | 15.42 |
| Fe ₂ O ₃ * | 8.77 | 8.91 | 7.83 | 9.80 | 9.42 | 7.37 | 15.52 | 12.84 | 12.77 |
| MnO | 0.14 | 0.14 | 0.13 | 0.15 | 0.15 | 0.13 | 0.23 | 0.20 | 0.18 |
| MgO | 8.39 | 7.81 | 7.03 | 6.22 | 8.01 | 7.28 | 5.97 | 5.77 | 6.37 |
| CaO | 11.90 | 11.37 | 11.31 | 9.83 | 10.18 | 11.12 | 9.21 | 9.65 | 10.66 |
| Na ₂ O | 2.38 | 2.70 | 2.88 | 3.30 | 2.62 | 2.97 | 3.71 | 3.57 | 2.78 |
| K ₂ O | 0.03 | 0.19 | 0.18 | 0.40 | 0.25 | 0.10 | 0.13 | 0.14 | 0.28 |
| P ₂ O ₅ | 0.09 | 0.13 | 0.09 | 0.16 | 0.02 | 0.06 | 0.19 | 0.17 | 0.23 |
| LOI | 0.53 | 0.47 | 0.57 | 0.68 | 0.50 | 0.67 | 0.35 | 0.37 | 0.60 |
| Total | 97.99 | 98.74 | 98.26 | 99.47 | 98.88 | 98.03 | 101.09 | 100.69 | 100.75 |
| FeO** | 7.89 | 8.02 | 7.04 | 8.82 | 8.47 | 6.63 | 13.97 | 11.55 | 11.50 |
| Elements (ppm) | | | | | | | | | |
| Sc | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 39.97 | n.a. | n.a. |
| V | 211.27 | 252.70 | 202.04 | 271.62 | 235.32 | 179.53 | 677.50 | 357.01 | 377.84 |
| Cr | 306.80 | 320.10 | 316.40 | 283.30 | 283.40 | 279.00 | 75.19 | 94.60 | 253.00 |
| Ni | 142.40 | 132.09 | 133.59 | 84.33 | 90.40 | 147.57 | 65.09 | 41.49 | 86.98 |
| Cu | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 19.36 | n.a. | n.a. |
| Zn | 47.03 | 44.12 | 43.64 | 53.12 | 60.01 | 39.41 | 104.98 | 64.11 | 82.99 |
| Ga | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 21.29 | n.a. | n.a. |
| Rb | 2.02 | 2.13 | 2.60 | 5.33 | 4.07 | 3.21 | 2.85 | 1.79 | 2.35 |
| Sr | 105.62 | 103.22 | 123.48 | 153.44 | 96.31 | 114.62 | 163.41 | 115.97 | 91.67 |
| Y | 16.51 | 28.87 | 20.25 | 31.40 | 24.58 | 13.99 | 46.09 | 43.23 | 50.53 |
| Zr | 47.38 | 53.44 | 47.80 | 102.59 | 92.90 | 80.82 | 156.64 | 94.00 | 112.55 |
| Nb | 1.82 | 3.51 | 3.04 | 3.51 | 3.31 | 1.99 | n.d. | 4.07 | 4.41 |
| Ba | 4.50 | 16.40 | 60.10 | 98.80 | 35.00 | 22.90 | 42.07 | 13.60 | n.d. |
| La | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 3.14 | n.a. | n.a. |
| Ce | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 17.92 | n.a. | n.a. |
| Nd | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 16.22 | n.a. | n.a. |
| Yb | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 5.49 | n.a. | n.a. |
| Hf | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 1.97 | n.a. | n.a. |
| Pb | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 0.75 | n.a. | n.a. |
| Th | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 5.01 | n.a. | n.a. |
| U | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | 0.61 | n.a. | n.a. |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | 2.23 | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 0.17 | 1.13 | 1.08 | 2.34 | 1.45 | 0.59 | 0.75 | 0.81 | 1.66 |
| ab | 20.10 | 22.85 | 24.34 | 27.94 | 22.16 | 25.16 | 31.36 | 30.24 | 23.56 |
| an | 31.78 | 29.60 | 32.06 | 26.63 | 24.70 | 30.02 | 21.14 | 22.93 | 28.75 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 21.74 | 21.20 | 19.16 | 17.40 | 20.98 | 20.19 | 19.55 | 19.88 | 18.79 |
| wo | 11.14 | 10.84 | 9.80 | 8.81 | 10.72 | 10.35 | 9.74 | 9.94 | 9.44 |
| en | 6.51 | 6.21 | 5.62 | 4.50 | 6.08 | 6.10 | 3.99 | 4.33 | 4.38 |
| fs | 4.10 | 4.15 | 3.74 | 4.09 | 4.18 | 3.74 | 5.82 | 5.60 | 4.97 |
| hy | 13.49 | 14.47 | 14.35 | 18.66 | 23.41 | 18.12 | 3.93 | 16.48 | 13.42 |
| en | 8.28 | 8.67 | 8.62 | 9.77 | 13.88 | 11.23 | 1.60 | 7.19 | 6.29 |
| fs | 5.21 | 5.80 | 5.73 | 8.89 | 9.53 | 6.89 | 2.33 | 9.29 | 7.13 |
| ol | 7.26 | 5.56 | 3.96 | 1.73 | - | 0.96 | 16.94 | 4.86 | 8.18 |
| fo | 4.29 | 3.20 | 2.29 | 0.86 | - | 0.57 | 6.50 | 2.00 | 3.64 |
| fa | 2.97 | 2.36 | 1.67 | 0.86 | - | 0.39 | 10.44 | 2.85 | 4.55 |
| il | 1.83 | 2.27 | 1.76 | 2.74 | 2.46 | 1.46 | 5.09 | 3.45 | 3.96 |
| ap | 0.21 | 0.30 | 0.20 | 0.38 | 0.05 | 0.13 | 0.43 | 0.40 | 0.54 |
| X Mg | 0.655 | 0.634 | 0.640 | 0.557 | 0.628 | 0.662 | 0.432 | 0.471 | 0.497 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X Mg=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipesotsu area, Ot: Okutokachi area, Oc: Ochiai area, SH: Shunbetsu river, KB: Koibokushushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sasshibichari river, NO: Nishuonai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shimosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarashibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipesotsu river, OA: Ochiaino-sawa river, SI: Shisopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix 1. Continued.

