**Table S2.** Sm–Nd isotope data of the Devonian and Carboniferous carbonates of the Greater Karatau, with information on investigated successions, lithological fraction, stratigraphy and geographic position. The Nd(t) values were calculated for average sedimentation ages, i.e. t = 362 Ma for the Famennian, t = 352 Ma for the Tournaisian, t = 338 Ma for the Viséan, t = 326 Ma for the Serpukhovian, and t = 322 Ma for the Bashkirian samples.

| **Section** | **Sample** | **Fraction** | **Weight****(mg)** | **Sm (ppm)** | **Nd (ppm)** | **147Sm/****144Nd** | **143Nd/144Nd****(measured)** | **143Nd/144Nd****(t)** | **εNd****(t)** | **Sm/Nd** | **Stratigraphic age** | **Coordinates**latitude / longitude |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Besharik | BE-01 | carbonate | 261.26 | 0.25 | 1.36 | 0.1091 | 0.511956 ± 18 | 0.511697 | –9.3 | 0.18 | Famennian | 43°46´33.82´´N / 67°49´24.63´´E |
| BE-02 | carbonate | 280.86 | 0.26 | 1.40 | 0.1145 | 0.512031 ± 12 | 0.511760 | –8.0 | 0.19 | 43°46´37.26´´N / 67°49´29.93´´E |
| BE-03 | carbonate | 261.34 | 0.16 | 0.83 | 0.1129 | 0.512070 ± 13 | 0.511802 | –7.2 | 0.19 | 43°46´33.82´´N / 67°49´24.63´´E |
| Zhertansai | ZE-01 | carbonate | 279.73 | 0.26 | 1.38 | 0.1143 | 0.512036 ± 10 | 0.511765 | –7.9 | 0.19 | 43°43´47.54´´N / 67°55´55.03´´E |
| ZE-02 | carbonate | 254.79 | 0.72 | 4.08 | 0.1073 | 0.511982 ± 13 | 0.511727 | –8.7 | 0.18 | 43°43´43.89´´N / 67°55´55.34´´E |
| non-carb. | 107.30 | 0.57 | 2.58 | 0.1328 | 0.511919 ± 61 | 0.511604 | –11.1 | 0.22 |
| ZE-03 | carbonate | 288.28 | 0.21 | 1.05 | 0.1187 | 0.512523 ± 15 | 0.512249 | 1.3 | 0.20 | Tournaisian | 43°43´40.54´´N / 67°55´57.40´´E |
| non-carb. | 146.03 | 0.22 | 1.16 | 0.1150 | 0.512487 ± 77 | 0.512222 | 0.7 | 0.19 |
| Aktobe | AK-01 | carbonate | 283.02 | 0.25 | 1.39 | 0.1101 | 0.512044 ± 10 | 0.511783 | –7.6 | 0.18 | Famennian | 43°42´57.35´´N / 68°10´38.16´´E |
| AK-02 | carbonate | 380.67 | 0.03 | 0.14 | 0.1123 | 0.512160 ± 81 | 0.511893 | –5.4 | 0.19 | 43°42´37.54´´N / 68°10´09.19´´E |
| AK-03 | carbonate | 355.23 | 1.17 | 5.90 | 0.1201 | 0.512524 ± 10 | 0.512248 | 1.2 | 0.20 | Tournaisian | 43°41´49.17´´N / 68°09´41.06´´E |
| non-carb. | 96.95 | 0.57 | 2.52 | 0.1357 | 0.512536 ± 10 | 0.512224 | 0.8 | 0.22 |
| AK-04 | carbonate | 349.41 | 0.63 | 3.35 | 0.1136 | 0.512432 ± 10 | 0.512170 | –0.3 | 0.19 |
| AK-05 | carbonate | 352.88 | 0.90 | 4.56 | 0.1191 | 0.512501 ± 8 | 0.512226 | 0.8 | 0.20 |
| non-carb. | 98.29 | 0.15 | 0.57 | 0.1558 | 0.512605 ± 19 | 0.512246 | 1.2 | 0.26 |
| AK-06 | carbonate | 395.23 | 1.32 | 6.29 | 0.1273 | 0.512561 ± 15 | 0.512267 | 1.6 | 0.21 |
