

# Predictive biophysical models of bivalve larvae dispersal in Scotland

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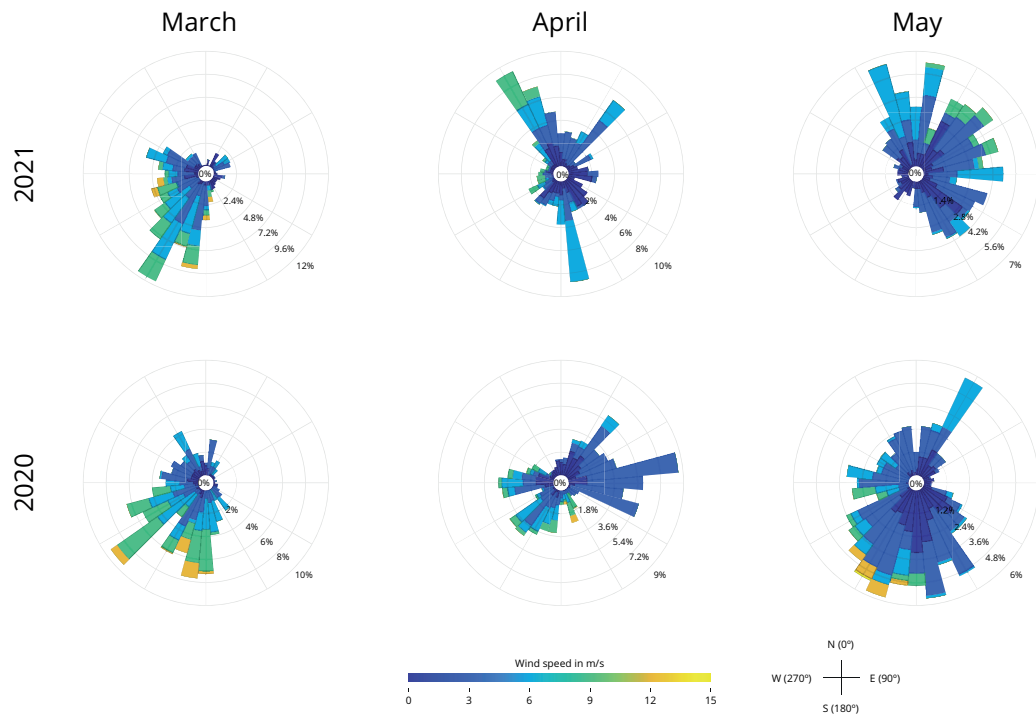
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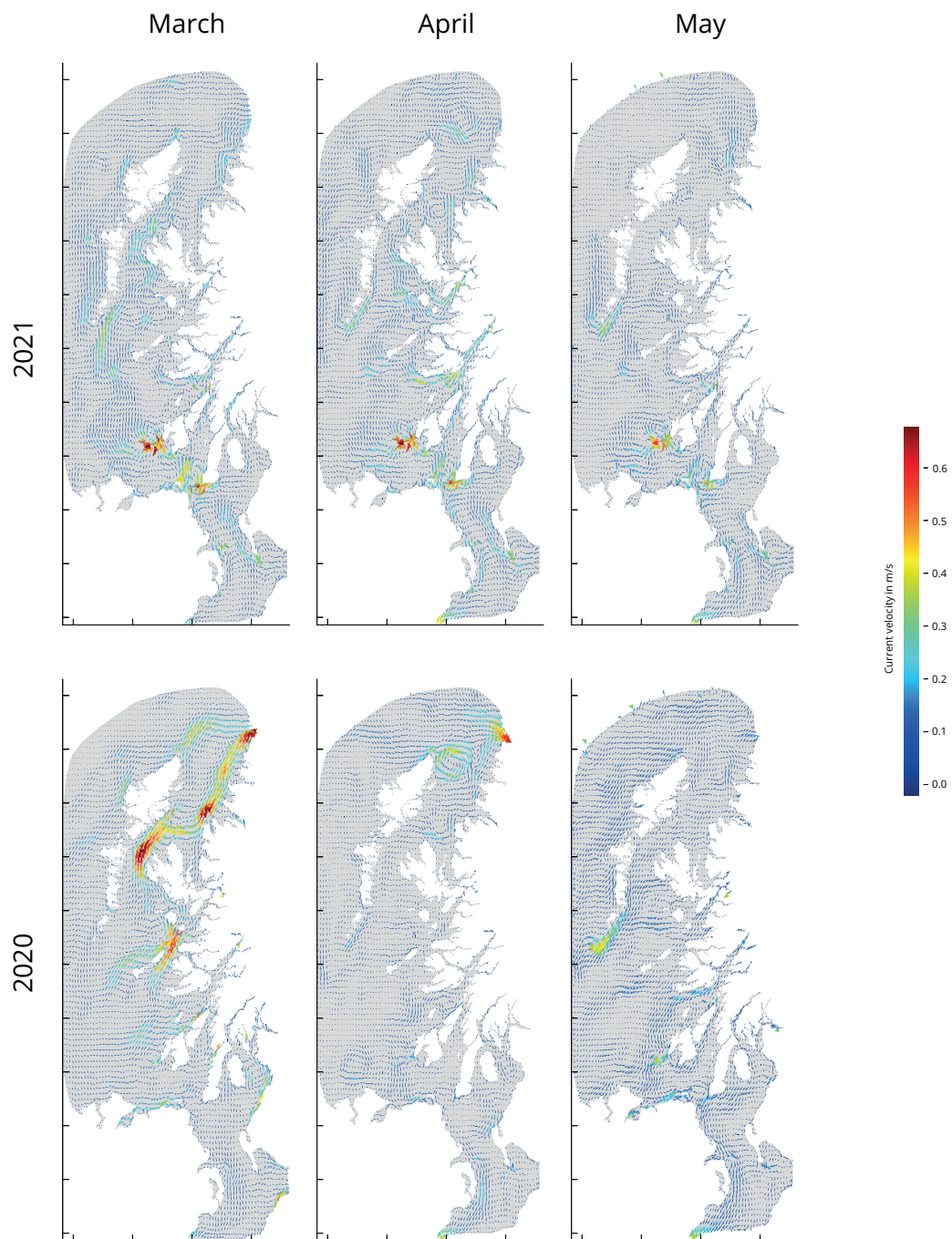
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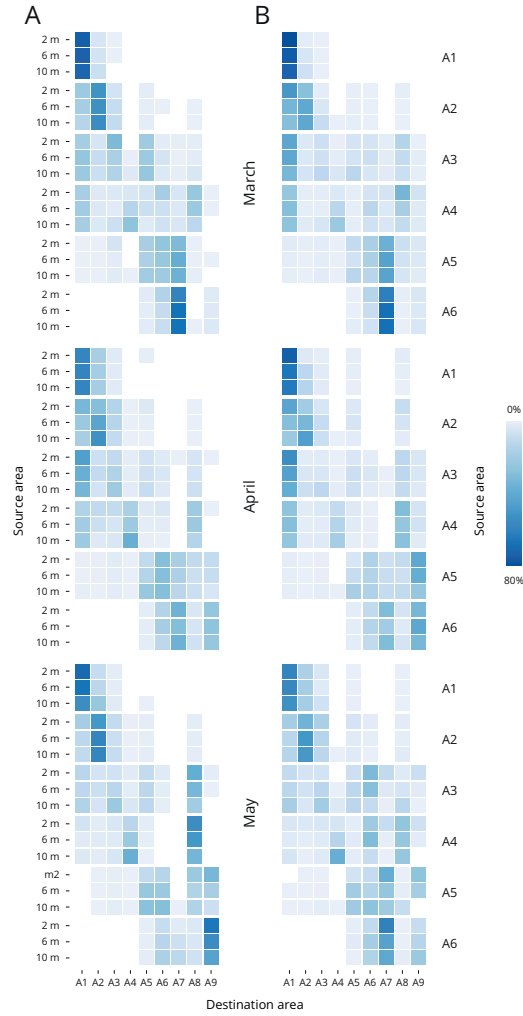
## SUPPLEMENTARY MATERIAL



**Supplementary Figure S1.** Wind roses for March, April, and May 2021 and 2020. The wind direction determined by where it blows to. The colour scale represents wind speed (m/s), whereas the inner circle represents frequency. The data are from WRF v4.



