|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Region | Sample No. | Lithology | Longintude | Lattitude | Trending | Sequence | Texture | Mineral assemblage | Alteration |
| Karamay | KM1503h | Dioritic porphyrite | 84°42′57″ | 45°40′24″ | WNW | Late 1 | Fine-grained ophitic texture/Porphyritic texture  | Pl (50-55%1) + Hb (15-20%) + Bi (5-15%) + Q (<10%) + Cpx (<5%) + Mt (<5%) + Apatite (<5%) + Zircon (<5%) /Phynocrysts (15-35%) including Pl (15-30%) ± Hb (0-5%) and microcrystalline matrix (65-85%) composed of Hb + Bi + Q  | Slightly chloritised |
| KM1510h | Dioritic porphyrite | 84°44′04″ | 45°39′39″ | WNW | Late 1 |
| Xierpu | XP1501h | Dioritic porphyrite | 84°34′14″ | 45°41′51″ | WNW | Late 1 | Porphyritic texture | Phynocrysts (20-40%) including Pl (10-25%) + Hb (10-25%) set in a fine grained (<0.02 mm) matrix (60-80%) composed of Pl + Hb  | Weak Argillization |
| XP1505h | Dioritic porphyrite | 84°36′18″ | 45°42′35″ | WNW | Late 1 |
| XP1507h | Dioritic porphyrite | 84°36′20″ | 45°42′42″ | WNW | Late 1 |
| XP1510h | Dioritic porphyrite | 84°36′24″ | 45°42′42″ | WNW | Late 1 |
| Bieluagaxi | BLG1502h | Dolerite | 84°24′31″ | 46°01′52″ | ENE | Early | Opgitic texture/Fine-grained granular texture/Porphyritic texture  | Di (35-45%) + Pl (50-55%) + Ti-Fe oxides (5-10%) + Hb (<5%) + Bi (<5%)/Pl (50-60%) + Hb (30-35%) + Bi (<5%) + Q (<5%) + Ap (<3%) + Ep (<3%)/Phynocrysts (20-40%) consist of Pl (15-25%) + Hb (5-15%) and microcrystalline matrix (60-80%) with needle-like Pl (45-55%) + Hb (15-25%) + Q (<5%) +Opx (5%) | Slight chloritisation and sericitisation |
| BLG1505h | Diorite | 84°24′19″ | 46°02′09″ | ENE | Early |
| BLG1507h | Dioritic porphyrite | 84°24′24″ | 46°09′17″ | ENE | Early |
| Liushugou | LSG1501h | Diorite | 84°17′40″ | 45°30′59″ | NE | Late 2 | Fine-medium grained granular texture/Porphyritic texture  | Pl (45-55%) + Hb (25-35%) + Q (<5%) + Opx (<5%) + Mt (<3%) + Ap (<3%) + Ep (<3%)/Phynocrysts (15-25%) consist of Pl (15-20%) ± Hb (0-5%) and aphanitic matrix (75-85%) with Pl (55-65%) + Hb (30-45%) + Kf (<5%) | Slight chloritisation and sericitisation |
| LSG1502h | Diorite | 84°17′47″ | 45°30′46″ | NE | Late 2 |
| LSG1504h | Dioritic porphyrite | 84°22′08″ | 45°30′18″ | WNW | Late 1 |
| LSG1505h | Dioritic porphyrite | 84°21′58″ | 45°30′39″ | WNW | Late 1 |
| [1] All mineralogical percentages in the paper are in vol.% |  |  |  |

