**Table S1: impact of several environmental factors on H5N1 dispersion velocity.** The results are based on 100 trees sampled in each posterior distribution. “C” and “R” indicate if the considered environmental raster was considered as a conductance ("C") or resistance factor ("R"), and *k* is the rescaling parameter used to transform the initial raster (see the Appendix S1 for further details). For regression coefficients and *Q* values we report both the median estimate and the 95% HPD interval. The Bayes factor (BF) supports based on the randomisation procedure is only reported when $p(Q > 0)$ is at least 90%. Following Kass & Raftery (1995) we consider a Bayes factor (BF) >3 as positive support for a significant correlation between the environmental distances and dispersal durations.

| Path model | Environmental factor | *k* | Regression coefficient | *Q* statistic | $p(Q > 0)$ | BF |
|---|---|---|---|---|---|---|
| least-cost | elevation (C) | 10 | 0.005 [0.003, 0.009] | 0.006 [0.002, 0.011] | 0.99 | 1.1 |
| | | 100 | 0.020 [0.013, 0.038] | 0.032 [0.013, 0.056] | 1.00 | 2.3 |
| | | 1000 | 0.048 [0.030, 0.104] | 0.030 [0.011, 0.074] | 1.00 | 2.4 |
| | elevation (R) | 10 | 0.001 [0.001, 0.003] | 0.000 [-0.002, 0.003] | 0.58 | - |
| | | 100 | 0.001 [0.000, 0.001] | 0.004 [-0.001, 0.019] | 0.89 | - |
| | | 1000 | 0.000 [0.000, 0.000] | 0.008 [-0.001, 0.030] | 0.94 | 4.0 |
| | croplands (C) | 10 | 0.010 [0.006, 0.017] | -0.001 [-0.004, 0.004] | 0.32 | - |
| | | 100 | 0.076 [0.041, 0.138] | 0.003 [-0.004, 0.021] | 0.82 | - |
| | | 1000 | 0.189 [0.001, 0.532] | 0.000 [-0.008, 0.028] | 0.50 | - |
| | croplands (R) | 10 | 0.001 [0.001, 0.002] | 0.020 [0.009, 0.035] | 1.00 | 2.2 |
| | | 100 | 0.000 [0.000, 0.000] | 0.037 [0.014, 0.064] | 1.00 | 1.6 |
| | | 1000 | 0.000 [0.000, 0.000] | 0.039 [0.015, 0.069] | 1.00 | 1.5 |
| | forests (C) | 10 | 0.013 [0.009, 0.020] | 0.020 [0.007, 0.033] | 1.00 | 1.9 |
| | | 100 | 0.029 [0.021, 0.048] | 0.033 [0.011, 0.066] | 1.00 | 1.4 |
| | | 1000 | 0.042 [0.030, 0.068] | 0.033 [0.009, 0.068] | 1.00 | 2.0 |
| | forests (R) | 10 | 0.001 [0.000, 0.001] | -0.001 [-0.005, 0.003] | 0.17 | - |
| | | 100 | 0.000 [0.000, 0.000] | -0.001 [-0.006, 0.010] | 0.41 | - |
| | | 1000 | 0.000 [0.000, 0.000] | 0.000 [-0.006, 0.013] | 0.46 | - |
| | savannas (C) | 10 | 0.008 [0.006, 0.013] | 0.013 [0.006, 0.022] | 1.00 | 3.5 |
| | | 100 | 0.019 [0.014, 0.033] | 0.030 [0.013, 0.057] | 1.00 | 2.2 |
| | | 1000 | 0.029 [0.020, 0.049] | 0.037 [0.013, 0.068] | 1.00 | 2.8 |
| | savannas (R) | 10 | 0.001 [0.001, 0.002] | -0.002 [-0.004, -0.001] | 0.01 | - |
| | | 100 | 0.001 [0.000, 0.002] | -0.001 [-0.005, 0.014] | 0.29 | - |
| | | 1000 | 0.000 [0.000, 0.000] | -0.003 [-0.009, 0.018] | 0.25 | - |