**Supplementary Figure S2.** Average current velocity (0 m to 10 m below sea level) for March, April, and May 2021 and 2020. Current velocity in m/s.



**Supplementary Figure S3.** Heatmaps of the particle connectivity between the source (Y axis) and destination area (X axis) for March, April, and May 2021, at 2 m, 6 m and 10 m. The particle accumulations from the Single day release setup, where the accumulation for each source regions have been averaged for (A) One month release (March, April, and May); (B) 45-day release with beginning points on 1st March, 1st April, and 1st May. Dark blue boxes corresponding to areas with higher particle accumulation, and light blue to white boxes corresponding to areas with lower particle accumulation in percent. Detailed means and standard deviations are provided in Supplementary Table S3



**Supplementary Figure S4.** Heatmaps of the particle connectivity between the source (Y axis) and destination area (X axis) through year 2021 for April at 6 m depth. The heatmap depicts the average amount of particles arriving in each target locations. Note the percentage represented in the figure goes up to 4% because we are only considering 10 particles released every hour during 14 days from each source point. Dark blue boxes corresponding to areas with higher particle accumulation, and light blue to white boxes corresponding to areas with lower particle accumulation in percent.

**Supplementary Table S1.** The particle accumulations in each target area from the Single day release setup (30-day release). Representing March, April and May, at three different depths in 2021 to 2017.

| Month    | Depth | Source | A1     | A2     | A3     | A4     | A5     | A6     | A7     | A8     | A9     |
|----------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| April-21 | 2     | A1     | 503180 | 154985 | 26424  | 0      | 6207   | 0      | 0      | 188    | 0      |
| April-21 | 2     | A2     | 332586 | 292794 | 144766 | 1612   | 31779  | 0      | 0      | 2133   | 0      |
| April-21 | 2     | A3     | 233417 | 37268  | 53760  | 5932   | 30603  | 14458  | 244    | 24076  | 714    |
| April-21 | 2     | A4     | 65650  | 45806  | 42572  | 71578  | 11406  | 17450  | 0      | 88384  | 735    |
| April-21 | 2     | A5     | 2593   | 2167   | 12865  | 989    | 58008  | 160417 | 96237  | 59719  | 51957  |
| April-21 | 2     | A6     | 0      | 0      | 0      | 0      | 9506   | 94227  | 229671 | 25040  | 159347 |
| April-21 | 6     | A1     | 509280 | 164377 | 17216  | 0      | 233    | 0      | 0      | 36     | 0      |
| April-21 | 6     | A2     | 228478 | 431885 | 134949 | 1571   | 8105   | 0      | 0      | 1241   | 0      |
| April-21 | 6     | A3     | 182933 | 48241  | 76150  | 6755   | 34769  | 20772  | 12     | 28779  | 49     |
| April-21 | 6     | A4     | 86316  | 35478  | 20842  | 92721  | 4915   | 7848   | 0      | 95947  | 0      |
| April-21 | 6     | A5     | 1626   | 2895   | 9519   | 1755   | 80945  | 158484 | 89194  | 45302  | 48397  |
| April-21 | 6     | A6     | 0      | 0      | 0      | 0      | 7711   | 120259 | 188191 | 32021  | 168058 |
| April-21 | 10    | A1     | 514527 | 159556 | 17102  | 0      | 0      | 0      | 0      | 0      | 0      |
| April-21 | 10    | A2     | 174249 | 533529 | 93715  | 594    | 3168   | 0      | 0      | 945    | 0      |
| April-21 | 10    | A3     | 168255 | 29412  | 102642 | 8345   | 43274  | 12859  | 0      | 35629  | 0      |
| April-21 | 10    | A4     | 94310  | 12158  | 16470  | 158561 | 1702   | 1081   | 0      | 61070  | 0      |
| April-21 | 10    | A5     | 3293   | 876    | 9654   | 1067   | 123653 | 150506 | 64332  | 42604  | 23311  |
| April-21 | 10    | A6     | 0      | 0      | 0      | 0      | 9383   | 74300  | 230677 | 43494  | 154668 |
| March-21 | 2     | A1     | 645802 | 43934  | 1373   | 0      | 91     | 0      | 0      | 0      | 0      |
| March-21 | 2     | A2     | 219827 | 515145 | 58799  | 0      | 12284  | 0      | 0      | 327    | 0      |
| March-21 | 2     | A3     | 97474  | 24427  | 156343 | 168    | 105642 | 8362   | 4336   | 6375   | 0      |
| March-21 | 2     | A4     | 75031  | 10808  | 13961  | 16602  | 25604  | 78917  | 20229  | 98906  | 212    |
| March-21 | 2     | A5     | 837    | 1148   | 30346  | 0      | 100303 | 143264 | 171679 | 1676   | 24     |
| March-21 | 2     | A6     | 0      | 0      | 0      | 0      | 13560  | 100155 | 386188 | 3      | 18489  |
| March-21 | 6     | A1     | 638698 | 51853  | 615    | 0      | 34     | 0      | 0      | 0      | 0      |
| March-21 | 6     | A2     | 181532 | 530072 | 87110  | 20     | 6566   | 448    | 0      | 601    | 0      |
| March-21 | 6     | A3     | 124593 | 43869  | 85567  | 2511   | 107340 | 28219  | 1566   | 9416   | 0      |
| March-21 | 6     | A4     | 86028  | 13535  | 9085   | 59345  | 34614  | 31141  | 14789  | 94876  | 274    |
| March-21 | 6     | A5     | 1982   | 1948   | 10511  | 101    | 89229  | 131034 | 211749 | 2005   | 509    |
| March-21 | 6     | A6     | 0      | 0      | 0      | 0      | 6126   | 61803  | 432730 | 10     | 17608  |
| March-21 | 10    | A1     | 618840 | 72312  | 48     | 0      | 0      | 0      | 0      | 0      | 0      |
| March-21 | 10    | A2     | 140313 | 558272 | 93592  | 70     | 11283  | 5      | 0      | 2602   | 0      |
| March-21 | 10    | A3     | 113533 | 38614  | 76959  | 12909  | 120658 | 15897  | 4127   | 20063  | 0      |
| March-21 | 10    | A4     | 79388  | 15389  | 31753  | 113804 | 12542  | 27547  | 16960  | 47085  | 24     |
| March-21 | 10    | A5     | 1101   | 835    | 12522  | 366    | 111112 | 115196 | 200597 | 4827   | 0      |
| March-21 | 10    | A6     | 0      | 0      | 0      | 0      | 10155  | 53320  | 432633 | 377    | 21550  |
| May-21   | 2     | A1     | 604303 | 76832  | 9044   | 0      | 0      | 0      | 0      | 0      | 0      |
| May-21   | 2     | A2     | 183512 | 499792 | 93047  | 3963   | 10943  | 0      |        | 14535  | 0      |
| May-21   | 2     | A3     | 62615  | 25836  | 29371  | 11743  | 47299  | 14125  | 0      | 184590 | 7333   |
| May-21   | 2     | A4     | 25018  | 8320   | 18362  | 54881  | 5239   | 26     | 0      | 232765 | 105    |
| May-21   | 2     | A5     | 3      | 595    | 3294   | 1109   | 56384  | 74056  | 0      | 121318 | 177714 |
| May-21   | 2     | A6     | 0      | 0      | 0      | 0      | 3894   | 56047  | 15748  | 21787  | 420433 |
| May-21   | 6     | A1     | 565147 | 104413 | 9158   | 0      | 51     | 0      | 0      | 0      | 0      |
| May-21   | 6     | A2     | 108889 | 597601 | 75876  | 982    | 8483   | 0      | 0      | 14223  | 0      |
| May-21   | 6     | A3     | 54807  | 40753  | 64581  | 7156   | 58970  | 6400   | 0      | 164089 | 1370   |
| May-21   | 6     | A4     | 8722   | 9353   | 12927  | 96507  | 3321   | 0      | 0      | 214660 | 0      |
| May-21   | 6     | A5     | 7      | 549    | 4059   | 894    | 125167 | 121074 | 131    | 80618  | 94750  |
| May-21   | 6     | A6     | 0      | 0      | 0      | 0      | 5489   | 81263  | 46199  | 26192  | 357408 |
| May-21   | 10    | A1     | 460542 | 196697 | 20812  | 0      | 344    | 0      | 0      | 0      | 0      |
| May-21   | 10    | A2     | 108308 | 589774 | 87637  | 738    | 10482  | 0      | 0      | 9289   |        |