**Table S1 The GPS and descriptions for studied dykes in Central west Junggar**

**Table S2 Plots of FeOt, MgO, TiO2, P2O5, Na2O, K2O, Nb, Sr, Rb, Ba, La, and Th versus LOI for the high-Mg dioritic dykes in the west Junggar**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| Sample No. | KM1503h | KM1510h | XP1505h | XP1510h | XP1501h | XP1507h | BLG1502h | BLG1505h | BLG1507h | LSG1501h | LSG1502h | LSG1504h | LSG1505h |
| Group | Group 1 | Group 1 | Group 1 | Group 1 | Group 1 | Group 1 | Group 2 | Group 2 | Group 2 | Group 1 | Group 1 | Group 1 | Group 1 |
| Sample Name | Dioritic Porphyrite | Dioritic Porphyrite | Dioritic Porphyrite | Dioritic Porphyrite | Dioritic Porphyrite | Dioritic Porphyrite | Diorite | Diorite | Dioritic Porphyrite | Diorite | Diorite | Dioritic Porphyrite | Dioritic Porphyrite |
| SiO2 | 60.94  | 59.35  | 57.53  | 57.16  | 59.27  | 58.62  | 52.97  | 52.30  | 54.59  | 53.93  | 55.70  | 55.18  | 55.20  |
| TiO2 | 0.56  | 0.76  | 0.70  | 0.75  | 0.78  | 0.77  | 1.38  | 1.09  | 0.61  | 0.92  | 0.90  | 0.80  | 0.82  |
| Al2O3 | 17.19  | 16.36  | 17.09  | 16.94  | 16.41  | 17.42  | 15.29  | 15.78  | 14.81  | 16.54  | 16.18  | 15.94  | 16.43  |
| Fe2O3 | 1.36  | 2.18  | 1.49  | 1.37  | 2.03  | 1.28  | 3.30  | 0.95  | 0.97  | 2.73  | 1.69  | 1.49  | 1.42  |
| FeO | 3.07  | 3.67  | 4.90  | 4.47  | 3.83  | 4.63  | 4.75  | 6.27  | 5.87  | 4.43  | 4.57  | 4.37  | 5.27  |
| MnO | 0.07  | 0.10  | 0.11  | 0.09  | 0.09  | 0.07  | 0.14  | 0.12  | 0.15  | 0.13  | 0.10  | 0.09  | 0.11  |
| MgO | 2.56  | 4.28  | 4.54  | 4.11  | 4.08  | 3.29  | 5.63  | 7.91  | 8.41  | 5.20  | 6.12  | 5.62  | 5.28  |
| CaO | 5.29  | 5.95  | 6.46  | 6.56  | 5.60  | 6.35  | 6.02  | 6.73  | 7.10  | 8.06  | 5.02  | 5.60  | 6.26  |
| Na2O | 3.72  | 3.21  | 3.19  | 3.67  | 3.50  | 3.72  | 3.98  | 3.43  | 2.67  | 3.42  | 4.45  | 4.16  | 3.91  |
| K2O | 1.55  | 1.35  | 1.19  | 1.11  | 1.57  | 0.74  | 1.74  | 1.46  | 1.02  | 1.60  | 0.62  | 0.86  | 1.20  |
| P2O5 | 0.11  | 0.15  | 0.14  | 0.15  | 0.15  | 0.19  | 0.46  | 0.22  | 0.12  | 0.17  | 0.18  | 0.17  | 0.16  |
| H2O+ | 2.13  | 2.08  | 2.14  | 2.36  | 1.92  | 1.92  | 2.67  | 2.70  | 2.50  | 2.37  | 2.86  | 3.05  | 2.52  |
| CO2 | 1.13  | 0.18  | 0.27  | 0.92  | 0.47  | 0.82  | 0.98  | 0.72  | 0.57  | 0.04  | 0.98  | 2.06  | 1.03  |
| LOI | 2.99  | 2.00  | 1.88  | 2.88  | 2.02  | 2.18  | 3.56  | 2.81  | 3.00  | 2.13  | 3.72  | 5.37  | 3.10  |
| Total | 99.69  | 99.61  | 99.75  | 99.67  | 99.71  | 99.82  | 99.31  | 99.68  | 99.38  | 99.54  | 99.36  | 99.39  | 99.60  |
| FeOT | 4.30  | 5.63  | 6.24  | 5.70  | 5.66  | 5.79  | 7.72  | 7.13  | 6.74  | 6.88  | 6.09  | 5.71  | 6.55  |
| Rb | 34.0  | 28.1  | 39.3  | 32.0  | 37.1  | 18.0  | 32.2  | 31.5  | 26.3  | 40.0  | 13.6  | 18.2  | 19.5  |
| Sr | 606  | 641  | 643  | 697  | 564  | 671  | 618  | 463  | 294  | 681  | 748  | 647  | 715  |
| Nb | 2.19  | 2.59  | 1.44  | 1.66  | 3.12  | 2.48  | 15.5  | 6.39  | 3.77  | 2.50  | 1.23  | 1.11  | 1.53  |
| Ba | 642  | 431  | 382  | 376  | 477  | 421  | 503  | 358  | 395  | 438  | 1163  | 465  | 446  |
| La | 10.6  | 9.87  | 6.40  | 5.89  | 11.1  | 7.34  | 33.7  | 11.3  | 9.40  | 8.86  | 5.56  | 5.49  | 6.60  |
| Th | 3.31  | 2.40  | 1.15  | 0.94  | 2.73  | 1.14  | 7.37  | 2.16  | 2.67  | 1.83  | 0.63  | 0.77  | 0.97  |

