**Supplementary Material**

“The Origin of the Ultramafic rocks of the Tulu Dimtu Belt, western Ethiopia– Do they represent remnants of the Mozambique Ocean?”

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Category of Paper: Original article

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13-26 - 01** | **E13-26 - 02** | **E13-26 - 03** | **E13-26 - 04** | **E13-26 - 05** | **E13-26 - 06** | **E13-26 - 07** | **E13-26 - 08** | **E13-26 - 09** | **E13-26 - 10** | **E13-26 - 11** | **E13-26 - 12** | **E13-26 - 13** |
| *Tulu Dimtu Hill ( 9° 27’ 60.9”N 35° 44’ 19.8”E)* | |  |  |  |  |  |  |  |  |  |  |  |  |
| SiO2 | <0.01 | <0.01 | 0.01 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 0.03 | 0.02 | <0.1 | 0.01 | 0.010 |
| TiO2 | 0.02 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.01 | 0.02 | 0.01 | 0.019 |
| Al2O3 | 6.72 | 6.64 | 6.63 | 6.76 | 6.65 | 6.42 | 6.37 | 6.83 | 6.76 | 6.57 | 6.71 | 5.22 | 5.192 |
| Cr2O3 | 64.09 | 64.18 | 64.79 | 64.33 | 63.90 | 63.54 | 62.67 | 63.87 | 63.99 | 62.62 | 62.89 | 64.90 | 65.535 |
| Fe2O3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.13 | 0.06 | 0.33 | 0.17 | 0.00 | 0.000 |
| FeO | 21.58 | 21.85 | 20.06 | 20.91 | 21.87 | 23.50 | 25.71 | 21.40 | 21.25 | 24.81 | 24.23 | 24.67 | 23.538 |
| MnO | 0.37 | 0.44 | 0.44 | 0.45 | 0.45 | 0.54 | 0.57 | 0.47 | 0.44 | 0.54 | 0.55 | 0.54 | 0.486 |
| MgO | 7.03 | 6.70 | 7.79 | 7.31 | 6.77 | 5.53 | 4.31 | 6.91 | 6.93 | 4.69 | 5.05 | 4.40 | 4.880 |
| ZnO | 0.11 | 0.12 | 0.20 | 0.16 | 0.28 | 0.40 | 0.15 | 0.19 | 0.35 | 0.32 | 0.27 | 0.15 | 0.298 |
| CaO | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.02 | <0.01 | <0.01 | <0.01 |
| Na2O | 0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | 0.02 | 0.12 | 0.12 | 0.07 | 0.09 | 0.04 | 0.023 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 |
| NiO | 0.05 | 0.04 | 0.05 | 0.03 | 0.02 | 0.02 | 0.03 | 0.06 | 0.03 | <0.03 | <0.03 | 0.04 | 0.010 |
| *Cations to 32 oxygens* | |  |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.26 | 0.26 | 0.28 | 0.27 | 0.27 | 0.27 | 0.22 | 0.21 |
| Cr | 1.74 | 1.74 | 1.75 | 1.74 | 1.73 | 1.74 | 1.73 | 1.73 | 1.73 | 1.72 | 1.73 | 1.80 | 1.82 |
| Fe3+ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Fe2+ | 0.62 | 0.63 | 0.57 | 0.60 | 0.63 | 0.68 | 0.75 | 0.61 | 0.61 | 0.72 | 0.70 | 0.72 | 0.69 |
| Mn2+ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 |
| Mg | 0.36 | 0.34 | 0.40 | 0.37 | 0.35 | 0.29 | 0.22 | 0.35 | 0.35 | 0.24 | 0.26 | 0.23 | 0.25 |
| Zn | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.37 | 0.35 | 0.41 | 0.38 | 0.36 | 0.30 | 0.23 | 0.37 | 0.37 | 0.25 | 0.27 | 0.24 | 0.27 |
| Fe # | 0.63 | 0.65 | 0.59 | 0.62 | 0.64 | 0.70 | 0.77 | 0.63 | 0.63 | 0.75 | 0.73 | 0.76 | 0.73 |
| Cr # | 0.86 | 0.87 | 0.87 | 0.86 | 0.87 | 0.87 | 0.87 | 0.86 | 0.86 | 0.86 | 0.86 | 0.89 | 0.89 |
| Fe3+# | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13-26 - 14** | **E13-26 - 15** | **E13-26 - 16** | **E13-26 - 17** | **E13-26 - 18** | **E13-26 - 19** | **E13-26 - 20** | **E13-26 - 21** | **E13-26 - 22** | **E13-26 - 23** | **E13-26 - 24** | **E13-26 - 25** | **E13-26 - 26** |
| *Tulu Dimtu Hill ( 9° 27’ 60.9”N 35° 44’ 19.8”E)* | |  |  |  |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.02 | 0.04 | 0.02 | 0.13 | 0.05 | 0.02 | 0.03 | 0.02 | 0.03 | <0.01 | 0.04 | 0.04 | 0.07 |
| TiO2 | 0.01 | 0.01 | <0.01 | <0.01 | 0.02 | 0.01 | 0.01 | <0.01 | 0.02 | 0.01 | 0.02 | 0.00 | 0.01 |
| Al2O3 | 5.16 | 0.65 | 6.07 | 4.65 | 6.56 | 6.54 | 6.56 | 6.69 | 6.78 | 6.69 | 6.54 | 6.52 | 6.28 |
| Cr2O3 | 64.45 | 60.27 | 62.58 | 62.29 | 64.35 | 64.33 | 64.93 | 64.38 | 65.33 | 65.74 | 63.97 | 63.38 | 62.53 |
| Fe2O3 | 0.00 | 7.93 | 0.23 | 1.47 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 |
| FeO | 25.05 | 27.18 | 25.96 | 27.54 | 21.50 | 21.81 | 20.13 | 21.17 | 18.57 | 18.26 | 21.91 | 23.53 | 26.06 |
| MnO | 0.54 | 0.87 | 0.60 | 0.74 | 0.40 | 0.41 | 0.42 | 0.41 | 0.42 | 0.34 | 0.44 | 0.52 | 0.64 |
| MgO | 4.15 | 2.04 | 3.83 | 2.87 | 6.92 | 6.75 | 7.74 | 7.21 | 8.73 | 8.75 | 6.73 | 5.54 | 4.08 |
| ZnO | 0.57 | 0.85 | 0.68 | 0.23 | 0.13 | 0.13 | 0.14 | 0.06 | 0.08 | 0.15 | 0.30 | 0.45 | 0.11 |
| CaO | 0.02 | 0.02 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 |
| Na2O | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | 0.02 | 0.02 | 0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | <0.03 | 0.15 | <0.03 | 0.05 | 0.05 | <0.03 | 0.04 | 0.03 | 0.03 | 0.04 | 0.02 | <0.03 | <0.03 |
| *Cations to 32 oxygens* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.21 | 0.03 | 0.25 | 0.20 | 0.27 | 0.26 | 0.26 | 0.27 | 0.27 | 0.27 | 0.26 | 0.27 | 0.26 |
| Cr | 1.80 | 1.75 | 1.74 | 1.76 | 1.75 | 1.75 | 1.75 | 1.74 | 1.75 | 1.76 | 1.74 | 1.74 | 1.73 |
| Fe3+ | 0.00 | 0.22 | 0.01 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fe2+ | 0.74 | 0.83 | 0.76 | 0.82 | 0.62 | 0.63 | 0.57 | 0.61 | 0.53 | 0.52 | 0.63 | 0.68 | 0.76 |
| Mn2+ | 0.02 | 0.03 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |
| Mg | 0.22 | 0.11 | 0.20 | 0.15 | 0.35 | 0.35 | 0.39 | 0.37 | 0.44 | 0.44 | 0.34 | 0.29 | 0.21 |
| Zn | 0.01 | 0.02 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.23 | 0.12 | 0.21 | 0.16 | 0.36 | 0.36 | 0.41 | 0.38 | 0.46 | 0.46 | 0.35 | 0.30 | 0.22 |
| Fe # | 0.77 | 0.88 | 0.79 | 0.84 | 0.64 | 0.64 | 0.59 | 0.62 | 0.54 | 0.54 | 0.65 | 0.70 | 0.78 |
| Cr # | 0.89 | 0.88 | 0.87 | 0.88 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 |
| Fe3+# | 0.00 | 0.11 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13-26 - 27** | **E13-26 - 28** | **E13-26 - 29** | **E13-26 - 30** | **E13-26 - 31** | **E13-26 - 32** | **E13-26 - 33** | **E13-26 - 34** | **E13-26 - 35** | **E13-26 - 36** | **E13-26 - 37** |
| *Tulu Dimtu Hill ( 9° 27’ 60.9”N 35° 44’ 19.8”E)* | | | |  |  |  |  |  |  |  |  |
| SiO2 | 0.06 | 0.01 | 0.05 | 0.03 | 0.03 | 0.03 | 0.02 | <0.01 | 0.02 | 0.95 | 0.04 |
| TiO2 | 0.01 | 0.01 | 0.03 | <0.01 | 0.02 | 0.03 | 0.02 | 0.01 | 0.01 | 0.03 | 0.02 |
| Al2O3 | 6.59 | 6.67 | 6.34 | 6.69 | 2.65 | 5.19 | 5.22 | 5.19 | 7.22 | 3.97 | 6.78 |
| Cr2O3 | 64.03 | 64.01 | 62.34 | 62.89 | 63.39 | 65.03 | 65.48 | 64.59 | 63.15 | 63.46 | 62.94 |
| Fe2O3 | 0.10 | 0.00 | 0.42 | 0.25 | 2.59 | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 |
| FeO | 21.56 | 21.45 | 25.71 | 23.66 | 28.05 | 24.55 | 23.59 | 25.38 | 22.61 | 26.05 | 23.64 |
| MnO | 0.49 | 0.42 | 0.56 | 0.58 | 0.79 | 0.53 | 0.45 | 0.56 | 0.52 | 0.55 | 0.53 |
| MgO | 6.86 | 6.85 | 4.21 | 5.30 | 2.14 | 4.44 | 4.89 | 4.01 | 6.24 | 4.45 | 5.64 |
| ZnO | 0.17 | 0.44 | 0.28 | 0.46 | 0.26 | 0.13 | 0.26 | 0.23 | 0.16 | 0.22 | 0.34 |
| CaO | 0.02 | 0.02 | 0.01 | 0.03 | 0.02 | 0.01 | 0.02 | 0.01 | 0.00 | 0.06 | 0.03 |
| Na2O | 0.12 | 0.08 | 0.05 | 0.08 | 0.02 | 0.06 | <0.02 | 0.02 | 0.02 | 0.06 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | <0.03 | 0.03 | <0.03 | 0.03 | 0.04 | <0.03 | 0.04 | <0.03 | 0.03 | <0.03 | 0.03 |
| *Cations to 32 oxygens* | | | |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.27 | 0.27 | 0.26 | 0.27 | 0.11 | 0.21 | 0.22 | 0.22 | 0.29 | 0.16 | 0.28 |
| Cr | 1.73 | 1.73 | 1.73 | 1.72 | 1.82 | 1.81 | 1.81 | 1.80 | 1.72 | 1.77 | 1.72 |
| Fe3+ | 0.00 | 0.00 | 0.01 | 0.01 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Fe2+ | 0.62 | 0.61 | 0.75 | 0.69 | 0.85 | 0.72 | 0.69 | 0.75 | 0.65 | 0.77 | 0.68 |
| Mn2+ | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mg | 0.35 | 0.35 | 0.22 | 0.27 | 0.12 | 0.23 | 0.26 | 0.21 | 0.32 | 0.23 | 0.29 |
| Zn | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.36 | 0.36 | 0.23 | 0.29 | 0.12 | 0.24 | 0.27 | 0.22 | 0.33 | 0.23 | 0.30 |
| Fe # | 0.64 | 0.64 | 0.77 | 0.71 | 0.88 | 0.76 | 0.73 | 0.78 | 0.67 | 0.77 | 0.70 |
| Cr # | 0.87 | 0.87 | 0.86 | 0.86 | 0.91 | 0.89 | 0.89 | 0.89 | 0.85 | 0.91 | 0.86 |
| Fe3+# | 0.00 | 0.00 | 0.01 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E14 - 10 - 01** | **E14 - 10 - 02** | **E14 - 10 - 03** | **E14 - 10 - 04** | **E14 - 10 - 05** | **E14 - 10 - 06** | **E14 - 10 - 07** | **E14 - 10 - 08** | **E14 - 10 - 09** | **E14 - 10 - 10** | **E14 - 10 - 11** | **E14 - 10 - 12** | **E14 - 10 - 13** |
