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Supplement of

Morphology and surface features of olivine in kimberlite: implications for ascent processes

T. J. Jones et al.

Correspondence to: T. J. Jones (thomas.jones.2010@my.bristol.ac.uk)

Appendix A ImageJ results for traced olivines in Figure 3a

| Olivine # | Area/mm ² | P _{trace} /mm | Major Axis/mm | Minor Axis/mm | Circularity | D _{eq} /mm | Phi | P _R /mm | Ellipticity |
|-----------|----------------------|------------------------|---------------|---------------|-------------|---------------------|-----------|--------------------|-------------|
| 1 | 21.413 | 19.273 | 7.186 | 3.794 | 0.724 | 5.221482 | -2.384459 | 17.66133 | 0.916377 |
| 2 | 4.933 | 8.337 | 2.641 | 2.378 | 0.892 | 2.506171 | -1.325485 | 7.88924 | 0.946292 |
| 3 | 6.203 | 9.366 | 2.974 | 2.656 | 0.889 | 2.810321 | -1.490735 | 8.850638 | 0.944975 |
| 4 | 33.023 | 22.453 | 8.235 | 5.105 | 0.823 | 6.484303 | -2.696952 | 21.24382 | 0.946146 |
| 5 | 7.617 | 10.545 | 3.623 | 2.677 | 0.861 | 3.114204 | -1.638863 | 9.951879 | 0.943753 |
| 6 | 27.419 | 20.132 | 6.895 | 5.063 | 0.85 | 5.908549 | -2.562804 | 18.89396 | 0.938504 |
| 7 | 2.096 | 5.657 | 1.928 | 1.384 | 0.823 | 1.633619 | -0.708071 | 5.237626 | 0.925866 |
| 8 | 7.134 | 10.401 | 3.835 | 2.368 | 0.829 | 3.01385 | -1.591608 | 9.880374 | 0.949945 |
| 9 | 9.547 | 11.926 | 4.351 | 2.793 | 0.843 | 3.486491 | -1.801776 | 11.3556 | 0.952172 |
| 10 | 9.25 | 11.804 | 4.407 | 2.673 | 0.834 | 3.431831 | -1.778979 | 11.28864 | 0.95634 |
| 11 | 11.481 | 13.313 | 4.856 | 3.011 | 0.814 | 3.823358 | -1.93484 | 12.52796 | 0.941032 |
| 12 | 8.445 | 11.399 | 4.111 | 2.615 | 0.817 | 3.279102 | -1.713301 | 10.69625 | 0.93835 |
| 13 | 25.737 | 19.252 | 5.991 | 5.47 | 0.873 | 5.724453 | -2.517138 | 18.0122 | 0.935601 |
| 14 | 4.33 | 8.009 | 2.801 | 1.968 | 0.848 | 2.348005 | -1.231435 | 7.548375 | 0.942487 |
| 15 | 15.573 | 15.087 | 5.144 | 3.855 | 0.86 | 4.452882 | -2.154739 | 14.20819 | 0.941751 |
| 16 | 12.543 | 13.721 | 4.642 | 3.441 | 0.837 | 3.996279 | -1.998657 | 12.76692 | 0.930466 |
| 17 | 7.59 | 10.514 | 3.595 | 2.688 | 0.863 | 3.108679 | -1.636302 | 9.920798 | 0.94358 |
| 18 | 2.33 | 6.081 | 2.231 | 1.33 | 0.792 | 1.722396 | -0.784417 | 5.68349 | 0.934631 |
| 19 | 25.417 | 20.25 | 7.588 | 4.265 | 0.779 | 5.688755 | -2.508113 | 18.9863 | 0.937595 |
| 20 | 10.326 | 12.44 | 4.118 | 3.193 | 0.839 | 3.625944 | -1.858357 | 11.5301 | 0.926857 |
| 21 | 3.453 | 7.162 | 2.416 | 1.82 | 0.846 | 2.096782 | -1.068177 | 6.686864 | 0.933659 |