| Area | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | MKI | MKI | MN | MN | MN | ON | ON | ON | ON |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 49.81 | 48.79 | 48.83 | 49.97 | 49.58 | 48.34 | 49.18 | 48.62 | 50.31 |
| TiO ₂ | 0.78 | 1.15 | 1.13 | 1.07 | 1.03 | 1.11 | 0.93 | 0.91 | 1.17 |
| Al ₂ O ₃ | 16.86 | 14.67 | 18.68 | 15.13 | 15.05 | 15.52 | 15.49 | 14.47 | 15.39 |
| Fe ₂ O ₃ * | 7.20 | 9.50 | 7.96 | 9.35 | 8.85 | 10.11 | 8.51 | 10.40 | 9.12 |
| MnO | 0.12 | 0.15 | 0.12 | 0.16 | 0.14 | 0.12 | 0.15 | 0.12 | 0.15 |
| MgO | 7.68 | 9.15 | 7.38 | 8.29 | 8.71 | 8.51 | 8.57 | 8.54 | 8.40 |
| CaO | 11.79 | 12.69 | 10.89 | 11.25 | 11.26 | 11.00 | 12.13 | 11.21 | 10.34 |
| Na ₂ O | 2.35 | 1.17 | 2.66 | 2.33 | 2.70 | 2.70 | 2.17 | 2.56 | 2.83 |
| K ₂ O | 0.23 | 0.20 | 0.12 | 0.08 | 0.01 | 0.07 | 0.04 | 0.06 | 0.09 |
| P ₂ O ₅ | 0.07 | 0.03 | 0.13 | 0.09 | 0.08 | 0.06 | 0.08 | 0.06 | 0.04 |
| LOI | 1.01 | 0.49 | 0.55 | 0.47 | 0.68 | 0.60 | 0.53 | 0.68 | 0.68 |
| Total | 97.89 | 98.01 | 98.45 | 98.20 | 98.10 | 98.13 | 97.80 | 97.62 | 98.52 |
| FeO** | 6.48 | 8.55 | 7.17 | 8.42 | 7.97 | 9.10 | 7.66 | 9.36 | 8.21 |
| Elements (ppm) | | | | | | | | | |
| Sc | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| V | 180.16 | 237.87 | 276.01 | 244.98 | 233.54 | 246.82 | 221.20 | 221.77 | 224.83 |
| Cr | 330.10 | 390.10 | 319.50 | 351.30 | 413.00 | 311.50 | 339.70 | 378.70 | 351.30 |
| Ni | 151.42 | 188.92 | 122.57 | 109.75 | 122.18 | 94.92 | 156.86 | 98.53 | 154.21 |
| Cu | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Zn | 42.68 | 64.29 | 39.12 | 36.53 | 19.74 | 11.90 | 44.43 | 10.39 | 56.48 |
| Ga | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Rb | 5.69 | 2.43 | 4.29 | 3.68 | 1.94 | 2.48 | 0.75 | 1.95 | 2.27 |
| Sr | 122.65 | 60.95 | 96.68 | 100.96 | 97.75 | 115.38 | 96.48 | 101.03 | 111.62 |
| Y | 13.46 | 25.17 | 24.97 | 18.47 | 18.51 | 21.87 | 16.92 | 16.17 | 21.56 |
| Zr | 46.61 | 71.26 | 56.62 | 53.97 | 50.62 | 54.89 | 47.86 | 42.12 | 59.33 |
| Nb | 1.78 | 2.92 | 2.74 | 1.99 | 2.13 | 2.51 | 2.00 | 1.97 | 2.15 |
| Ba | 40.90 | 54.60 | n.d. | 56.60 | 8.10 | 26.80 | n.d. | n.d. | 18.60 |
| La | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Ce | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Nd | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Yb | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Hf | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Pb | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Th | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| U | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| CIPW norm | | | | | | | | | |
| Q | - | 0.22 | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 1.37 | 1.19 | 0.68 | 0.48 | 0.09 | 0.39 | 0.24 | 0.33 | 0.51 |
| ab | 19.89 | 9.91 | 22.48 | 19.73 | 22.83 | 22.82 | 18.39 | 21.63 | 23.94 |
| an | 34.76 | 34.19 | 38.72 | 30.57 | 28.92 | 30.04 | 32.39 | 27.85 | 29.05 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 18.90 | 23.26 | 11.75 | 20.15 | 21.50 | 19.71 | 22.17 | 22.44 | 17.92 |
| wo | 9.71 | 11.92 | 6.02 | 10.30 | 11.02 | 10.06 | 11.37 | 11.43 | 9.17 |
| en | 5.87 | 7.01 | 3.52 | 5.87 | 6.51 | 5.64 | 6.75 | 6.29 | 5.33 |
| fs | 3.32 | 4.33 | 2.21 | 3.98 | 3.96 | 4.01 | 4.05 | 4.71 | 3.42 |
| hy | 16.47 | 25.54 | 12.58 | 20.44 | 12.09 | 6.84 | 15.66 | 9.85 | 16.73 |
| en | 10.51 | 15.79 | 7.73 | 12.19 | 7.52 | 4.00 | 9.79 | 5.63 | 10.19 |
| fs | 5.95 | 9.75 | 4.84 | 8.25 | 4.57 | 2.85 | 5.87 | 4.22 | 6.54 |
| ol | 3.13 | - | 8.44 | 3.18 | 8.95 | 14.46 | 5.61 | 11.94 | 6.47 |
| fo | 1.93 | - | 4.99 | 1.82 | 5.36 | 8.10 | 3.37 | 6.54 | 3.79 |
| fa | 1.20 | - | 3.44 | 1.36 | 3.59 | 6.36 | 2.23 | 5.39 | 2.68 |
| il | 1.48 | 2.19 | 2.15 | 2.04 | 1.95 | 2.11 | 1.77 | 1.73 | 2.21 |
| ap | 0.16 | 0.08 | 0.31 | 0.20 | 0.19 | 0.15 | 0.19 | 0.13 | 0.09 |
| X Mg | 0.679 | 0.656 | 0.647 | 0.637 | 0.661 | 0.625 | 0.666 | 0.619 | 0.646 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X Mg=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.
 CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipesotsu area, Ot: Okutokachi area, Oc: Ochiai area, SH: Shunbetsu river, KB: Koibokushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sasshibichari river, NO: Nishuomanai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinnosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipesotsu river, OA: Ochiaino-sawa river, SI: Shiisapurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix I. Continued.

| Area | nSHMB | nSHMB | nSHMB | nSHMB | nSHMB | sSHMB | sSHMB | sSHMB | CHMB |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------|
| Locality | ON | FC | FC | FC | FC | RB | NK | NK | NNC |
| Rock Type | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Opx amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 49.88 | 49.02 | 52.57 | 48.74 | 50.77 | 50.61 | 49.14 | 51.19 | 49.41 |
| TiO ₂ | 1.15 | 1.11 | 0.73 | 1.59 | 0.92 | 1.23 | 2.22 | 2.07 | 1.07 |
| Al ₂ O ₃ | 15.88 | 16.43 | 15.58 | 15.04 | 15.17 | 16.03 | 13.54 | 13.32 | 15.90 |
| Fe ₂ O ₃ * | 9.90 | 9.87 | 6.57 | 11.49 | 8.93 | 9.77 | 14.30 | 12.79 | 9.09 |
| MnO | 0.16 | 0.20 | 0.11 | 0.19 | 0.16 | 0.17 | 0.23 | 0.19 | 0.16 |
| MgO | 8.66 | 9.90 | 7.88 | 8.00 | 9.93 | 8.43 | 7.76 | 7.33 | 8.89 |
| CaO | 11.76 | 11.64 | 10.72 | 11.60 | 11.58 | 11.86 | 11.12 | 11.07 | 12.13 |
| Na ₂ O | 2.56 | 1.69 | 2.91 | 1.77 | 2.46 | 2.63 | 2.52 | 2.97 | 2.67 |
| K ₂ O | 0.10 | 0.10 | 0.15 | 0.07 | 0.10 | 0.07 | 0.21 | 0.17 | 0.03 |
| P ₂ O ₅ | 0.10 | 0.09 | 0.04 | 0.10 | 0.02 | 0.08 | 0.15 | 0.18 | 0.07 |
| LOI | 0.60 | 0.45 | 0.66 | 0.45 | 0.45 | 0.66 | 1.31 | 0.46 | 0.63 |
| Total | 100.73 | 100.50 | 97.91 | 99.03 | 100.50 | 101.56 | 102.49 | 101.73 | 100.06 |
| FeO** | 8.91 | 8.88 | 5.91 | 10.34 | 8.04 | 8.80 | 12.87 | 11.51 | 8.18 |
| Elements (ppm) | | | | | | | | | |
| Sc | 37.74 | 33.00 | n.a. | n.a. | 34.89 | 42.15 | 53.62 | 49.63 | 38.60 |
| V | 250.29 | 234.10 | 163.59 | 338.02 | 234.06 | 268.77 | 471.33 | 418.88 | 240.71 |
| Cr | 447.03 | 495.41 | 374.90 | 314.70 | 505.92 | 282.49 | 102.74 | 95.10 | 360.26 |
| Ni | 139.40 | 242.00 | 77.50 | 89.34 | 219.19 | 111.14 | 57.39 | 53.00 | 99.74 |
| Cu | 10.25 | 2.66 | n.a. | n.a. | 4.65 | 49.43 | n.d. | 4.75 | 36.65 |
| Zn | 32.32 | 129.01 | 44.08 | 71.67 | 68.55 | 54.65 | 129.04 | 109.14 | 59.62 |
| Ga | 14.88 | 14.74 | n.a. | n.a. | 13.70 | 14.26 | 19.59 | 17.96 | 15.66 |
| Rb | 1.64 | 2.21 | 4.03 | 1.32 | 5.14 | 2.71 | 4.46 | 3.28 | 4.79 |
| Sr | 142.50 | 43.97 | 161.84 | 77.73 | 144.59 | 156.11 | 179.94 | 148.74 | 109.29 |
| Y | 23.16 | 24.05 | 14.00 | 36.56 | 19.63 | 27.00 | 51.03 | 44.27 | 23.62 |
| Zr | 78.74 | 75.60 | 83.39 | 74.79 | 58.35 | 74.21 | 148.38 | 136.74 | 63.71 |
| Nb | 3.33 | 2.65 | 2.62 | 3.59 | 2.32 | 1.35 | 4.88 | 2.31 | 1.27 |
| Ba | 25.40 | 31.74 | 71.50 | 7.60 | 51.09 | 28.57 | 99.23 | 71.35 | 32.17 |
| La | 2.70 | 1.04 | n.a. | n.a. | 0.59 | 0.21 | 5.10 | 1.99 | 2.21 |
| Ce | 10.43 | 9.46 | n.a. | n.a. | 3.17 | 11.40 | 16.05 | 15.00 | 8.53 |
| Nd | 7.66 | 6.46 | n.a. | n.a. | 6.04 | 6.40 | 13.98 | 12.62 | 6.18 |
| Yb | 3.31 | 3.08 | n.a. | n.a. | 2.76 | 2.45 | 5.28 | 5.21 | 1.75 |
| Hf | 1.33 | 0.63 | n.a. | n.a. | 0.79 | 0.16 | 1.56 | 2.25 | 1.13 |
| Pb | n.d. | 1.64 | n.a. | n.a. | 1.34 | 0.39 | 4.52 | 1.52 | 0.88 |
| Th | 2.71 | 5.80 | n.a. | n.a. | 6.07 | 2.81 | n.d. | 2.76 | 30.59 |
| U | n.d. | 0.37 | n.a. | n.a. | n.d. | 1.22 | 0.67 | 0.04 | n.d. |
| CIPW norm | | | | | | | | | |
| Q | - | - | 1.13 | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 0.58 | 0.58 | 0.89 | 0.42 | 0.59 | 0.40 | 1.21 | 0.98 | 0.23 |