| | inaccessibility (C) | 10 | 0.006 [0.003, 0.009] | 0.003 [0.001, 0.006] | 1.00 | 2.8 |
| | | 100 | 0.041 [0.029, 0.061] | 0.013 [0.004, 0.020] | 1.00 | 4.0 |
| | | 1000 | 0.380 [0.263, 0.575] | 0.016 [0.005, 0.029] | 0.99 | 4.0 |
| | inaccessibility (R) | 10 | 0.001 [0.001, 0.002] | -0.001 [-0.003, 0.000] | 0.03 | - |
| | | 100 | 0.000 [0.000, 0.001] | -0.001 [-0.003, 0.002] | 0.27 | - |
| | | 1000 | 0.000 [0.000, 0.000] | 0.000 [-0.002, 0.004] | 0.45 | - |
| | human pop. density (C) | 10 | 0.002 [0.001, 0.004] | -0.001 [-0.002, 0.000] | 0.00 | - |
| | | 100 | 0.003 [0.001, 0.005] | -0.002 [-0.005, -0.001] | 0.01 | - |
| | | 1000 | 0.018 [0.011, 0.029] | 0.001 [-0.002, 0.009] | 0.8 | - |
| | human pop. density (R) | 10 | 0.002 [0.001, 0.003] | 0.001 [0.000, 0.002] | 1.00 | 4.3 |
| | | 100 | 0.002 [0.001, 0.003] | 0.008 [0.002, 0.015] | 1.00 | 5.2 |
| | | 1000 | 0.001 [0.000, 0.001] | 0.028 [0.009, 0.052] | 1.00 | 1.9 |
| | chicken pop. density (C) | 10 | 0.002 [0.001, 0.004] | 0.000 [-0.001, 0.000] | 0.20 | - |
| | | 100 | 0.002 [0.001, 0.004] | -0.001 [-0.003, 0.000] | 0.06 | - |
| | | 1000 | 0.004 [0.002, 0.007] | -0.002 [-0.006, 0.000] | 0.02 | - |
| | chicken pop. density (R) | 10 | 0.002 [0.001, 0.003] | 0.000 [-0.001, 0.001] | 0.83 | - |
| | | 100 | 0.002 [0.001, 0.003] | 0.001 [-0.001, 0.003] | 0.93 | 2.4 |
| | | 1000 | 0.002 [0.001, 0.002] | 0.011 [0.002, 0.023] | 0.99 | 3.2 |
| | duck pop. density (C) | 10 | 0.002 [0.001, 0.004] | -0.001 [-0.003, 0.000] | 0.00 | - |
| | | 100 | 0.003 [0.001, 0.005] | -0.003 [-0.006, 0.000] | 0.02 | - |
| | | 1000 | 0.013 [0.008, 0.025] | 0.000 [-0.004, 0.008] | 0.53 | - |
| | duck pop. density (R) | 10 | 0.002 [0.001, 0.003] | 0.001 [0.000, 0.002] | 0.98 | 2.4 |
| | | 100 | 0.002 [0.001, 0.004] | 0.012 [0.004, 0.021] | 1.00 | 5.2 |
| | | 1000 | 0.001 [0.000, 0.001] | 0.033 [0.010, 0.056] | 1.00 | 2.4 |
| Circuitscape | elevation (C) | 10 | 0.251 [0.194, 0.414] | 0.010 [0.001, 0.021] | 0.97 | 1.4 |
| | | 100 | 0.313 [0.225, 0.593] | 0.009 [-0.012, 0.037] | 0.77 | - |
| | | 1000 | 0.432 [0.276, 0.916] | -0.012 [-0.037, 0.037] | 0.32 | - |
| | elevation (R) | 10 | 0.092 [0.072, 0.146] | -0.017 [-0.026, -0.005] | 0.01 | - |
| | | 100 | 0.014 [0.008, 0.022] | -0.035 [-0.054, -0.017] | 0.01 | - |
| | | 1000 | 0.001 [0.001, 0.002] | -0.038 [-0.059, -0.019] | 0.01 | - |
| | croplands (C) | 10 | 0.362 [0.211, 0.690] | -0.030 [-0.051, -0.008] | 0.02 | - |
| | | 100 | 0.567 [0.157, 1.307] | -0.038 [-0.064, -0.008] | 0.02 | - |
| | | 1000 | 0.600 [-0.018, 2.078] | -0.044 [-0.070, -0.009] | 0.01 | - |
| | croplands (R) | 10 | 0.029 [0.023, 0.044] | 0.012 [-0.012, 0.031] | 0.88 | - |
| | | 100 | 0.003 [0.003, 0.005] | 0.013 [-0.014, 0.036] | 0.85 | - |
| | | 1000 | 0.000 [0.000, 0.001] | 0.013 [-0.014, 0.037] | 0.85 | - |
