**Tracing the origin of Korean invasive populations of the spotted lanternfly, *Lycorma delicatula* (Hemiptera: Fulgoridae)**

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**Supplementary material 2**

**Table S1.** Pairwise *F*ST divergences between 38 different geographical populations of the soybean aphid. Pairwise G test values are above the diagonal and pairwise *F*ST values are below the diagonal. Red and bold *F*ST values mean those significantly different from zero at *P* < 0.001.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KR06-CA | KR07-SL | KR08-SG | KR09-GG | KR09-JE | KR09-GB | KR09-GW | KR10-SL | KR10-IN | KR10-NY | KR10-SW | KR10-IC | KR10-AS | KR10-CA | KR10-CY | KR10-NS | KR10-GC | KR10-GJ | KR10-BA | KR10-KJ |
| / KR06-CA | - | 2.568 | 1.567 | 2.036 | 1.978 | 2.339 | 1.882 | 1.539 | 1.900 | 1.779 | 2.160 | 2.576 | 3.084 | 2.833 | 2.083 | 2.058 | 2.236 | 2.298 | 1.628 | 2.233 |
| / KR07-SL | 0.089 | - | 2.823 | 3.270 | 6.579 | 6.571 | 3.177 | 2.976 | 3.358 | 3.929 | 2.949 | 2.686 | 3.759 | 5.834 | 5.536 | 4.872 | 2.270 | 2.967 | 3.000 | 2.594 |
| / KR08-SG | 0.138 | 0.081 | - | 21.302 | 10.132 | 2.839 | 13.906 | 29.619 | 16.665 | 6.281 | 4.851 | 4.447 | 4.929 | 6.296 | 5.222 | 13.191 | 8.371 | 7.391 | 24.022 | 18.819 |
| / KR09-GG | 0.109 | 0.071 | 0.012 | - | 13.517 | 9.554 | 10.357 | 102.631 | 15.583 | 12.922 | 12.077 | 19.686 | 15.483 | 22.898 | 13.456 | 67.870 | 11.886 | 13.411 | 24.093 | 18.379 |
| / KR09-JE | 0.112 | **0.037** | **0.024** | **0.018** | - | 7.319 | 18.951 | 12.505 | 46.566 | Infinity | 12.269 | 6.019 | 9.802 | 11.114 | 20.497 | 61.025 | 6.868 | 5.049 | 12.887 | 8.834 |
| / KR09-GB | 0.097 | **0.037** | 0.081 | **0.026** | **0.033** | - | 2.316 | 4.724 | 5.228 | 9.671 | 5.060 | 7.419 | 8.151 | 8.017 | 25.234 | 21.661 | 4.401 | 12.023 | 5.018 | 4.237 |
| / KR09-GW | 0.117 | 0.073 | 0.018 | 0.024 | **0.013** | 0.097 | - | 12.584 | 8.434 | 9.429 | 5.639 | 4.503 | 4.678 | 7.162 | 4.587 | 6.901 | 4.964 | 4.162 | 5.834 | 6.743 |
| / KR10-SL | 0.140 | 0.077 | **0.008** | **0.002** | **0.020** | 0.050 | 0.019 | - | 22.813 | 13.374 | 33.903 | 14.319 | 7.476 | 10.792 | 12.120 | 247.275 | 9.917 | 11.672 | 94.447 | 32.951 |
| / KR10-IN | 0.116 | 0.069 | 0.015 | 0.016 | **0.005** | 0.046 | 0.029 | **0.011** | - | 15.493 | 8.908 | 5.384 | 5.819 | 7.587 | 9.037 | 21.913 | 8.510 | 7.173 | 21.209 | 10.361 |
| / KR10-NY | 0.123 | 0.060 | 0.038 | 0.019 | **-0.004** | **0.025** | 0.026 | 0.018 | 0.016 | - | 7.521 | 5.494 | 6.836 | 5.761 | 7.737 | 11.999 | 7.841 | 7.987 | 9.962 | 10.620 |
| / KR10-SW | 0.104 | 0.078 | 0.049 | 0.020 | **0.020** | 0.047 | 0.042 | **0.007** | 0.027 | 0.032 | - | Infinity | 28.820 | 18.269 | 17.405 | 19.544 | 8.749 | 8.682 | 12.083 | 15.910 |
| / KR10-IC | 0.088 | 0.085 | 0.053 | **0.013** | 0.040 | **0.033** | 0.053 | **0.017** | 0.044 | 0.044 | **-0.003** | - | Infinity | Infinity | 44.633 | 31.760 | 11.042 | 9.006 | 11.460 | 24.700 |
| / KR10-AS | 0.075 | 0.062 | 0.048 | 0.016 | 0.025 | **0.030** | 0.051 | 0.032 | 0.041 | 0.035 | **0.009** | **-0.004** | - | 567.932 | 19.718 | 29.547 | 15.745 | 18.351 | 23.905 | 80.919 |
| / KR10-CA | 0.081 | 0.041 | 0.038 | 0.011 | 0.022 | **0.030** | 0.034 | 0.023 | 0.032 | 0.042 | 0.014 | **-0.000** | **0.000** | - | 454.295 | 126.013 | 7.875 | 8.280 | 10.754 | 9.726 |
| / KR10-CY | 0.107 | 0.043 | 0.046 | 0.018 | **0.012** | **0.010** | 0.052 | 0.020 | 0.027 | 0.031 | 0.014 | **0.006** | **0.013** | **0.001** | - | Infinity | 8.182 | 5.903 | 16.608 | 8.449 |
| / KR10-NS | 0.108 | 0.049 | **0.019** | **0.004** | **0.004** | **0.011** | 0.035 | **0.001** | **0.011** | **0.020** | **0.013** | **0.008** | **0.008** | **0.002** | **-0.010** | - | 12.771 | 8.891 | Infinity | 19.373 |
| / KR10-GC | 0.101 | 0.099 | 0.029 | 0.021 | 0.035 | 0.054 | 0.048 | 0.025 | 0.029 | 0.031 | 0.028 | 0.022 | **0.016** | 0.031 | 0.030 | 0.019 | - | 17.087 | 39.686 | 79.368 |
| / KR10-GJ | 0.098 | 0.078 | 0.033 | 0.018 | 0.047 | **0.020** | 0.057 | 0.021 | 0.034 | 0.030 | 0.028 | 0.027 | **0.013** | 0.029 | 0.041 | 0.027 | **0.014** | - | 18.951 | Infinity |