| ab | 21.66 | 14.30 | 24.64 | 14.97 | 20.86 | 22.29 | 21.29 | 25.11 | 24.38 |
| an | 31.55 | 36.97 | 28.99 | 32.88 | 30.03 | 31.71 | 25.04 | 22.53 | 33.37 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 21.35 | 16.46 | 19.39 | 19.78 | 22.14 | 21.73 | 24.12 | 25.84 | - |
| wo | 10.91 | 8.44 | 10.00 | 10.04 | 11.39 | 11.10 | 12.15 | 13.04 | - |
| en | 6.20 | 5.00 | 6.25 | 5.29 | 6.95 | 6.30 | 5.82 | 6.43 | - |
| fs | 4.24 | 3.01 | 3.14 | 4.45 | 3.80 | 4.33 | 6.15 | 6.36 | - |
| hy | 10.03 | 20.35 | 20.09 | 24.06 | 13.70 | 11.67 | 11.60 | 14.65 | 3.56 |
| en | 5.95 | 12.70 | 13.37 | 13.08 | 8.85 | 6.91 | 5.64 | 7.36 | 1.98 |
| fs | 4.07 | 7.65 | 6.72 | 10.98 | 4.85 | 4.75 | 5.96 | 7.29 | 1.58 |
| ol | 11.56 | 8.10 | - | 2.08 | 10.04 | 9.60 | 11.91 | 6.56 | 33.65 |
| fo | 6.59 | 4.87 | - | 1.08 | 6.26 | 5.46 | 5.51 | 3.14 | 17.87 |
| fa | 4.97 | 3.23 | - | 1.00 | 3.78 | 4.14 | 6.41 | 3.42 | 15.78 |
| il | 2.18 | 2.12 | 1.38 | 3.01 | 1.74 | 2.34 | 4.21 | 3.93 | 2.35 |
| ap | 0.23 | 0.20 | 0.09 | 0.22 | 0.06 | 0.19 | 0.36 | 0.41 | 0.22 |
| X _{Mg} | 0.634 | 0.665 | 0.704 | 0.580 | 0.688 | 0.631 | 0.518 | 0.532 | 0.659 |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X_{Mg}=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipetsotsu area, Ot: Okutokachi area, Oc: Ochiai area, SH: Shunbetsu river, KB: Koibokushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sasshibichari river, NO: Nishuomanai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinnosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shiitokachi river, NU: Nupun-Tomuraushi river, NP: Nipetsotsu river, OA: Ochiaino-sawa river, SI: Shiisopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.

Appendix I. Continued.

| Area | CHMB | CHMB | CHMB | CHMB | nSHMB | CHMB | CHMB | CHMB | CHMB |
|----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Locality | OG | SS | NO | HB | PN | SG | SG | MM | SC |
| Rock Type | Opx amphibolite | Opx amphibolite | Opx amphibolite | Opx amphibolite | Opx amphibolite | 2Px amphibolite | 2Px amphibolite | 2Px amphibolite | 2Px amphibolite |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 48.87 | 49.74 | 51.89 | 48.38 | 48.50 | 48.50 | 49.20 | 48.06 | 48.67 |
| TiO ₂ | 1.15 | 1.39 | 1.24 | 1.46 | 1.13 | 1.02 | 1.28 | 1.13 | 1.26 |
| Al ₂ O ₃ | 17.40 | 15.93 | 16.28 | 17.82 | 15.18 | 16.13 | 15.66 | 15.77 | 15.78 |
| Fe ₂ O ₃ * | 9.37 | 10.36 | 8.36 | 10.49 | 10.27 | 9.84 | 10.30 | 10.19 | 10.07 |
| MnO | 0.19 | 0.18 | 0.20 | 0.18 | 0.18 | 0.18 | 0.19 | 0.18 | 0.17 |
| MgO | 8.83 | 9.68 | 8.30 | 8.64 | 9.85 | 9.48 | 8.87 | 9.76 | 9.13 |
| CaO | 10.25 | 10.24 | 9.65 | 11.43 | 13.21 | 13.12 | 12.56 | 12.70 | 13.05 |
| Na ₂ O | 3.01 | 2.97 | 3.57 | 1.57 | 2.06 | 2.18 | 2.47 | 2.29 | 2.05 |
| K ₂ O | 0.43 | 0.16 | 0.23 | 0.17 | 0.05 | 0.03 | 0.06 | 0.03 | 0.08 |
| P ₂ O ₅ | 0.12 | 0.08 | 0.10 | 0.14 | 0.07 | 0.07 | 0.09 | 0.07 | 0.09 |
| LOI | 0.77 | 0.25 | 0.46 | 0.56 | 0.44 | 0.35 | 0.44 | 0.53 | 0.45 |
| Total | 100.38 | 100.99 | 100.28 | 100.85 | 100.74 | 100.88 | 101.11 | 100.71 | 100.80 |
| FeO** | 8.44 | 9.32 | 7.53 | 9.44 | 9.25 | 8.85 | 9.27 | 9.17 | 9.06 |
| Elements (ppm) | | | | | | | | | |
| Sc | 36.98 | 38.39 | 37.41 | 37.11 | 42.46 | 40.42 | 42.23 | 42.41 | 42.60 |
| V | 249.72 | 289.28 | 261.06 | 304.32 | 273.63 | 253.58 | 277.57 | 277.57 | 282.50 |
| Cr | 296.86 | 353.17 | 307.89 | 261.04 | 428.66 | 414.18 | 335.04 | 453.37 | 329.06 |
| Ni | 137.46 | 112.29 | 90.66 | 99.82 | 123.85 | 120.76 | 93.05 | 114.70 | 107.97 |