| *Yubdo E14.10 (8° 57‘37.4” N, 35° 27’ 18.2”E)* | | |  |  |  |  |  |  |  |  |  |  |  |
| SiO2 | <0.01 | 0.08 | 0.04 | 0.05 | <0.01 | 0.03 | <0.01 | 0.38 | 0.02 | 0.05 | 0.14 | 0.16 | 0.09 |
| TiO2 | 0.45 | 0.38 | 0.49 | 0.41 | 0.46 | 0.40 | 0.46 | 0.48 | 0.47 | 0.48 | 0.44 | 0.42 | 0.35 |
| Al2O3 | 10.38 | 9.65 | 9.94 | 10.39 | 9.31 | 10.90 | 10.22 | 9.92 | 10.70 | 10.50 | 10.40 | 9.80 | 9.12 |
| Cr2O3 | 41.67 | 42.45 | 44.32 | 42.34 | 42.52 | 36.57 | 43.49 | 43.19 | 39.07 | 37.33 | 40.82 | 39.58 | 39.34 |
| Fe2O3 | 16.43 | 17.56 | 14.70 | 17.14 | 16.59 | 20.97 | 15.69 | 17.78 | 18.29 | 20.18 | 18.35 | 19.18 | 20.41 |
| FeO | 24.83 | 21.65 | 23.15 | 21.29 | 25.32 | 25.50 | 23.03 | 19.63 | 25.62 | 25.55 | 21.56 | 24.64 | 24.51 |
| MnO | 0.72 | 0.52 | 0.56 | 0.45 | 0.71 | 0.78 | 0.55 | 0.51 | 0.85 | 0.70 | 0.50 | 0.70 | 0.56 |
| MgO | 5.26 | 7.40 | 6.54 | 7.66 | 4.70 | 3.99 | 6.20 | 7.19 | 4.55 | 4.92 | 7.48 | 5.11 | 5.38 |
| ZnO | 0.21 | 0.28 | 0.20 | 0.17 | 0.30 | 0.58 | 0.15 | 0.19 | 0.35 | 0.22 | 0.19 | 0.17 | 0.11 |
| CaO | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | 0.02 | 0.00 |
| Na2O | <0.02 | <0.02 | 0.02 | 0.05 | 0.04 | 0.21 | 0.14 | 0.69 | 0.03 | 0.04 | 0.06 | 0.11 | 0.03 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.04 | 0.03 | 0.07 | 0.06 | 0.05 | 0.08 | 0.06 | 0.03 | 0.06 | 0.10 | 0.05 | 0.10 | 0.10 |
| *Cations to 32 oxygens* | | | |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Ti | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Al | 0.42 | 0.39 | 0.40 | 0.41 | 0.38 | 0.44 | 0.41 | 0.39 | 0.44 | 0.43 | 0.41 | 0.40 | 0.37 |
| Cr | 1.13 | 1.14 | 1.19 | 1.13 | 1.17 | 1.00 | 1.17 | 1.15 | 1.07 | 1.02 | 1.09 | 1.08 | 1.08 |
| Fe3+ | 0.42 | 0.45 | 0.38 | 0.44 | 0.43 | 0.55 | 0.40 | 0.45 | 0.47 | 0.52 | 0.47 | 0.50 | 0.53 |
| Fe2+ | 0.71 | 0.61 | 0.66 | 0.60 | 0.73 | 0.74 | 0.66 | 0.55 | 0.74 | 0.74 | 0.61 | 0.71 | 0.71 |
| Mn2+ | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 |
| Mg | 0.27 | 0.37 | 0.33 | 0.39 | 0.24 | 0.21 | 0.32 | 0.36 | 0.23 | 0.25 | 0.38 | 0.26 | 0.28 |
| Zn | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.04 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.27 | 0.38 | 0.34 | 0.39 | 0.25 | 0.22 | 0.32 | 0.40 | 0.24 | 0.26 | 0.38 | 0.27 | 0.28 |
| Fe # | 0.73 | 0.62 | 0.66 | 0.61 | 0.75 | 0.78 | 0.68 | 0.60 | 0.76 | 0.74 | 0.62 | 0.73 | 0.72 |
| Cr # | 0.57 | 0.58 | 0.61 | 0.57 | 0.59 | 0.50 | 0.59 | 0.58 | 0.54 | 0.52 | 0.55 | 0.55 | 0.54 |
| Fe3+# | 0.21 | 0.23 | 0.19 | 0.22 | 0.22 | 0.27 | 0.20 | 0.23 | 0.24 | 0.27 | 0.24 | 0.25 | 0.27 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E14 - 10 - 14** | **E14 - 10 - 15** | **E14 - 10 - 16** | **E14 - 10 - 17** | **E14 - 10 - 18** | **E14 - 10 - 19** | **E14 - 10 - 20** | **E14 - 10 - 21** | **E14 - 10 - 22** | **E14 - 10 - 23** | **E14 - 10 - 24** | **E14 - 10 - 25** |
| *Yubdo E14.10 (8° 57‘37.4” N, 35° 27’ 18.2”E)* | | |  |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.00 | 0.03 | <0.01 | 0.06 | 0.57 | 0.13 | 0.02 | 0.06 | 0.04 | 0.06 | 0.02 | 0.05 |
| TiO2 | 0.51 | 0.42 | 0.40 | 0.49 | 0.42 | 0.45 | 0.46 | 0.42 | 0.44 | 0.40 | 0.36 | 0.40 |
| Al2O3 | 9.08 | 10.31 | 8.93 | 10.52 | 12.99 | 10.26 | 10.88 | 10.20 | 10.77 | 9.83 | 9.12 | 10.12 |
| Cr2O3 | 41.81 | 40.90 | 37.84 | 37.11 | 39.48 | 43.59 | 43.23 | 41.97 | 40.18 | 40.11 | 40.82 | 38.69 |
| Fe2O3 | 17.81 | 18.43 | 21.77 | 20.67 | 16.18 | 15.25 | 15.55 | 17.30 | 18.32 | 19.24 | 18.71 | 19.06 |
| FeO | 24.45 | 21.96 | 25.30 | 24.92 | 21.78 | 22.54 | 21.36 | 21.83 | 22.37 | 23.04 | 24.98 | 26.45 |
| MnO | 0.70 | 0.52 | 0.77 | 0.61 | 0.39 | 0.55 | 0.46 | 0.57 | 0.61 | 0.54 | 0.68 | 0.92 |
| MgO | 5.24 | 7.18 | 4.66 | 5.26 | 7.57 | 6.87 | 7.78 | 7.40 | 7.06 | 6.63 | 5.04 | 3.92 |
| ZnO | 0.21 | 0.18 | 0.20 | 0.21 | 0.18 | 0.27 | 0.18 | 0.14 | 0.20 | 0.11 | 0.15 | 0.31 |
| CaO | 0.02 | <0.01 | 0.02 | <0.01 | 0.14 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 |
| Na2O | 0.05 | 0.04 | <0.02 | <0.02 | 0.19 | 0.03 | <0.02 | 0.03 | <0.02 | 0.03 | <0.02 | 0.03 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.12 | 0.05 | 0.12 | 0.11 | 0.10 | 0.07 | 0.07 | 0.14 | 0.03 | 0.06 | 0.10 | 0.04 |
| *Cations to 32 oxygens* | |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Al | 0.37 | 0.41 | 0.37 | 0.43 | 0.51 | 0.41 | 0.43 | 0.41 | 0.43 | 0.40 | 0.37 | 0.41 |
| Cr | 1.14 | 1.10 | 1.04 | 1.01 | 1.04 | 1.17 | 1.15 | 1.12 | 1.08 | 1.08 | 1.12 | 1.06 |
| Fe3+ | 0.46 | 0.47 | 0.57 | 0.53 | 0.41 | 0.39 | 0.39 | 0.44 | 0.47 | 0.49 | 0.49 | 0.50 |
| Fe2+ | 0.71 | 0.62 | 0.74 | 0.72 | 0.61 | 0.64 | 0.60 | 0.62 | 0.63 | 0.66 | 0.72 | 0.77 |
| Mn2+ | 0.02 | 0.01 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| Mg | 0.27 | 0.36 | 0.24 | 0.27 | 0.38 | 0.35 | 0.39 | 0.37 | 0.36 | 0.34 | 0.26 | 0.20 |
| Zn | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.28 | 0.37 | 0.25 | 0.27 | 0.38 | 0.35 | 0.39 | 0.38 | 0.36 | 0.34 | 0.26 | 0.21 |
| Fe # | 0.72 | 0.63 | 0.75 | 0.73 | 0.62 | 0.65 | 0.61 | 0.62 | 0.64 | 0.66 | 0.74 | 0.79 |
| Cr # | 0.58 | 0.55 | 0.53 | 0.51 | 0.53 | 0.59 | 0.58 | 0.57 | 0.55 | 0.55 | 0.57 | 0.54 |
| Fe3+# | 0.23 | 0.24 | 0.29 | 0.27 | 0.21 | 0.20 | 0.20 | 0.22 | 0.24 | 0.25 | 0.25 | 0.25 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E14 - 19 - 02** | **E14 - 19 - 03** | **E14 - 19 - 04** | **E14 - 19 - 05** | **E14 - 19 - 06** | **E14 - 19 - 07** | **E14 - 19 - 08** | **E14 - 19 - 09** | **E14 - 19 - 10** | **E14 - 19 - 11** | **E14 - 19 - 12** | **E14 - 19 - 13** | **E14 - 19 - 14** |
| *Abshala Melange E14.19 (09° 23’ 16 .0” N 035° 43’ 15.9” E)* | | | |  |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.21 | <0.01 | <0.01 | 0.04 | 0.02 | <0.01 | <0.01 | 0.03 | 0.04 | 0.09 | <0.01 | <0.01 | 0.02 |
| TiO2 | <0.01 | 0.03 | <0.01 | 0.01 | <0.01 | 0.02 | <0.01 | 0.06 | 0.01 | 0.01 | <0.01 | 0.01 | 0.04 |
| Al2O3 | 7.24 | 7.51 | 7.37 | 8.11 | 8.01 | 8.31 | 7.80 | 7.00 | 7.16 | 8.20 | 8.15 | 6.99 | 7.13 |
| Cr2O3 | 62.62 | 58.94 | 56.72 | 64.27 | 59.33 | 62.18 | 59.30 | 57.63 | 56.74 | 65.46 | 55.40 | 65.72 | 60.35 |
| Fe2O3 | 0.00 | 1.41 | 6.71 | 0.00 | 2.33 | 0.00 | 0.29 | 4.19 | 7.48 | 0.00 | 7.03 | 0.00 | 1.29 |
| FeO | 26.72 | 28.75 | 21.43 | 22.53 | 23.72 | 26.28 | 30.10 | 26.70 | 19.76 | 22.12 | 21.27 | 22.71 | 26.78 |
| MnO | 0.29 | 0.34 | 0.37 | 0.42 | 0.39 | 0.36 | 0.38 | 0.34 | 0.37 | 0.38 | 0.44 | 0.34 | 0.35 |
| MgO | 2.57 | 2.21 | 7.18 | 4.24 | 5.81 | 2.25 | 1.33 | 3.76 | 8.12 | 3.55 | 7.42 | 3.85 | 3.74 |
| ZnO | 0.31 | 0.75 | 0.17 | 0.35 | 0.35 | 0.58 | 0.67 | 0.27 | 0.19 | 0.23 | 0.23 | 0.29 | 0.25 |
| CaO | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 |
| Na2O | 0.04 | 0.02 | 0.04 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.09 | <0.02 | <0.02 | 0.04 | 0.04 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | <0.03 | <0.03 | <0.03 | 0.03 | 0.03 | <0.03 | 0.10 | 0.07 | 0.03 | <0.03 | 0.07 | 0.05 | <0.03 |
| *Cations to 32 oxygens* | | |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.30 | 0.31 | 0.30 | 0.33 | 0.32 | 0.35 | 0.33 | 0.29 | 0.29 | 0.34 | 0.33 | 0.29 | 0.29 |
| Cr | 1.75 | 1.65 | 1.53 | 1.77 | 1.61 | 1.73 | 1.67 | 1.60 | 1.52 | 1.81 | 1.49 | 1.82 | 1.67 |
| Fe3+ | 0.00 | 0.04 | 0.17 | 0.00 | 0.06 | 0.00 | 0.01 | 0.11 | 0.19 | 0.00 | 0.18 | 0.00 | 0.03 |
| Fe2+ | 0.79 | 0.85 | 0.61 | 0.66 | 0.68 | 0.78 | 0.89 | 0.78 | 0.56 | 0.65 | 0.61 | 0.67 | 0.78 |
| Mn2+ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Mg | 0.14 | 0.12 | 0.37 | 0.22 | 0.30 | 0.12 | 0.07 | 0.20 | 0.41 | 0.19 | 0.38 | 0.20 | 0.20 |
| Zn | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.15 | 0.12 | 0.37 | 0.25 | 0.30 | 0.13 | 0.07 | 0.20 | 0.42 | 0.22 | 0.38 | 0.23 | 0.20 |
| Fe # | 0.85 | 0.88 | 0.63 | 0.75 | 0.70 | 0.87 | 0.93 | 0.80 | 0.58 | 0.78 | 0.62 | 0.77 | 0.80 |