| / KR10-BA | 0.133 | 0.077 | **0.010** | **0.010** | **0.019** | 0.047 | 0.041 | 0.003 | 0.012 | 0.024 | 0.020 | 0.021 | **0.010** | 0.023 | 0.015 | **-0.002** | **0.006** | **0.013** | - | Infinity |
| / KR10-KJ | 0.101 | 0.088 | **0.013** | **0.013** | **0.028** | **0.056** | **0.036** | **0.008** | **0.024** | **0.023** | **0.015** | **0.010** | **0.003** | 0.025 | 0.029 | **0.013** | **0.003** | **-0.004** | **-0.003** | - |
| / KR10-AD | 0.121 | 0.071 | 0.074 | 0.049 | 0.052 | 0.049 | **0.067** | 0.040 | 0.056 | 0.074 | 0.038 | 0.055 | 0.047 | 0.046 | 0.048 | 0.028 | 0.101 | 0.061 | 0.059 | 0.058 |
| / KR10-YC | 0.121 | 0.082 | 0.059 | 0.067 | 0.085 | 0.093 | 0.095 | 0.090 | 0.087 | 0.117 | 0.111 | 0.100 | 0.057 | 0.063 | 0.089 | 0.065 | 0.093 | 0.054 | 0.072 | 0.064 |
| / KR10-SJ | 0.159 | 0.092 | 0.088 | 0.092 | 0.105 | 0.055 | 0.130 | 0.095 | 0.073 | 0.086 | 0.135 | 0.137 | 0.113 | 0.112 | 0.112 | 0.085 | 0.106 | 0.052 | 0.088 | 0.080 |
| / KR11-CW | 0.261 | 0.283 | 0.183 | 0.221 | 0.289 | 0.408 | 0.219 | 0.240 | 0.191 | 0.289 | 0.289 | 0.307 | 0.301 | 0.260 | 0.284 | 0.244 | 0.272 | 0.266 | 0.248 | 0.272 |
| / KR11-SC | 0.147 | 0.102 | 0.115 | 0.098 | 0.065 | 0.121 | 0.115 | 0.099 | 0.087 | 0.078 | 0.071 | 0.069 | 0.065 | 0.077 | 0.075 | 0.079 | 0.081 | 0.111 | 0.084 | 0.081 |
| / CN09-BJ | 0.105 | 0.124 | 0.173 | 0.165 | 0.154 | 0.133 | 0.195 | 0.172 | 0.153 | 0.178 | 0.140 | 0.145 | 0.137 | 0.132 | 0.141 | 0.139 | 0.148 | 0.138 | 0.160 | 0.150 |
| / CN10-TJ | 0.192 | 0.163 | 0.227 | 0.203 | 0.212 | 0.164 | 0.251 | 0.209 | 0.213 | 0.233 | 0.175 | 0.178 | 0.176 | 0.165 | 0.152 | 0.160 | 0.194 | 0.193 | 0.198 | 0.210 |
| / CN11-YT | 0.151 | 0.122 | 0.108 | 0.104 | 0.108 | 0.089 | 0.136 | 0.103 | 0.091 | 0.104 | 0.118 | 0.102 | 0.107 | 0.095 | 0.095 | 0.080 | 0.088 | 0.099 | 0.101 | 0.102 |
| / CN11-HY | 0.164 | 0.177 | 0.130 | 0.127 | 0.123 | 0.127 | 0.159 | 0.140 | 0.100 | 0.113 | 0.146 | 0.136 | 0.131 | 0.137 | 0.132 | 0.114 | 0.094 | 0.130 | 0.124 | 0.132 |
| / CN11-QD | 0.162 | 0.113 | 0.077 | 0.067 | 0.065 | **0.049** | 0.119 | 0.070 | 0.045 | 0.080 | 0.076 | 0.072 | 0.076 | 0.074 | 0.048 | 0.038 | 0.072 | 0.078 | 0.050 | 0.085 |
| / CN11-LY | 0.161 | 0.087 | 0.086 | 0.071 | 0.069 | 0.059 | 0.121 | 0.077 | 0.073 | 0.078 | 0.073 | 0.073 | 0.074 | 0.071 | 0.061 | 0.061 | 0.069 | 0.069 | 0.066 | 0.093 |
| / CN11-RZ | 0.182 | 0.099 | 0.071 | 0.060 | 0.057 | 0.065 | 0.102 | 0.058 | 0.051 | 0.076 | 0.065 | 0.083 | 0.077 | 0.060 | 0.057 | 0.041 | 0.069 | 0.076 | 0.055 | 0.095 |
| / CN11-LG | 0.165 | 0.096 | 0.052 | 0.039 | 0.050 | 0.077 | 0.072 | 0.037 | 0.045 | 0.071 | 0.048 | 0.052 | 0.063 | 0.033 | 0.034 | 0.023 | 0.044 | 0.075 | 0.040 | 0.076 |
| / CN10-SH | 0.105 | 0.068 | 0.021 | 0.015 | **0.003** | **0.037** | 0.037 | 0.017 | **0.006** | **0.022** | **0.019** | **0.017** | **0.010** | **0.015** | **0.008** | **-0.004** | **0.012** | 0.032 | **-0.000** | **0.015** |
| / CN10-NB | 0.201 | 0.230 | 0.257 | 0.249 | 0.263 | 0.206 | 0.293 | 0.279 | 0.239 | 0.254 | 0.265 | 0.232 | 0.218 | 0.224 | 0.224 | 0.220 | 0.198 | 0.226 | 0.225 | 0.221 |
| / CN10-TT | 0.198 | 0.186 | 0.196 | 0.192 | 0.202 | 0.145 | 0.234 | 0.213 | 0.198 | 0.194 | 0.207 | 0.185 | 0.168 | 0.177 | 0.171 | 0.165 | 0.148 | 0.171 | 0.172 | 0.170 |
| / CN10-LA | 0.228 | 0.239 | 0.248 | 0.243 | 0.264 | 0.187 | 0.292 | 0.264 | 0.251 | 0.254 | 0.259 | 0.221 | 0.218 | 0.225 | 0.224 | 0.218 | 0.201 | 0.218 | 0.224 | 0.217 |
| / JP10-HS | 0.140 | 0.111 | 0.099 | 0.098 | 0.125 | 0.111 | 0.115 | 0.129 | 0.129 | 0.150 | 0.147 | 0.131 | 0.102 | 0.097 | 0.130 | 0.097 | 0.142 | 0.111 | 0.127 | 0.123 |

**Table S1.** (continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KR10-AD | KR10-YC | KR10-SJ | KR11-CW | KR11-SC | CN09-BJ | CN10-TJ | CN11-YT | CN11-HY | CN11-QD | CN11-LY | CN11-RZ | CN11-LG | CN10-SH | CN10-NB | CN10-TT | CN10-LA | JP10-HS |
| / KR06-CA | 1.809 | 1.821 | 1.322 | 0.707 | 1.450 | 2.134 | 1.051 | 1.405 | 1.270 | 1.290 | 1.304 | 1.122 | 1.263 | 2.130 | 0.991 | 1.012 | 0.846 | 1.535 |