| Cu | 25.78 | 3.92 | 46.97 | n.d. | 19.39 | 46.38 | 194.06 | 87.13 | 68.19 |
| Zn | 130.98 | 44.69 | 122.77 | 67.64 | 50.18 | 53.51 | 92.97 | 60.19 | 73.39 |
| Ga | 19.21 | 15.96 | 17.24 | 21.45 | 13.86 | 14.87 | 14.50 | 13.96 | 14.26 |
| Rb | 8.84 | 2.74 | 2.61 | 6.31 | 1.42 | 2.73 | 1.58 | 2.51 | 1.87 |
| Sr | 149.53 | 145.69 | 139.13 | 200.85 | 120.48 | 122.70 | 126.60 | 125.21 | 151.61 |
| Y | 25.81 | 31.49 | 30.39 | 32.37 | 25.47 | 21.87 | 27.15 | 25.70 | 27.84 |
| Zr | 71.97 | 85.27 | 72.97 | 87.60 | 50.68 | 47.86 | 75.15 | 49.98 | 64.21 |
| Nb | 0.15 | 1.67 | 1.82 | 1.74 | 1.64 | 1.44 | 0.02 | 0.90 | 0.60 |
| Ba | 66.64 | 34.70 | 55.65 | 39.64 | 23.42 | 22.22 | 31.22 | 24.84 | 24.31 |
| La | 2.95 | 3.47 | 3.16 | 3.56 | 0.83 | 0.59 | 2.78 | 2.07 | 1.46 |
| Ce | 8.20 | 11.31 | 14.97 | 8.19 | 7.59 | 4.94 | 6.59 | 1.92 | 8.32 |
| Nd | 8.20 | 8.98 | 10.90 | 8.51 | 5.73 | 5.79 | 6.79 | 6.39 | 7.20 |
| Yb | 2.47 | 2.76 | 4.83 | 2.90 | 3.19 | 3.02 | 3.11 | 3.07 | 2.77 |
| Hf | 1.00 | 1.43 | 1.91 | 1.60 | 0.78 | 0.59 | 1.53 | 1.10 | 0.35 |
| Pb | 4.92 | 1.74 | 3.56 | 1.56 | n.c. | 0.06 | 0.44 | n.d. | 0.42 |
| Th | 5.51 | 4.16 | 2.09 | 20.81 | 3.58 | 5.87 | 5.19 | 5.80 | 5.16 |
| U | 0.33 | 0.21 | 0.60 | n.d. | 0.40 | n.d. | 0.32 | n.d. | n.d. |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | - |
| C | - | - | - | - | - | - | - | - | - |
| or | 2.53 | 0.97 | 1.36 | 1.03 | 0.32 | 0.20 | 0.35 | 0.18 | 0.45 |
| ab | 25.48 | 25.13 | 30.19 | 13.31 | 17.41 | 18.47 | 20.86 | 19.38 | 17.37 |
| an | 32.70 | 29.66 | 27.72 | 31.05 | 32.01 | 34.10 | 31.50 | 32.67 | 33.61 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 14.16 | 16.80 | 15.86 | 12.05 | 26.97 | 24.88 | 24.72 | 24.37 | 24.94 |
| wo | 7.25 | 8.61 | 8.14 | 6.15 | 13.81 | 12.74 | 12.63 | 12.48 | 12.76 |
| en | 4.23 | 5.03 | 4.86 | 3.46 | 8.07 | 7.44 | 7.16 | 7.29 | 7.36 |
| fs | 2.68 | 3.16 | 2.86 | 2.44 | 5.08 | 4.70 | 4.94 | 4.59 | 4.82 |
| hy | 0.72 | 6.20 | 11.03 | 22.80 | 2.64 | 2.21 | 4.23 | 0.25 | 6.74 |
| en | 0.44 | 3.81 | 6.95 | 13.35 | 1.62 | 1.36 | 2.50 | 0.15 | 4.07 |
| fs | 0.28 | 2.39 | 4.08 | 9.45 | 1.02 | 0.86 | 1.73 | 0.10 | 2.67 |
| ol | 20.63 | 18.11 | 16.24 | 5.89 | 17.62 | 17.60 | 15.34 | 20.02 | 13.64 |
| fo | 12.15 | 10.70 | 6.22 | 3.31 | 10.40 | 10.38 | 8.71 | 11.81 | 7.92 |
| fa | 8.48 | 7.41 | 4.02 | 2.58 | 7.21 | 7.22 | 6.63 | 8.20 | 5.72 |
| il | 2.18 | 2.63 | 2.36 | 2.78 | 2.14 | 1.93 | 2.44 | 2.14 | 2.39 |
| ap | 0.27 | 0.19 | 0.23 | 0.33 | 0.15 | 0.16 | 0.20 | 0.16 | 0.21 |
| A/Mg | 0.651 | 0.649 | 0.663 | 0.620 | 0.646 | 0.656 | 0.630 | 0.655 | 0.642 |

FeO*: total Fe as FeO; FeO**, total Fe as FeO; LOI, loss on ignition; A/Mg, Mg/(Mg+Fe); n.d., not determined; n.a., not analyzed

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipetsotsu area, Ot: Okutokachi area, Oc: Ochiai area, Sji: Shunbetsu river, KB: Kobokusushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikuro-zawa river, SS: Sasshibichari river, NO: Nishuomian-zawa river, SM: Soematsu-zawa river, HB: Hidakabetsu river, SG: Sogabetsu river, MM: Menashaman river, SOB: Sobetsu river, SC: Shirochonomi river, MS: Menashubetsu river, MK: Mukroetsu river, PN: Parake river, SN: Shinnosukeshubetsu river, MKT: Mikitonari river, MKI: Mikinari river, MN: Menashubetsu river, ON: Onarubetsu river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shitokachi river, NU: Nupun-Tomuraushi river, NP: Nipetsotsu river, OA: Ochiama-sawa river, SI: Shisopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomami river

Appendix 1. Continued.