**Supplementary Table S1. Cont.**

| Month    | Depth | Source | A1     | A2     | A3     | A4     | A5     | A6     | A7     | A8     | A9     |
|----------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| May-21   | 10    | A3     | 77935  | 26872  | 113219 | 20250  | 56728  | 4267   | 0      | 101137 | 0      |
| May-21   | 10    | A4     | 13494  | 7609   | 19548  | 158703 | 1377   | 0      | 0      | 144821 | 0      |
| May-21   | 10    | A5     | 0      | 299    | 7616   | 956    | 141525 | 150223 | 775    | 79601  | 39745  |
| May-21   | 10    | A6     | 0      | 0      | 0      | 0      | 6799   | 106861 | 76447  | 43522  | 282182 |
| April-20 | 2     | A1     | 531085 | 83917  | 24329  | 401    | 17615  | 0      | 0      | 32669  | 0      |
| April-20 | 2     | A2     | 125317 | 389131 | 156022 | 875    | 39903  | 6774   | 24     | 79396  | 0      |
| April-20 | 2     | A3     | 15790  | 1503   | 10925  | 904    | 57943  | 155401 | 2780   | 104044 | 28977  |
| April-20 | 2     | A4     | 23201  | 927    | 2452   | 16408  | 17090  | 64787  | 0      | 168171 | 38759  |
| April-20 | 2     | A5     | 0      | 0      | 10     | 0      | 49749  | 239144 | 92428  | 8706   | 55700  |
| April-20 | 2     | A6     | 0      | 0      | 0      | 0      | 648    | 190660 | 224904 | 7137   | 94986  |
| April-20 | 6     | A1     | 491524 | 124271 | 33126  | 1585   | 21019  | 0      | 0      | 18330  | 0      |
| April-20 | 6     | A2     | 120206 | 487627 | 143469 | 195    | 39273  | 2150   | 0      | 13231  |        |
| April-20 | 6     | A3     | 26069  | 5835   | 59229  | 788    | 127023 | 121126 | 1386   | 50553  | 1084   |
| April-20 | 6     | A4     | 15599  | 5033   | 29601  | 77874  | 33894  | 71260  | 0      | 60051  | 3719   |
| April-20 | 6     | A5     | 0      | 24     | 693    | 19     | 97085  | 227446 | 111252 | 5037   | 5316   |
| April-20 | 6     | A6     | 0      | 0      | 0      | 0      | 5586   | 148610 | 288050 | 3928   | 71577  |
| April-20 | 10    | A1     | 499846 | 157741 | 12211  | 233    | 11392  | 0      | 0      | 9543   | 0      |
| April-20 | 10    | A2     | 115198 | 521763 | 136619 | 240    | 20417  | 8      | 0      | 11035  | 0      |
| April-20 | 10    | A3     | 35418  | 8753   | 135086 | 10210  | 78366  | 68950  | 72     | 57118  | 513    |
| April-20 | 10    | A4     | 1874   | 1416   | 20738  | 154585 | 12764  | 40607  | 0      | 100786 | 724    |
| April-20 | 10    | A5     | 0      | 25     | 3929   | 33     | 134880 | 169665 | 120344 | 8143   | 6966   |
| April-20 | 10    | A6     | 0      | 0      | 0      | 0      | 10797  | 94432  | 329824 | 6863   | 71680  |
| March-20 | 2     | A1     | 341793 | 157576 | 157104 | 5039   | 15823  | 0      | 0      | 12737  | 0      |
| March-20 | 2     | A2     | 78493  | 466804 | 139761 | 14190  | 25331  | 10054  | 16434  | 51941  | 750    |
| March-20 | 2     | A3     | 3686   | 2113   | 5608   | 977    | 24314  | 75147  | 201395 | 76256  | 8575   |
| March-20 | 2     | A4     | 12255  | 4974   | 15178  | 9363   | 31813  | 53391  | 60985  | 138514 | 8679   |
| March-20 | 2     | A5     | 0      | 0      | 57     | 0      | 51448  | 56883  | 329027 | 7734   | 2933   |
| March-20 | 2     | A6     | 0      | 0      | 0      | 0      | 1512   | 88009  | 428372 | 10     | 495    |
| March-20 | 6     | A1     | 360051 | 175784 | 126813 | 5563   | 10253  | 0      | 0      | 11605  | 0      |
| March-20 | 6     | A2     | 63225  | 495501 | 139096 | 5140   | 35992  | 9965   | 9499   | 46538  | 420    |
| March-20 | 6     | A3     | 6427   | 7607   | 34181  | 14245  | 39752  | 53561  | 131184 | 96019  | 4471   |
| March-20 | 6     | A4     | 8779   | 11937  | 17166  | 109758 | 29733  | 32730  | 48225  | 79955  | 3389   |
| March-20 | 6     | A5     | 0      | 0      | 1309   | 2      | 43601  | 46414  | 342036 | 11774  | 2426   |
| March-20 | 6     | A6     | 0      | 0      | 0      | 0      | 1218   | 68847  | 446034 | 1217   | 843    |
| March-20 | 10    | A1     | 380229 | 238205 | 13129  | 4871   | 30427  | 0      | 0      | 24168  | 0      |
| March-20 | 10    | A2     | 84985  | 524590 | 126170 | 895    | 39225  | 5319   | 7164   | 17575  | 24     |
| March-20 | 10    | A3     | 23737  | 8650   | 74888  | 23227  | 72878  | 30272  | 113918 | 36737  | 883    |
| March-20 | 10    | A4     | 3049   | 1997   | 11292  | 174264 | 19400  | 45678  | 31752  | 52235  | 1557   |
| March-20 | 10    | A5     | 24     | 0      | 4989   | 72     | 50854  | 21591  | 362465 | 5676   | 1522   |
| March-20 | 10    | A6     | 0      | 0      | 0      | 0      | 722    | 48483  | 447637 | 2676   | 18563  |
| May-20   | 2     | A1     | 643807 | 28095  | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| May-20   | 2     | A2     | 287980 | 456125 | 56450  | 0      | 0      | 0      | 0      | 0      | 0      |
| May-20   | 2     | A3     | 83207  | 52675  | 141308 | 2894   | 85999  | 24541  | 211    | 11386  | 0      |
| May-20   | 2     | A4     | 27645  | 34033  | 56478  | 33793  | 108783 | 125    | 0      | 77251  | 0      |
| May-20   | 2     | A5     | 99     | 2937   | 12468  | 144    | 129683 | 212333 | 75573  | 3579   | 8016   |
| May-20   | 2     | A6     | 0      | 0      | 0      | 0      | 14280  | 120132 | 301131 | 260    | 82583  |
| May-20   | 6     | A1     | 630594 | 38539  | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| May-20   | 6     | A2     | 192388 | 487115 | 93958  | 0      | 523    | 0      | 0      | 451    | 0      |
| May-20   | 6     | A3     | 94587  | 50417  | 122440 | 5497   | 82791  | 24460  | 1766   | 18930  | 0      |
| May-20   | 6     | A4     | 28846  | 45722  | 37570  | 32497  | 93822  | 1516   | 0      | 87651  | 0      |
| May-20   | 6     | A5     | 267    | 3383   | 5677   | 643    | 90264  | 217113 | 113507 | 5757   | 9103   |