| / KR07-SL | 3.280 | 2.791 | 2.464 | 0.632 | 2.190 | 1.758 | 1.280 | 1.791 | 1.160 | 1.967 | 2.622 | 2.270 | 2.358 | 3.409 | 0.836 | 1.094 | 0.797 | 1.996 |
| / KR08-SG | 3.133 | 4.001 | 2.594 | 1.115 | 1.925 | 1.191 | 0.853 | 2.055 | 1.672 | 3.018 | 2.671 | 3.254 | 4.573 | 11.886 | 0.723 | 1.025 | 0.757 | 2.272 |
| / KR09-GG | 4.817 | 3.468 | 2.462 | 0.879 | 2.290 | 1.270 | 0.983 | 2.157 | 1.726 | 3.481 | 3.267 | 3.948 | 6.150 | 16.676 | 0.755 | 1.054 | 0.779 | 2.290 |
| / KR09-JE | 4.604 | 2.691 | 2.141 | 0.614 | 3.569 | 1.371 | 0.929 | 2.055 | 1.776 | 3.581 | 3.349 | 4.131 | 4.743 | 84.784 | 0.700 | 0.991 | 0.696 | 1.753 |
| / KR09-GB | 4.903 | 2.446 | 4.267 | 0.363 | 1.817 | 1.633 | 1.273 | 2.569 | 1.717 | 4.855 | 4.004 | 3.599 | 3.001 | 6.532 | 0.962 | 1.478 | 1.088 | 2.001 |
| / KR09-GW | 3.487 | 2.369 | 1.667 | 0.891 | 1.929 | 1.033 | 0.747 | 1.583 | 1.318 | 1.843 | 1.818 | 2.210 | 3.201 | 6.481 | 0.603 | 0.820 | 0.607 | 1.915 |
| / KR10-SL | 6.030 | 2.517 | 2.369 | 0.790 | 2.278 | 1.199 | 0.947 | 2.166 | 1.529 | 3.327 | 3.012 | 4.089 | 6.540 | 14.430 | 0.647 | 0.925 | 0.698 | 1.681 |
| / KR10-IN | 4.226 | 2.622 | 3.164 | 1.057 | 2.632 | 1.389 | 0.924 | 2.502 | 2.255 | 5.286 | 3.172 | 4.617 | 5.309 | 39.307 | 0.798 | 1.013 | 0.748 | 1.692 |
| / KR10-NY | 3.150 | 1.880 | 2.670 | 0.615 | 2.967 | 1.155 | 0.824 | 2.164 | 1.967 | 2.857 | 2.955 | 3.056 | 3.282 | 11.124 | 0.733 | 1.041 | 0.733 | 1.419 |
| / KR10-SW | 6.279 | 1.999 | 1.596 | 0.616 | 3.269 | 1.530 | 1.175 | 1.863 | 1.467 | 3.041 | 3.194 | 3.614 | 4.958 | 12.812 | 0.695 | 0.960 | 0.717 | 1.447 |
| / KR10-IC | 4.297 | 2.246 | 1.570 | 0.564 | 3.352 | 1.470 | 1.152 | 2.192 | 1.591 | 3.234 | 3.164 | 2.755 | 4.566 | 14.370 | 0.829 | 1.104 | 0.879 | 1.657 |
| / KR10-AS | 5.075 | 4.166 | 1.958 | 0.580 | 3.593 | 1.576 | 1.172 | 2.089 | 1.653 | 3.030 | 3.151 | 2.990 | 3.733 | 24.236 | 0.899 | 1.238 | 0.895 | 2.206 |
| / KR10-CA | 5.180 | 3.727 | 1.972 | 0.710 | 2.978 | 1.648 | 1.262 | 2.393 | 1.577 | 3.132 | 3.279 | 3.921 | 7.226 | 16.037 | 0.865 | 1.164 | 0.860 | 2.328 |
| / KR10-CY | 4.936 | 2.550 | 1.991 | 0.631 | 3.065 | 1.520 | 1.394 | 2.388 | 1.642 | 4.916 | 3.828 | 4.147 | 7.206 | 31.966 | 0.866 | 1.208 | 0.864 | 1.678 |
| / KR10-NS | 8.753 | 3.625 | 2.700 | 0.774 | 2.914 | 1.555 | 1.312 | 2.894 | 1.947 | 6.301 | 3.875 | 5.921 | 10.841 | Infinity | 0.886 | 1.267 | 0.895 | 2.338 |
| / KR10-GC | 2.220 | 2.449 | 2.110 | 0.668 | 2.820 | 1.436 | 1.037 | 2.595 | 2.421 | 3.244 | 3.349 | 3.373 | 5.434 | 20.583 | 1.013 | 1.435 | 0.996 | 1.510 |
| / KR10-GJ | 3.829 | 4.385 | 4.539 | 0.688 | 1.999 | 1.564 | 1.046 | 2.278 | 1.675 | 2.952 | 3.370 | 3.050 | 3.070 | 7.624 | 0.858 | 1.208 | 0.896 | 1.997 |
| / KR10-BA | 4.003 | 3.237 | 2.606 | 0.757 | 2.722 | 1.309 | 1.015 | 2.229 | 1.759 | 4.753 | 3.519 | 4.263 | 5.963 | Infinity | 0.862 | 1.202 | 0.866 | 1.716 |
| / KR10-KJ | 4.025 | 3.676 | 2.873 | 0.669 | 2.848 | 1.420 | 0.939 | 2.213 | 1.641 | 2.686 | 2.430 | 2.385 | 3.040 | 16.932 | 0.880 | 1.220 | 0.903 | 1.786 |
| / KR10-AD | - | 2.827 | 1.983 | 0.612 | 1.492 | 1.227 | 0.964 | 1.379 | 0.921 | 1.928 | 1.465 | 2.003 | 2.046 | 3.822 | 0.606 | 0.798 | 0.624 | 2.354 |
| / KR10-YC | 0.081 | - | 2.424 | 0.934 | 1.032 | 1.329 | 0.874 | 1.338 | 1.000 | 1.775 | 1.629 | 1.841 | 1.801 | 2.844 | 0.692 | 0.868 | 0.700 | 3.378 |
| / KR10-SJ | 0.112 | 0.093 | - | 0.674 | 1.184 | 0.946 | 0.704 | 2.405 | 1.410 | 1.847 | 1.483 | 1.661 | 1.473 | 2.448 | 0.820 | 1.048 | 0.856 | 1.588 |
| / KR11-CW | 0.290 | 0.211 | 0.271 | - | 0.460 | 0.520 | 0.335 | 0.650 | 0.524 | 0.669 | 0.523 | 0.575 | 0.596 | 0.792 | 0.340 | 0.391 | 0.368 | 0.578 |
| / KR11-SC | 0.144 | 0.195 | 0.174 | 0.352 | - | 1.117 | 0.863 | 2.341 | 1.697 | 1.917 | 1.924 | 1.709 | 1.940 | 4.093 | 0.828 | 1.201 | 0.824 | 0.955 |
| / CN09-BJ | 0.169 | 0.158 | 0.209 | 0.325 | 0.183 | - | 4.719 | 1.298 | 1.031 | 1.362 | 1.390 | 1.315 | 1.136 | 1.588 | 0.750 | 0.909 | 0.682 | 0.995 |
| / CN10-TJ | 0.206 | 0.222 | 0.262 | 0.427 | 0.225 | 0.050 | - | 0.938 | 0.649 | 0.968 | 1.001 | 1.046 | 0.971 | 1.117 | 0.650 | 0.934 | 0.675 | 0.751 |