| 22 | 26.814 | 20.479 | 7.594 | 4.496 | 0.803 | 5.843 | -2.546709 | 19.30396 | 0.942622 |
| 23 | 7.394 | 10.846 | 3.696 | 2.547 | 0.79 | 3.068279 | -1.617429 | 9.889702 | 0.911829 |
| 24 | 7.824 | 10.694 | 3.557 | 2.801 | 0.86 | 3.156236 | -1.658205 | 10.02245 | 0.937204 |
| 25 | 10.07 | 12.456 | 4.486 | 2.858 | 0.816 | 3.580715 | -1.840248 | 11.67809 | 0.937547 |
| 26 | 3.772 | 7.422 | 2.405 | 1.997 | 0.86 | 2.191497 | -1.131917 | 6.929504 | 0.933644 |
| 27 | 11.589 | 13.159 | 4.53 | 3.257 | 0.841 | 3.841298 | -1.941594 | 12.31365 | 0.935759 |
| 28 | 17.993 | 18.233 | 6.708 | 3.415 | 0.68 | 4.786376 | -2.258934 | 16.32465 | 0.895336 |
| 29 | 4.148 | 7.877 | 2.716 | 1.945 | 0.84 | 2.298129 | -1.20046 | 7.371651 | 0.935845 |
| 30 | 7.863 | 10.537 | 3.334 | 3.003 | 0.89 | 3.164093 | -1.661792 | 9.960927 | 0.945329 |
| 31 | 4.483 | 8.203 | 3.018 | 1.892 | 0.837 | 2.389128 | -1.256484 | 7.81435 | 0.952621 |
| 32 | 2.495 | 6.197 | 2.168 | 1.465 | 0.816 | 1.782339 | -0.833772 | 5.760249 | 0.929522 |
| 33 | 12.856 | 13.71 | 4.765 | 3.435 | 0.859 | 4.045833 | -2.016437 | 12.96538 | 0.945688 |
| 34 | 5.337 | 9.111 | 3.233 | 2.102 | 0.808 | 2.606776 | -1.382266 | 8.474621 | 0.930153 |
| 35 | 18.289 | 16.222 | 5.291 | 4.401 | 0.873 | 4.825586 | -2.270704 | 15.25627 | 0.940468 |
| 36 | 3.257 | 6.892 | 2.476 | 1.675 | 0.862 | 2.036404 | -1.026024 | 6.581215 | 0.954906 |
| 37 | 9.392 | 11.94 | 4.267 | 2.802 | 0.828 | 3.458073 | -1.789968 | 11.22351 | 0.939992 |
| 38 | 8.193 | 10.811 | 3.264 | 3.196 | 0.881 | 3.229807 | -1.691448 | 10.14763 | 0.938639 |
| 39 | 23.319 | 19.114 | 7.012 | 4.234 | 0.802 | 5.448915 | -2.445969 | 17.93569 | 0.938354 |
| 40 | 12.108 | 14.28 | 4.55 | 3.388 | 0.746 | 3.92637 | -1.973196 | 12.53587 | 0.877862 |
| 41 | 21.124 | 17.833 | 5.928 | 4.537 | 0.835 | 5.186127 | -2.374658 | 16.51107 | 0.925872 |
| 42 | 12.547 | 13.579 | 4.575 | 3.492 | 0.855 | 3.996916 | -1.998887 | 12.72877 | 0.937387 |
| 43 | 10.022 | 12.32 | 4.31 | 2.961 | 0.83 | 3.572171 | -1.836801 | 11.51976 | 0.935045 |
| 44 | 9.163 | 11.812 | 4.155 | 2.808 | 0.825 | 3.415654 | -1.772162 | 11.04002 | 0.934645 |
| 45 | 1.956 | 5.679 | 2.091 | 1.191 | 0.762 | 1.578118 | -0.658205 | 5.252732 | 0.92494 |
| 46 | 16.754 | 15.86 | 5.572 | 3.829 | 0.837 | 4.618642 | -2.207469 | 14.89424 | 0.939107 |
| 47 | 1.556 | 4.716 | 1.575 | 1.258 | 0.879 | 1.407537 | -0.493173 | 4.464006 | 0.946566 |
| 48 | 22.544 | 18.57 | 6.207 | 4.624 | 0.821 | 5.357603 | -2.421588 | 17.10427 | 0.92107 |