**Supplementary Table S1. Cont.**

| Month    | Depth | Source | A1     | A2     | A3     | A4     | A5     | A6     | A7     | A8     | A9     |
|----------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| May-20   | 6     | A6     | 0      | 0      | 0      | 0      | 4284   | 146638 | 217560 | 996    | 148405 |
| May-20   | 10    | A1     | 558031 | 110788 | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| May-20   | 10    | A2     | 128328 | 554568 | 79187  | 0      | 1963   | 0      | 0      | 484    | 0      |
| May-20   | 10    | A3     | 96768  | 35951  | 138423 | 5366   | 82996  | 17230  | 468    | 17701  | 0      |
| May-20   | 10    | A4     | 29441  | 19264  | 35730  | 87367  | 32365  | 4034   | 0      | 106528 | 0      |
| May-20   | 10    | A5     | 912    | 2801   | 6689   | 201    | 94744  | 152087 | 164730 | 10954  | 13765  |
| May-20   | 10    | A6     | 0      | 0      | 0      | 0      | 8143   | 122254 | 247743 | 2990   | 136600 |
| April-19 | 2     | A1     | 276979 | 26259  | 142544 | 1666   | 152206 | 35892  | 9      | 44238  | 0      |
| April-19 | 2     | A2     | 0      | 472904 | 73897  | 3699   | 124747 | 60559  | 21578  | 42966  | 0      |
| April-19 | 2     | A3     | 0      | 0      | 9495   | 945    | 80742  | 193382 | 82937  | 19783  | 4934   |
| April-19 | 2     | A4     | 0      | 24     | 1605   | 13711  | 20749  | 181599 | 1925   | 116062 | 0      |
| April-19 | 2     | A5     | 0      | 0      | 3757   | 0      | 103230 | 92790  | 202303 | 7501   | 36215  |
| April-19 | 2     | A6     | 0      | 0      | 0      | 0      | 8781   | 71036  | 319745 | 1585   | 116695 |
| April-19 | 6     | A1     | 275442 | 130045 | 159780 | 3198   | 97592  | 0      | 0      | 25037  | 0      |
| April-19 | 6     | A2     | 0      | 579044 | 83555  | 5847   | 77754  | 37641  | 592    | 22719  | 0      |
| April-19 | 6     | A3     | 0      | 122    | 44538  | 2213   | 149346 | 177150 | 12082  | 15970  | 0      |
| April-19 | 6     | A4     | 0      | 206    | 9159   | 71518  | 95780  | 104329 | 2263   | 57421  | 0      |
| April-19 | 6     | A5     | 0      | 0      | 2328   | 0      | 85621  | 165688 | 184779 | 2268   | 7207   |
| April-19 | 6     | A6     | 0      | 0      | 0      | 0      | 3187   | 97275  | 324659 | 11419  | 79432  |
| April-19 | 10    | A1     | 352937 | 161591 | 116522 | 2888   | 39145  | 0      | 0      | 18102  | 0      |
| April-19 | 10    | A2     | 0      | 620067 | 82796  | 8006   | 55727  | 8113   | 0      | 31455  | 0      |
| April-19 | 10    | A3     | 0      | 3665   | 108685 | 5484   | 168935 | 84419  | 334    | 28299  | 0      |
| April-19 | 10    | A4     | 0      | 846    | 22499  | 120392 | 96466  | 19634  | 0      | 54902  | 0      |
| April-19 | 10    | A5     | 0      | 24     | 9729   | 18     | 182416 | 150070 | 86045  | 12930  | 0      |
| April-19 | 10    | A6     | 0      | 0      | 0      | 0      | 11422  | 135397 | 252434 | 27231  | 79737  |
| March-19 | 2     | A1     | 61207  | 157596 | 76     | 0      | 0      | 0      | 0      | 0      | 0      |
| March-19 | 2     | A2     | 68879  | 731520 | 5513   | 0      | 199    | 0      | 0      | 208    | 0      |
| March-19 | 2     | A3     | 107843 | 95003  | 70152  | 3257   | 123125 | 411    | 188    | 3220   | 0      |
| March-19 | 2     | A4     | 65238  | 55264  | 19126  | 214    | 48866  | 6365   | 35     | 12250  | 0      |
| March-19 | 2     | A5     | 1025   | 1423   | 23276  | 16     | 130138 | 106384 | 186584 | 415    | 19     |
| March-19 | 2     | A6     | 0      | 0      | 0      | 0      | 745    | 63513  | 452707 | 1391   | 20     |
| March-19 | 6     | A1     | 143633 | 75022  | 208    | 0      | 0      | 0      | 0      | 0      | 0      |
| March-19 | 6     | A2     | 217297 | 574552 | 14162  | 0      | 52     | 0      | 0      | 26     | 0      |
| March-19 | 6     | A3     | 233206 | 12170  | 60656  | 2127   | 71342  | 6004   | 9042   | 8453   | 0      |
| March-19 | 6     | A4     | 105819 | 3069   | 20999  | 18366  | 19731  | 9114   | 1200   | 28112  | 0      |
| March-19 | 6     | A5     | 2815   | 353    | 37750  | 10     | 97575  | 67655  | 238332 | 2896   | 1443   |
| March-19 | 6     | A6     | 0      | 0      | 0      | 0      | 646    | 38021  | 460328 | 186    | 19194  |
| March-19 | 10    | A1     | 180633 | 38137  | 107    | 0      | 0      | 0      | 0      | 0      | 0      |
| March-19 | 10    | A2     | 277075 | 443393 | 81972  | 326    | 2906   | 0      | 0      | 396    | 0      |
| March-19 | 10    | A3     | 201633 | 7329   | 83432  | 18509  | 44653  | 11403  | 15381  | 18885  | 0      |
| March-19 | 10    | A4     | 68165  | 2443   | 15768  | 63319  | 10266  | 1036   | 92     | 45785  | 0      |
| March-19 | 10    | A5     | 2992   | 368    | 34759  | 250    | 65717  | 51776  | 281724 | 9008   | 237    |
| March-19 | 10    | A6     | 0      | 0      | 0      | 0      | 2880   | 37145  | 460938 | 48     | 17388  |
| May-19   | 2     | A1     | 654997 | 21783  | 14371  | 0      | 0      | 0      | 0      | 0      | 0      |
| May-19   | 2     | A2     | 252567 | 412517 | 114247 | 143    | 5091   | 0      | 0      | 2313   | 0      |
| May-19   | 2     | A3     | 47890  | 27929  | 143355 | 29004  | 69645  | 27831  | 0      | 56875  | 0      |
| May-19   | 2     | A4     | 13517  | 18792  | 82378  | 130455 | 51702  | 0      | 0      | 46121  | 0      |
| May-19   | 2     | A5     | 8      | 717    | 8631   | 2978   | 161756 | 142630 | 0      | 63597  | 52775  |
| May-19   | 2     | A6     | 0      | 0      | 0      | 48     | 18567  | 123137 | 11679  | 89379  | 272202 |
| May-19   | 6     | A1     | 569083 | 94526  | 14868  | 0      | 0      | 0      | 0      | 0      | 0      |
| May-19   | 6     | A2     | 153949 | 549048 | 74010  | 140    | 5669   | 0      | 0      | 1129   | 0      |