| / CN11-YT | 0.153 | 0.157 | 0.094 | 0.278 | 0.096 | 0.161 | 0.210 | - | 6.162 | 3.056 | 2.163 | 2.074 | 2.331 | 3.261 | 1.001 | 1.602 | 1.133 | 1.316 |
| / CN11-HY | 0.214 | 0.200 | 0.151 | 0.323 | 0.128 | 0.195 | 0.278 | 0.039 | - | 3.476 | 2.421 | 1.688 | 1.834 | 3.003 | 0.794 | 1.124 | 0.870 | 0.914 |
| / CN11-QD | 0.115 | 0.123 | 0.119 | 0.272 | 0.115 | 0.155 | 0.205 | 0.076 | 0.067 | - | 9.329 | 5.186 | 4.302 | 7.166 | 0.788 | 1.047 | 0.848 | 1.235 |
| / CN11-LY | 0.146 | 0.133 | 0.144 | 0.323 | 0.115 | 0.152 | 0.200 | 0.104 | 0.094 | 0.026 | - | 5.894 | 5.005 | 3.914 | 0.676 | 0.977 | 0.775 | 1.149 |
| / CN11-RZ | 0.111 | 0.120 | 0.131 | 0.303 | 0.128 | 0.160 | 0.193 | 0.108 | 0.129 | 0.046 | 0.041 | - | 21.320 | 4.782 | 0.619 | 0.920 | 0.668 | 1.157 |
| / CN11-LG | 0.109 | 0.122 | 0.145 | 0.295 | 0.114 | 0.180 | 0.205 | 0.097 | 0.120 | 0.055 | 0.048 | 0.012 | - | 7.075 | 0.648 | 0.932 | 0.713 | 1.285 |
| / CN10-SH | 0.061 | 0.081 | 0.093 | 0.240 | 0.058 | 0.136 | 0.183 | 0.071 | 0.077 | 0.034 | 0.060 | 0.050 | 0.034 | - | 0.906 | 1.275 | 0.879 | 1.950 |
| / CN10-NB | 0.292 | 0.265 | 0.234 | 0.423 | 0.232 | 0.250 | 0.278 | 0.200 | 0.239 | 0.241 | 0.270 | 0.288 | 0.278 | 0.216 | - | 3.263 | 4.215 | 0.659 |
| / CN10-TT | 0.239 | 0.224 | 0.193 | 0.390 | 0.172 | 0.216 | 0.211 | 0.135 | 0.182 | 0.193 | 0.204 | 0.214 | 0.212 | 0.164 | 0.071 | - | 5.117 | 0.913 |
| / CN10-LA | 0.286 | 0.263 | 0.226 | 0.405 | 0.233 | 0.268 | 0.270 | 0.181 | 0.223 | 0.228 | 0.244 | 0.272 | 0.260 | 0.221 | 0.056 | 0.047 | - | 0.757 |
| / JP10-HS | 0.096 | 0.069 | 0.136 | 0.302 | 0.207 | 0.201 | 0.250 | 0.160 | 0.215 | 0.168 | 0.179 | 0.178 | 0.163 | 0.114 | 0.275 | 0.215 | 0.248 | - |

**Table S2.** Results of the bottleneck test based on the two mutation models, SMM and TPM, using a nonparametric Wilcoxon signed-rank test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pop. ID | Wilcowon signed-rank tests | | Mode shift | MODE-Shift |
| TPM | SMM |
| KR06-CA | 0.2593 | 0.1697 | normal | | 0.432 | 0.114 | 0.045 | 0.068 | 0.136 | 0.091 | 0.045 | 0.000 | 0.023 | 0.045 | |
| KR07-SL | 0.1030 | 0.0615 | shifted mode | | 0.282 | 0.308 | 0.077 | 0.051 | 0.026 | 0.103 | 0.000 | 0.128 | 0.000 | 0.026 | |
| KR08-SG | 0.0320 | 0.0067 | normal | | 0.566 | 0.113 | 0.057 | 0.019 | 0.038 | 0.038 | 0.075 | 0.038 | 0.019 | 0.038 | |
| KR09-GG | 0.0031 | 0.0012 | normal | | 0.609 | 0.125 | 0.031 | 0.047 | 0.031 | 0.031 | 0.047 | 0.031 | 0.047 | 0.000 | |
| KR09-JE | 0.0415 | 0.0415 | normal | | 0.351 | 0.216 | 0.081 | 0.081 | 0.000 | 0.000 | 0.135 | 0.054 | 0.054 | 0.027 | |
| KR09-GB | 0.4251 | 0.2847 | shifted mode | | 0.000 | 0.212 | 0.303 | 0.061 | 0.061 | 0.152 | 0.030 | 0.061 | 0.061 | 0.061 | |
| KR09-GW | 0.0415 | 0.0061 | normal | | 0.477 | 0.159 | 0.068 | 0.068 | 0.023 | 0.023 | 0.091 | 0.000 | 0.045 | 0.045 | |
| KR10-SL | 0.0053 | 0.0017 | normal | | 0.426 | 0.149 | 0.149 | 0.000 | 0.064 | 0.021 | 0.043 | 0.043 | 0.085 | 0.021 | |
| KR10-IN | 0.1018 | 0.0212 | normal | | 0.491 | 0.182 | 0.073 | 0.055 | 0.018 | 0.018 | 0.073 | 0.036 | 0.018 | 0.036 | |
| KR10-NY | 0.0046 | 0.0017 | normal | | 0.490 | 0.204 | 0.041 | 0.041 | 0.020 | 0.061 | 0.020 | 0.020 | 0.102 | 0.000 | |
| KR10-SW | 0.0031 | 0.0006 | normal | | 0.549 | 0.118 | 0.020 | 0.078 | 0.039 | 0.039 | 0.059 | 0.020 | 0.020 | 0.059 | |
| KR10-IC | 0.0171 | 0.0040 | normal | | 0.417 | 0.208 | 0.042 | 0.063 | 0.063 | 0.042 | 0.042 | 0.063 | 0.042 | 0.021 | |
| KR10-AS | 0.2119 | 0.0881 | normal | | 0.293 | 0.293 | 0.024 | 0.049 | 0.122 | 0.049 | 0.049 | 0.024 | 0.073 | 0.024 | |
| KR10-CA | 0.0647 | 0.0067 | normal | | 0.429 | 0.204 | 0.082 | 0.041 | 0.020 | 0.061 | 0.061 | 0.061 | 0.041 | 0.000 | |
| KR10-CY | 0.0212 | 0.0212 | normal | | 0.375 | 0.271 | 0.063 | 0.042 | 0.021 | 0.021 | 0.083 | 0.083 | 0.000 | 0.042 | |
| KR10-NS | 0.0171 | 0.0031 | normal | | 0.564 | 0.091 | 0.109 | 0.018 | 0.018 | 0.018 | 0.073 | 0.091 | 0.000 | 0.018 | |