| AK-07 | carbonate | 266.34 | 0.53 | 2.78 | 0.1156 | 0.512407 ± 9 | 0.512141 | –0.9 | 0.19 | 43°38´47.53´´N / 68°07´32.48´´E |
| non-carb. | 192.46 | 0.28 | 1.38 | 0.1245 | 0.512271 ± 14 | 0.511984 | –3.9 | 0.21 |
| AK-08 | carbonate | 294.23 | 0.85 | 4.01 | 0.1274 | 0.512568 ± 10 | 0.512286 | 1.6 | 0.21 | Visean | 43°39´15.65´´N / 68°07´55.91´´E |
| AK-09 | carbonate | 357.93 | 0.33 | 1.69 | 0.1188 | 0.512517 ± 18 | 0.512254 | 1.0 | 0.20 | 43°39´22.02´´N / 68°08´08.54´´E |
| AK-10 | carbonate | 361.48 | 0.35 | 1.77 | 0.1181 | 0.512441 ± 36 | 0.512180 | –0.4 | 0.20 |
| non-carb. | 48.30 | 0.45 | 2.09 | 0.1295 | 0.512443 ± 49  | 0.512156 | –0.9 | 0.21 |
| AK-11 | carbonate | 342.14 | 0.48 | 2.38 | 0.1216 | 0.512451 ± 10 | 0.512182 | –0.4 | 0.20 |
| Aktobe | AK-11 | non-carb. | 106.21 | 0.95 | 4.49 | 0.1281 | 0.512422 ± 68 | 0.512138 | –1.3 | 0.21 | Visean | 43°39´22.02´´N / 68°08´08.54´´E |
| AK-12 | carbonate | 257.88 | 0.80 | 4.45 | 0.1093 | 0.512415 ± 8 | 0.512173 | –0.6 | 0.18 |
| AK-13 | carbonate | 253.58 | 0.35 | 1.88 | 0.1126 | 0.512410 ± 16 | 0.512161 | –0.8 | 0.19 |
| non-carb. | 141.64 | 0.24 | 1.18 | 0.1220 | 0.512449 ± 21 | 0.512179 | –0.5 | 0.20 |
| AK-14 | carbonate | 352.11 | 0.15 | 0.78 | 0.1156 | 0.512426 ± 21 | 0.512179 | –0.8 | 0.19 | Serpukhovian | 43°39´23.64´´N / 68°08´17.37´´E |
| Zhankurgan | ZH-01 | carbonate | 395.05 | 1.91 | 9.14 | 0.1266 | 0.512559 ± 8 | 0.512279 | 1.5 | 0.21 | Visean | 43°38´55.89´´N / 68°12´57.73´´E |
| non-carb. | 121.51 | 1.03 | 3.33 | 0.1877 | 0.512694 ± 16 | 0.512279 | 1.5 | 0.31 |
| ZH-02 | carbonate | 264.68 | 0.87 | 4.86 | 0.1086 | 0.512431 ± 10 | 0.512190 | –0.2 | 0.18 |
| non-carb. | 88.75 | 0.54 | 2.69 | 0.1209 | 0.512408 ± 16 | 0.512440 | –1.2 | 0.20 |
| ZH-03 | carbonate | 226.53 | 0.49 | 2.81 | 0.1059 | 0.512458 ± 19 | 0.512223 | 0.4 | 0.18 |
| ZH-04 | carbonate | 280.09 | 0.24 | 1.34 | 0.1097 | 0.512335 ± 14 | 0.512092 | –2.2 | 0.18 |
| ZH-05 | carbonate | 326.87 | 0.73 | 3.69 | 0.1204 | 0.512434 ± 10 | 0.512168 | –0.7 | 0.20 | 43°38´53.19´´N / 68°12´55.34´´E |
| non-carb. | 73.78 | 0.91 | 3.83 | 0.1435 | 0.512496 ± 10 | 0.512179 | –0.5 | 0.24 |
| ZH-06 | carbonate | 355.68 | 2.06 | 10.79 | 0.1155 | 0.512384 ± 15 | 0.512128 | –1.5 | 0.19 |
| ZH-07 | carbonate | 22.00 | 6.52 | 29.67 | 0.1329 | 0.512564 ± 22 | 0.512270 | 1.3 | 0.22 | 43°38´52.86´´N / 68°12´54.79´´E |
| non-carb. | 579.16 | 1.91 | 9.51 | 0.1215 | 0.512547 ± 15 | 0.512278 | 1.5 | 0.20 |
| ZH-08 | carbonate | 77.54 | 5.31 | 24.47 | 0.1311 | 0.512526 ± 10 | 0.512236 | 0.7 | 0.22 |
| non-carb. | 454.22 | 1.21 | 5.57 | 0.1310 | 0.512567 ± 18 | 0.512278 | 1.5 | 0.22 |