Supplementary Table S1. *Cont.*

| Month    | Depth | Source | A1     | A2      | A3     | A4    | A5     | A6     | A7     | A8     | A9     |
|----------|-------|--------|--------|---------|--------|-------|--------|--------|--------|--------|--------|
| May-19   | 6     | A3     | 50197  | 29523   | 163934 | 11138 | 86599  | 17695  | 0      | 38143  | 0      |
| May-19   | 6     | A4     | 13408  | 21770   | 72057  | 68162 | 69420  | 0      | 0      | 61353  | 0      |
| May-19   | 6     | A5     | 0      | 895     | 9486   | 2088  | 157604 | 162277 | 64     | 60401  | 31079  |
| May-19   | 6     | A6     | 0      | 0       | 0      | 0     | 15510  | 213131 | 14540  | 53554  | 217044 |
| May-19   | 10    | A1     | 543655 | 121407  | 10229  | 0     | 0      | 0      | 0      | 0      | 0      |
| May-19   | 10    | A2     | 118027 | 582462  | 82085  | 0     | 404    | 0      | 0      | 24     | 0      |
| May-19   | 10    | A3     | 52977  | 26251   | 147725 | 7561  | 101620 | 6376   | 9      | 34253  | 0      |
| May-19   | 10    | A4     | 6113   | 23348   | 99031  | 72894 | 24460  | 0      | 0      | 67060  | 0      |
| May-19   | 10    | A5     | 127    | 536     | 11979  | 633   | 206702 | 159107 | 307    | 46867  | 1526   |
| May-19   | 10    | A6     | 0      | 0       | 0      | 0     | 21647  | 243828 | 55139  | 53546  | 136623 |
| April-18 | 2     | A1     | 150905 | 825068  | 310745 | 32    | 233268 | 279    | 0      | 11514  | 0      |
| April-18 | 2     | A2     | 1801   | 373826  | 125832 | 75    | 245555 | 47958  | 0      | 10621  | 0      |
| April-18 | 2     | A3     | 0      | 1898    | 26678  | 743   | 149525 | 199702 | 8241   | 14673  | 25     |
| April-18 | 2     | A4     | 21     | 8159    | 61266  | 13775 | 107683 | 1305   | 0      | 14844  | 0      |
| April-18 | 2     | A5     | 0      | 0       | 3485   | 9     | 31573  | 156022 | 242513 | 10434  | 272    |
| April-18 | 2     | A6     | 0      | 0       | 0      | 0     | 669    | 160823 | 319922 | 1766   | 14069  |
| April-18 | 6     | A1     | 36032  | 56458   | 85530  | 51    | 37679  | 0      | 0      | 3119   | 0      |
| April-18 | 6     | A2     | 484    | 536413  | 142050 | 83    | 103211 | 9698   | 0      | 14109  | 0      |
| April-18 | 6     | A3     | 0      | 8057    | 76131  | 920   | 193830 | 88671  | 5023   | 29625  | 0      |
| April-18 | 6     | A4     | 13     | 5144    | 63650  | 26992 | 103678 | 314    | 0      | 7418   | 0      |
| April-18 | 6     | A5     | 0      | 0       | 4901   | 0     | 73089  | 230229 | 128155 | 6167   | 0      |
| April-18 | 6     | A6     | 0      | 0       | 0      | 0     | 1494   | 121917 | 300619 | 18766  | 39019  |
| April-18 | 10    | A1     | 239271 | 1051627 | 220658 | 305   | 14599  | 0      | 0      | 5193   | 0      |
| April-18 | 10    | A2     | 1649   | 591256  | 162445 | 133   | 34977  | 350    | 0      | 15389  | 0      |
| April-18 | 10    | A3     | 0      | 12535   | 143695 | 761   | 157582 | 31290  | 924    | 55156  | 0      |
| April-18 | 10    | A4     | 7      | 4465    | 55192  | 61440 | 74505  | 0      | 0      | 11637  | 0      |
| April-18 | 10    | A5     | 0      | 1       | 8404   | 3     | 151230 | 176087 | 90193  | 15819  | 0      |
| April-18 | 10    | A6     | 0      | 0       | 0      | 0     | 2514   | 60950  | 324057 | 47584  | 37971  |
| March-18 | 2     | A1     | 18451  | 67251   | 54583  | 2663  | 47348  | 0      | 0      | 28087  | 0      |
| March-18 | 2     | A2     | 1149   | 255227  | 298541 | 8030  | 144810 | 3625   | 0      | 88791  | 0      |
| March-18 | 2     | A3     | 0      | 1346    | 103643 | 9929  | 92412  | 73779  | 1854   | 99557  | 0      |
| March-18 | 2     | A4     | 0      | 3251    | 73416  | 24423 | 47157  | 0      | 0      | 58982  | 0      |
| March-18 | 2     | A5     | 0      | 0       | 8824   | 38    | 24804  | 244033 | 83079  | 85030  | 766    |
| March-18 | 2     | A6     | 0      | 0       | 0      | 0     | 445    | 158781 | 146721 | 78659  | 88128  |
| March-18 | 6     | A1     | 31097  | 73759   | 60932  | 1325  | 29711  | 0      | 0      | 21726  | 0      |
| March-18 | 6     | A2     | 5      | 408436  | 262520 | 4143  | 65078  | 1214   | 0      | 60431  | 0      |
| March-18 | 6     | A3     | 0      | 8239    | 112143 | 7974  | 118703 | 43759  | 4882   | 94507  | 0      |
| March-18 | 6     | A4     | 0      | 2676    | 84468  | 17877 | 41621  | 0      | 0      | 60635  | 0      |
| March-18 | 6     | A5     | 0      | 4       | 10929  | 51    | 121358 | 201209 | 74454  | 34616  | 0      |
| March-18 | 6     | A6     | 0      | 0       | 0      | 0     | 739    | 81700  | 167435 | 133356 | 125911 |
| March-18 | 10    | A1     | 386710 | 676002  | 375051 | 2311  | 46986  | 0      | 0      | 43561  | 0      |
| March-18 | 10    | A2     | 0      | 498438  | 218053 | 1123  | 54162  | 531    | 0      | 32251  | 0      |
| March-18 | 10    | A3     | 0      | 14561   | 194532 | 2706  | 102476 | 20459  | 4334   | 53421  | 0      |
| March-18 | 10    | A4     | 0      | 2000    | 84022  | 44905 | 32610  | 0      | 0      | 43761  | 0      |
| March-18 | 10    | A5     | 0      | 4       | 10929  | 51    | 121358 | 201209 | 74454  | 34616  | 0      |
| March-18 | 10    | A6     | 0      | 0       | 0      | 0     | 997    | 140224 | 190901 | 133545 | 44712  |
| May-18   | 2     | A1     | 222067 | 364540  | 846149 | 7     | 58199  | 0      | 0      | 40427  | 0      |
| May-18   | 2     | A2     | 1086   | 644385  | 77605  | 1016  | 43330  | 714    | 0      | 32713  | 0      |
| May-18   | 2     | A3     | 21     | 27      | 6530   | 2221  | 153072 | 50859  | 0      | 127958 | 0      |
| May-18   | 2     | A4     | 607    | 2821    | 40519  | 19283 | 26733  | 71     | 0      | 97163  | 0      |
| May-18   | 2     | A5     | 0      | 0       | 308    | 24    | 77459  | 245113 | 58444  | 30068  | 8444   |