| KR10-GC | 0.0320 | 0.0031 | normal | | 0.482 | 0.196 | 0.054 | 0.054 | 0.036 | 0.036 | 0.071 | 0.036 | 0.000 | 0.036 | |
| KR10-GJ | 0.1506 | 0.1167 | normal | | 0.391 | 0.174 | 0.065 | 0.087 | 0.087 | 0.022 | 0.109 | 0.000 | 0.022 | 0.043 | |
| KR10-BA | 0.0053 | 0.0023 | normal | | 0.479 | 0.104 | 0.104 | 0.063 | 0.021 | 0.021 | 0.104 | 0.042 | 0.042 | 0.021 | |
| KR10-KJ | 0.0615 | 0.0415 | shifted mode | | 0.250 | 0.306 | 0.028 | 0.083 | 0.056 | 0.083 | 0.083 | 0.028 | 0.056 | 0.028 | |
| KR10-AD | 0.3501 | 0.2886 | normal | | 0.207 | 0.207 | 0.103 | 0.069 | 0.069 | 0.069 | 0.138 | 0.034 | 0.000 | 0.103 | |
| KR10-YC | 0.3667 | 0.2593 | normal | | 0.308 | 0.205 | 0.103 | 0.051 | 0.026 | 0.026 | 0.128 | 0.077 | 0.051 | 0.026 | |
| KR10-SJ | 0.9739 | 0.9243 | shifted mode | | 0.172 | 0.034 | 0.207 | 0.069 | 0.103 | 0.207 | 0.034 | 0.103 | 0.000 | 0.069 | |
| KR10-CW | 0.7813 | 0.7188 | shifted mode | | 0.154 | 0.000 | 0.231 | 0.154 | 0.077 | 0.077 | 0.000 | 0.154 | 0.000 | 0.154 | |
| KR11-SC | 0.1030 | 0.0337 | normal | | 0.463 | 0.122 | 0.073 | 0.073 | 0.024 | 0.098 | 0.024 | 0.049 | 0.049 | 0.024 | |
| CN09-BJ | 0.0874 | 0.0615 | normal | | 0.286 | 0.286 | 0.048 | 0.119 | 0.048 | 0.024 | 0.119 | 0.048 | 0.000 | 0.024 | |
| CN10-TJ | 0.5508 | 0.3823 | normal | | 0.314 | 0.114 | 0.143 | 0.143 | 0.029 | 0.057 | 0.057 | 0.086 | 0.029 | 0.029 | |
| CN11-YT | 0.7881 | 0.6614 | normal | | 0.383 | 0.128 | 0.106 | 0.064 | 0.106 | 0.085 | 0.128 | 0.000 | 0.000 | 0.000 | |
| CN11-HY | 0.7114 | 0.5508 | normal | | 0.375 | 0.050 | 0.175 | 0.075 | 0.125 | 0.050 | 0.100 | 0.050 | 0.000 | 0.000 | |
| CN11-QD | 0.2119 | 0.1167 | normal | | 0.429 | 0.163 | 0.102 | 0.041 | 0.041 | 0.082 | 0.041 | 0.082 | 0.020 | 0.000 | |
| CN11-LY | 0.8669 | 0.7881 | normal | | 0.231 | 0.231 | 0.103 | 0.103 | 0.051 | 0.103 | 0.077 | 0.026 | 0.077 | 0.000 | |
| CN11-RZ | 0.2593 | 0.1506 | normal | | 0.440 | 0.180 | 0.080 | 0.080 | 0.020 | 0.060 | 0.060 | 0.000 | 0.020 | 0.060 | |
| CN11-LG | 0.2119 | 0.1697 | normal | | 0.404 | 0.191 | 0.128 | 0.043 | 0.000 | 0.021 | 0.085 | 0.043 | 0.085 | 0.000 | |
| CN10-SH | 0.0320 | 0.0040 | normal | | 0.571 | 0.125 | 0.036 | 0.018 | 0.054 | 0.054 | 0.054 | 0.054 | 0.000 | 0.036 | |
| CN10-NB | 0.0757 | 0.0386 | normal | | 0.475 | 0.180 | 0.098 | 0.066 | 0.082 | 0.016 | 0.000 | 0.033 | 0.016 | 0.033 | |
| CN10-TT | 0.5452 | 0.1167 | normal | | 0.466 | 0.155 | 0.138 | 0.069 | 0.052 | 0.017 | 0.052 | 0.034 | 0.017 | 0.000 | |
| CN10-LA | 0.0031 | 0.0009 | normal | | 0.598 | 0.195 | 0.069 | 0.034 | 0.034 | 0.011 | 0.034 | 0.000 | 0.011 | 0.011 | |
| JP10-HS | 0.9998 | 0.9988 | shifted mode | | 0.077 | 0.192 | 0.077 | 0.154 | 0.077 | 0.154 | 0.154 | 0.077 | 0.038 | 0.000 | |

**Table S3.** Mean assignment rate of individuals into (rows) and from (columns) each population using GeneClass 2 (Piry et al. 2004). Values in bold and underlined indicate the proportions of individuals assigned to the source population. Zero values were excluded from the table. The cells were gradiented according to the size range of the numbers (see note)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KR06-CA | KR07-SL | KR08-SG | KR09-GG | KR09-JE | KR09-GB | KR09-GW | KR10-SL | KR10-IN | KR10-NY | KR10-SW | KR10-IC | KR10-AS | KR10-CA | KR10-CY | KR10-NS | KR10-GC | KR10-GJ | KR10-BA | KR10-KJ |
| / KR06-CA | **0.401** | 0.126 | 0.030 | 0.152 | 0.032 | 0.156 | 0.059 | 0.025 | 0.130 | 0.053 | 0.144 | 0.187 | 0.146 | 0.161 | 0.111 | 0.134 | 0.199 | 0.082 | 0.074 | 0.059 |
| / KR07-SL | 0.085 | **0.257** | 0.166 | 0.213 | 0.144 | 0.257 | 0.039 | 0.136 | 0.176 | 0.212 | 0.152 | 0.179 | 0.141 | 0.215 | 0.241 | 0.276 | 0.201 | 0.174 | 0.156 | 0.083 |
| / KR08-SG | 0.120 | 0.214 | **0.421** | 0.456 | 0.243 | 0.284 | 0.250 | 0.351 | 0.385 | 0.330 | 0.324 | 0.315 | 0.266 | 0.328 | 0.318 | 0.442 | 0.468 | 0.298 | 0.327 | 0.234 |
| / KR09-GG | 0.141 | 0.180 | 0.303 | **0.436** | 0.181 | 0.302 | 0.146 | 0.306 | 0.381 | 0.312 | 0.316 | 0.400 | 0.315 | 0.339 | 0.321 | 0.416 | 0.374 | 0.289 | 0.276 | 0.182 |