| 49 | 8.597 | 11.158 | 3.699 | 2.959 | 0.868 | 3.30848 | -1.726169 | 10.49069 | 0.940194 |
| 50 | 13.772 | 14.406 | 5.01 | 3.5 | 0.834 | 4.187488 | -2.066085 | 13.4729 | 0.935228 |
| 51 | 16.402 | 15.365 | 5.23 | 3.993 | 0.873 | 4.569866 | -2.192152 | 14.55268 | 0.947132 |
| 52 | 11.628 | 13.94 | 5.293 | 2.797 | 0.752 | 3.847756 | -1.944017 | 13.01198 | 0.933427 |
| 53 | 2.746 | 6.692 | 2.54 | 1.376 | 0.771 | 1.869844 | -0.902918 | 6.287867 | 0.93961 |
| 54 | 3.824 | 7.689 | 2.819 | 1.727 | 0.813 | 2.206551 | -1.141793 | 7.244223 | 0.942154 |
| 55 | 3.264 | 6.953 | 2.344 | 1.773 | 0.849 | 2.038591 | -1.027572 | 6.498105 | 0.934576 |
| 56 | 6.444 | 9.619 | 3.121 | 2.629 | 0.875 | 2.864394 | -1.51823 | 9.048618 | 0.940703 |
| 57 | 38.178 | 25.047 | 9.183 | 5.294 | 0.765 | 6.972069 | -2.801587 | 23.15254 | 0.924364 |
| 58 | 26.345 | 19.382 | 6.395 | 5.245 | 0.881 | 5.791675 | -2.533981 | 18.32871 | 0.945656 |
| 59 | 5.57 | 9.142 | 3.244 | 2.186 | 0.837 | 2.66307 | -1.413091 | 8.61057 | 0.941869 |
| 60 | 4.397 | 8.14 | 2.855 | 1.961 | 0.834 | 2.366101 | -1.242512 | 7.630266 | 0.937379 |
| 61 | 14.084 | 14.258 | 4.838 | 3.706 | 0.871 | 4.234655 | -2.082245 | 13.47985 | 0.945423 |
| 62 | 12.056 | 13.013 | 4.008 | 3.83 | 0.895 | 3.91793 | -1.970092 | 12.31349 | 0.946245 |
| 63 | 5.968 | 9.269 | 3.126 | 2.431 | 0.873 | 2.756573 | -1.462876 | 8.763083 | 0.945418 |

| | | | | | | | | | |
|-----|--------|--------|--------|-------|-------|----------|-----------|----------|----------|
| 64 | 4.882 | 8.606 | 3.152 | 1.972 | 0.828 | 2.493182 | -1.317988 | 8.155829 | 0.947691 |
| 65 | 5.626 | 9.458 | 3.485 | 2.056 | 0.79 | 2.676424 | -1.420307 | 8.849112 | 0.935622 |
| 66 | 4.746 | 9.106 | 3.422 | 1.766 | 0.719 | 2.45821 | -1.297608 | 8.358208 | 0.917879 |
| 67 | 12.147 | 13.4 | 4.628 | 3.342 | 0.85 | 3.932689 | -1.975516 | 12.60087 | 0.940363 |
| 68 | 11.56 | 13.144 | 4.415 | 3.334 | 0.841 | 3.836489 | -1.939787 | 12.23139 | 0.930569 |
| 69 | 11.961 | 13.718 | 5.155 | 2.954 | 0.799 | 3.902463 | -1.964385 | 12.97328 | 0.945712 |
| 70 | 7.503 | 10.465 | 3.313 | 2.884 | 0.861 | 3.090812 | -1.627986 | 9.745891 | 0.931284 |
| 71 | 7.285 | 10.182 | 3.201 | 2.897 | 0.883 | 3.045579 | -1.606716 | 9.584668 | 0.941335 |
| 72 | 3.372 | 7.636 | 3.057 | 1.404 | 0.727 | 2.072043 | -1.051054 | 7.249955 | 0.949444 |
| 73 | 19.05 | 17.775 | 6.811 | 3.561 | 0.758 | 4.924958 | -2.300111 | 16.6947 | 0.939223 |
| 75 | 11.354 | 12.813 | 4.138 | 3.493 | 0.869 | 3.802152 | -1.926816 | 12.00817 | 0.937186 |