| Cr # | 0.85 | 0.82 | 0.77 | 0.84 | 0.81 | 0.83 | 0.83 | 0.80 | 0.76 | 0.84 | 0.75 | 0.86 | 0.84 |
| Fe3+# | 0.00 | 0.02 | 0.09 | 0.00 | 0.03 | 0.00 | 0.00 | 0.06 | 0.10 | 0.00 | 0.09 | 0.00 | 0.02 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E14 - 19 - 15** | **E14 - 19 - 16** | **E14 - 19 - 17** | **E14 - 19 - 18** | **E14 - 19 - 19** | **E14 - 19 - 20** | **E14 - 19 - 21** | **E14 - 19 - 22** | **E14 - 19 - 23** | **E14 - 19 - 24** | **E14 - 19 - 25** | **E14 - 19 - 26** |
| *Abshala Melange E14.19 (09° 23’ 16 .0” N 035° 43’ 15.9” E)* | | | |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.06 | 0.09 | 0.03 | 0.08 | 0.04 | 0.06 | 0.04 | 0.03 | 0.03 | 0.05 | 0.06 | <0.01 |
| TiO2 | 0.02 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | <0.01 |
| Al2O3 | 7.10 | 6.78 | 7.07 | 9.84 | 10.29 | 10.57 | 9.78 | 10.06 | 6.89 | 7.59 | 6.77 | 7.31 |
| Cr2O3 | 61.68 | 60.59 | 58.00 | 53.02 | 60.42 | 63.30 | 56.39 | 55.06 | 64.32 | 60.66 | 63.87 | 64.81 |
| Fe2O3 | 0.00 | 0.00 | 3.23 | 7.96 | 0.13 | 0.00 | 2.99 | 6.01 | 0.00 | 3.22 | 0.98 | 0.00 |
| FeO | 28.49 | 30.09 | 27.78 | 19.88 | 19.85 | 21.72 | 25.09 | 19.28 | 20.31 | 18.77 | 18.65 | 20.80 |
| MnO | 0.42 | 0.36 | 0.24 | 0.48 | 0.42 | 0.26 | 0.34 | 0.41 | 0.46 | 0.39 | 0.43 | 0.37 |
| MgO | 1.22 | 1.23 | 2.88 | 8.50 | 8.57 | 3.41 | 5.05 | 8.90 | 7.71 | 9.14 | 9.02 | 6.37 |
| ZnO | 0.87 | 0.78 | 0.68 | 0.17 | 0.18 | 0.68 | 0.22 | 0.19 | 0.16 | 0.15 | 0.09 | 0.24 |
| CaO | 0.03 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Na2O | 0.04 | 0.04 | 0.02 | <0.02 | 0.04 | 0.03 | 0.05 | 0.03 | 0.05 | <0.02 | 0.04 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.07 | 0.05 | 0.04 | 0.07 | 0.05 | <0.03 | <0.03 | 0.02 | 0.08 | <0.03 | 0.07 | 0.07 |
| *Cations to 32 oxygens* | |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.30 | 0.29 | 0.29 | 0.39 | 0.40 | 0.43 | 0.40 | 0.40 | 0.28 | 0.30 | 0.27 | 0.30 |
| Cr | 1.74 | 1.71 | 1.62 | 1.41 | 1.59 | 1.73 | 1.53 | 1.45 | 1.73 | 1.61 | 1.70 | 1.76 |
| Fe3+ | 0.00 | 0.00 | 0.09 | 0.20 | 0.00 | 0.00 | 0.08 | 0.15 | 0.00 | 0.08 | 0.02 | 0.00 |
| Fe2+ | 0.85 | 0.90 | 0.82 | 0.56 | 0.55 | 0.63 | 0.72 | 0.54 | 0.58 | 0.53 | 0.53 | 0.60 |
| Mn2+ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Mg | 0.06 | 0.07 | 0.15 | 0.42 | 0.43 | 0.18 | 0.26 | 0.44 | 0.39 | 0.46 | 0.45 | 0.33 |
| Zn | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.07 | 0.07 | 0.16 | 0.43 | 0.43 | 0.22 | 0.26 | 0.45 | 0.40 | 0.46 | 0.46 | 0.35 |
| Fe # | 0.93 | 0.93 | 0.84 | 0.57 | 0.57 | 0.78 | 0.74 | 0.55 | 0.60 | 0.54 | 0.54 | 0.65 |
| Cr # | 0.85 | 0.86 | 0.81 | 0.70 | 0.80 | 0.80 | 0.76 | 0.73 | 0.86 | 0.81 | 0.85 | 0.86 |
| Fe3+# | 0.00 | 0.00 | 0.04 | 0.10 | 0.00 | 0.00 | 0.04 | 0.08 | 0.00 | 0.04 | 0.01 | 0.00 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID number** | **E14 - 19 - 27** | **E14 - 19 - 28** | **E14 - 19 - 29** | **E14 - 19 - 30** |
| *Abshala Melange E14.19 (09° 23’ 16 .0” N 035° 43’ 15.9” E)* | | | | |
| SiO2 | 0.13 | 0.49 | 0.16 | 0.05 |
| TiO2 | <0.01 | <0.01 | <0.01 | <0.01 |
| Al2O3 | 6.37 | 9.43 | 7.03 | 7.27 |
| Cr2O3 | 61.58 | 60.52 | 60.45 | 65.51 |
| Fe2O3 | 2.55 | 0.00 | 3.90 | 0.00 |
| FeO | 21.90 | 21.80 | 18.88 | 20.81 |
| MnO | 0.29 | 0.33 | 0.41 | 0.36 |
| MgO | 6.90 | 7.14 | 8.94 | 5.73 |
| ZnO | 0.12 | 0.27 | 0.18 | 0.28 |
| CaO | 0.06 | 0.02 | 0.01 | 0.02 |
| Na2O | 0.05 | <0.02 | 0.04 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.06 | 0.01 | 0.00 | -0.02 |
| *Cations to 32 oxygens* | | | | |
| Si | 0.00 | 0.02 | 0.01 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.26 | 0.38 | 0.28 | 0.30 |
| Cr | 1.67 | 1.62 | 1.61 | 1.79 |
| Fe3+ | 0.07 | 0.00 | 0.10 | 0.00 |
| Fe2+ | 0.63 | 0.62 | 0.53 | 0.60 |
| Mn2+ | 0.01 | 0.01 | 0.01 | 0.01 |
| Mg | 0.35 | 0.36 | 0.45 | 0.29 |
| Zn | 0.00 | 0.01 | 0.00 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.36 | 0.37 | 0.46 | 0.33 |
| Fe # | 0.64 | 0.63 | 0.54 | 0.67 |
| Cr # | 0.84 | 0.81 | 0.81 | 0.86 |
| Fe3+# | 0.03 | 0.00 | 0.05 | 0.00 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 22 - 01** | **E13 - 22 - 02** | **E13 - 22 - 03** | **E13 - 22 - 04** | **E13 - 22 - 05** | **E13 - 22 - 06** | **E13 - 22 - 07** | **E13 - 22 - 08** | **E13 - 22 - 09** | **E13 - 22 - 10** | **E13 - 22 - 11** | **E13 - 22 - 12** | **E13 - 22 - 13** |
| *Tulu Dimtu Hill (9° 27’ 60.9”N 35° 44’ 19.8”E)* | | | |  |  |  |  |  |  |  |  |  |  |
| SiO2 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.06 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 |
| TiO2 | 0.39 | 0.37 | 0.08 | 0.42 | 0.20 | 0.25 | 0.24 | 0.37 | 0.38 | 0.30 | 0.37 | 0.38 | 0.37 |
| Al2O3 | 10.85 | 10.68 | 5.86 | 0.20 | 10.56 | 10.02 | 0.07 | 10.67 | 10.59 | 9.00 | 11.03 | 10.84 | 10.56 |
| Cr2O3 | 53.16 | 53.48 | 50.12 | 34.65 | 52.40 | 51.78 | 17.92 | 53.11 | 53.48 | 51.12 | 52.75 | 53.02 | 53.99 |
| Fe2O3 | 3.56 | 3.47 | 12.16 | 33.26 | 4.61 | 5.68 | 50.36 | 3.63 | 3.56 | 7.24 | 3.63 | 3.54 | 3.15 |
| FeO | 27.26 | 27.04 | 28.37 | 29.67 | 27.85 | 28.04 | 30.25 | 27.42 | 27.13 | 28.44 | 27.31 | 27.44 | 26.97 |
| MnO | 0.47 | 0.56 | 0.72 | 0.63 | 0.68 | 0.67 | 0.32 | 0.65 | 0.52 | 0.69 | 0.65 | 0.57 | 0.51 |
| MgO | 3.90 | 3.96 | 2.20 | 0.78 | 3.09 | 2.84 | 0.45 | 3.53 | 3.94 | 2.57 | 3.67 | 3.65 | 4.07 |
| ZnO | 0.34 | 0.40 | 0.44 | 0.26 | 0.57 | 0.63 | 0.16 | 0.57 | 0.38 | 0.62 | 0.51 | 0.47 | 0.35 |
| CaO | <0.01 | <0.01 | <0.01 | 0.03 | 0.03 | 0.02 | 0.09 | 0.03 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Na2O | <0.02 | <0.02 | <0.02 | 0.04 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.04 | 0.03 | <0.03 | 0.06 | <0.03 | 0.03 | 0.08 | <0.03 | <0.03 | <0.03 | 0.04 | 0.07 | <0.03 |
| *Cations to 32 oxygens* | | |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Al | 0.44 | 0.43 | 0.25 | 0.01 | 0.43 | 0.41 | 0.00 | 0.43 | 0.43 | 0.37 | 0.45 | 0.44 | 0.43 |
| Cr | 1.45 | 1.46 | 1.42 | 1.03 | 1.44 | 1.43 | 0.54 | 1.45 | 1.46 | 1.42 | 1.44 | 1.45 | 1.47 |
| Fe3+ | 0.09 | 0.09 | 0.33 | 0.94 | 0.12 | 0.15 | 1.44 | 0.09 | 0.09 | 0.19 | 0.09 | 0.09 | 0.08 |
| Fe2+ | 0.78 | 0.78 | 0.85 | 0.93 | 0.81 | 0.82 | 0.96 | 0.79 | 0.78 | 0.84 | 0.79 | 0.79 | 0.78 |
| Mn2+ | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 |
| Mg | 0.20 | 0.20 | 0.12 | 0.04 | 0.16 | 0.15 | 0.03 | 0.18 | 0.20 | 0.13 | 0.19 | 0.19 | 0.21 |
| Zn | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.20 | 0.21 | 0.12 | 0.04 | 0.17 | 0.15 | 0.03 | 0.19 | 0.21 | 0.14 | 0.19 | 0.19 | 0.21 |
| Fe # | 0.80 | 0.79 | 0.88 | 0.96 | 0.83 | 0.85 | 0.97 | 0.81 | 0.79 | 0.86 | 0.81 | 0.81 | 0.79 |
| Cr # | 0.73 | 0.74 | 0.71 | 0.52 | 0.72 | 0.72 | 0.27 | 0.73 | 0.74 | 0.72 | 0.73 | 0.73 | 0.74 |
| Fe3+# | 0.05 | 0.05 | 0.16 | 0.48 | 0.06 | 0.08 | 0.73 | 0.05 | 0.05 | 0.10 | 0.05 | 0.05 | 0.04 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 22 - 14** | **E13 - 22 - 15** | **E13 - 22 - 16** | **E13 - 22 - 17** | **E13 - 22 - 18** | **E13 - 22 - 19** | **E13 - 22 - 20** | **E13 - 22 - 21** | **E13 - 22 - 22** | **E13 - 22 - 23** | **E13 - 22 - 24** | **E13 - 22 - 25** | **E13 - 22 - 26** |
| *Tulu Dimtu Hill (9° 27’ 60.9”N 35° 44’ 19.8”E)* | | | |  |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.02 | <0.01 | <0.01 | <0.01 | 0.04 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | 0.02 |
| TiO2 | 0.34 | 0.31 | 0.36 | 0.34 | 0.33 | 0.31 | 0.41 | 0.26 | 0.26 | 0.17 | 0.23 | 0.26 | 0.26 |
| Al2O3 | 10.40 | 9.20 | 10.41 | 10.03 | 9.58 | 10.76 | 0.21 | 8.71 | 8.83 | 0.20 | 8.57 | 8.16 | 8.26 |
| Cr2O3 | 53.96 | 52.46 | 53.68 | 54.05 | 52.48 | 53.28 | 33.32 | 56.42 | 56.55 | 13.08 | 55.25 | 56.80 | 56.70 |
| Fe2O3 | 3.23 | 5.66 | 3.45 | 3.44 | 5.25 | 3.53 | 35.03 | 3.06 | 2.94 | 55.47 | 3.95 | 3.23 | 3.07 |
| FeO | 27.29 | 28.38 | 27.31 | 27.62 | 27.97 | 27.41 | 29.09 | 26.70 | 26.33 | 29.84 | 27.64 | 27.05 | 27.21 |
| MnO | 0.58 | 0.72 | 0.61 | 0.61 | 0.65 | 0.63 | 0.56 | 0.57 | 0.45 | 0.21 | 0.63 | 0.48 | 0.57 |
| MgO | 3.74 | 2.68 | 3.65 | 3.43 | 3.01 | 3.47 | 0.90 | 3.96 | 4.31 | 0.59 | 3.10 | 3.66 | 3.53 |