| / KR09-JE | 0.144 | 0.372 | 0.445 | 0.418 | **0.285** | 0.297 | 0.221 | 0.322 | 0.422 | 0.365 | 0.452 | 0.284 | 0.223 | 0.318 | 0.386 | 0.422 | 0.478 | 0.275 | 0.279 | 0.190 |
| / KR09-GB | 0.051 | 0.161 | 0.179 | 0.303 | 0.140 | **0.133** | 0.022 | 0.121 | 0.225 | 0.178 | 0.173 | 0.184 | 0.241 | 0.184 | 0.262 | 0.335 | 0.291 | 0.344 | 0.122 | 0.166 |
| / KR09-GW | 0.193 | 0.309 | 0.426 | 0.401 | 0.299 | 0.283 | **0.382** | 0.353 | 0.385 | 0.377 | 0.342 | 0.328 | 0.239 | 0.432 | 0.322 | 0.398 | 0.534 | 0.253 | 0.280 | 0.267 |
| / KR10-SL | 0.114 | 0.240 | 0.428 | 0.457 | 0.230 | 0.332 | 0.257 | **0.398** | 0.433 | 0.376 | 0.392 | 0.429 | 0.298 | 0.338 | 0.416 | 0.542 | 0.515 | 0.367 | 0.386 | 0.271 |
| / KR10-IN | 0.118 | 0.208 | 0.294 | 0.389 | 0.201 | 0.264 | 0.183 | 0.271 | **0.460** | 0.296 | 0.333 | 0.299 | 0.235 | 0.330 | 0.328 | 0.350 | 0.371 | 0.265 | 0.291 | 0.199 |
| / KR10-NY | 0.104 | 0.246 | 0.264 | 0.309 | 0.216 | 0.293 | 0.198 | 0.292 | 0.313 | **0.373** | 0.245 | 0.257 | 0.206 | 0.210 | 0.276 | 0.386 | 0.399 | 0.283 | 0.281 | 0.206 |
| / KR10-SW | 0.110 | 0.204 | 0.255 | 0.355 | 0.182 | 0.248 | 0.153 | 0.279 | 0.341 | 0.251 | **0.384** | 0.392 | 0.255 | 0.251 | 0.277 | 0.368 | 0.418 | 0.265 | 0.244 | 0.186 |
| / KR10-IC | 0.095 | 0.141 | 0.204 | 0.382 | 0.068 | 0.232 | 0.112 | 0.282 | 0.251 | 0.201 | 0.300 | **0.364** | 0.275 | 0.350 | 0.265 | 0.391 | 0.315 | 0.229 | 0.189 | 0.146 |
| / KR10-AS | 0.151 | 0.220 | 0.217 | 0.421 | 0.153 | 0.296 | 0.083 | 0.263 | 0.276 | 0.291 | 0.344 | 0.410 | **0.419** | 0.304 | 0.291 | 0.406 | 0.396 | 0.294 | 0.252 | 0.211 |
| / KR10-CA | 0.160 | 0.247 | 0.169 | 0.336 | 0.150 | 0.307 | 0.156 | 0.196 | 0.295 | 0.209 | 0.324 | 0.385 | 0.255 | **0.437** | 0.352 | 0.378 | 0.281 | 0.224 | 0.215 | 0.144 |
| / KR10-CY | 0.074 | 0.202 | 0.209 | 0.330 | 0.195 | 0.320 | 0.111 | 0.226 | 0.328 | 0.310 | 0.305 | 0.340 | 0.254 | 0.302 | **0.431** | 0.451 | 0.364 | 0.259 | 0.287 | 0.139 |
| / KR10-NS | 0.052 | 0.160 | 0.229 | 0.332 | 0.171 | 0.301 | 0.097 | 0.321 | 0.260 | 0.306 | 0.259 | 0.317 | 0.187 | 0.281 | 0.349 | **0.367** | 0.336 | 0.201 | 0.244 | 0.096 |
| / KR10-GC | 0.058 | 0.074 | 0.155 | 0.213 | 0.121 | 0.163 | 0.091 | 0.121 | 0.147 | 0.127 | 0.148 | 0.158 | 0.114 | 0.102 | 0.138 | 0.212 | **0.366** | 0.216 | 0.137 | 0.112 |
| / KR10-GJ | 0.106 | 0.183 | 0.217 | 0.398 | 0.147 | 0.348 | 0.118 | 0.243 | 0.340 | 0.247 | 0.309 | 0.355 | 0.294 | 0.270 | 0.303 | 0.371 | 0.512 | **0.420** | 0.247 | 0.276 |
| / KR10-BA | 0.036 | 0.175 | 0.315 | 0.396 | 0.218 | 0.289 | 0.169 | 0.342 | 0.444 | 0.326 | 0.332 | 0.365 | 0.326 | 0.248 | 0.377 | 0.505 | 0.566 | 0.321 | **0.350** | 0.243 |
| / KR10-KJ | 0.073 | 0.139 | 0.202 | 0.265 | 0.176 | 0.299 | 0.081 | 0.211 | 0.298 | 0.291 | 0.230 | 0.259 | 0.267 | 0.212 | 0.228 | 0.393 | 0.479 | 0.323 | 0.268 | **0.296** |
| / KR10-AD | 0.140 | 0.293 | 0.349 | 0.483 | 0.270 | 0.438 | 0.217 | 0.494 | 0.453 | 0.364 | 0.504 | 0.423 | 0.340 | 0.420 | 0.448 | 0.612 | 0.432 | 0.399 | 0.448 | 0.282 |
| / KR10-YC | 0.090 | 0.263 | 0.239 | 0.405 | 0.199 | 0.291 | 0.128 | 0.244 | 0.278 | 0.188 | 0.197 | 0.285 | 0.336 | 0.321 | 0.293 | 0.408 | 0.383 | 0.304 | 0.212 | 0.231 |
| / KR10-SJ | 0.077 | 0.254 | 0.209 | 0.336 | 0.141 | 0.547 | 0.048 | 0.247 | 0.373 | 0.200 | 0.227 | 0.251 | 0.230 | 0.216 | 0.273 | 0.418 | 0.399 | 0.519 | 0.186 | 0.266 |
| / KR11-CW | 0.491 | 0.550 | 0.824 | 0.712 | 0.487 | 0.334 | 0.629 | 0.654 | 0.796 | 0.551 | 0.476 | 0.506 | 0.518 | 0.627 | 0.508 | 0.752 | 0.688 | 0.331 | 0.662 | 0.627 |
| / KR11-SC | 0.016 | 0.096 | 0.126 | 0.102 | 0.125 | 0.118 | 0.054 | 0.111 | 0.085 | 0.152 | 0.184 | 0.194 | 0.093 | 0.086 | 0.136 | 0.152 | 0.157 | 0.084 | 0.090 | 0.072 |
| / CN09-BJ | 0.016 | 0.029 | 0.009 | 0.015 | 0.001 | 0.033 | 0.005 | 0.002 | 0.003 | 0.007 | 0.010 | 0.018 | 0.001 | 0.009 | 0.015 | 0.046 | 0.042 | 0.005 | 0.010 | 0.002 |
| / CN10-TJ | 0.070 | 0.074 | 0.013 | 0.063 | 0.008 | 0.130 | 0.017 | 0.022 | 0.036 | 0.022 | 0.086 | 0.107 | 0.047 | 0.066 | 0.087 | 0.143 | 0.096 | 0.049 | 0.047 | 0.029 |
