## Table 1. Re-Os isotopes and mineral data of Gakkel abyssal peridotites

| Sample[a] | Rock type[b] | $Al_2O_3$ (%)[c] | Sp Cr# | LOI (%) | Re (ppt) | Os (ppb) | $^{187}Os/^{188}Os$ | Ce (ppm) | Yb (ppm) | $T_{RD}$ (Gyr)[d] |
|---|---|---|---|---|---|---|---|---|---|---|
| **D70-56** | Sp LH | 2.07 | 0.2 | 13.5 | 252 | 3.38 | 0.1261±2 | 0.81 | 0.81 | 0.49 |
| **D70-58**[e] | Sp LH | 3.2 | 0.13 | 9.4 | 52 | 1.72 | 0.1301±3 | 0.04 | 1.33 | |
| **D70-58**[f] | | | | | 50 | 2.85 | 0.1306±2 | | | |
| **D70-62**[e] | **Sp HZ** | 1.31 | 0.28 | 13.8 | 158 | 4.05 | 0.1149±2 | 0.23 | 0.83 | 2.05 |
| **D70-64**[e] | Sp LH | 1.68 | 0.21 | 12.7 | 286 | 2.14 | 0.1226±3 | 0.71 | 0.85 | 0.99 |
| **D70-73** | Sp LH | 2.62 | 0.13 | 12.5 | 288 | 3.3 | 0.1285±4 | 0.04 | 1.2 | 0.15 |
| **D70-75**[e] | Sp LH | 2.53 | 0.16 | 14.9 | 142 | 3.01 | 0.1277±3 | 0.2 | 0.96 | 0.27 |
| **D70-91** | Sp LH | 3.11 | 0.12 | 11.5 | 130 | 2.07 | 0.1292±3 | 0.02 | 1.15 | 0.05 |
| **PS66-238-2** | Sp LH | 1.9 | 0.2 | 0 | 218 | 4.34 | 0.1266±2 | 2.61 | 1.03 | 0.42 |
| **PS66-238-4-c** | Sp LH | 2.15 | 0.19 | 0 | 361 | 4.53 | 0.1286±2 | 2.4 | 1.07 | 0.14 |
| **PS66-238-4-r** | Sp LH | 2.51 | | 3 | 297 | 4.21 | 0.1296±2 | | | |
| **PS66-238-5** | **Pl LH** | 3.04 | | 0 | 318 | 3.9 | 0.1271±2 | 0.31 | 2.13 | 0.36 |
| **PS66-238-7** | Sp LH | 2.54 | 0.15 | 0 | 303 | 4.66 | 0.1263±3 | 1 | 1.34 | 0.46 |
| **PS66-238-9** | Sp LH | 2.6 | 0.15 | 0 | 310 | 4.56 | 0.1261±2 | 1.1 | 1.31 | 0.5 |
| **PS66-238-11-c** | Sp LH | 2.38 | 0.17 | 1.2 | 224 | 3.8 | 0.1240±2 | 0.33 | 1.21 | 0.79 |
| **PS66-238-11-c**[f] | Sp LH | | | | 249 | 3.97 | 0.1238±3 | | | 0.81 |
| **PS66-238-11-r** | Sp LH | 2.59 | | 1.7 | 219 | 5.57 | 0.1247±3 | | | 0.68 |
| **PS66-238-11-r**[f] | Sp LH | | | | 243 | 4.69 | 0.1248±3 | | | 0.68 |
| **PS66-238-18** | Sp LH | 2.51 | 0.15 | 0 | 344 | 5.39 | 0.1225±2 | 0.26 | 1.33 | 0.99 |
| **PS66-238-22-c** | **Sp HZ** | 1.57 | 0.28 | 0 | 231 | 6.71 | 0.1139±2 | 5.65 | 1.06 | 2.18 |
| **PS66-238-22-r** | **Sp HZ** | 1.58 | | 0.2 | 135 | 6.58 | 0.1165±2 | | | 1.82 |
| **PS66-238-35** | Sp LH | 2.25 | 0.19 | 0 | 277 | 4.71 | 0.1279±2 | 2.32 | 1.04 | 0.24 |
| **PS66-238-39-c** | Sp LH | 2.21 | 0.18 | 0 | 286 | 5.46 | 0.1274±2 | 2.26 | 1.02 | 0.31 |
| **PS66-238-39-r** | Sp LH | 2.3 | | 0.2 | 287 | 4.3 | 0.1278±2 | | | 0.26 |
| **PS66-238-49-c** | Sp LH | 2.16 | 0.17 | 1.1 | 221 | 4.44 | 0.1237±2 | 0.34 | 1.25 | 0.82 |
| **PS66-238-49-r** | Sp LH | 2.42 | | 1.2 | 240 | 4.36 | 0.1252±2 | | | 0.61 |

**a: -c: the fresh cores; -r: the altered rims.**

**b: Sp LH (spinel lherzolite), Sp HZ (spinel harzburgite), Pl LH (plagioclase lherzolite).**

**c: The bulk $Al_2O_3$ content of D70 serpentinites have been recalculated by LOI, whereas PS66-238 peridotites are not due to their very small LOI.**

**d: $T_{RD}$ (Re-depletion age) is calculated relative to the evolution of PUM (data from ref. 30) assuming $^{187}Re/^{188}Os=0$.**

**e: The mineral major and trace elements data of these samples are from ref. 49.**

**f: Replicate analyses of Re-Os isotopes.**