| ZH-09 | carbonate | 195.11 | 0.59 | 2.95 | 0.1203 | 0.512481 ± 12 | 0.512215 | 0.2 | 0.22 |
| non-carb. | 931.25 | 0.07 | 0.31 | 0.1450 | 0.512510 ± 23 | 0.512189 | –0.3 | 0.24 |
| Ushozen | US-01 | carbonate | 379.99 | 0.23 | 1.25 | 0.1113 | 0.512421 ± 13 | 0.512175 | –0.5 | 0.18 | Visean | 43°40´44.84´´N / 68°02´16.87´´E |
| US-02 | carbonate | 251.72 | 0.36 | 2.00 | 0.1098 | 0.512271 ± 10 | 0.512028 | –3.4 | 0.18 | 43°40´41.80´´N / 68°02´14.24´´E |
| US-03 | carbonate | 197.72 | 0.71 | 3.43 | 0.1252 | 0.512438 ± 10 | 0.512171 | –0.9 | 0.21 | Serpukhovian | 43°40´58.49´´N / 68°02´06.63´´E |
| non-carb. | 44.26 | 0.46 | 1.53 | 0.1823 | 0.512356 ± 47 | 0.511967 | –4.9 | 0.30 |
| US-04 | carbonate | 190.21 | 0.48 | 2.55 | 0.1131 | 0.512549 ± 13 | 0.512307 | 1.7 | 0.19 | 43°40´58.49´´N / 68°02´06.63´´E |
| non-carb. | 82.81 | 0.55 | 1.78 | 0.1854 | 0.512547 ± 33 | 0.512152 | –1.3 | 0.31 |
| US-05 | carbonate | 207.01 | 0.24 | 1.27 | 0.1159 | 0.512621 ± 12 | 0.512374 | 3.0 | 0.19 |
| US-06 | carbonate | 203.77 | 0.11 | 0.58 | 0.1140 | 0.512633 ± 12 | 0.512390 | 3.4 | 0.19 |
| US-07 | carbonate | 204.77 | 0.31 | 1.53 | 0.1233 | 0.512689 ± 21 | 0.512426 | 4.0 | 0.20 |
| US-08 | carbonate | 359.39 | 0.61 | 3.21 | 0.1149 | 0.512560 ± 10 | 0.512314 | 1.9 | 0.19 |
| US-09 | carbonate | 373.94 | 0.21 | 1.10 | 0.1149 | 0.512684 ± 13 | 0.512439 | 4.3 | 0.19 |
| non-carb. | 82.87 | 0.24 | 1.24 | 0.1168 | 0.512707 ± 26 | 0.512458 | 4.7 | 0.19 |
| US-10 | carbonate | 385.56 | 0.11 | 0.54 | 0.1185 | 0.512613 ± 13 | 0.512360 | 2.8 | 0.20 |
| non-carb. | 104.17 | 0.16 | 0.82 | 0.1177 | 0.512657 ± 64 | 0.512406 | 3.7 | 0.19 |
| US-11 | carbonate | 381.84 | 0.05 | 0.23 | 0.1191 | 0.512582 ± 67 | 0.512328 | 2.1 | 0.20 |
| US-12 | carbonate | 362.51 | 0.33 | 1.64 | 0.1209 | 0.512604 ± 12 | 0.512346 | 2.5 | 0.20 |
| US-13 | carbonate | 341.39 | 0.26 | 1.27 | 0.1230 | 0.512627 ± 27 | 0.512364 | 2.9 | 0.20 |
| non-carb. | 20.96 | 0.28 | 1.26 | 0.1337 | 0.512645 ± 44 | 0.512359 | 2.8 | 0.22 |
| US-14 | carbonate | 282.42 | 0.23 | 1.20 | 0.1138 | 0.512584 ± 14 | 0.512344 | 2.4 | 0.19 | Bashkirian | 43°40´55.24´´N / 68°02´08.29´´E |
| US-15 | carbonate | 296.48 | 0.17 | 0.89 | 0.1170 | 0.512530 ± 19 | 0.512284 | 1.2 | 0.19 | 43°40´32.99´´N / 68°01´54.98´´E |
| non-carb. | 93.72 | 0.22 | 1.06 | 0.1263 | 0.512526 ± 32 | 0.512260 | 0.7 | 0.21 |
| US-16 | carbonate | 274.94 | 0.76 | 3.97 | 0.1164 | 0.512571 ± 10 | 0.512326 | 2.0 | 0.19 | 43°40´28.63´´N / 68°01´27.88´´E |
| US-17 | carbonate | 376.6 | 0.14 | 0.68 | 0.1262 | 0.512620 ± 39 | 0.512354 | 2.5 | 0.21 | 43°40´32.29´´N / 68°01´20.10´´E |