| / CN11-YT | 0.007 | 0.010 | 0.035 | 0.050 | 0.018 | 0.086 | 0.009 | 0.049 | 0.055 | 0.046 | 0.026 | 0.075 | 0.030 | 0.064 | 0.048 | 0.121 | 0.057 | 0.028 | 0.023 | 0.010 |
| / CN11-HY | 0.005 | 0.030 | 0.055 | 0.066 | 0.034 | 0.114 | 0.009 | 0.059 | 0.075 | 0.112 | 0.058 | 0.057 | 0.031 | 0.028 | 0.059 | 0.153 | 0.102 | 0.042 | 0.026 | 0.018 |
| / CN11-QD | 0.029 | 0.080 | 0.129 | 0.132 | 0.116 | 0.184 | 0.052 | 0.148 | 0.172 | 0.150 | 0.179 | 0.196 | 0.148 | 0.102 | 0.197 | 0.243 | 0.172 | 0.146 | 0.140 | 0.079 |
| / CN11-LY | 0.008 | 0.157 | 0.146 | 0.107 | 0.123 | 0.138 | 0.019 | 0.122 | 0.134 | 0.186 | 0.200 | 0.124 | 0.096 | 0.037 | 0.141 | 0.214 | 0.213 | 0.137 | 0.081 | 0.073 |
| / CN11-RZ | 0.015 | 0.138 | 0.192 | 0.188 | 0.122 | 0.205 | 0.096 | 0.171 | 0.141 | 0.157 | 0.148 | 0.111 | 0.078 | 0.140 | 0.090 | 0.273 | 0.233 | 0.131 | 0.093 | 0.128 |
| / CN11-LG | 0.025 | 0.109 | 0.247 | 0.257 | 0.154 | 0.233 | 0.133 | 0.204 | 0.246 | 0.214 | 0.251 | 0.184 | 0.121 | 0.207 | 0.180 | 0.325 | 0.341 | 0.153 | 0.139 | 0.133 |
| / CN10-SH | 0.085 | 0.151 | 0.250 | 0.328 | 0.176 | 0.230 | 0.118 | 0.249 | 0.333 | 0.280 | 0.276 | 0.332 | 0.248 | 0.232 | 0.248 | 0.393 | 0.371 | 0.177 | 0.260 | 0.167 |
| / CN10-NB | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| / CN10-TT | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | 0.004 | 0.000 | 0.000 | 0.000 |
| / CN10-LA | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| / JP10-HS | 0.144 | 0.125 | 0.174 | 0.264 | 0.117 | 0.243 | 0.117 | 0.131 | 0.149 | 0.119 | 0.133 | 0.186 | 0.201 | 0.173 | 0.142 | 0.252 | 0.187 | 0.122 | 0.154 | 0.127 |

**Table S3.** (continued)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | KR10-AD | KR10-YC | KR10-SJ | KR11-CW | KR11-SC | CN09-BJ | CN10-TJ | CN11-YT | CN11-HY | CN11-QD | CN11-LY | CN11-RZ | CN11-LG | CN10-SH | CN10-NB | CN10-TT | CN10-LA | JP10-HS |
| / KR06-CA | 0.001 | 0.027 | 0.003 | 0.000 | 0.014 | 0.136 | 0.005 | 0.012 | 0.019 | 0.020 | 0.004 | 0.007 | 0.018 | 0.174 | 0.015 | 0.002 | 0.039 | 0.002 |
| / KR07-SL | 0.027 | 0.077 | 0.048 | 0.000 | 0.039 | 0.169 | 0.011 | 0.048 | 0.015 | 0.116 | 0.108 | 0.042 | 0.078 | 0.260 | 0.002 | 0.003 | 0.024 | 0.004 |
| / KR08-SG | 0.074 | 0.147 | 0.015 | 0.000 | 0.098 | 0.132 | 0.015 | 0.173 | 0.107 | 0.261 | 0.179 | 0.216 | 0.262 | 0.377 | 0.005 | 0.014 | 0.043 | 0.028 |
| / KR09-GG | 0.056 | 0.110 | 0.045 | 0.000 | 0.056 | 0.103 | 0.017 | 0.161 | 0.060 | 0.194 | 0.112 | 0.149 | 0.205 | 0.389 | 0.004 | 0.007 | 0.031 | 0.022 |
| / KR09-JE | 0.080 | 0.145 | 0.031 | 0.000 | 0.148 | 0.137 | 0.011 | 0.241 | 0.107 | 0.300 | 0.198 | 0.252 | 0.290 | 0.466 | 0.007 | 0.007 | 0.027 | 0.021 |
| / KR09-GB | 0.002 | 0.133 | 0.105 | 0.000 | 0.075 | 0.042 | 0.003 | 0.113 | 0.063 | 0.199 | 0.189 | 0.189 | 0.156 | 0.186 | 0.004 | 0.004 | 0.078 | 0.000 |
| / KR09-GW | 0.068 | 0.092 | 0.017 | 0.000 | 0.086 | 0.169 | 0.029 | 0.144 | 0.058 | 0.181 | 0.138 | 0.207 | 0.231 | 0.370 | 0.004 | 0.013 | 0.027 | 0.018 |
| / KR10-SL | 0.096 | 0.105 | 0.038 | 0.000 | 0.131 | 0.126 | 0.012 | 0.202 | 0.084 | 0.258 | 0.194 | 0.196 | 0.264 | 0.396 | 0.002 | 0.009 | 0.035 | 0.006 |
| / KR10-IN | 0.081 | 0.081 | 0.041 | 0.006 | 0.087 | 0.109 | 0.011 | 0.149 | 0.096 | 0.247 | 0.123 | 0.138 | 0.166 | 0.360 | 0.004 | 0.004 | 0.029 | 0.006 |
| / KR10-NY | 0.074 | 0.088 | 0.125 | 0.000 | 0.107 | 0.100 | 0.012 | 0.183 | 0.112 | 0.164 | 0.151 | 0.163 | 0.179 | 0.268 | 0.004 | 0.010 | 0.030 | 0.009 |
| / KR10-SW | 0.063 | 0.062 | 0.033 | 0.000 | 0.087 | 0.104 | 0.010 | 0.101 | 0.043 | 0.178 | 0.110 | 0.139 | 0.193 | 0.364 | 0.002 | 0.006 | 0.033 | 0.002 |
| / KR10-IC | 0.033 | 0.050 | 0.000 | 0.000 | 0.082 | 0.108 | 0.017 | 0.082 | 0.015 | 0.102 | 0.083 | 0.130 | 0.176 | 0.307 | 0.007 | 0.005 | 0.043 | 0.000 |
| / KR10-AS | 0.016 | 0.110 | 0.005 | 0.000 | 0.088 | 0.083 | 0.008 | 0.193 | 0.053 | 0.169 | 0.139 | 0.089 | 0.158 | 0.367 | 0.004 | 0.017 | 0.079 | 0.014 |
| / KR10-CA | 0.037 | 0.081 | 0.007 | 0.000 | 0.031 | 0.117 | 0.013 | 0.080 | 0.022 | 0.112 | 0.067 | 0.056 | 0.135 | 0.304 | 0.003 | 0.007 | 0.024 | 0.002 |