| ZnO | 0.42 | 0.53 | 0.50 | 0.47 | 0.66 | 0.50 | 0.18 | 0.26 | 0.27 | 0.14 | 0.54 | 0.31 | 0.36 |
| CaO | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Na2O | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.04 | 0.14 | <0.02 | <0.02 | 0.01 | 0.01 | 0.03 | 0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | <0.03 | 0.03 | <0.03 | <0.03 | <0.03 | 0.03 | 0.14 | 0.05 | 0.03 | 0.27 | 0.03 | <0.03 | <0.03 |
| *Cations to 32 oxygens* | | |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| Al | 0.42 | 0.38 | 0.42 | 0.41 | 0.39 | 0.44 | 0.01 | 0.36 | 0.36 | 0.01 | 0.35 | 0.34 | 0.34 |
| Cr | 1.47 | 1.45 | 1.47 | 1.48 | 1.45 | 1.46 | 0.99 | 1.55 | 1.55 | 0.39 | 1.53 | 1.57 | 1.57 |
| Fe3+ | 0.08 | 0.15 | 0.09 | 0.09 | 0.14 | 0.09 | 0.99 | 0.08 | 0.08 | 1.59 | 0.10 | 0.08 | 0.08 |
| Fe2+ | 0.79 | 0.83 | 0.79 | 0.80 | 0.82 | 0.79 | 0.91 | 0.78 | 0.76 | 0.95 | 0.81 | 0.79 | 0.79 |
| Mn2+ | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 |
| Mg | 0.19 | 0.14 | 0.19 | 0.18 | 0.16 | 0.18 | 0.05 | 0.21 | 0.22 | 0.03 | 0.16 | 0.19 | 0.18 |
| Zn | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.20 | 0.14 | 0.19 | 0.18 | 0.16 | 0.18 | 0.05 | 0.21 | 0.23 | 0.03 | 0.17 | 0.19 | 0.19 |
| Fe # | 0.80 | 0.86 | 0.81 | 0.82 | 0.84 | 0.82 | 0.95 | 0.79 | 0.77 | 0.97 | 0.83 | 0.81 | 0.81 |
| Cr # | 0.74 | 0.73 | 0.74 | 0.75 | 0.73 | 0.73 | 0.50 | 0.78 | 0.78 | 0.20 | 0.77 | 0.79 | 0.79 |
| Fe3+# | 0.04 | 0.08 | 0.05 | 0.05 | 0.07 | 0.05 | 0.50 | 0.04 | 0.04 | 0.80 | 0.05 | 0.04 | 0.04 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 22 - 27** | **E13 - 22 - 28** | **E13 - 22 - 29** | **E13 - 22 - 30** | **E13 - 22 - 31** | **E13 - 22 - 32** | **E13 - 22 - 33** | **E13 - 22 - 34** | **E13 - 22 - 35** | **E13 - 22 - 36** | **E13 - 22 - 37** | **E13 - 22 - 38** | **E13 - 22 - 39** |
| *Tulu Dimtu Hill (9° 27’ 60.9”N 35° 44’ 19.8”E)* | | | |  |  |  |  |  |  |  |  |  |  |
| SiO2 | <0.01 | 0.02 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.05 | 0.02 | 0.01 |
| TiO2 | 0.24 | 0.05 | 0.11 | 0.10 | 0.20 | 0.23 | 0.41 | 0.36 | 0.23 | 0.21 | 0.23 | 0.07 | 0.24 |
| Al2O3 | 8.19 | 4.36 | 3.99 | 7.54 | 1.38 | 8.25 | 0.61 | 1.12 | 7.95 | 8.06 | 7.54 | 7.89 | 7.72 |
| Cr2O3 | 56.67 | 53.07 | 51.86 | 55.55 | 50.11 | 56.85 | 43.89 | 35.91 | 57.10 | 57.19 | 56.97 | 50.76 | 57.63 |
| Fe2O3 | 3.10 | 10.79 | 12.38 | 5.03 | 16.75 | 2.98 | 23.57 | 31.09 | 2.90 | 2.70 | 3.29 | 9.28 | 2.71 |
| FeO | 27.55 | 28.60 | 28.74 | 27.70 | 28.91 | 27.14 | 29.05 | 29.34 | 27.51 | 27.43 | 27.70 | 28.24 | 27.34 |
| MnO | 0.60 | 0.77 | 0.76 | 0.70 | 0.76 | 0.59 | 0.83 | 0.64 | 0.72 | 0.66 | 0.65 | 0.74 | 0.68 |
| MgO | 3.34 | 1.90 | 1.79 | 2.89 | 1.42 | 3.53 | 1.29 | 1.23 | 3.14 | 3.24 | 2.85 | 2.46 | 3.34 |
| ZnO | 0.29 | 0.43 | 0.31 | 0.47 | 0.38 | 0.37 | 0.26 | 0.14 | 0.38 | 0.47 | 0.61 | 0.46 | 0.29 |
| CaO | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | 0.05 | <0.01 | <0.01 |
| Na2O | <0.02 | <0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02 | <0.02 | 0.03 | 0.01 | 0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | <0.03 | <0.03 | 0.03 | <0.03 | 0.06 | 0.03 | 0.09 | 0.14 | 0.03 | 0.02 | 0.04 | 0.04 | <0.03 |
| *Cations to 32 oxygens* | | | |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| Al | 0.34 | 0.19 | 0.17 | 0.31 | 0.06 | 0.34 | 0.03 | 0.05 | 0.33 | 0.33 | 0.31 | 0.33 | 0.32 |
| Cr | 1.57 | 1.52 | 1.49 | 1.55 | 1.46 | 1.57 | 1.29 | 1.06 | 1.58 | 1.58 | 1.59 | 1.42 | 1.60 |
| Fe3+ | 0.08 | 0.29 | 0.34 | 0.13 | 0.47 | 0.08 | 0.66 | 0.87 | 0.08 | 0.07 | 0.09 | 0.25 | 0.07 |
| Fe2+ | 0.81 | 0.86 | 0.87 | 0.82 | 0.89 | 0.79 | 0.90 | 0.91 | 0.81 | 0.80 | 0.82 | 0.84 | 0.80 |
| Mn2+ | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| Mg | 0.17 | 0.10 | 0.10 | 0.15 | 0.08 | 0.18 | 0.07 | 0.07 | 0.16 | 0.17 | 0.15 | 0.13 | 0.17 |
| Zn | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.18 | 0.11 | 0.10 | 0.16 | 0.08 | 0.19 | 0.07 | 0.07 | 0.17 | 0.17 | 0.15 | 0.13 | 0.18 |
| Fe # | 0.82 | 0.89 | 0.90 | 0.84 | 0.92 | 0.81 | 0.93 | 0.93 | 0.83 | 0.83 | 0.85 | 0.87 | 0.82 |
| Cr # | 0.79 | 0.76 | 0.75 | 0.78 | 0.74 | 0.79 | 0.65 | 0.53 | 0.80 | 0.80 | 0.80 | 0.71 | 0.80 |
| Fe3+# | 0.04 | 0.15 | 0.17 | 0.07 | 0.23 | 0.04 | 0.33 | 0.44 | 0.04 | 0.04 | 0.04 | 0.12 | 0.04 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 22 - 40** | **E13 - 22 - 41** | **E13 - 22 - 42** | **E13 - 22 - 43** | **E13 - 22 - 44** | **E13 - 22 - 45** | **E13 - 22 - 46** | **E13 - 22 - 47** | **E13 - 22 - 48** | **E13 - 22 - 49** | **E13 - 22 - 50** | **E13 - 22 - 51** |
| *Tulu Dimtu Hill (9° 27’ 60.9”N 35° 44’ 19.8”E)* | | | |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.04 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.02 | 0.03 | <0.01 | <0.01 |
| TiO2 | 0.22 | 0.22 | 0.09 | 0.21 | 0.17 | 0.24 | 0.09 | 0.24 | 0.30 | 0.29 | 0.23 | 0.24 |
| Al2O3 | 7.67 | 7.78 | 3.88 | 7.77 | 5.78 | 7.78 | 3.24 | 7.81 | 0.18 | 0.63 | 7.74 | 7.81 |
| Cr2O3 | 56.90 | 57.18 | 54.37 | 57.47 | 55.94 | 57.06 | 53.81 | 57.20 | 22.91 | 29.56 | 56.84 | 57.35 |
| Fe2O3 | 3.29 | 3.04 | 10.00 | 2.86 | 6.41 | 3.13 | 11.18 | 2.99 | 45.30 | 38.14 | 3.36 | 2.84 |
| FeO | 27.67 | 27.39 | 28.61 | 27.32 | 27.87 | 27.38 | 28.59 | 27.34 | 29.80 | 29.63 | 27.59 | 27.52 |
| MnO | 0.67 | 0.72 | 0.75 | 0.66 | 0.69 | 0.71 | 0.80 | 0.69 | 0.41 | 0.50 | 0.70 | 0.60 |
| MgO | 3.06 | 3.17 | 1.89 | 3.33 | 2.62 | 3.24 | 1.69 | 3.28 | 0.72 | 0.93 | 2.98 | 3.15 |
| ZnO | 0.46 | 0.45 | 0.38 | 0.31 | 0.46 | 0.46 | 0.55 | 0.37 | 0.09 | 0.14 | 0.51 | 0.38 |
| CaO | <0.01 | 0.02 | <0.01 | 0.02 | <0.01 | <0.01 | 0.02 | 0.02 | 0.03 | <0.01 | 0.02 | 0.02 |
| Na2O | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 | 0.02 | 0.03 | 0.03 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | <0.03 | 0.03 | <0.03 | 0.04 | 0.05 | <0.03 | 0.03 | <0.03 | 0.22 | 0.13 | <0.03 | 0.05 |
| *Cations to 32 oxygens* |  |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Al | 0.32 | 0.32 | 0.17 | 0.32 | 0.24 | 0.32 | 0.14 | 0.32 | 0.01 | 0.03 | 0.32 | 0.32 |
| Cr | 1.58 | 1.59 | 1.56 | 1.59 | 1.58 | 1.58 | 1.55 | 1.59 | 0.69 | 0.88 | 1.58 | 1.59 |
| Fe3+ | 0.09 | 0.08 | 0.27 | 0.08 | 0.17 | 0.08 | 0.31 | 0.08 | 1.29 | 1.08 | 0.09 | 0.08 |
| Fe2+ | 0.81 | 0.80 | 0.87 | 0.80 | 0.83 | 0.80 | 0.87 | 0.80 | 0.94 | 0.93 | 0.81 | 0.81 |
| Mn2+ | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 |
| Mg | 0.16 | 0.17 | 0.10 | 0.17 | 0.14 | 0.17 | 0.09 | 0.17 | 0.04 | 0.05 | 0.16 | 0.16 |
| Zn | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.16 | 0.17 | 0.11 | 0.18 | 0.14 | 0.17 | 0.10 | 0.18 | 0.04 | 0.05 | 0.16 | 0.17 |
| Fe # | 0.84 | 0.83 | 0.89 | 0.82 | 0.86 | 0.83 | 0.90 | 0.82 | 0.96 | 0.95 | 0.84 | 0.83 |
| Cr # | 0.80 | 0.80 | 0.78 | 0.80 | 0.79 | 0.80 | 0.78 | 0.80 | 0.35 | 0.44 | 0.79 | 0.80 |
| Fe3+# | 0.04 | 0.04 | 0.14 | 0.04 | 0.09 | 0.04 | 0.15 | 0.04 | 0.65 | 0.54 | 0.04 | 0.04 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 11 - 01** | **E13 - 11 - 02** | **E13 - 11 - 03** | **E13 - 11 - 04** | **E13 - 11 - 05** | **E13 - 11 - 06** | **E13 - 11 - 07** | **E13 - 11 - 08** | **E13 - 11 - 09** | **E13 - 11 - 10** | **E13 - 11 - 11** | **E13 - 11 - 12** | **E13 - 11 - 13** |
| *Daleti Quarry – E13.11 (09° 09’ 56.4” N, 35° 37’ 30.0” E)* | | |  |  |  |  |  |  |  |  |  |  |  |
| SiO2 | <0.01 | <0.01 | <0.01 | 0.02 | 0.02 | 0.04 | <0.01 | <0.01 | 0.02 | 0.02 | <0.01 | 0.02 | 0.02 |
| TiO2 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Al2O3 | 0.60 | 0.76 | 0.67 | 1.88 | 0.93 | 0.81 | 2.47 | 1.66 | 2.06 | 1.20 | 2.11 | 1.63 | 1.94 |
| Cr2O3 | 30.82 | 31.58 | 31.46 | 35.80 | 32.55 | 31.50 | 44.68 | 37.65 | 39.38 | 36.54 | 36.91 | 36.28 | 37.37 |
| Fe2O3 | 37.19 | 36.36 | 36.53 | 30.65 | 35.07 | 36.22 | 21.12 | 29.15 | 27.06 | 30.84 | 29.39 | 30.61 | 29.09 |
| FeO | 28.01 | 27.72 | 27.87 | 27.23 | 27.57 | 27.58 | 27.10 | 27.57 | 27.21 | 27.52 | 27.08 | 27.20 | 27.08 |
| MnO | 2.26 | 2.30 | 2.29 | 3.08 | 2.70 | 2.65 | 3.24 | 2.76 | 2.94 | 2.56 | 3.20 | 3.07 | 3.26 |