| 76 | 4.742 | 8.448 | 3.061 | 1.972 | 0.835 | 2.457174 | -1.297 | 7.998622 | 0.946807 |
| 77 | 3.754 | 7.357 | 2.45 | 1.951 | 0.871 | 2.186262 | -1.128466 | 6.935311 | 0.942682 |
| 78 | 18.535 | 16.324 | 5.021 | 4.7 | 0.874 | 4.857931 | -2.280342 | 15.27387 | 0.93567 |
| 79 | 2.878 | 6.838 | 2.551 | 1.437 | 0.773 | 1.914258 | -0.936785 | 6.387139 | 0.934065 |
| 80 | 16.471 | 16.194 | 5.757 | 3.643 | 0.789 | 4.579468 | -2.19518 | 14.95278 | 0.923353 |
| 81 | 3.104 | 7.761 | 2.78 | 1.422 | 0.648 | 1.987998 | -0.991316 | 6.773973 | 0.872822 |
| 82 | 35.615 | 30.55 | 9.108 | 4.978 | 0.48 | 6.733976 | -2.751458 | 22.60434 | 0.739913 |
| 83 | 7.563 | 11.136 | 4.224 | 2.28 | 0.766 | 3.103145 | -1.633731 | 10.44592 | 0.938032 |
| 84 | 5.826 | 9.553 | 3.349 | 2.215 | 0.802 | 2.723581 | -1.445505 | 8.830909 | 0.924412 |
| 85 | 4.593 | 8.203 | 2.723 | 2.148 | 0.858 | 2.418262 | -1.27397 | 7.678027 | 0.936002 |
| 86 | 9.581 | 12.081 | 4.342 | 2.809 | 0.825 | 3.492694 | -1.80434 | 11.36219 | 0.940501 |
| 87 | 2.386 | 5.88 | 1.83 | 1.66 | 0.867 | 1.742971 | -0.801549 | 5.485332 | 0.93288 |
| 88 | 11.233 | 13.494 | 4.933 | 2.899 | 0.775 | 3.781838 | -1.919088 | 12.5108 | 0.927138 |
| 89 | 5.305 | 9.685 | 3.866 | 1.747 | 0.711 | 2.598949 | -1.377928 | 9.133872 | 0.943095 |
| 90 | 2.998 | 6.562 | 2.196 | 1.738 | 0.875 | 1.953758 | -0.966252 | 6.20047 | 0.944905 |
| 91 | 20.301 | 17.484 | 5.936 | 4.355 | 0.835 | 5.084096 | -2.345991 | 16.26059 | 0.930027 |
| 92 | 5.175 | 8.915 | 2.958 | 2.227 | 0.818 | 2.566908 | -1.360031 | 8.185101 | 0.918127 |
| 93 | 19.23 | 16.556 | 5.327 | 4.596 | 0.882 | 4.948171 | -2.306895 | 15.60817 | 0.94275 |
| 94 | 6.151 | 9.479 | 3.08 | 2.543 | 0.86 | 2.798517 | -1.484662 | 8.852738 | 0.933932 |
| 95 | 4.74 | 8.46 | 2.959 | 2.039 | 0.832 | 2.456655 | -1.296695 | 7.917484 | 0.935873 |
| 96 | 5.005 | 8.791 | 3.059 | 2.083 | 0.814 | 2.524394 | -1.335937 | 8.149948 | 0.927079 |
| 97 | 3.566 | 7.378 | 2.663 | 1.705 | 0.823 | 2.130815 | -1.091405 | 6.943998 | 0.941176 |
| 98 | 15.678 | 15.589 | 5.627 | 3.547 | 0.811 | 4.467869 | -2.159587 | 14.59628 | 0.936319 |
| 99 | 21.705 | 17.81 | 5.882 | 4.698 | 0.86 | 5.256963 | -2.39423 | 16.6711 | 0.936053 |
| 100 | 6.65 | 10.631 | 4.097 | 2.067 | 0.739 | 2.909818 | -1.540929 | 9.946729 | 0.935634 |
| 101 | 20.044 | 18.58 | 7.377 | 3.46 | 0.73 | 5.051813 | -2.336801 | 17.58331 | 0.946357 |
| 102 | 22.557 | 18.268 | 6.221 | 4.617 | 0.849 | 5.359148 | -2.422004 | 17.11764 | 0.937029 |
| 103 | 18.794 | 16.896 | 6.081 | 3.935 | 0.827 | 4.891755 | -2.290352 | 15.91418 | 0.94189 |