| / KR10-CY | 0.020 | 0.027 | 0.003 | 0.000 | 0.113 | 0.074 | 0.005 | 0.173 | 0.066 | 0.203 | 0.139 | 0.093 | 0.168 | 0.352 | 0.005 | 0.005 | 0.032 | 0.000 |
| / KR10-NS | 0.050 | 0.066 | 0.002 | 0.000 | 0.035 | 0.062 | 0.006 | 0.117 | 0.037 | 0.183 | 0.080 | 0.102 | 0.149 | 0.317 | 0.007 | 0.008 | 0.028 | 0.005 |
| / KR10-GC | 0.011 | 0.043 | 0.011 | 0.000 | 0.014 | 0.045 | 0.002 | 0.029 | 0.009 | 0.043 | 0.023 | 0.050 | 0.100 | 0.166 | 0.004 | 0.006 | 0.018 | 0.001 |
| / KR10-GJ | 0.063 | 0.137 | 0.073 | 0.000 | 0.031 | 0.089 | 0.012 | 0.111 | 0.030 | 0.156 | 0.130 | 0.164 | 0.180 | 0.277 | 0.002 | 0.005 | 0.023 | 0.050 |
| / KR10-BA | 0.034 | 0.050 | 0.010 | 0.000 | 0.045 | 0.069 | 0.003 | 0.150 | 0.102 | 0.244 | 0.100 | 0.172 | 0.224 | 0.437 | 0.005 | 0.013 | 0.053 | 0.000 |
| / KR10-KJ | 0.020 | 0.078 | 0.090 | 0.000 | 0.063 | 0.080 | 0.006 | 0.167 | 0.056 | 0.184 | 0.091 | 0.110 | 0.159 | 0.289 | 0.004 | 0.009 | 0.072 | 0.002 |
| / KR10-AD | **0.358** | 0.235 | 0.113 | 0.000 | 0.067 | 0.166 | 0.045 | 0.139 | 0.027 | 0.198 | 0.058 | 0.163 | 0.167 | 0.423 | 0.002 | 0.009 | 0.017 | 0.021 |
| / KR10-YC | 0.062 | **0.410** | 0.045 | 0.000 | 0.051 | 0.125 | 0.006 | 0.079 | 0.034 | 0.154 | 0.070 | 0.180 | 0.161 | 0.291 | 0.002 | 0.003 | 0.018 | 0.011 |
| / KR10-SJ | 0.025 | 0.167 | **0.461** | 0.000 | 0.040 | 0.049 | 0.002 | 0.218 | 0.115 | 0.249 | 0.102 | 0.220 | 0.132 | 0.335 | 0.006 | 0.017 | 0.142 | 0.001 |
| / KR11-CW | 0.255 | 0.642 | 0.041 | **0.470** | 0.270 | 0.643 | 0.076 | 0.451 | 0.302 | 0.583 | 0.320 | 0.440 | 0.411 | 0.717 | 0.008 | 0.004 | 0.046 | 0.122 |
| / KR11-SC | 0.002 | 0.001 | 0.000 | 0.000 | **0.424** | 0.043 | 0.002 | 0.205 | 0.097 | 0.179 | 0.122 | 0.116 | 0.104 | 0.226 | 0.002 | 0.026 | 0.050 | 0.000 |
| / CN09-BJ | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | **0.361** | 0.137 | 0.002 | 0.002 | 0.004 | 0.003 | 0.005 | 0.005 | 0.047 | 0.010 | 0.001 | 0.001 | 0.000 |
| / CN10-TJ | 0.004 | 0.012 | 0.000 | 0.000 | 0.005 | 0.476 | **0.442** | 0.009 | 0.001 | 0.016 | 0.005 | 0.006 | 0.010 | 0.082 | 0.010 | 0.006 | 0.012 | 0.000 |
| / CN11-YT | 0.000 | 0.006 | 0.001 | 0.000 | 0.027 | 0.005 | 0.000 | **0.439** | 0.128 | 0.135 | 0.034 | 0.049 | 0.043 | 0.112 | 0.004 | 0.012 | 0.062 | 0.000 |
| / CN11-HY | 0.000 | 0.001 | 0.000 | 0.000 | 0.045 | 0.010 | 0.000 | 0.344 | **0.382** | 0.242 | 0.169 | 0.075 | 0.106 | 0.129 | 0.001 | 0.012 | 0.044 | 0.000 |
| / CN11-QD | 0.012 | 0.024 | 0.022 | 0.000 | 0.066 | 0.036 | 0.001 | 0.233 | 0.185 | **0.398** | 0.259 | 0.150 | 0.157 | 0.254 | 0.003 | 0.003 | 0.041 | 0.011 |
| / CN11-LY | 0.000 | 0.004 | 0.001 | 0.000 | 0.117 | 0.020 | 0.001 | 0.224 | 0.179 | 0.409 | **0.432** | 0.232 | 0.221 | 0.212 | 0.001 | 0.003 | 0.028 | 0.000 |
| / CN11-RZ | 0.019 | 0.055 | 0.037 | 0.000 | 0.057 | 0.039 | 0.003 | 0.151 | 0.078 | 0.187 | 0.145 | **0.425** | 0.226 | 0.149 | 0.001 | 0.007 | 0.010 | 0.000 |
| / CN11-LG | 0.019 | 0.045 | 0.022 | 0.000 | 0.088 | 0.048 | 0.004 | 0.215 | 0.143 | 0.234 | 0.180 | 0.392 | **0.432** | 0.281 | 0.001 | 0.006 | 0.014 | 0.001 |
| / CN10-SH | 0.027 | 0.059 | 0.007 | 0.000 | 0.095 | 0.119 | 0.011 | 0.152 | 0.123 | 0.210 | 0.103 | 0.139 | 0.201 | **0.363** | 0.011 | 0.009 | 0.057 | 0.018 |
| / CN10-NB | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | **0.369** | 0.024 | 0.180 | 0.000 |
| / CN10-TT | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.071 | **0.446** | 0.345 | 0.000 |
| / CN10-LA | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.029 | 0.042 | **0.371** | 0.000 |
| / JP10-HS | 0.091 | 0.147 | 0.073 | 0.000 | 0.029 | 0.123 | 0.028 | 0.060 | 0.018 | 0.117 | 0.061 | 0.061 | 0.087 | 0.242 | 0.003 | 0.003 | 0.027 | **0.390** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Note. | gradient | 0.000 | 0.00 |  | 0.090 | ≥ 0.001 | | 0.100 | ≥ 0.1 |  | 0.200 | ≥ 0.2 |  | 0.300 | ≥ 0.3 |  | 0.400 | ≥ 0.4 |  | 0.500 | ≥ 0.5 |  | 0.600 | ≥ 0.6 |  | 0.700 | ≥ 0.7 |  | 0.800 | ≥ 0.8 |
|  | /range |  |  |  |  | < 0.1 |  |  | < 0.2 |  |  | < 0.3 |  |  | < 0.4 |  |  | < 0.5 |  |  | < 0.6 |  |  | < 0.7 |  |  | < 0.8 |  |  |  |