| MgO | 0.47 | 0.54 | 0.52 | 0.61 | 0.54 | 0.53 | 0.67 | 0.60 | 0.58 | 0.63 | 0.61 | 0.58 | 0.58 |
| ZnO | 0.16 | 0.21 | 0.18 | 0.30 | 0.16 | 0.17 | 0.46 | 0.18 | 0.31 | 0.24 | 0.30 | 0.16 | 0.25 |
| CaO | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Na2O | <0.02 | 0.03 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | 0.03 | 0.07 | 0.03 | 0.02 | 0.04 | 0.03 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.47 | 0.48 | 0.47 | 0.41 | 0.43 | 0.49 | 0.24 | 0.37 | 0.36 | 0.41 | 0.36 | 0.41 | 0.37 |
| *Cations to 32 oxygens* |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.03 | 0.03 | 0.03 | 0.08 | 0.04 | 0.04 | 0.11 | 0.07 | 0.09 | 0.05 | 0.09 | 0.07 | 0.09 |
| Cr | 0.92 | 0.94 | 0.94 | 1.06 | 0.97 | 0.94 | 1.31 | 1.11 | 1.16 | 1.08 | 1.09 | 1.07 | 1.10 |
| Fe3+ | 1.05 | 1.03 | 1.03 | 0.86 | 0.99 | 1.02 | 0.59 | 0.82 | 0.76 | 0.87 | 0.82 | 0.86 | 0.82 |
| Fe2+ | 0.88 | 0.87 | 0.88 | 0.85 | 0.87 | 0.87 | 0.84 | 0.86 | 0.85 | 0.86 | 0.84 | 0.85 | 0.84 |
| Mn2+ | 0.07 | 0.07 | 0.07 | 0.10 | 0.09 | 0.08 | 0.10 | 0.09 | 0.09 | 0.08 | 0.10 | 0.10 | 0.10 |
| Mg | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Zn | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Mg # | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| Fe # | 0.97 | 0.97 | 0.97 | 0.96 | 0.97 | 0.97 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Cr # | 0.46 | 0.47 | 0.47 | 0.53 | 0.48 | 0.47 | 0.65 | 0.55 | 0.58 | 0.54 | 0.54 | 0.53 | 0.55 |
| Fe3+# | 0.53 | 0.51 | 0.52 | 0.43 | 0.50 | 0.51 | 0.29 | 0.41 | 0.38 | 0.43 | 0.41 | 0.43 | 0.41 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 11 - 14** | **E13 - 11 - 15** | | | **E13 - 11 - 16** | | **E13 - 11 - 17** | | **E13 - 11 - 18** | | **E13 - 11 - 19** | | **E13 - 11 - 20** | | **E13 - 11 - 21** | | **E13 - 11 - 22** | | **E13 - 11 - 23** | | **E13 - 11 - 24** | | **E13 - 11 - 25** | | **E13 - 11 - 26** | |
| *Daleti Quarry – E13.11 (09° 09’ 56.4” N, 35° 37’ 30.0” E)* | | | | | | | | | |  | |  | |  | |  | |  | |  | |  | |  | |
| SiO2 | <0.01 | | <0.01 | <0.01 | | 0.03 | | <0.01 | | <0.01 | | <0.01 | | <0.01 | | 0.02 | | <0.01 | | <0.01 | | <0.01 | | 0.015 | |
| TiO2 | 0.01 | | 0.01 | <0.01 | | 0.01 | | <0.01 | | 0.01 | | 0.02 | | <0.01 | | <0.01 | | 0.01 | | 0.01 | | 0.02 | | 0.010 | |
| Al2O3 | 1.26 | | 1.68 | 1.70 | | 1.38 | | 1.48 | | 1.18 | | 1.55 | | 2.78 | | 2.72 | | 2.36 | | 2.33 | | 1.40 | | 0.603 | |
| Cr2O3 | 35.65 | | 37.81 | 36.85 | | 36.24 | | 36.62 | | 35.72 | | 37.03 | | 45.08 | | 47.61 | | 39.18 | | 39.35 | | 36.62 | | 32.549 | |
| Fe2O3 | 31.63 | | 28.92 | 29.88 | | 30.97 | | 30.36 | | 31.68 | | 29.82 | | 20.30 | | 17.82 | | 26.72 | | 26.63 | | 30.51 | | 35.502 | |
| FeO | 27.29 | | 27.17 | 27.30 | | 27.14 | | 27.37 | | 27.24 | | 27.43 | | 26.97 | | 26.95 | | 27.13 | | 27.12 | | 27.36 | | 27.668 | |
| MnO | 3.02 | | 3.24 | 3.00 | | 2.86 | | 2.90 | | 2.86 | | 2.90 | | 3.62 | | 3.70 | | 3.31 | | 3.30 | | 2.86 | | 2.416 | |
| MgO | 0.53 | | 0.59 | 0.55 | | 0.65 | | 0.59 | | 0.56 | | 0.60 | | 0.67 | | 0.66 | | 0.62 | | 0.60 | | 0.58 | | 0.568 | |
| ZnO | 0.19 | | 0.23 | 0.31 | | 0.27 | | 0.24 | | 0.27 | | 0.26 | | 0.38 | | 0.32 | | 0.31 | | 0.33 | | 0.23 | | 0.217 | |
| CaO | <0.01 | | <0.01 | <0.01 | | <0.01 | | <0.01 | | <0.01 | | <0.01 | | <0.01 | | <0.01 | | <0.01 | | <0.01 | | 0.02 | | <0.01 | |
| Na2O | 0.02 | | <0.02 | 0.02 | | 0.05 | | <0.02 | | 0.03 | | <0.02 | | <0.02 | | 0.03 | | <0.02 | | 0.02 | | 0.03 | | <0.02 | |
| K2O | 0.00 | | 0.00 | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.000 | |
| NiO | 0.38 | | 0.35 | 0.37 | | 0.39 | | 0.40 | | 0.43 | | 0.38 | | 0.19 | | 0.17 | | 0.34 | | 0.30 | | 0.37 | | 0.434 | |
| *Cations to 32 oxygens* | | | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| Si | 0.00 | | 0.00 | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.001 | |
| Ti | 0.00 | | 0.00 | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.000 | |
| Al | 0.06 | | 0.07 | 0.07 | | 0.06 | | 0.07 | | 0.05 | | 0.07 | | 0.12 | | 0.12 | | 0.10 | | 0.10 | | 0.06 | | 0.027 | |
| Cr | 1.05 | | 1.11 | 1.09 | | 1.07 | | 1.08 | | 1.06 | | 1.09 | | 1.32 | | 1.39 | | 1.15 | | 1.15 | | 1.08 | | 0.968 | |
| Fe3+ | 0.89 | | 0.81 | 0.84 | | 0.87 | | 0.85 | | 0.89 | | 0.84 | | 0.56 | | 0.49 | | 0.75 | | 0.74 | | 0.86 | | 1.005 | |
| Fe2+ | 0.85 | | 0.85 | 0.85 | | 0.85 | | 0.85 | | 0.85 | | 0.86 | | 0.83 | | 0.83 | | 0.84 | | 0.84 | | 0.85 | | 0.870 | |
| Mn2+ | 0.10 | | 0.10 | 0.09 | | 0.09 | | 0.09 | | 0.09 | | 0.09 | | 0.11 | | 0.12 | | 0.10 | | 0.10 | | 0.09 | | 0.077 | |
| Mg | 0.03 | | 0.03 | 0.03 | | 0.04 | | 0.03 | | 0.03 | | 0.03 | | 0.04 | | 0.04 | | 0.03 | | 0.03 | | 0.03 | | 0.032 | |
| Zn | 0.01 | | 0.01 | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.006 | |
| Ca | 0.00 | | 0.00 | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.000 | |
| Na | 0.00 | | 0.00 | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.001 | |
| K | 0.00 | | 0.00 | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.00 | | 0.000 | |
| Ni | 0.01 | | 0.01 | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.01 | | 0.013 | |
| Mg # | 0.03 | | 0.04 | 0.03 | | 0.04 | | 0.04 | | 0.04 | | 0.04 | | 0.04 | | 0.04 | | 0.04 | | 0.04 | | 0.04 | | 0.035 | |
| Fe # | 0.97 | | 0.96 | 0.97 | | 0.96 | | 0.96 | | 0.96 | | 0.96 | | 0.96 | | 0.96 | | 0.96 | | 0.96 | | 0.96 | | 0.965 | |
| Cr # | 0.53 | | 0.56 | 0.54 | | 0.53 | | 0.54 | | 0.53 | | 0.55 | | 0.66 | | 0.69 | | 0.58 | | 0.58 | | 0.54 | | 0.484 | |
| Fe3+# | 0.45 | | 0.41 | 0.42 | | 0.43 | | 0.43 | | 0.45 | | 0.42 | | 0.28 | | 0.25 | | 0.37 | | 0.37 | | 0.43 | | 0.503 | |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 11 - 40** | **E13 - 11 - 41** | **E13 - 11 - 42** | **E13 - 11 - 43** | **E13 - 11 - 44** | **E13 - 11 - 45** | **E13 - 11 - 46** | **E13 - 11 - 47** |
| *Daleti Quarry – E13.11 (09° 09’ 56.4” N, 35° 37’ 30.0” E)* | | | |  |  |  |  |  |
| SiO2 | 0.02 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | 0.02 | 0.04 |
| TiO2 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.02 | 0.01 | <0.01 |
| Al2O3 | 1.03 | 0.63 | 2.39 | 2.44 | 1.88 | 0.88 | 2.53 | 0.02 |
| Cr2O3 | 33.14 | 32.25 | 37.63 | 38.28 | 38.98 | 33.12 | 36.70 | 22.53 |
| Fe2O3 | 34.38 | 35.72 | 28.25 | 27.68 | 27.58 | 34.62 | 28.98 | 47.77 |
| FeO | 27.62 | 27.87 | 25.54 | 27.05 | 27.21 | 27.46 | 27.27 | 21.84 |
| MnO | 2.63 | 2.38 | 5.01 | 3.25 | 3.09 | 2.72 | 3.29 | 2.34 |
| MgO | 0.52 | 0.52 | 0.59 | 0.63 | 0.62 | 0.54 | 0.60 | 3.49 |
| ZnO | 0.25 | 0.19 | 0.22 | 0.26 | 0.25 | 0.16 | 0.24 | 0.60 |
| CaO | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 |
| Na2O | 0.02 | <0.02 | <0.02 | 0.04 | 0.03 | 0.02 | <0.02 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.39 | 0.41 | 0.33 | 0.33 | 0.35 | 0.47 | 0.37 | 1.33 |
| *Cations to 32 oxygens* |  |  |  |  |  |  |  |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.05 | 0.03 | 0.10 | 0.11 | 0.08 | 0.04 | 0.11 | 0.00 |
| Cr | 0.98 | 0.96 | 1.10 | 1.12 | 1.15 | 0.98 | 1.08 | 0.66 |
| Fe3+ | 0.97 | 1.01 | 0.79 | 0.77 | 0.77 | 0.98 | 0.81 | 1.33 |
| Fe2+ | 0.87 | 0.88 | 0.79 | 0.84 | 0.85 | 0.86 | 0.85 | 0.68 |
| Mn2+ | 0.08 | 0.08 | 0.16 | 0.10 | 0.10 | 0.09 | 0.10 | 0.07 |
| Mg | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | 0.19 |
| Zn | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.02 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.04 |
| Mg # | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.03 | 0.04 | 0.22 |
| Fe # | 0.97 | 0.97 | 0.96 | 0.96 | 0.96 | 0.97 | 0.96 | 0.78 |
| Cr # | 0.49 | 0.48 | 0.55 | 0.56 | 0.57 | 0.49 | 0.54 | 0.33 |
| Fe3+# | 0.49 | 0.51 | 0.39 | 0.39 | 0.39 | 0.49 | 0.41 | 0.67 |

*Supplementary table 1: Chrome spinel microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | **E13 - 20 -01** | **E13 - 20 -02** | **E13 - 20 -03** | **E13 - 20 -04** | **E13 - 20 -05** | **E13 - 20 -06** | **E13 - 20 -07** | **E13 - 20 -08** | **E13 - 20 -09** | | **E13 - 20 -10** | **E13 - 20 -11** | **E13 - 20 -12** | **E13 - 20 -13** |