**Supplementary Table S1. *Cont.***

| Month    | Depth | Source | A1    | A2     | A3     | A4    | A5      | A6      | A7     | A8    | A9    |
|----------|-------|--------|-------|--------|--------|-------|---------|---------|--------|-------|-------|
| May-18   | 2     | A6     | 0     | 0      | 0      | 0     | 480     | 200570  | 304517 | 28    | 12710 |
| May-18   | 6     | A1     | 23667 | 108029 | 86377  | 0     | 105     | 0       | 0      | 60    | 0     |
| May-18   | 6     | A2     | 6631  | 612317 | 151419 | 279   | 22707   | 8       | 0      | 12283 | 0     |
| May-18   | 6     | A3     | 582   | 2477   | 106615 | 1896  | 209186  | 3384    | 0      | 61497 | 0     |
| May-18   | 6     | A4     | 5093  | 4722   | 66097  | 43221 | 39067   | 0       | 0      | 49092 | 0     |
| May-18   | 6     | A5     | 0     | 0      | 1313   | 38    | 147401  | 182331  | 60644  | 28429 | 10501 |
| May-18   | 6     | A6     | 0     | 0      | 0      | 0     | 3169    | 157854  | 321612 | 2371  | 30536 |
| May-18   | 10    | A1     | 46408 | 166420 | 6026   | 0     | 0       | 0       | 0      | 0     | 0     |
| May-18   | 10    | A2     | 25509 | 623554 | 136896 | 273   | 11193   | 0       | 0      | 8901  | 0     |
| May-18   | 10    | A3     | 12621 | 7619   | 160949 | 7112  | 161420  | 2054    | 0      | 50341 | 0     |
| May-18   | 10    | A4     | 10376 | 4242   | 48350  | 74284 | 24802   | 0       | 0      | 45248 | 0     |
| May-18   | 10    | A5     | 0     | 27     | 8745   | 144   | 208530  | 149855  | 55384  | 18605 | 3716  |
| May-18   | 10    | A6     | 0     | 0      | 0      | 0     | 15804   | 136257  | 332383 | 5967  | 22526 |
| April-17 | 2     | A1     | 26099 | 192776 | 5      | 0     | 0       | 0       | 0      | 0     | 0     |
| April-17 | 2     | A2     | 17003 | 750908 | 37791  | 0     | 554     | 0       | 0      | 0     | 0     |
| April-17 | 2     | A3     | 10238 | 83529  | 195760 | 7     | 108882  | 4       | 0      | 4423  | 0     |
| April-17 | 2     | A4     | 9218  | 99242  | 87167  | 9372  | 2175    | 0       | 0      | 0     | 0     |
| April-17 | 2     | A5     | 6     | 288    | 45160  | 0     | 268030  | 123930  | 0      | 11525 | 0     |
| April-17 | 2     | A6     | 0     | 84     | 5497   | 0     | 27208   | 248529  | 215146 | 20002 | 79    |
| April-17 | 6     | A1     | 34449 | 182615 | 1751   | 0     | 0       | 0       | 0      | 0     | 0     |
| April-17 | 6     | A2     | 35063 | 670324 | 95421  | 0     | 4173    | 0       | 0      | 1030  | 0     |
| April-17 | 6     | A3     | 9793  | 64969  | 191962 | 89    | 116074  | 0       | 0      | 20156 | 0     |
| April-17 | 6     | A4     | 15239 | 80130  | 68299  | 34740 | 7603    | 0       | 0      | 1287  | 0     |
| April-17 | 6     | A5     | 0     | 684    | 31305  | 19    | 276269  | 111219  | 0      | 19872 | 0     |
| April-17 | 6     | A6     | 0     | 230    | 6783   | 359   | 9505    | 190240  | 275998 | 15137 | 8067  |
| April-17 | 10    | A1     | 61903 | 155532 | 1423   | 0     | 0       | 0       | 0      | 0     | 0     |
| April-17 | 10    | A2     | 35933 | 641770 | 119953 | 0     | 7112    | 0       | 0      | 1250  | 0     |
| April-17 | 10    | A3     | 13481 | 54078  | 214237 | 452   | 100625  | 0       | 0      | 20072 | 0     |
| April-17 | 10    | A4     | 19896 | 52495  | 53508  | 55241 | 20425   | 0       | 0      | 5669  | 0     |
| April-17 | 10    | A5     | 45    | 753    | 22638  | 70    | 257749  | 105018  | 131    | 57193 | 12    |
| April-17 | 10    | A6     | 0     | 0      | 2565   | 8826  | 3992    | 207049  | 276236 | 2850  | 13695 |
| March-17 | 2     | A1     | 25765 | 181902 | 11181  | 0     | 0       | 0       | 0      | 0     | 0     |
| March-17 | 2     | A2     | 38    | 660790 | 93659  | 0     | 43878   | 4787    | 0      | 3226  | 0     |
| March-17 | 2     | A3     | 0     | 3660   | 69821  | 108   | 246761  | 57066   | 192    | 25589 | 0     |
| March-17 | 2     | A4     | 0     | 7911   | 89876  | 8834  | 60733   | 3816    | 0      | 36171 | 0     |
| March-17 | 2     | A5     | 0     | 0      | 3485   | 0     | 89893   | 281751  | 73162  | 301   | 52    |
| March-17 | 2     | A6     | 0     | 0      | 0      | 0     | 1723    | 155644  | 360133 | 0     | 48    |
| March-17 | 6     | A1     | 11228 | 205227 | 2416   | 0     | 0       | 0       | 0      | 0     | 0     |
| March-17 | 6     | A2     | 17    | 659596 | 122031 | 39    | 22557   | 739     | 0      | 1317  | 0     |
| March-17 | 6     | A3     | 1     | 13873  | 156128 | 511   | 197225  | 18300   | 192    | 16943 | 0     |
| March-17 | 6     | A4     | 15    | 25563  | 89939  | 29200 | 40680   | 91      | 0      | 21822 | 0     |
| March-17 | 6     | A5     | 0     | 123    | 137776 | 15    | 1186041 | 1208611 | 600453 | 7312  | 61    |
| March-17 | 6     | A6     | 0     | 0      | 0      | 0     | 12132   | 128315  | 368564 | 1033  | 6850  |
| March-17 | 10    | A1     | 63760 | 118099 | 36727  | 0     | 43      | 0       | 0      | 3     | 0     |
| March-17 | 10    | A2     | 2983  | 647408 | 147291 | 7     | 7759    | 0       | 0      | 832   | 0     |
| March-17 | 10    | A3     | 356   | 20823  | 229174 | 333   | 133285  | 5388    | 0      | 13774 | 0     |
| March-17 | 10    | A4     | 308   | 22370  | 80646  | 57370 | 28543   | 0       | 0      | 18040 | 0     |
| March-17 | 10    | A5     | 0     | 444    | 22794  | 0     | 133383  | 151952  | 130499 | 8554  | 227   |
| March-17 | 10    | A6     | 0     | 0      | 0      | 0     | 8468    | 82515   | 393227 | 14611 | 9329  |
| May-17   | 2     | A1     | 130   | 117404 | 62670  | 0     | 38253   | 0       | 0      | 383   | 0     |
| May-17   | 2     | A2     | 89    | 473736 | 139136 | 0     | 176585  | 14231   | 0      | 2456  | 0     |

**Supplementary Table S1. *Cont.***

| Month  | Depth | Source | A1    | A2     | A3     | A4    | A5     | A6     | A7     | A8    | A9    |
|--------|-------|--------|-------|--------|--------|-------|--------|--------|--------|-------|-------|
| May-17 | 2     | A3     | 26    | 3118   | 58388  | 1234  | 202558 | 116580 | 3325   | 17568 | 0     |
| May-17 | 2     | A4     | 344   | 4164   | 44405  | 11505 | 124274 | 0      | 0      | 22636 | 0     |
| May-17 | 2     | A5     | 0     | 0      | 1190   | 0     | 27417  | 195387 | 222211 | 153   | 0     |
| May-17 | 2     | A6     | 0     | 0      | 0      | 0     | 883    | 86780  | 388931 | 597   | 40454 |
| May-17 | 6     | A1     | 18019 | 147918 | 44161  | 0     | 8619   | 0      | 0      | 138   | 0     |
| May-17 | 6     | A2     | 1691  | 650350 | 117874 | 0     | 35530  | 24     | 0      | 491   | 0     |
| May-17 | 6     | A3     | 567   | 14092  | 122372 | 1205  | 194151 | 48494  | 960    | 21269 | 0     |
| May-17 | 6     | A4     | 1987  | 10104  | 71068  | 37830 | 71463  | 0      | 0      | 14851 | 0     |
| May-17 | 6     | A5     | 0     | 0      | 7835   | 0     | 83320  | 215740 | 133687 | 3967  | 0     |
| May-17 | 6     | A6     | 0     | 0      | 0      | 0     | 549    | 191434 | 305540 | 1477  | 17640 |
| May-17 | 10    | A1     | 63484 | 131442 | 19664  | 0     | 4043   | 0      | 0      | 220   | 0     |
| May-17 | 10    | A2     | 2282  | 625119 | 152492 | 0     | 25571  | 0      | 0      | 659   | 0     |
| May-17 | 10    | A3     | 377   | 31635  | 158808 | 4763  | 167255 | 15589  | 0      | 24647 | 0     |
| May-17 | 10    | A4     | 1037  | 20023  | 56802  | 68339 | 50720  | 0      | 0      | 10329 | 0     |
| May-17 | 10    | A5     | 0     | 0      | 8860   | 0     | 188294 | 193999 | 40527  | 10231 | 0     |
| May-17 | 10    | A6     | 0     | 0      | 0      | 0     | 23303  | 208454 | 242381 | 21243 | 11386 |

**Supplementary Table S2.** Mean and standard deviation calculation for the particles connectivity between source and destination area. The particle accumulations from Single day release setup, where the accumulation for each source regions have been averaged for March, April, and May at 2 m, 6 m, and 10 m depth for the years 2021 to 2017; 30-day release and 45-day release with beginning points on 1<sup>st</sup> March, 1<sup>st</sup> April, and 1<sup>st</sup> May 2021 (Mean  $\pm$ Standard error).