Fig. S1 Major oxides vs. LOI diagrams of dykes in West Junngar

**Table S3 The geochronological information of the granitoids in the Western Junggar**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **lithology** | **Age（Ma）** | **1σ** | **Method** | **Data source** |
| Karamay | K-feldspar granite | 276 | 5 | SHRIMP | Han et al., 2006 |
| Karamay | alkali-feldspar granite | 296 | 4 | TIMS | Su et al., 2006 |
| Karamay | granite | 316.7 | 3.6 | LA-ICP-MS | Gao et al., 2006 |
| Karamay | granite | 318 | 5 | SHRIMP | Han et al., 2006 |
| Karamay | monzogranite | 319 | 1 | LA-ICP-MS | Feng et al., 2012b |
| Karamay | granite | 300 | 2.6 | LA-ICP-MS | Li et al., 2015 |
| Karamay | dioritic dyke  | 298 |  | LA-ICP-MS | Li et al., 2015 |
| East Karamay (Karamay) | granodiorite | 316 | 3 | LA-ICP-MS | Tang et al., 2012 |
| East Karamay (Karamay) | diorite | 314 | 3 | LA-ICP-MS | Tang et al., 2012 |
| East Karamay (Karamay) | alkali-feldspar granite | 304 | 3 | LA-ICP-MS | Tang et al., 2012 |
| Karamay | dioritic porphyry dyke | 303.1 | 1.2 | LA-ICP-MS | Feng et al., 2012b |
| Karamay (C1 strata) | dioritic dyke | 321 | 1 | Ar-Ar | Yin et al., 2010 |
| Karamay | dilorite dyke | 316.8 | 5.3 | LA-ICP-MS | unpublished data |
| Karamay | dioritic porphyry dyke | 311.3 | 2.1 | LA-ICP-MS | this study |
| North Karamay | dioritic dyke | 308 | 7 | SHRIMP | Han et al., 2006 |
| West Karamay (Xiaerpu) | granite | 311 | 3 | LA-ICP-MS | Tang et al., 2012b |
| west Karamay (Xiaerpu) | dioritic dyke | 305 | 2 | Ar-Ar | Yin et al., 2013 |
| Xiaerpu  | monzogranite | 299 | 6 | LA-ICP-MS | Kang et al., 2009 |
| Xiaerpu  | granodiorite | 297.6 | 2.5 | LA-ICP-MS | Li et al., 2013 |
| Xiaerpu  | diabase dyke | 298.9 | 5 | LA-ICP-MS | Li et al., 2013 |
| West Karamay (Xiaerpu) | dioritic dyke | 309 | 3 | LA-ICP-MS | Tang et al., 2012 |
| Xiaerpu  | dilorite dyke | 310.2 | 4.1 | LA-ICP-MS | unpublished data |
| Xiaerpu  | dioritic porphyry dyke | 309.7 | 2.4 | LA-ICP-MS | this study |
| Hongshan | dioritic dyke | 284 | 3 | Ar-Ar | Yin et al., 2013 |
| Hongshan | alkali-feldspar granite | 301 | 4 | TIMS | Su t al., 2006 |
| Hongshan | K-feldspar granite | 317.8 | 2.2 | LA-ICP-MS | Gao et al., 2014 |
| Hongshan | K-feldspar granite | 315.7 | 2.4 | SIMS | Gao et al., 2014 |
| Hongshan | K-feldspar granite | 316 | 0.59 | CA-TIMS | Gao et al., 2014 |
| Hongshan | alkali-feldspar granite | 315.7 | 2.4 | SIMS | Jiang et al., 2015 |
| Hongshan | alkali-feldspar granite | 317.8 | 3.8 | LA-ICP-MS | Jiang et al., 2015 |
| Hongshan | granite | 297 | 12 | Rb-Sr | Chen and Jahn, 2004 |
| Hongshan | granite | 304 | 1 | LA-ICP-MS | Feng et al., 2012a |
| Hongshan | ring dioritic dyke | 302-304 | 1 | LA-ICP-MS | Feng et al., 2012a |
| Hongshan | non-ring dioritic dyke | 302 | 1 | LA-ICP-MS | Feng et al., 2012a |
| Hongshan | dioritic dyke | 295 | 2 | LA-ICP-MS | Ma et al., 2020 |
| Bieluagaxi | granodiorite | 319 | 3.2 | LA-ICP-MS | Gao et al., 2014 |
| Bieluagaxi | diorite | 299.3 | 2 | Ar-Ar | Yin et al., 2015 |
| Bieluagaxi | dioritic dyke | 296.7 | 2.1 | Ar-Ar | Yin et al., 2015 |
| Bieluagaxi | dioritic dyke | 291.9 | 3 | Ar-Ar | Yin et al., 2012 |
| Bieluagaxi | dioritic dyke | 318.5 | 3.3 | LA-ICP-MS | unpublished data |
| Bieluagaxi | dioritic dyke | 324.3 | 3.6 | LA-ICP-MS | this study |
| Bieluagaxi | dioritic dyke | 315 | 4.5 | LA-ICP-MS | Duan et al., 2019 |
| Bieluagaxi | dioritic porphyry dyke | 318.6 | 3.9 | LA-ICP-MS | Duan et al., 2019 |
| Bieluagaxi  | dioritic dyke | 308.6 | 5.5 | LA-ICP-MS | He et al., 2015 |
| Baogutu area (Wudehe) | dioritic porphyry | 311-315 | 4 | LA-ICP-MS | Tang et al., 2010 |
| Baogutu area (Kuogeshaye) | dioritic porphyry dyke | 314 | 4 | LA-ICP-MS | Tang et al., 2010 |
| Baogutu area (Kuogeshaye) | dioritic porphyry | 310 | 3 | LA-ICP-MS | Tang et al., 2010 |
| Baogutu area (C1 starta) | dioritic dyke | 321 | 1 | Ar-Ar | Yin et al., 2010 |
| Liushugou (C1 starta) | dioritic dyke | 313.9 | 3.2 | LA-ICP-MS | this study |

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