| *Tulu Dimtu Hill (9° 27’ 60.9”N 35° 44’ 19.8”E)* |  |  |  |  |  |  |  |  |  |
| SiO2 | 0.05 | 0.06 | 0.05 | <0.01 | 0.02 | 0.05 | <0.01 | 0.08 | 0.23 | | 0.04 | 0.02 | 0.14 | 0.02 |
| TiO2 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | <0.01 | 0.01 | 0.01 | <0.01 | | <0.01 | <0.01 | <0.01 | <0.01 |
| Al2O3 | <0.007 | <0.007 | <0.007 | 11.05 | 11.53 | 12.22 | 12.35 | 11.97 | <0.007 | | 12.40 | 11.81 | 30.56 | 10.54 |
| Cr2O3 | 0.34 | 2.84 | 3.04 | 58.88 | 59.60 | 58.05 | 57.26 | 58.38 | 1.54 | | 57.57 | 56.54 | <0.03 | 60.25 |
| Fe2O3 | 68.76 | 66.19 | 66.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 67.14 | | 0.00 | 0.00 | 33.57 | 0.00 |
| FeO | 27.71 | 27.80 | 27.79 | 20.30 | 19.16 | 20.42 | 21.04 | 20.45 | 27.75 | | 20.36 | 22.13 | 15.58 | 20.72 |
| MnO | 0.84 | 1.35 | 1.37 | 7.45 | 9.05 | 8.53 | 8.83 | 8.40 | 1.11 | | 8.83 | 8.59 | 18.96 | 7.90 |
| MgO | 0.30 | 0.45 | 0.49 | 1.56 | 0.33 | 0.42 | 0.40 | 0.40 | 0.46 | | 0.45 | 0.62 | 0.98 | 0.36 |
| ZnO | <0.07 | 0.03 | 0.02 | 0.69 | 0.20 | 0.22 | 0.22 | 0.20 | <0.07 | | 0.27 | 0.24 | <0.07 | 0.20 |
| CaO | <0.01 | 0.04 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 | | <0.01 | <0.01 | <0.01 | <0.01 |
| Na2O | 0.04 | <0.02 | <0.02 | 0.02 | 0.02 | 0.03 | <0.02 | <0.02 | 0.02 | | 0.04 | <0.02 | 0.05 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 1.88 | 1.22 | 1.20 | <0.03 | 0.06 | 0.05 | 0.03 | 0.07 | 1.73 | | 0.03 | 0.04 | 0.17 | <0.03 |
| *Cations to 32 oxygens* |  |  |  |  |  |  |  |  |  | |  |
| Si | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.00 | 0.00 | 0.00 | 0.46 | 0.48 | 0.51 | 0.51 | 0.50 | 0.00 | | 0.51 | 0.49 | 1.17 | 0.44 |
| Cr | 0.01 | 0.09 | 0.09 | 1.63 | 1.66 | 1.61 | 1.59 | 1.62 | 0.05 | | 1.59 | 1.57 | 0.00 | 1.69 |
| Fe3+ | 1.99 | 1.91 | 1.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.94 | | 0.00 | 0.00 | 0.82 | 0.00 |
| Fe2+ | 0.89 | 0.89 | 0.89 | 0.59 | 0.56 | 0.60 | 0.62 | 0.60 | 0.89 | | 0.60 | 0.65 | 0.42 | 0.61 |
| Mn2+ | 0.03 | 0.04 | 0.04 | 0.22 | 0.27 | 0.25 | 0.26 | 0.25 | 0.04 | | 0.26 | 0.25 | 0.52 | 0.24 |
| Mg | 0.02 | 0.03 | 0.03 | 0.08 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | | 0.02 | 0.03 | 0.05 | 0.02 |
| Zn | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | | 0.01 | 0.01 | 0.00 | 0.01 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.06 | 0.04 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg # | 0.02 | 0.03 | 0.03 | 0.12 | 0.03 | 0.04 | 0.03 | 0.03 | 0.03 | | 0.04 | 0.05 | 0.10 | 0.03 |
| Fe # | 0.98 | 0.97 | 0.97 | 0.88 | 0.97 | 0.96 | 0.97 | 0.97 | 0.97 | | 0.96 | 0.95 | 0.90 | 0.97 |
| Cr # | 0.01 | 0.04 | 0.05 | 0.78 | 0.78 | 0.76 | 0.76 | 0.77 | 0.02 | | 0.76 | 0.76 | 0.00 | 0.79 |
| Fe3+# | 0.99 | 0.96 | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 | | 0.00 | 0.00 | 0.41 | 0.00 |

*Supplementary Table 2: Olivine microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | E14 - 10 - 01 | E14 - 10 - 02 | E14 - 10 - 03 | E14 - 10 - 04 | E14 - 10 - 05 | E14 - 10 - 06 | E14 - 10 - 07 | E14 - 10 - 08 | E14 - 10 - 09 | E14 - 10 - 10 |
|  |  |  |  |  |  |  |  |  |  |  |
| SiO2 | 39.77 | 40.13 | 39.83 | 40.57 | 40.35 | 40.77 | 40.28 | 40.40 | 40.82 | 40.06 |
| TiO2 | 0.05 | 0.01 | <0.01 | <0.01 | 0.02 | <0.01 | 0.02 | 0.01 | 0.01 | 0.01 |
| Al2O3 | 0.03 | 0.01 | 0.20 | <0.01 | 0.01 | 0.11 | <0.01 | 0.01 | 0.02 | 0.15 |
| Cr2O3 | 0.04 | 0.03 | 0.03 | <0.03 | <0.03 | 0.03 | 0.01 | <0.03 | 0.03 | <0.03 |
| FeO | 9.60 | 9.70 | 9.58 | 9.63 | 9.85 | 9.91 | 9.71 | 9.57 | 9.55 | 9.44 |
| MnO | 0.19 | 0.21 | 0.14 | 0.20 | 0.22 | 0.22 | 0.21 | 0.19 | 0.18 | 0.19 |
| MgO | 49.00 | 49.99 | 49.68 | 50.43 | 50.11 | 49.62 | 50.12 | 50.66 | 50.55 | 49.77 |
| ZnO | 0.02 | <0.02 | 0.08 | 0.02 | <0.02 | 0.10 | 0.03 | 0.05 | <0.02 | 0.05 |
| CaO | 0.17 | 0.16 | 0.18 | 0.14 | 0.09 | 0.08 | 0.09 | 0.10 | 0.07 | 0.16 |
| Na2O | 0.46 | <0.02 | 0.18 | <0.02 | <0.02 | 0.04 | <0.02 | 0.05 | 0.04 | 0.10 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.12 | 0.13 | 0.12 | 0.13 | 0.09 | 0.09 | 0.08 | 0.10 | 0.13 | 0.10 |
| Cl | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | 99.35 | 100.37 | 99.85 | 101.08 | 100.70 | 100.87 | 100.51 | 101.14 | 101.40 | 99.93 |
| **No. Oxygens** | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Si | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.99 | 0.98 | 0.98 | 0.99 | 0.98 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cr | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fe2+ | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.19 | 0.19 | 0.19 |
| Mn2+ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg | 1.81 | 1.82 | 1.82 | 1.82 | 1.82 | 1.80 | 1.83 | 1.83 | 1.82 | 1.82 |
| Zn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cl | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Total Cations (S)** | 3.03 | 3.02 | 3.02 | 3.01 | 3.02 | 3.01 | 3.02 | 3.02 | 3.01 | 3.02 |
| Xmg (mg/(fe+mg)) | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Xmg(divalent) | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.89 | 0.90 | 0.90 | 0.90 | 0.90 |
| XFe2+ | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |

*Supplementary Table 2: Olivine microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | E14 - 10 - 11 | E14 - 10 - 12 | E14 - 10 - 13 | E14 - 10 - 14 | E13-11-01 | E13-11-02 | E13-11-03 | E13-11-04 | E13-11-05 | E13-11-06 |
|  | ***Yubdo ultra mafic*** | |  |  | ***Daleti Dunite*** | | | |  |  |
| SiO2 | 40.65 | 40.47 | 39.85 | 39.85 | 42.08 | 41.68 | 42.05 | 42.12 | 41.64 | 41.03 |
| TiO2 | 0.01 | 0.01 | 0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Al2O3 | 1.56 | <0.01 | 0.01 | 0.02 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | <0.01 |
| Cr2O3 | 0.03 | <0.03 | <0.03 | 0.02 | <0.03 | <0.03 | <0.03 | 0.03 | <0.03 | <0.03 |
| FeO | 9.52 | 9.62 | 9.83 | 9.56 | 5.99 | 5.60 | 5.54 | 5.58 | 5.50 | 5.77 |
| MnO | 0.18 | 0.23 | 0.15 | 0.17 | 0.11 | 0.10 | 0.16 | 0.11 | 0.11 | 0.13 |
| MgO | 50.32 | 50.28 | 50.07 | 50.03 | 49.26 | 52.87 | 52.80 | 52.24 | 52.90 | 53.43 |
| ZnO | <0.02 | 0.06 | 0.03 | 0.04 | 0.03 | 0.06 | <0.02 | 0.04 | 0.03 | <0.02 |
| CaO | 0.17 | 0.12 | 0.16 | 0.17 | 0.01 | 0.03 | 0.01 | 0.02 | <0.01 | 0.01 |
| Na2O | 0.07 | <0.02 | 0.02 | 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.12 | 0.18 | 0.12 | 0.09 | 0.41 | 0.37 | 0.37 | 0.37 | 0.40 | 0.41 |
| Cl | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | 102.64 | 100.96 | 100.24 | 99.90 | 97.90 | 100.74 | 100.95 | 100.51 | 100.62 | 100.82 |
| **No. Oxygens** | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Si | 0.97 | 0.98 | 0.98 | 0.98 | 1.03 | 1.00 | 1.00 | 1.01 | 1.00 | 0.98 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cr | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fe2+ | 0.19 | 0.20 | 0.20 | 0.20 | 0.12 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 |
| Mn2+ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg | 1.79 | 1.82 | 1.83 | 1.83 | 1.80 | 1.88 | 1.87 | 1.86 | 1.89 | 1.91 |
| Zn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Cl | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Total Cations (S)** | 3.01 | 3.02 | 3.02 | 3.02 | 2.97 | 3.00 | 3.00 | 2.99 | 3.00 | 3.02 |
| Xmg (mg/(fe+mg)) | 0.90 | 0.90 | 0.90 | 0.90 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Xmg(divalent) | 0.90 | 0.90 | 0.90 | 0.90 | 0.93 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| XFe2+ | 0.10 | 0.10 | 0.10 | 0.10 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |

*Supplementary Table 2: Olivine microprobe analyses from ultramafic rocks of the Western Ethiopian Shield*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID number** | E13-11-07 | E13-11-08 | E13-11-09 | E13-11-10 | E13-11-11 | E13-11-12 | E13-11-13 | E13-11-14 | E13-11-15 | E13-11-16 |
|  | ***Daleti Dunite*** |  |  |  |  |  |  |  |  |  |
| SiO2 | 40.42 | 39.86 | 36.28 | 41.18 | 41.25 | 42.37 | 42.27 | 44.26 | 42.25 | 41.87 |