| Simulation | Year | Source/<br>Target area | A1             | A2             | A3             | A4             | A5             | A6             | A7              | A8             | A9             |
|------------|------|------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|
|            |      |                        |                |                |                |                |                |                |                 |                |                |
| 30-day     | 2021 | A1                     | 81.7 $\pm$ 3.2 | 16.6 $\pm$ 2.7 | 1.6 $\pm$ 0.5  | 0              | 0.1 $\pm$ 0.1  | 0              | 0               | 0              | 0              |
| 30-day     | 2021 | A2                     | 23.1 $\pm$ 2.9 | 62.7 $\pm$ 3.9 | 12.0 $\pm$ 1.1 | 0.1 $\pm$ 0.1  | 1.4 $\pm$ 0.3  | 0              | 0               | 0.6 $\pm$ 0.2  | 0              |
| 30-day     | 2021 | A3                     | 31.0 $\pm$ 5.0 | 8.8 $\pm$ 0.7  | 21.1 $\pm$ 3.0 | 2.1 $\pm$ 0.5  | 16.8 $\pm$ 2.8 | 3.5 $\pm$ 0.6  | 0.3 $\pm$ 0.2   | 16.2 $\pm$ 5.9 | 0.3 $\pm$ 0.2  |
| 30-day     | 2021 | A4                     | 17.3 $\pm$ 3.3 | 5.1 $\pm$ 1.3  | 6.0 $\pm$ 1.0  | 26.5 $\pm$ 4.6 | 3.3 $\pm$ 1.1  | 5.3 $\pm$ 2.5  | 1.7 $\pm$ 0.9   | 34.8 $\pm$ 6.3 | 0              |
| 30-day     | 2021 | A5                     | 0.3 $\pm$ 0.1  | 0.3 $\pm$ 0.1  | 2.5 $\pm$ 0.6  | 0.2 $\pm$ 0.0  | 22.7 $\pm$ 2.4 | 30.7 $\pm$ 2.1 | 20.9 $\pm$ 6.3  | 11.3 $\pm$ 3.2 | 11.2 $\pm$ 4.4 |
| 30-day     | 2021 | A6                     | 0              | 0              | 0              | 0              | 1.6 $\pm$ 0.2  | 16.1 $\pm$ 1.5 | 43.8 $\pm$ 10.5 | 4.2 $\pm$ 1.1  | 34.4 $\pm$ 9.6 |
| 30-day     | 2020 | A1                     | 72.3 $\pm$ 5.8 | 18.0 $\pm$ 3.2 | 5.9 $\pm$ 2.8  | 0.3 $\pm$ 0.1  | 1.7 $\pm$ 0.5  | 0              | 0               | 1.8 $\pm$ 0.6  | 0              |
| 30-day     | 2020 | A2                     | 16.7 $\pm$ 2.9 | 61.2 $\pm$ 2.2 | 14.9 $\pm$ 1.4 | 0.3 $\pm$ 0.2  | 2.8 $\pm$ 0.7  | 0.5 $\pm$ 0.2  | 0.5 $\pm$ 0.2   | 3.1 $\pm$ 1.2  | 0              |
| 30-day     | 2020 | A3                     | 10.8 $\pm$ 3.2 | 4.8 $\pm$ 1.7  | 20.3 $\pm$ 4.7 | 1.8 $\pm$ 0.7  | 18.4 $\pm$ 2.5 | 16.3 $\pm$ 4.2 | 12.9 $\pm$ 6.6  | 13.4 $\pm$ 3.0 | 1.3 $\pm$ 0.8  |
| 30-day     | 2020 | A4                     | 5.1 $\pm$ 1.1  | 4.2 $\pm$ 1.6  | 7.7 $\pm$ 1.7  | 23.5 $\pm$ 5.9 | 12.8 $\pm$ 3.4 | 10.7 $\pm$ 2.9 | 4.6 $\pm$ 2.4   | 29.4 $\pm$ 3.7 | 1.9 $\pm$ 1.3  |
| 30-day     | 2020 | A5                     | 0              | 0.2 $\pm$ 0.1  | 0.9 $\pm$ 0.3  | 0              | 18.5 $\pm$ 2.7 | 33.5 $\pm$ 6.4 | 42.6 $\pm$ 8.8  | 1.7 $\pm$ 0.2  | 2.6 $\pm$ 1.3  |
| 30-day     | 2020 | A6                     | 0              | 0              | 0              | 0              | 1.0 $\pm$ 0.3  | 22.1 $\pm$ 2.8 | 62.9 $\pm$ 6.0  | 0.6 $\pm$ 0.2  | 13.4 $\pm$ 3.5 |
| 30-day     | 2019 | A1                     | 63.0 $\pm$ 7.9 | 22.8 $\pm$ 6.9 | 7.4 $\pm$ 3.3  | 0.1 $\pm$ 0.1  | 4.7 $\pm$ 2.7  | 0.6 $\pm$ 0.6  | 0               | 1.4 $\pm$ 0.8  | 0              |
| 30-day     | 2019 | A2                     | 15.2 $\pm$ 4.6 | 68.9 $\pm$ 4.1 | 8.5 $\pm$ 1.5  | 0.3 $\pm$ 0.1  | 3.8 $\pm$ 1.9  | 1.5 $\pm$ 0.9  | 0.3 $\pm$ 0.3   | 1.4 $\pm$ 0.7  | 0              |
| 30-day     | 2019 | A3                     | 19.3 $\pm$ 7.2 | 5.6 $\pm$ 2.5  | 23.3 $\pm$ 4.5 | 2.2 $\pm$ 0.8  | 25.1 $\pm$ 3.4 | 14.7 $\pm$ 6.4 | 3.4 $\pm$ 2.3   | 6.3 $\pm$ 1.4  | 0.1 $\pm$ 0.1  |
| 30-day     | 2019 | A4                     | 14.7 $\pm$ 7.0 | 5.7 $\pm$ 2.8  | 13.7 $\pm$ 3.7 | 20.0 $\pm$ 5.0 | 17.5 $\pm$ 3.2 | 10.7 $\pm$ 6.3 | 0.4 $\pm$ 0.2   | 17.3 $\pm$ 3.2 | 0              |
| 30-day     | 2019 | A5                     | 0.2 $\pm$ 0.1  | 0.1 $\pm$ 0.0  | 3.6 $\pm$ 1.0  | 0.2 $\pm$ 0.1  | 30.2 $\pm$ 3.8 | 27.8 $\pm$ 3.4 | 29.3 $\pm$ 8.3  | 5.3 $\pm$ 2.0  | 3.3 $\pm$ 1.5  |
| 30-day     | 2019 | A6                     | 0              | 0              | 0              | 0              | 1.8 $\pm$ 0.5  | 22.1 $\pm$ 4.8 | 50.6 $\pm$ 12.2 | 5.2 $\pm$ 2.1  | 20.3 $\pm$ 6.0 |
| 30-day     | 2018 | A1                     | 15.2 $\pm$ 1.8 | 45.1 $\pm$ 6.2 | 27.6 $\pm$ 5.1 | 0.2 $\pm$ 0.1  | 8.4 $\pm$ 2.8  | 0              | 0               | 3.4 $\pm$ 1.6  | 0              |
| 30-day     | 2018 | A2                     | 0.5 $\pm$ 0.3  | 62.6 $\pm$ 5.5 | 21.8 $\pm$ 2.9 | 0.2 $\pm$ 0.1  | 10.0 $\pm$ 3.1 | 0.9 $\pm$ 0.6  | 0               | 3.8 $\pm$ 1.1  | 0              |
| 30-day     | 2018 | A3                     | 0.4 $\pm$ 0.3  | 1.6 $\pm$ 0.4  | 26.3 $\pm$ 5.1 | 1.0 $\pm$ 0.3  | 38.3 $\pm$ 3.4 | 14.6 $\pm$ 5.1 | 0.7 $\pm$ 0.2   | 17.2 $\pm$ 3.5 | 0              |