| Area | CHMB | nSHMB | sSHMB | CHMB | CHMB | SK | SK | SK | Tm |
|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|---------|---------|------------|
| Locality | MS | PN | PN | KB | SS | OA | OA | OA | NI |
| Rock Type | 2Px amphibolite | 2Px amphibolite | 2Px amphibolite | Grt amphibolite | Grt amphibolite | Diorite | Diorite | Diorite | Cpx basalt |
| Oxides (wt %) | | | | | | | | | |
| SiO ₂ | 48.52 | 49.01 | 48.96 | 48.61 | 44.67 | 50.47 | 49.93 | 50.41 | 47.47 |
| TiO ₂ | 1.20 | 1.21 | 1.13 | 1.54 | 1.23 | 1.57 | 1.73 | 1.51 | 1.42 |
| Al ₂ O ₃ | 16.42 | 16.01 | 16.33 | 17.94 | 16.59 | 14.41 | 15.65 | 17.35 | 16.09 |
| FeO** | 9.89 | 9.96 | 9.53 | 19.70 | 23.81 | 11.31 | 10.44 | 9.57 | 10.20 |
| MnO | 0.17 | 0.12 | 0.16 | 0.23 | 0.29 | 0.19 | 0.18 | 0.15 | 0.15 |
| MgO | 8.55 | 9.13 | 8.77 | 7.20 | 10.03 | 7.72 | 7.70 | 6.40 | 8.96 |
| CaO | 12.54 | 12.31 | 12.22 | 2.77 | 3.50 | 8.94 | 10.18 | 10.95 | 10.50 |
| Na ₂ O | 2.20 | 2.61 | 2.61 | 3.69 | 2.39 | 2.61 | 3.40 | 3.22 | 2.73 |
| K ₂ O | 0.09 | 0.04 | 0.03 | 0.01 | 0.03 | 0.33 | 0.13 | 0.31 | 0.27 |
| P ₂ O ₅ | 0.07 | 0.08 | 0.09 | 0.27 | 0.05 | 0.16 | 0.18 | 0.14 | 0.12 |
| LOI | 0.34 | 0.29 | 0.44 | 0.04 | 0.71 | 3.91 | 1.90 | 1.81 | 4.34 |
| Total | 100.00 | 100.78 | 100.27 | 101.86 | 103.20 | 101.60 | 101.43 | 101.82 | 102.24 |
| FeO** | 8.90 | 8.97 | 8.57 | 17.73 | 21.43 | 10.78 | 9.40 | 8.61 | 9.18 |
| Elements (ppm) | | | | | | | | | |
| Sc | 38.18 | 42.43 | 36.32 | 37.02 | 31.41 | 46.54 | 44.45 | 40.76 | 47.31 |
| V | 268.67 | 278.30 | 239.15 | 294.04 | 242.42 | 316.12 | 330.68 | 286.15 | 272.06 |
| Cr | 288.30 | 336.09 | 351.74 | 215.52 | 225.35 | 54.99 | 235.60 | 217.67 | 309.58 |
| Ni | 110.39 | 105.76 | 125.23 | 98.84 | 122.55 | 44.96 | 97.13 | 79.22 | 90.69 |
| Cu | 16.88 | n.d. | 28.74 | 322.97 | 1296.32 | 65.01 | 61.50 | 19.67 | 95.40 |
| Zn | 67.23 | 24.60 | 56.25 | 52.72 | 83.91 | 101.76 | 76.89 | 75.77 | 72.51 |
| Ga | 15.51 | 15.12 | 13.55 | 21.14 | 19.80 | 17.78 | 18.03 | 16.67 | 18.72 |
| Rb | 3.23 | 1.68 | 1.44 | n.d. | 1.11 | 1.52 | 5.29 | 8.70 | 5.65 |
| Sr | 119.97 | 166.04 | 145.92 | 93.11 | 78.21 | 202.45 | 213.05 | 211.37 | 216.39 |
| Y | 26.63 | 26.41 | 25.70 | 34.29 | 30.45 | 38.71 | 39.48 | 33.29 | 27.64 |
| Zr | 59.47 | 59.42 | 80.55 | 106.52 | 86.15 | 134.27 | 139.42 | 115.38 | 112.42 |
| Nb | 1.85 | 0.73 | 2.97 | 2.23 | n.c. | 1.96 | 2.66 | 2.35 | 2.71 |
| Ba | 24.70 | 31.87 | 26.79 | 37.21 | 26.83 | 102.19 | 46.97 | 100.09 | 48.55 |
| La | 0.81 | 2.22 | 0.86 | 4.15 | 2.32 | 5.02 | 2.17 | 2.91 | 3.54 |
| Ce | 6.81 | 8.66 | 10.75 | 12.23 | 2.96 | 16.88 | 14.58 | 17.96 | 13.27 |
| Nd | 7.18 | 6.29 | 7.59 | 10.27 | 4.02 | 13.63 | 13.31 | 12.21 | 9.45 |
| Yb | 3.50 | 3.85 | 3.07 | 5.11 | 4.09 | 4.71 | 4.63 | 2.97 | 1.25 |
| Hf | 0.94 | 0.90 | 1.17 | 2.34 | 3.25 | 2.04 | 2.43 | 1.59 | 1.71 |
| Pb | 1.70 | n.d. | 0.44 | n.d. | 0.87 | 0.70 | 1.51 | 2.14 | 0.42 |
| Tb | 4.58 | 3.84 | 2.80 | 0.86 | n.d. | 5.12 | 2.76 | 2.08 | 3.29 |
| Tm | n.d. | 0.37 | n.d. | 1.81 | 1.55 | n.d. | 0.40 | n.d. | 0.26 |
| CIPW norm | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | - |
| C | - | - | - | 7.44 | 6.29 | - | - | - | - |
| or | 0.52 | 0.25 | 0.21 | 0.07 | 0.19 | 1.94 | 0.78 | 0.84 | 1.58 |
| ab | 18.58 | 22.07 | 22.12 | 31.26 | 20.18 | 22.10 | 28.80 | 27.24 | 23.11 |
| an | 34.69 | 31.85 | 32.73 | 12.01 | 17.05 | 26.61 | 27.64 | 31.97 | 30.85 |
| ne | - | - | - | - | - | - | - | - | - |
| di | 22.12 | 23.40 | 22.28 | - | - | 13.73 | 18.27 | 17.66 | 16.71 |
| wo | 11.30 | 11.98 | 11.40 | - | - | 6.97 | 9.30 | 8.96 | 8.55 |
| en | 6.41 | 6.94 | 6.60 | - | - | 3.65 | 5.07 | 4.69 | 1.91 |
| fs | 4.41 | 4.48 | 4.28 | - | - | 3.12 | 3.90 | 4.01 | 3.26 |
| hy | 7.22 | 1.73 | 3.71 | 37.72 | 28.11 | 28.63 | 6.12 | 6.99 | 2.08 |
| en | 4.27 | 1.05 | 1.94 | 13.98 | 11.18 | 15.43 | 3.46 | 3.77 | 1.25 |
| fs | 2.94 | 0.68 | 1.26 | 23.74 | 16.93 | 13.20 | 2.66 | 3.22 | 6.83 |