| TiO2 | <0.01 | 0.01 | <0.01 | 0.01 | 0.01 | 0.01 | 0.01 | <0.01 | <0.01 | <0.01 |
| Al2O3 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 | 0.02 | <0.01 | <0.01 |
| Cr2O3 | <0.03 | <0.03 | 0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 | <0.03 |
| FeO | 5.76 | 5.78 | 5.59 | 5.84 | 6.00 | 6.12 | 6.10 | 5.96 | 6.04 | 6.16 |
| MnO | 0.10 | 0.10 | 0.09 | 0.12 | 0.13 | 0.10 | 0.11 | 0.11 | 0.15 | 0.14 |
| MgO | 53.89 | 53.86 | 54.29 | 53.29 | 53.42 | 50.33 | 50.22 | 49.29 | 50.77 | 48.65 |
| ZnO | 0.02 | <0.02 | 0.01 | <0.02 | 0.03 | <0.02 | 0.02 | <0.02 | 0.01 | 0.03 |
| CaO | 0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.01 | <0.01 |
| Na2O | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| K2O | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NiO | 0.39 | 0.34 | 0.34 | 0.34 | 0.32 | 0.40 | 0.42 | 0.37 | 0.45 | 0.38 |
| Cl | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Total** | 100.60 | 99.95 | 96.66 | 100.79 | 101.15 | 99.34 | 99.14 | 100.02 | 99.68 | 97.24 |
| **No. Oxygens** | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Si | 0.97 | 0.96 | 0.92 | 0.99 | 0.98 | 1.03 | 1.02 | 1.06 | 1.02 | 1.03 |
| Ti | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Al | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cr | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Fe2+ | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.13 |
| Mn2+ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mg | 1.93 | 1.94 | 2.04 | 1.90 | 1.90 | 1.82 | 1.82 | 1.76 | 1.83 | 1.79 |
| Zn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ca | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Na | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| K | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ni | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Cl | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| F | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Total Cations (S)** | 3.03 | 3.03 | 3.08 | 3.01 | 3.02 | 2.97 | 2.98 | 2.94 | 2.98 | 2.97 |
| Xmg (mg/(fe+mg)) | 0.94 | 0.94 | 0.95 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.93 |
| Xmg(divalent) | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| XFe2+ | 0.06 | 0.06 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.07 |

*Supplementary Table 3: Olivine spinel geothermometer*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Xsp Ti** | **XOlvMg** | **XolFe** | **XspFe2+** | **Xsp Mg** | **P** | **XspCr** | **KD (ol-Sp Mg - Fe)** | **Temp (K)** | **Fe3+** | **KD (ol-Sp Mg - Fe)** | **Temp in °C** |
| ***Yubdo E14.10 (8° 57‘37.4” N, 35° 27’ 18.2”E)*** | | | |  |  |  |  |  |  |  |  |
| 0.011587 | 1.808 | 0.199 | 0.714 | 0.270 | 1 | 1.132 | 24.077 | 1236.4 | 0.425 | 24.077 | 963.4 |
| 0.009734 | 1.808 | 0.199 | 0.615 | 0.375 | 1 | 1.140 | 14.940 | 1427.2 | 0.449 | 14.940 | 1154.2 |
| 0.012544 | 1.808 | 0.199 | 0.660 | 0.333 | 1 | 1.195 | 18.060 | 1325.4 | 0.377 | 18.060 | 1052.4 |
| 0.010297 | 1.808 | 0.199 | 0.601 | 0.385 | 1 | 1.131 | 14.193 | 1430.4 | 0.435 | 14.193 | 1157.4 |
| 0.011905 | 1.808 | 0.199 | 0.734 | 0.243 | 1 | 1.165 | 27.485 | 1220.0 | 0.433 | 27.485 | 947.0 |
| 0.010323 | 1.808 | 0.199 | 0.738 | 0.206 | 1 | 1.001 | 32.644 | 1175.2 | 0.546 | 32.644 | 902.2 |
| 0.011852 | 1.808 | 0.199 | 0.657 | 0.315 | 1 | 1.172 | 18.967 | 1316.9 | 0.403 | 18.967 | 1043.9 |
| 0.012131 | 1.808 | 0.199 | 0.553 | 0.361 | 1 | 1.150 | 13.931 | 1465.1 | 0.451 | 13.931 | 1192.1 |
| 0.012182 | 1.808 | 0.199 | 0.739 | 0.234 | 1 | 1.066 | 28.763 | 1190.4 | 0.475 | 28.763 | 917.4 |
| 0.012426 | 1.808 | 0.199 | 0.737 | 0.253 | 1 | 1.018 | 26.507 | 1228.9 | 0.524 | 26.507 | 955.9 |
| 0.011219 | 1.808 | 0.199 | 0.610 | 0.377 | 1 | 1.091 | 14.703 | 1422.6 | 0.467 | 14.703 | 1149.6 |
| 0.011013 | 1.808 | 0.199 | 0.710 | 0.263 | 1 | 1.079 | 24.603 | 1259.9 | 0.498 | 24.603 | 986.9 |
| 0.009163 | 1.808 | 0.199 | 0.708 | 0.277 | 1 | 1.075 | 23.252 | 1302.0 | 0.531 | 23.252 | 1029.0 |
| 0.013199 | 1.808 | 0.199 | 0.707 | 0.270 | 1 | 1.143 | 23.806 | 1277.8 | 0.463 | 23.806 | 1004.8 |
| 0.010667 | 1.808 | 0.199 | 0.623 | 0.363 | 1 | 1.097 | 15.617 | 1404.9 | 0.471 | 15.617 | 1131.9 |
| 0.010355 | 1.808 | 0.199 | 0.737 | 0.242 | 1 | 1.042 | 27.715 | 1261.9 | 0.570 | 27.715 | 988.9 |
| 0.012795 | 1.808 | 0.199 | 0.717 | 0.270 | 1 | 1.009 | 24.181 | 1261.2 | 0.535 | 24.181 | 988.2 |
| 0.010448 | 1.808 | 0.199 | 0.606 | 0.375 | 1 | 1.039 | 14.691 | 1333.5 | 0.405 | 14.691 | 1060.5 |
| 0.011457 | 1.808 | 0.199 | 0.640 | 0.348 | 1 | 1.170 | 16.737 | 1348.6 | 0.389 | 16.737 | 1075.6 |
| 0.011749 | 1.808 | 0.199 | 0.601 | 0.390 | 1 | 1.150 | 14.020 | 1409.7 | 0.394 | 14.020 | 1136.7 |
| 0.01063 | 1.808 | 0.199 | 0.619 | 0.374 | 1 | 1.125 | 15.059 | 1408.6 | 0.441 | 15.059 | 1135.6 |
| 0.011149 | 1.808 | 0.199 | 0.634 | 0.357 | 1 | 1.077 | 16.170 | 1377.2 | 0.467 | 16.170 | 1104.2 |
| 0.010 | 1.808 | 0.199 | 0.658 | 0.337 | 1 | 1.083 | 17.746 | 1370.0 | 0.494 | 17.746 | 1097.0 |
| 0.009 | 1.808 | 0.199 | 0.724 | 0.260 | 1 | 1.119 | 25.303 | 1263.0 | 0.488 | 25.303 | 990.0 |
| 0.010 | 1.808 | 0.199 | 0.769 | 0.203 | 1 | 1.064 | 34.465 | 1156.5 | 0.499 | 34.465 | 883.5 |
| ***Average Values E14 - 10*** | | |  |  |  |  |  |  |  |  |  |
| 0.009734 | 1.808 | 0.198708 | 0.614919 | 0.375 | 1 | 1.140 | 14.940 | 1427.2 | 0.449 | 14.940 | 1154.2 |
| *Ballhaus et al. (1991) and Ballhaus et al. (1994)* | | | | |  |  |  |  |  |  |  |

*Supplementary Table 3: Olivine spinel geothermometer*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Xsp Ti** | **XOlvMg** | **XolFe** | **XspFe2+** | **Xsp Mg** | **P** | **XspCr** | **KD (ol-Sp Mg - Fe)** | **Temp (K)** | **Fe3+** | **KD (ol-Sp Mg - Fe)** | **Temp in °C** |
| ***Daleti Quarry – E13.11 (09° 09’ 56.4” N, 35° 37’ 30.0” E)*** | | | | |  |  |  |  |  |  |  |
| 0.00 | 1.87 | 0.12 | 0.88 | 0.03 | 1 | 0.92 | 523.62 | 945 | 1.05 | 523.62 | 672 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.94 | 454.15 | 959 | 1.03 | 454.15 | 686 |
| 0.00 | 1.87 | 0.12 | 0.88 | 0.03 | 1 | 0.94 | 475.27 | 955 | 1.03 | 475.27 | 682 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.06 | 395.26 | 935 | 0.86 | 395.26 | 662 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.97 | 452.20 | 951 | 0.99 | 452.20 | 678 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.94 | 457.53 | 955 | 1.02 | 457.53 | 682 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.04 | 1 | 1.31 | 358.16 | 897 | 0.59 | 358.16 | 624 |
| 0.00 | 1.87 | 0.12 | 0.86 | 0.03 | 1 | 1.11 | 403.43 | 930 | 0.82 | 403.43 | 657 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.16 | 411.71 | 912 | 0.76 | 411.71 | 639 |
| 0.00 | 1.87 | 0.12 | 0.86 | 0.03 | 1 | 1.08 | 388.92 | 949 | 0.87 | 388.92 | 676 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.03 | 1 | 1.09 | 391.66 | 928 | 0.82 | 391.66 | 655 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.07 | 413.55 | 933 | 0.86 | 413.55 | 660 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.03 | 1 | 1.10 | 415.07 | 921 | 0.82 | 415.07 | 648 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.05 | 451.70 | 931 | 0.89 | 451.70 | 658 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.11 | 410.74 | 925 | 0.81 | 410.74 | 652 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.09 | 437.88 | 921 | 0.84 | 437.88 | 648 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.04 | 1 | 1.07 | 372.20 | 953 | 0.87 | 372.20 | 680 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.08 | 410.22 | 935 | 0.85 | 410.22 | 662 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.06 | 428.59 | 939 | 0.89 | 428.59 | 666 |
| 0.00 | 1.87 | 0.12 | 0.86 | 0.03 | 1 | 1.09 | 401.36 | 934 | 0.84 | 401.36 | 661 |
| 0.00 | 1.87 | 0.12 | 0.83 | 0.04 | 1 | 1.32 | 357.54 | 889 | 0.56 | 357.54 | 616 |
