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**Petrogenesis of plagiogranites in the Muslim Bagh Ophiolite, Pakistan: implications for the generation of Archaean continental crust  
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| **Table S1** Sample No., co-ordinates, rock type, field features and lithology | | | |
| **Sample No.** | **Latitude** | **Longitude** | **Field Features and Lithology** |
| Pl-01 | 30°44'00.9"N | 68°03'04.6"E | Plagiogranite dyke in a stream, sheeted dyke complex of Muslim Bagh Ophiolite. |
| Pl-02 | 30°44'00.9"N | 68°03'04.6"E | Another dyke of plagiogranite in the same stream, sheeted dyke complex of Muslim Bagh Ophiolite. |
| Pl-03 | 30°44'0.62"N | 68° 3'4.81"E | A lens of plagiogranite about 10 m SE of sample nos. Pl 1-2, sheeted dyke complex of Muslim Bagh Ophiolite |
| Pl-06 | 30°44'0.46"N | 68° 3'6.37"E | Plagiogranite lens about 15m NE of sample no. Pl 5. |
| Pl-07 | 30°44'0.46"N | 68° 3'6.37"E | Another lens of plagiogranite about 15m NE of sample no. Pl 6. |
| Pl-13 | 30°44'0.12"N | 68° 3'7.46"E | Plagiogranite lens about 30m east of sample nos. Pl 6-7. |
| Pl-15 | 30°44'0.09"N | 68° 3'7.84"E | Plagiogranite lens about 10m east of sample no. Pl 13. |
| Pl-17 | 30°44'0.01"N | 68° 3'9.00"E | Small dyke of plagiogranite trending NW is about 30m east of sample no. Pl 15 in Sheeted dyke complex. |
| Pl-19 | 30°44'0.02"N | 68° 3'9.42"E | Another dyke of plagiogranite about 10m east of sample no. Pl 17. |
| Pl-21 | 30°44'0.05"N | 68° 3'10.29"E | A small dyke of plagiogranite about 20m east of sample no. Pl 19 in Sheeted dyke complex |
| Pl-22 | 30°44'03.6"N | 68°03'27.3"E | A dyke of Plagiogranite away from Pl 21 in another stream, sheeted dyke complex of Muslim Bagh Ophiolite. |
| Pl-23 | 30°44'3.27"N | 68°4'6.66"E | Closely spaced dykes and lenses of plagiogranite about a km east of sample no. Pl 22, sheeted dyke complex of Muslim Bagh Ophiolite. |
| Pl-25 | 30°44'3.27"N | 68°4'6.66"E | Another small dyke near to the sample no. Pl. 23, sheeted dyke complex of Muslim Bagh Ophiolite. |

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| **Table S2** International standard reference material analysis | | | |
|  | **JB1a certifieda** | **JB1a obtained** | **Detection limitsb** |
| **Sample number** | **-** | **-** | **-** |
| **Rock type** | **-** | **-** | **-** |
| **Co-ordinates** | **-** | **-** | **-** |
| **SiO2 (wt. %)** | 52.16 | 53.03 | 0.0119 |
| **TiO2** | 1.30 | 1.33 | 0.0002 |
| **Al2O3** | 14.51 | 14.67 | 0.0055 |
| **Fe2O3** | 9.10 | 8.99 | 0.0044 |
| **MnO** | 0.15 | 0.15 | 0.0194 |
| **MgO** | 7.75 | 7.86 | 0.0004 |
| **CaO** | 9.23 | 9.21 | 0.0029 |
| **Na2O** | 2.74 | 2.68 | 0.0029 |
| **K2O** | 1.42 | 1.38 | 0.0169 |
| **P2O5** | 0.25 | 0.26 | 0.0044 |
| Sc (ppm) | 27.9 | 27.9 | 0.31 |
| V | 206.0 | 200.7 | 0.07 |
| Cr | 415.0 | 409.0 | 0.21 |
| Co | 39.5 | 38.2 | 0.03 |
| Ga | 18.0 | 17.8 | 0.022 |
| Rb | 42.0 | 39.0 | 0.031 |
| Sr | 443.0 | 438.8 | 0.29 |
| Y | 24.0 | 23.8 | 0.02 |
| Zr | 146.0 | 135.3 | 0.05 |
| Nb | 27.00 | 28.43 | 0.09 |
| Cs | 1.20 | 1.24 | **-** |
| Ba | 497.0 | 489.1 | 0.41 |
| La | 38.10 | 36.90 | 0.011 |
| Ce | 66.10 | 64.29 | 0.006 |
| Pr | 7.30 | 6.88 | 0.003 |
| Nd | 25.50 | 25.13 | 0.006 |
| Sm | 5.02 | 4.94 | 0.005 |
| Eu | 1.47 | 1.45 | 0.002 |
| Gd | 4.54 | 4.46 | 0.028 |
| Tb | 0.69 | 0.66 | 0.009 |
| Dy | 4.19 | 4.00 | 0.003 |
| Ho | 0.72 | 0.74 | 0.001 |
| Er | 2.18 | 2.09 | 0.003 |
| Tm | 0.31 | 0.33 | 0.001 |
| Yb | 2.10 | 2.11 | 0.003 |
| Lu | 0.32 | 0.30 | 0.004 |
| Hf | 3.48 | 3.42 | 0.002 |
| Ta | 1.60 | 1.63 | 0.001 |
| Pb | 7.20 | 7.85 |  |
| Th | 8.80 | 8.57 | 0.002 |
| U | 1.60 | 1.50 | 0.004 |
| *aValues of the international standard JB1a mostly from Govindaraju (1994)*  *bDetection limits from McDonald and Viljoen (2006)* | | | |