| ol | 13.10 | 17.70 | 15.99 | 7.94 | 25.84 | 0.20 | 13.76 | 10.17 | 19.59 |
| fo | 7.45 | 10.34 | 9.32 | 2.77 | 9.68 | 0.10 | 7.45 | 5.24 | 1.32 |
| fs | 5.65 | 7.36 | 6.67 | 5.18 | 16.16 | 0.10 | 6.31 | 4.93 | 8.27 |
| il | 2.29 | 2.29 | 2.14 | 2.92 | 2.33 | 2.97 | 3.29 | 2.86 | 2.69 |
| ap | 0.16 | 0.19 | 0.21 | 0.61 | 0.12 | 0.37 | 0.41 | 0.33 | 0.27 |
| X _{Mg} | 0.631 | 0.645 | 0.655 | 0.455 | 0.420 | 0.575 | 0.593 | 0.570 | 0.635 |

FeO*: total Fe as FeO; FeO**: total Fe as FeO; LOI: loss on ignition; X_{Mg}: Mg/(Mg+Fe); n.d.: not determined; n.a.: not analyzed

CHMB: central area of the Hidaka metamorphic Belt; nSHMB: Northern part of southern area of the Hidaka metamorphic Belt; sSHMB: southern part of southern area of the Hidaka metamorphic Belt; SK: Shirakawa area; Tm: Tomuraushi area; Np: Nipetsotsu area; Ot: Okutokachi area; Oc: Ochiai area; SH: Sühmbetsu river; KB: Koubokushibichan river; NNC: Nanashino-sawa river; OG: Ogawara-zawa river; BK: Benikaru-zawa river; SS: Sasshibichan river; NO: Nishuomazai-zawa river; SM: Socratsu-zawa river; HB: Hidakuborobetsu river; SG: Sogabetsu river; MM: Menashuman river; NOB: Nobetsu river; SC: Shirochinomi river; MS: Menashubetsu river; MK: Mukorobetsu river; PN: Panke river; SN: Shimosakushubetsu river; MKT: Mikatonai river; MKI: Mikinaai river; MN: Menashubetsu river; ON: Onarushibe river; IC: Ichiumi river; RB: Rubeshibe river; NK: Nikanbetsu river; ST: Shitokachi river; NU: Nupun-Tomuraushi river; NP: Nipetsotsu river; OA: Ochiino-sawa river; SI: Shisopurachi river; LC: Uchino-sawa river; KN: Kanano-sawa river; TM: Tomama river

Appendix 1. Continued.

| Area | Tm | NP | Ot | Ot | Oc | Oc | Oc | Oc | Oc | Oc | |
|----------------------------------|-----------|------------------|-------------|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Locality | NU | NP | ST | ST | SI | UC | UC | UC | KN | KN | TM |
| Rock Type | Dorellite | Act-Chl dolerite | Amphibolite | Ep amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite | Amphibolite |
| Oxides (wt %) | | | | | | | | | | | |
| SiO ₂ | 48.61 | 50.14 | 53.64 | 50.13 | 52.58 | 52.11 | 51.71 | 52.07 | 50.19 | 51.30 | |
| TiO ₂ | 1.75 | 1.93 | 2.21 | 2.18 | 2.11 | 1.67 | 1.85 | 1.43 | 1.95 | 1.41 | |
| Al ₂ O ₃ | 15.87 | 15.14 | 15.49 | 13.29 | 14.20 | 16.14 | 15.43 | 16.50 | 15.29 | 16.60 | |
| Fe ₂ O ₃ * | 11.36 | 12.54 | 12.92 | 13.97 | 13.59 | 9.91 | 11.74 | 9.24 | 12.01 | 9.24 | |
| MnO | 0.17 | 0.18 | 0.19 | 0.21 | 0.23 | 0.18 | 0.20 | 0.16 | 0.27 | 0.14 | |
| MgO | 7.93 | 5.93 | 3.96 | 6.76 | 5.18 | 5.97 | 5.96 | 7.01 | 6.96 | 7.31 | |
| CaO | 9.09 | 10.79 | 6.96 | 10.43 | 6.47 | 10.15 | 9.33 | 10.35 | 11.59 | 8.67 | |
| Na ₂ O | 3.00 | 3.26 | 5.21 | 3.60 | 4.72 | 3.40 | 3.68 | 3.47 | 2.03 | 3.45 | |
| K ₂ O | 0.59 | 0.27 | 0.07 | 0.32 | 0.52 | 0.31 | 0.45 | 0.34 | 0.16 | 1.18 | |
| P ₂ O ₅ | 0.17 | 0.13 | 0.30 | 0.21 | 0.40 | 0.20 | 0.18 | 0.15 | 0.20 | 0.17 | |
| LOI | 3.03 | 0.91 | 0.90 | 1.24 | 0.82 | 0.73 | 0.80 | 0.55 | 1.15 | 1.66 | |
| Total | 101.55 | 101.22 | 101.85 | 102.35 | 100.83 | 100.78 | 101.31 | 101.27 | 101.79 | 101.12 | |
| FeO** | 10.22 | 11.28 | 11.63 | 12.57 | 12.23 | 8.92 | 10.56 | 8.32 | 10.80 | 8.32 | |
| Elements (ppm) | | | | | | | | | | | |
| Sc | 46.19 | 46.04 | 33.07 | 50.00 | 33.83 | 40.76 | 40.64 | 38.41 | 44.69 | 36.89 | |
| V | 322.11 | 368.81 | 302.01 | 415.32 | 234.73 | 278.82 | 333.98 | 250.66 | 337.81 | 235.82 | |
| Cr | 116.08 | 20.54 | 6.22 | 87.68 | 62.92 | 184.94 | 20.24 | 248.85 | 127.87 | 271.35 | |
| Ni | 47.44 | 24.66 | 8.53 | 50.07 | 19.51 | 51.16 | 29.33 | 73.32 | 60.36 | 63.63 | |
| Cu | 58.06 | 67.53 | 23.73 | 41.82 | 27.24 | 6.65 | 56.22 | 24.22 | 61.44 | 40.19 | |
| Zn | 90.26 | 92.96 | 112.43 | 115.30 | 128.14 | 76.43 | 137.13 | 77.17 | 93.03 | 74.02 | |
| Ga | 19.38 | 19.98 | 22.64 | 16.29 | 22.93 | 17.51 | 18.73 | 18.64 | 17.94 | 17.08 | |