| 104 | 6.345 | 10.305 | 3.912 | 2.065 | 0.751 | 2.842306 | -1.507062 | 9.614139 | 0.932959 |
| 105 | 1.721 | 6.292 | 2.708 | 0.809 | 0.546 | 1.480286 | -0.565875 | 5.934767 | 0.943224 |
| 106 | 6.688 | 9.896 | 3.279 | 2.597 | 0.858 | 2.91812 | -1.545039 | 9.26111 | 0.935844 |
| 107 | 9.25 | 11.805 | 4.018 | 2.932 | 0.834 | 3.431831 | -1.778979 | 10.98378 | 0.930434 |
| 108 | 27.448 | 20.835 | 7.629 | 4.581 | 0.795 | 5.911673 | -2.563566 | 19.47939 | 0.934936 |
| 109 | 22.747 | 18.484 | 6.564 | 4.412 | 0.837 | 5.381671 | -2.428054 | 17.40715 | 0.941742 |
| 110 | 23.725 | 19.502 | 7.475 | 4.041 | 0.784 | 5.496145 | -2.45842 | 18.49367 | 0.948296 |
| 111 | 4.602 | 8.109 | 2.673 | 2.192 | 0.88 | 2.42063 | -1.275382 | 7.660611 | 0.944705 |
| 112 | 5.569 | 9.31 | 3.493 | 2.03 | 0.807 | 2.662831 | -1.412961 | 8.828367 | 0.948267 |
| 113 | 20.109 | 17.282 | 5.858 | 4.371 | 0.846 | 5.059997 | -2.339137 | 16.15268 | 0.934653 |
| 114 | 11.646 | 14.14 | 5.41 | 2.741 | 0.732 | 3.850733 | -1.945133 | 13.14909 | 0.929922 |
| 115 | 3.441 | 7.189 | 2.5 | 1.753 | 0.837 | 2.093136 | -1.065666 | 6.73222 | 0.936461 |
| 116 | 9.717 | 12.046 | 4.21 | 2.938 | 0.841 | 3.517395 | -1.814507 | 11.31712 | 0.939492 |
| 117 | 18.243 | 16.645 | 5.955 | 3.901 | 0.827 | 4.819513 | -2.268887 | 15.65032 | 0.940242 |
| 118 | 17.143 | 16.384 | 5.734 | 3.807 | 0.803 | 4.671953 | -2.224026 | 15.1402 | 0.924084 |
| 119 | 28.541 | 20.616 | 7.238 | 5.02 | 0.844 | 6.028228 | -2.591734 | 19.41275 | 0.941635 |
| 120 | 5.358 | 9.253 | 3.409 | 2.001 | 0.786 | 2.611899 | -1.385099 | 8.642525 | 0.934024 |
| 121 | 2.292 | 6.833 | 2.835 | 1.03 | 0.617 | 1.708293 | -0.772555 | 6.406796 | 0.937626 |
| 122 | 2.564 | 6.241 | 1.988 | 1.642 | 0.827 | 1.806817 | -0.85345 | 5.714949 | 0.91571 |
| 123 | 29.027 | 24.334 | 10.156 | 3.639 | 0.616 | 6.079336 | -2.603914 | 22.89551 | 0.940885 |
| 124 | 7.754 | 10.704 | 3.564 | 2.77 | 0.85 | 3.142085 | -1.651722 | 9.988549 | 0.93316 |
| 125 | 5.988 | 10.23 | 4.045 | 1.885 | 0.719 | 2.761188 | -1.465289 | 9.626395 | 0.940997 |
| 126 | 5.652 | 9.155 | 3.108 | 2.315 | 0.847 | 2.682601 | -1.423633 | 8.564027 | 0.935448 |
| 127 | 17.148 | 15.858 | 5.413 | 4.033 | 0.857 | 4.672634 | -2.224236 | 14.91702 | 0.940662 |
| 128 | 13.212 | 15.355 | 5.472 | 3.074 | 0.704 | 4.101468 | -2.03614 | 13.68958 | 0.891539 |
| 129 | 4.905 | 8.359 | 2.623 | 2.381 | 0.882 | 2.499048 | -1.321379 | 7.864861 | 0.940885 |
| 130 | 20.832 | 18.807 | 7.24 | 3.663 | 0.74 | 5.150158 | -2.364617 | 17.59038 | 0.93531 |