| | forests (C) | 10 | 0.293 [0.234, 0.475] | 0.017 [-0.001, 0.035] | 0.96 | 1.9 |
| | | 100 | 0.328 [0.249, 0.518] | 0.007 [-0.015, 0.036] | 0.66 | - |
| | | 1000 | 0.325 [0.229, 0.529] | -0.005 [-0.034, 0.021] | 0.30 | - |
| | forests (R) | 10 | 0.034 [0.024, 0.060] | -0.034 [-0.054, -0.015] | 0.01 | - |
| | | 100 | 0.003 [0.001, 0.007] | -0.043 [-0.068, -0.021] | 0.01 | - |
| | | 1000 | 0.000 [0.000, 0.001] | -0.044 [-0.070, -0.021] | 0.01 | - |
| | savannas (C) | 10 | 0.245 [0.183, 0.389] | 0.009 [-0.002, 0.019] | 0.94 | 1.9 |

| | | | | | |
|---|---|---|---|---|---|
| | 100 | 0.292 [0.208, 0.497] | 0.012 [-0.008, 0.034] | 0.87 | - |
| | 1000 | 0.312 [0.219, 0.548] | 0.008 [-0.016, 0.034] | 0.73 | - |
| savannas (R) | 10 | 0.077 [0.052, 0.130] | -0.025 [-0.039, -0.010] | 0.00 | - |
| | 100 | 0.005 [0.001, 0.012] | -0.045 [-0.066, -0.022] | 0.00 | - |
| | 1000 | 0.000 [0.000, 0.001] | -0.048 [-0.071, -0.023] | 0.00 | - |
| inaccessibility (C) | 10 | 0.307 [0.239, 0.425] | 0.006 [-0.003, 0.015] | 0.90 | - |
| | 100 | 0.942 [0.699, 1.265] | 0.002 [-0.017, 0.029] | 0.56 | - |
| | 1000 | 5.291 [3.737, 7.261] | -0.006 [-0.028, 0.026] | 0.32 | - |
| inaccessibility (R) | 10 | 0.098 [0.073, 0.162] | -0.008 [-0.016, 0.003] | 0.06 | - |
| | 100 | 0.019 [0.013, 0.034] | -0.018 [-0.032, 0.005] | 0.04 | - |
| | 1000 | 0.002 [0.001, 0.004] | -0.020 [-0.036, 0.006] | 0.04 | - |
| human pop. density (C) | 10 | 0.189 [0.146, 0.303] | -0.007 [-0.013, -0.002] | 0.01 | - |
| | 100 | 0.242 [0.177, 0.410] | -0.021 [-0.032, -0.007] | 0.01 | - |
| | 1000 | 0.625 [0.423, 1.002] | -0.029 [-0.045, -0.010] | 0.01 | - |
| human pop. density (R) | 10 | 0.162 [0.126, 0.239] | 0.006 [-0.003, 0.021] | 0.92 | 1.1 |
| | 100 | 0.048 [0.032, 0.069] | -0.005 [-0.025, 0.031] | 0.32 | - |
| | 1000 | 0.005 [0.003, 0.007] | -0.016 [-0.038, 0.019] | 0.16 | - |
| chicken pop. density (C) | 10 | 0.178 [0.135, 0.284] | -0.002 [-0.008, 0.003] | 0.13 | - |
| | 100 | 0.191 [0.140, 0.319] | -0.010 [-0.021, 0.002] | 0.04 | - |
| | 1000 | 0.272 [0.186, 0.529] | -0.024 [-0.043, -0.004] | 0.01 | - |
| chicken pop. density (R) | 10 | 0.170 [0.132, 0.268] | 0.000 [-0.005, 0.005] | 0.55 | - |
| | 100 | 0.130 [0.102, 0.182] | 0.002 [-0.012, 0.017] | 0.62 | - |
| | 1000 | 0.024 [0.016, 0.036] | -0.016 [-0.039, 0.019] | 0.21 | - |
| duck pop. density (C) | 10 | 0.188 [0.142, 0.291] | -0.009 [-0.016, -0.002] | 0.01 | - |
| | 100 | 0.213 [0.149, 0.396] | -0.025 [-0.040, -0.006] | 0.02 | - |
| | 1000 | 0.379 [0.217, 0.778] | -0.032 [-0.052, -0.009] | 0.02 | - |
| duck pop. density (R) | 10 | 0.152 [0.118, 0.228] | 0.005 [-0.003, 0.015] | 0.85 | - |
| | 100 | 0.051 [0.036, 0.076] | 0.002 [-0.017, 0.033] | 0.55 | - |
| | 1000 | 0.006 [0.004, 0.009] | -0.007 [-0.028, 0.028] | 0.29 | - |