| Rb | 12.82 | 9.99 | 3.04 | 5.91 | 9.12 | 8.24 | 6.78 | 8.07 | 3.42 | 36.75 | |
| Sr | 181.15 | 165.30 | 220.21 | 124.60 | 163.75 | 225.66 | 204.07 | 220.16 | 164.72 | 282.93 | |
| Y | 36.49 | 36.48 | 54.49 | 47.29 | 71.81 | 35.33 | 37.13 | 30.57 | 40.06 | 26.64 | |
| Zr | 143.94 | 120.56 | 240.97 | 145.45 | 303.70 | 158.52 | 149.73 | 122.35 | 162.07 | 125.50 | |
| Nb | 5.22 | 2.22 | 4.85 | 2.53 | 8.39 | 7.34 | 4.56 | 5.86 | 4.24 | 6.89 | |
| Ba | 148.38 | 59.47 | 43.85 | 34.66 | 149.88 | 65.60 | 103.30 | 95.29 | 44.86 | 167.53 | |
| La | 4.27 | 2.61 | 8.56 | 2.73 | 12.54 | 7.78 | 4.18 | 6.80 | 6.94 | 7.37 | |
| Ce | 16.14 | 16.39 | 30.18 | 16.93 | 40.62 | 28.67 | 24.35 | 17.86 | 20.65 | 18.96 | |
| Nd | 14.23 | 11.60 | 21.03 | 15.62 | 26.90 | 15.35 | 13.35 | 11.84 | 15.18 | 13.79 | |
| Yb | 2.83 | 3.61 | 7.05 | 6.15 | 7.90 | 3.32 | 4.09 | 3.81 | 6.27 | 2.96 | |
| Hf | 1.96 | 1.67 | 3.07 | 1.84 | 5.36 | 2.33 | 1.80 | 1.30 | 1.63 | 1.51 | |
| Pb | 2.27 | 3.36 | 2.12 | 1.17 | 4.69 | 0.94 | 2.69 | 2.07 | 2.11 | 2.15 | |
| Th | 25.85 | 18.75 | 12.27 | 8.15 | 3.70 | 7.65 | 7.14 | 6.89 | 5.34 | 3.80 | |
| U | n.d. | n.d. | n.d. | n.d. | 0.18 | 0.23 | n.d. | 0.86 | 0.47 | 0.80 | |
| CIPW norm | | | | | | | | | | | |
| Q | - | - | - | - | - | - | - | - | 0.52 | - | |
| C | - | - | - | - | - | - | - | - | - | - | |
| or | 3.48 | 1.58 | 0.43 | 1.88 | 3.08 | 1.84 | 2.64 | 2.02 | 0.92 | 6.95 | |
| ab | 25.35 | 27.62 | 44.13 | 30.48 | 39.94 | 28.79 | 31.10 | 29.36 | 17.18 | 29.19 | |
| an | 28.10 | 25.89 | 18.63 | 19.16 | 16.03 | 27.85 | 24.28 | 28.44 | 32.14 | 26.33 | |
| ne | - | - | - | - | - | - | - | - | - | - | |
| di | 13.05 | 22.35 | 11.74 | 25.97 | 11.29 | 17.48 | 17.32 | 17.96 | 19.92 | 12.77 | |
| wo | 6.63 | 11.21 | 5.80 | 13.03 | 5.62 | 8.84 | 8.70 | 9.15 | 10.06 | 6.51 | |
| en | 3.53 | 5.04 | 2.10 | 5.93 | 2.27 | 4.46 | 4.05 | 5.02 | 4.96 | 3.62 | |
| fs | 2.89 | 6.10 | 3.84 | 7.01 | 3.40 | 4.18 | 4.56 | 3.79 | 4.90 | 2.63 | |
| hy | 7.67 | 6.84 | 13.46 | 0.03 | 13.91 | 17.42 | 11.95 | 11.03 | 24.60 | 6.89 | |
| en | 4.21 | 3.09 | 4.76 | 0.01 | 5.56 | 8.99 | 5.62 | 6.28 | 12.38 | 4.00 | |
| fs | 3.46 | 3.74 | 8.70 | 0.01 | 8.35 | 8.44 | 6.33 | 4.75 | 12.22 | 2.90 | |
| ol | 16.02 | 10.83 | 6.38 | 17.56 | 9.46 | 2.02 | 8.13 | 7.92 | - | 13.35 | |
| fo | 8.41 | 4.64 | 2.12 | 7.63 | 3.56 | 1.00 | 3.63 | 4.32 | - | 7.42 | |
| fa | 7.61 | 6.19 | 4.26 | 9.93 | 5.90 | 1.03 | 4.50 | 3.60 | - | 5.93 | |
| il | 3.32 | 3.67 | 4.19 | 4.14 | 4.02 | 3.17 | 3.51 | 2.72 | 3.71 | 2.67 | |
| ap | 0.40 | 0.29 | 0.70 | 0.49 | 0.92 | 0.47 | 0.41 | 0.35 | 0.46 | 0.38 | |
| X _{Mg} | 0.580 | 0.483 | 0.378 | 0.489 | 0.430 | 0.544 | 0.501 | 0.600 | 0.534 | 0.610 | |

Fe₂O₃*: total Fe as Fe₂O₃. FeO**: total Fe as FeO. LOI: loss on ignition. X_{Mg}=Mg/(Mg+Fe). n.d.: not determined. n.a.: not analyzed.

CHMB: central area of the Hidaka metamorphic Belt, nSHMB: Northern part of southern area of the Hidaka metamorphic Belt, sSHMB: southern part of southern area of the Hidaka metamorphic Belt, Sk: Shimokawa area, Tm: Tomuraushi area, Np: Nipesotsu area, Ot: Okutokachi area, Oc: Ochiini area, SH: Shunbetsu river, KB: Koibokushushibichari river, NNC: Nanashino-sawa river, OG: Ogawara-zawa river, BK: Benikaru-zawa river, SS: Sashibichari river, NO: Nishuomanai-zawa river, SM: Soematsu-zawa river, HB: Hidakahorobetsu river, SG: Sogabetsu river, MM: Menashuman river, NOB: Niobetsu river, SC: Shirochinomi river, MS: Menashunbetsu river, MK: Mukorobetsu river, PN: Panke river, SN: Shinosukeshunbetsu river, MKT: Mikitonai river, MKI: Mikiinai river, MN: Menashiesanbetsu river, ON: Onarushibe river, FC: Fuchimi river, RB: Rubeshibe river, NK: Nikanbetsu river, ST: Shitokachi river, NU: Nupun-Tomuraushi river, NP: Nipesotsu river, OA: Ochiaino-sawa river, SI: Shitsopurachi river, UC: Uchino-sawa river, KN: Kanano-sawa river, TM: Tomamu river.