**Table S3:** Starting parameters and results of non-modal batch melting of a hornblende gabbro from the crustal sequence of the Muslim Bagh Ophiolite (MBO). Mineral modes are those of the crustal sequence hornblende gabbros of the MBO (Siddiqui et al., 1996; Kakar et al., 2014). Melt modes are from the low pressure and low temperature dehydration melting experiments of Beard & Lofgren (1991). Partition coefficients listed above are those for elements in equilibrium with TTG-like silicic melts (Bedard, 2006). The starting composition used was that of hornblende gabbro C51 of Kakar et al. (2014). Normalisation to N-MORB has been calculated into the batch melting equation, using normalisation values of Sun & McDonough (1989).

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| **Table S3** Trace element modelling parameters for batch melting of a crustal hornblende gabbro | | | | | | | | | | | | | | | | | | | |
|  | **Plag** | **Amph** | **Cpx** | **Ol** | **Mag** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mineral mode** | 0.50 | 0.40 | 0.05 | 0.03 | 0.02 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Melt mode** | 0.40 | 2.76 | -1.89 | -0.18 | -0.09 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Kd** | **Th** | **Nb** | **La** | **Ce** | **Sr** | **Nd** | **Sm** | **Zr** | **Eu** | **Ti** | **Gd** | **Tb** | **Dy** | **Y** | **Ho** | **Er** | **Tm** | **Yb** | **Lu** |
| **Plagioclase** | 0.095 | 0.239 | 0.358 | 0.339 | 6.65 | 0.289 | 0.237 | 0.078 | 2.17 | 0.078 | 0.192 | 0.17 | 0.15 | 0.138 | 0.132 | 0.117 | 0.104 | 0.094 | 0.085 |
| **Amphibole** | 0.055 | 0.274 | 0.319 | 0.56 | 0.389 | 1.32 | 2.09 | 0.417 | 1.79 | 4.03 | 2.53 | 2.6 | 2.55 | 2.47 | 2.41 | 2.22 | 2 | 1.79 | 1.59 |
| **Clinopyroxene** | 0.104 | 0.007 | 0.028 | 0.059 | 0.032 | 0.115 | 0.259 | 0.125 | 0.341 | 0.473 | 0.422 | 0.502 | 0.57 | 0.603 | 0.616 | 0.64 | 0.644 | 0.635 | 0.617 |
| **Olivine** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Magnetite** | 0.02 | 0.04 | 0.015 | 0.016 | 0.022 | 0.026 | 0.024 | 0.12 | 0.025 | 5 | 0.018 | 0.019 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018 | 0.018 |
| **Do** | 0.0751 | 0.2303 | 0.3083 | 0.3968 | 3.4826 | 0.6788 | 0.9679 | 0.2145 | 1.8186 | 1.7747 | 1.1295 | 1.1505 | 1.1239 | 1.0875 | 1.0612 | 0.9789 | 0.8846 | 0.7951 | 0.7097 |
| **P** | -0.0086 | 0.8350 | 0.9694 | 1.5683 | 3.6712 | 3.5391 | 5.3715 | 0.9351 | 5.1617 | 9.8100 | 6.2604 | 6.2935 | 6.0191 | 5.7311 | 5.5385 | 4.9628 | 4.3428 | 3.7762 | 3.2547 |
| **Co (Hbl Gbo)** | 0.10 | 0.58 | 2.38 | 6.18 | 287.00 | 5.23 | 1.58 | 30.21 | 0.56 | 3053.20 | 1.76 | 0.33 | 2.18 | 14.30 | 0.43 | 1.30 | 0.20 | 1.23 | 0.20 |
| **Cl (Hbl Gbo)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **0.05** | 9.54 | 3.44 | 11.18 | 9.45 | 4.06 | 7.00 | 4.75 | 12.39 | 6.00 | 1.76 | 3.41 | 3.45 | 3.39 | 3.69 | 3.14 | 3.47 | 3.77 | 3.80 | 4.53 |
| **0.1** | 6.80 | 3.32 | 11.13 | 10.24 | 4.23 | 9.09 | 6.70 | 12.21 | 6.88 | 2.63 | 4.89 | 4.92 | 4.76 | 5.12 | 4.32 | 4.65 | 4.91 | 4.82 | 5.58 |
| **0.1449** | 5.41 | 3.23 | 11.08 | 11.07 | 4.39 | 12.43 | 10.64 | 12.05 | 7.94 | 4.72 | 8.04 | 7.97 | 7.46 | 7.82 | 6.50 | 6.69 | 6.76 | 6.35 | 7.06 |
| *Plag: Plagioclase, Amph: Amphibole, Cpx: Clinopyroxene, Ol: Olivine, Mag: Magnetite, Hbl Gbo: Hornblende Gabbro, Kd: Partition coefficients for a particular element in a mineral, Do: Bulk partition coefficient, P:Partition coefficient of a particular element weighted by the proportion contributed to the melt by each phase, Co: Protolith composition, Cl: Liquid composition* | | | | | | | | | | | | | | | | | | | |
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