| 0.00 | 1.87 | 0.12 | 0.83 | 0.04 | 1 | 1.39 | 363.04 | 876 | 0.49 | 363.04 | 603 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.03 | 1 | 1.15 | 384.77 | 914 | 0.75 | 384.77 | 641 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.03 | 1 | 1.15 | 401.75 | 909 | 0.74 | 401.75 | 636 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.08 | 413.95 | 936 | 0.86 | 413.95 | 663 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.97 | 430.93 | 964 | 1.00 | 430.93 | 691 |
| 0.00 | 1.87 | 0.12 | 0.88 | 0.03 | 1 | 0.97 | 483.41 | 949 | 1.00 | 483.41 | 676 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.99 | 443.28 | 954 | 0.98 | 443.28 | 681 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.96 | 550.10 | 926 | 1.00 | 550.10 | 653 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.99 | 476.60 | 942 | 0.97 | 476.60 | 669 |
| *Ballhaus et al. (1991) and Ballhaus et al. (1994)* | | | | |  |  |  |  |  |  |  |

*Supplementary Table 3: Olivine spinel geothermometer*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Xsp Ti** | **XOlvMg** | **XolFe** | **XspFe2+** | **Xsp Mg** | **P** | **XspCr** | **KD (ol-Sp Mg - Fe)** | **Temp (K)** | **Fe3+** | **KD (ol-Sp Mg - Fe)** | **Temp in °C** |
| ***Daleti Quarry – E13.11 (09° 09’ 56.4” N, 35° 37’ 30.0” E)*** | | | | |  |  |  |  |  |  |  |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.99 | 428.02 | 954 | 0.96 | 428.02 | 681 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 1.00 | 429.25 | 959 | 0.97 | 429.25 | 686 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.03 | 1 | 1.01 | 413.88 | 938 | 0.91 | 413.88 | 665 |
| 0.00 | 1.87 | 0.12 | 0.86 | 0.03 | 1 | 0.99 | 423.87 | 951 | 0.96 | 423.87 | 678 |
| 0.00 | 1.87 | 0.12 | 0.81 | 0.04 | 1 | 1.73 | 329.29 | 837 | 0.16 | 329.29 | 564 |
| 0.00 | 1.87 | 0.12 | 0.86 | 0.03 | 1 | 0.98 | 455.45 | 939 | 0.96 | 455.45 | 666 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.94 | 449.53 | 956 | 1.02 | 449.53 | 683 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.96 | 445.83 | 961 | 1.01 | 445.83 | 688 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.97 | 455.54 | 956 | 1.00 | 455.54 | 683 |
| 0.00 | 1.87 | 0.12 | 0.87 | 0.03 | 1 | 0.98 | 470.43 | 941 | 0.97 | 470.43 | 668 |
| 0.00 | 1.87 | 0.12 | 0.88 | 0.03 | 1 | 0.96 | 469.78 | 953 | 1.01 | 469.78 | 680 |
| 0.00 | 1.87 | 0.12 | 0.79 | 0.03 | 1 | 1.10 | 382.08 | 920 | 0.79 | 382.08 | 647 |
| 0.00 | 1.87 | 0.12 | 0.84 | 0.04 | 1 | 1.12 | 377.98 | 921 | 0.77 | 377.98 | 648 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.15 | 388.94 | 924 | 0.77 | 388.94 | 651 |
| 0.00 | 1.87 | 0.12 | 0.86 | 0.03 | 1 | 0.98 | 448.85 | 951 | 0.98 | 448.85 | 678 |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.03 | 1 | 1.08 | 404.05 | 916 | 0.81 | 404.05 | 643 |
| ***Average Values - E13 - 11*** | | |  |  |  |  |  |  |  |  |  |
| 0.00 | 1.87 | 0.12 | 0.85 | 0.04 | 1 | 1.06 | 378.76 | 951 | 0.88 | 378.76 | 678 |
| *Ballhaus et al. (1991) and Ballhaus et al. (1994)* | | | | |  |  |  |  |  |  |  |

*Supplementary Table 4: Oxygen fugacity ΔƒO2 (FMQ) calculations for spinel and olivine*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ballhaus et al. (1991) and Ballhaus et al. (1994) | | |  |  |  |  |  |
| Sample | Temperature (K) | Pressure (Gpa) | Xolfe | Xspfe2+ | Xspfe3+ | Xspal | ΔƒO2 (FMQ) |
| ***Daleti Quarry – E13.11 (09° 09’ 56.4” N, 35° 37’ 30.0” E)*** | | | |  |  |  |  |
| E13 - 11 | 945.3 | 1 | 0.06 | 0.46 | 0.53 | 0.01 | 5.06 |
| E13 - 11 | 959.3 | 1 | 0.06 | 0.46 | 0.51 | 0.02 | 5.03 |
| E13 - 11 | 954.9 | 1 | 0.06 | 0.46 | 0.52 | 0.01 | 5.04 |
| E13 - 11 | 935.4 | 1 | 0.06 | 0.50 | 0.43 | 0.04 | 4.78 |
| E13 - 11 | 950.6 | 1 | 0.06 | 0.47 | 0.50 | 0.02 | 4.97 |
| E13 - 11 | 955.5 | 1 | 0.06 | 0.46 | 0.51 | 0.02 | 5.02 |
| E13 - 11 | 896.9 | 1 | 0.06 | 0.59 | 0.29 | 0.05 | 4.23 |
| E13 - 11 | 929.5 | 1 | 0.06 | 0.51 | 0.41 | 0.04 | 4.71 |
| E13 - 11 | 911.9 | 1 | 0.06 | 0.53 | 0.38 | 0.04 | 4.58 |
| E13 - 11 | 949.1 | 1 | 0.06 | 0.50 | 0.43 | 0.03 | 4.80 |
| E13 - 11 | 928.2 | 1 | 0.06 | 0.51 | 0.41 | 0.05 | 4.71 |
| E13 - 11 | 933.1 | 1 | 0.06 | 0.50 | 0.43 | 0.04 | 4.77 |
| E13 - 11 | 920.8 | 1 | 0.06 | 0.51 | 0.41 | 0.04 | 4.69 |
| E13 - 11 | 930.7 | 1 | 0.06 | 0.49 | 0.45 | 0.03 | 4.81 |
| E13 - 11 | 925.1 | 1 | 0.06 | 0.51 | 0.41 | 0.04 | 4.69 |
| E13 - 11 | 920.7 | 1 | 0.06 | 0.50 | 0.42 | 0.04 | 4.73 |
| E13 - 11 | 953.2 | 1 | 0.06 | 0.49 | 0.43 | 0.03 | 4.80 |
| E13 - 11 | 934.8 | 1 | 0.06 | 0.50 | 0.43 | 0.03 | 4.76 |
| E13 - 11 | 939.4 | 1 | 0.06 | 0.49 | 0.45 | 0.03 | 4.82 |
| E13 - 11 | 934.2 | 1 | 0.06 | 0.51 | 0.42 | 0.03 | 4.74 |
| E13 - 11 | 888.6 | 1 | 0.06 | 0.60 | 0.28 | 0.06 | 4.16 |
| E13 - 11 | 875.6 | 1 | 0.06 | 0.63 | 0.25 | 0.06 | 3.97 |
| E13 - 11 | 914.4 | 1 | 0.06 | 0.53 | 0.37 | 0.05 | 4.57 |
| E13 - 11 | 908.8 | 1 | 0.06 | 0.53 | 0.37 | 0.05 | 4.56 |
| E13 - 11 | 935.9 | 1 | 0.06 | 0.50 | 0.43 | 0.03 | 4.77 |
| E13 - 11 | 964.5 | 1 | 0.06 | 0.46 | 0.50 | 0.01 | 5.00 |
| E13 - 11 | 948.6 | 1 | 0.06 | 0.47 | 0.50 | 0.01 | 4.99 |
| E13 - 11 | 953.8 | 1 | 0.06 | 0.47 | 0.49 | 0.02 | 4.96 |
| E13 - 11 | 926.1 | 1 | 0.06 | 0.47 | 0.50 | 0.02 | 4.97 |
| E13 - 11 | 942.2 | 1 | 0.06 | 0.47 | 0.49 | 0.02 | 4.94 |
| E13 - 11 | 954.2 | 1 | 0.06 | 0.47 | 0.48 | 0.02 | 4.95 |
| E13 - 11 | 959.2 | 1 | 0.06 | 0.47 | 0.49 | 0.01 | 4.96 |
| E13 - 11 | 938.2 | 1 | 0.06 | 0.48 | 0.46 | 0.04 | 4.85 |
| E13 - 11 | 951.0 | 1 | 0.06 | 0.47 | 0.48 | 0.03 | 4.93 |
| E13 - 11 | 837.1 | 1 | 0.06 | 0.83 | 0.08 | 0.05 | 2.26 |
| E13 - 11 | 938.8 | 1 | 0.06 | 0.47 | 0.48 | 0.03 | 4.92 |
| E13 - 11 | 956.2 | 1 | 0.06 | 0.46 | 0.51 | 0.02 | 5.01 |
| E13 - 11 | 961.2 | 1 | 0.06 | 0.46 | 0.51 | 0.01 | 5.01 |
| E13 - 11 | 955.7 | 1 | 0.06 | 0.47 | 0.50 | 0.01 | 4.99 |
| E13 - 11 | 940.9 | 1 | 0.06 | 0.47 | 0.49 | 0.02 | 4.94 |
| E13 - 11 | 953.0 | 1 | 0.06 | 0.46 | 0.51 | 0.01 | 5.01 |
| E13 - 11 | 920.1 | 1 | 0.06 | 0.50 | 0.39 | 0.05 | 4.62 |
| E13 - 11 | 920.9 | 1 | 0.06 | 0.52 | 0.39 | 0.05 | 4.62 |
| E13 - 11 | 924.0 | 1 | 0.06 | 0.52 | 0.39 | 0.04 | 4.62 |
| E13 - 11 | 950.8 | 1 | 0.06 | 0.47 | 0.49 | 0.02 | 4.96 |
| **Average E13 - 11** | 951.3 | 1 | 0.06 | 0.49 | 0.44 | 0.03 | 4.81 |

*Supplementary Table 4: Oxygen fugacity ΔƒO2 (FMQ) calculations for spinel and olivine*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ballhaus et al. (1991) and Ballhaus et al. (1994) | | |  |  |  |  |  |
| Sample | Temperature (K) | Pressure (Gpa) | Xolfe | Xspfe2+ | Xspfe3+ | Xspal | ΔƒO2 (FMQ) |
| ***Yubdo E14.10 (8° 57‘37.4” N, 35° 27’ 18.2”E)*** | | |  |  |  |  |  |
| E14 - 10 | 1236.4 | 1 | 0.10 | 0.63 | 0.21 | 0.21 | 2.92 |
| E14 - 10 | 1427.2 | 1 | 0.10 | 0.58 | 0.23 | 0.20 | 2.97 |
| E14 - 10 | 1325.4 | 1 | 0.10 | 0.64 | 0.19 | 0.20 | 2.74 |
| E14 - 10 | 1430.4 | 1 | 0.10 | 0.58 | 0.22 | 0.21 | 2.93 |
| E14 - 10 | 1220.0 | 1 | 0.10 | 0.63 | 0.22 | 0.19 | 2.93 |
| E14 - 10 | 1175.2 | 1 | 0.10 | 0.57 | 0.27 | 0.22 | 3.26 |
| E14 - 10 | 1316.9 | 1 | 0.10 | 0.62 | 0.20 | 0.21 | 2.82 |
| E14 - 10 | 1465.1 | 1 | 0.10 | 0.55 | 0.23 | 0.20 | 2.93 |
| E14 - 10 | 1190.4 | 1 | 0.10 | 0.61 | 0.24 | 0.22 | 3.08 |
| E14 - 10 | 1228.9 | 1 | 0.10 | 0.58 | 0.27 | 0.22 | 3.23 |
| E14 - 10 | 1422.6 | 1 | 0.10 | 0.57 | 0.24 | 0.21 | 3.03 |
| E14 - 10 | 1259.9 | 1 | 0.10 | 0.59 | 0.25 | 0.20 | 3.13 |
| E14 - 10 | 1302.0 | 1 | 0.10 | 0.57 | 0.27 | 0.19 | 3.22 |
| E14 - 10 | 1277.8 | 1 | 0.10 | 0.60 | 0.23 | 0.19 | 3.03 |
| E14 - 10 | 1404.9 | 1 | 0.10 | 0.57 | 0.24 | 0.21 | 3.04 |
| E14 - 10 | 1261.9 | 1 | 0.10 | 0.56 | 0.29 | 0.19 | 3.32 |
| E14 - 10 | 1261.2 | 1 | 0.10 | 0.57 | 0.27 | 0.22 | 3.25 |
| E14 - 10 | 1333.5 | 1 | 0.10 | 0.60 | 0.21 | 0.26 | 2.88 |
| E14 - 10 | 1348.6 | 1 | 0.10 | 0.62 | 0.20 | 0.21 | 2.79 |
| E14 - 10 | 1409.7 | 1 | 0.10 | 0.60 | 0.20 | 0.22 | 2.80 |
| E14 - 10 | 1408.6 | 1 | 0.10 | 0.58 | 0.22 | 0.21 | 2.96 |
| E14 - 10 | 1377.2 | 1 | 0.10 | 0.58 | 0.24 | 0.22 | 3.05 |
| E14 - 10 | 1370.0 | 1 | 0.10 | 0.57 | 0.25 | 0.20 | 3.12 |
| E14 - 10 | 1263.0 | 1 | 0.10 | 0.60 | 0.25 | 0.19 | 3.10 |
| E14 - 10 | 1156.5 | 1 | 0.10 | 0.61 | 0.25 | 0.21 | 3.14 |
| **Average E14 - 10** | 1427.0 | 1 | 0.10 | 0.62 | 0.23 | 0.20 | 3.03 |