| 30-day     | 2018 | A4                     | 0.9 $\pm$ 0.6  | 2.0 $\pm$ 0.3  | 31.2 $\pm$ 2.3 | 17.6 $\pm$ 3.4 | 26.9 $\pm$ 5.1 | 0.1 $\pm$ 0.1  | 0               | 21.4 $\pm$ 5.0 | 0              |
| 30-day     | 2018 | A5                     | 0              | 0              | 1.3 $\pm$ 0.3  | 0              | 23.8 $\pm$ 4.8 | 45.2 $\pm$ 3.0 | 22.5 $\pm$ 4.7  | 6.5 $\pm$ 1.9  | 0.7 $\pm$ 0.3  |
| 30-day     | 2018 | A6                     | 0              | 0              | 0              | 0              | 0.6 $\pm$ 0.3  | 27.1 $\pm$ 2.7 | 53.6 $\pm$ 5.1  | 9.4 $\pm$ 3.7  | 9.3 $\pm$ 2.5  |
| 30-day     | 2017 | A1                     | 15.5 $\pm$ 3.6 | 72.7 $\pm$ 5.0 | 9.1 $\pm$ 3.5  | 0              | 2.6 $\pm$ 1.9  | 0              | 0               | 0              | 0              |
| 30-day     | 2017 | A2                     | 1.3 $\pm$ 0.6  | 79.6 $\pm$ 3.0 | 14.1 $\pm$ 1.5 | 0              | 4.5 $\pm$ 2.3  | 0.3 $\pm$ 0.2  | 0               | 0.2 $\pm$ 0.0  | 0              |
| 30-day     | 2017 | A3                     | 1.0 $\pm$ 0.5  | 8.0 $\pm$ 2.4  | 38.5 $\pm$ 5.0 | 0.2 $\pm$ 0.1  | 40.4 $\pm$ 4.2 | 7.2 $\pm$ 3.2  | 0.1 $\pm$ 0.1   | 4.5 $\pm$ 0.5  | 0              |
| 30-day     | 2017 | A4                     | 2.6 $\pm$ 1.2  | 17.3 $\pm$ 5.5 | 34.4 $\pm$ 2.7 | 16.7 $\pm$ 3.6 | 21.8 $\pm$ 6.1 | 0.2 $\pm$ 0.2  | 0               | 7.0 $\pm$ 1.9  | 0              |
| 30-day     | 2017 | A5                     | 0              | 1.4 $\pm$ 1.4  | 8.4 $\pm$ 4.5  | 1.6 $\pm$ 1.6  | 35.3 $\pm$ 7.0 | 34.4 $\pm$ 6.0 | 14.9 $\pm$ 6.0  | 4.0 $\pm$ 1.5  | 0              |
| 30-day     | 2017 | A6                     | 0              | 0              | 0.3 $\pm$ 0.2  | 0.2 $\pm$ 0.2  | 1.9 $\pm$ 0.6  | 32.4 $\pm$ 3.7 | 61.1 $\pm$ 4.2  | 1.7 $\pm$ 0.6  | 2.3 $\pm$ 0.8  |
| 45-day     | 2021 | A1                     | 83.3 $\pm$ 3.7 | 13.2 $\pm$ 2.9 | 2.7 $\pm$ 0.9  | 0              | 0.4 $\pm$ 0.1  | 0              | 0               | 0.4 $\pm$ 0.2  | 0              |
| 45-day     | 2021 | A2                     | 34.9 $\pm$ 5.2 | 47.6 $\pm$ 4.2 | 10.7 $\pm$ 2.0 | 0.1 $\pm$ 0.0  | 3.1 $\pm$ 0.8  | 0.5 $\pm$ 0.3  | 0               | 3.0 $\pm$ 1.1  | 0              |
| 45-day     | 2021 | A3                     | 40.7 $\pm$ 6.6 | 5.9 $\pm$ 0.8  | 11.4 $\pm$ 2.2 | 1.5 $\pm$ 0.6  | 10.0 $\pm$ 1.2 | 13.0 $\pm$ 4.7 | 2.6 $\pm$ 1.3   | 11.8 $\pm$ 1.5 | 3.2 $\pm$ 1.0  |
| 45-day     | 2021 | A4                     | 23.6 $\pm$ 4.7 | 2.1 $\pm$ 0.4  | 3.4 $\pm$ 0.6  | 19.3 $\pm$ 4.3 | 1.6 $\pm$ 0.3  | 11.8 $\pm$ 4.3 | 3.3 $\pm$ 1.4   | 30.1 $\pm$ 2.9 | 4.8 $\pm$ 1.0  |
| 45-day     | 2021 | A5                     | 1.0 $\pm$ 0.3  | 0.3 $\pm$ 0.1  | 1.2 $\pm$ 0.3  | 0.1 $\pm$ 0.0  | 14.9 $\pm$ 2.6 | 20.1 $\pm$ 2.0 | 32.3 $\pm$ 6.3  | 8.0 $\pm$ 1.6  | 22.1 $\pm$ 6.7 |
| 45-day     | 2021 | A6                     | 0              | 0              | 0              | 0              | 1.1 $\pm$ 0.5  | 18.8 $\pm$ 2.5 | 65.0 $\pm$ 6.4  | 4.2 $\pm$ 1.5  | 10.9 $\pm$ 3.5 |
| 45-day     | 2020 | A1                     | 79.5 $\pm$ 5.0 | 14.4 $\pm$ 3.8 | 2.6 $\pm$ 1.5  | 0.4 $\pm$ 0.2  | 1.7 $\pm$ 0.7  | 0              | 0               | 1.5 $\pm$ 0.6  | 0              |
| 45-day     | 2020 | A2                     | 20.6 $\pm$ 2.3 | 56.1 $\pm$ 3.6 | 14.1 $\pm$ 2.7 | 0.5 $\pm$ 0.2  | 3.3 $\pm$ 0.9  | 1.5 $\pm$ 0.7  | 1.0 $\pm$ 0.6   | 2.6 $\pm$ 1.0  | 0.2 $\pm$ 0.2  |
| 45-day     | 2020 | A3                     | 14.9 $\pm$ 4.4 | 6.5 $\pm$ 2.0  | 12.4 $\pm$ 3.4 | 2.3 $\pm$ 0.7  | 10.8 $\pm$ 1.9 | 15.7 $\pm$ 1.9 | 18.4 $\pm$ 9.1  | 12.3 $\pm$ 2.6 | 6.8 $\pm$ 4.3  |
| 45-day     | 2020 | A4                     | 10.0 $\pm$ 2.4 | 2.5 $\pm$ 1.0  | 5.6 $\pm$ 1.6  | 19.8 $\pm$ 5.0 | 7.1 $\pm$ 1.3  | 13.9 $\pm$ 3.3 | 8.4 $\pm$ 4.7   | 25.9 $\pm$ 5.1 | 6.7 $\pm$ 3.2  |
| 45-day     | 2020 | A5                     | 0.2 $\pm$ 0.1  | 0.1 $\pm$ 0.0  | 0.5 $\pm$ 0.2  | 0.1 $\pm$ 0.0  | 13.5 $\pm$ 2.1 | 26.5 $\pm$ 5.0 | 46.8 $\pm$ 9.6  | 4.7 $\pm$ 1.3  | 7.6 $\pm$ 4.1  |
| 45-day     | 2020 | A6                     | 0 $\pm$ 0.1    | 0              | 0 $\pm$ 0.2    | 0              | 1.2 $\pm$ 2.1  | 14.8 $\pm$ 5.0 | 58.9 $\pm$ 9.6  | 2.3 $\pm$ 1.3  | 22.8 $\pm$ 4.1 |
| 45-day     | 2019 | A1                     | 51.3 $\pm$ 0.0 | 29.5 $\pm$ 0.0 | 8.2 $\pm$ 0.0  | 0.4 $\pm$ 0.0  | 5.4 $\pm$ 0.3  | 0.5 $\pm$ 1.7  | 0 $\pm$ 7.5     | 4.3 $\pm$ 0.9  | 0.4 $\pm$ 6.2  |
| 45-day     | 2019 | A2                     | 8.4 $\pm$ 9.4  | 68.0 $\pm$ 8.9 | 12.0 $\pm$ 2.5 | 0.3 $\pm$ 0.3  | 4.9 $\pm$ 2.1  | 1.5 $\pm$ 0.5  | 0.1 $\pm$ 0.0   | 4.2 $\pm$ 2.5  | 0.6 $\pm$ 0.4  |
| 45-day     | 2019 | A3                     | 5.8 $\pm$ 4.0  | 17.8 $\pm$ 3.9 | 21.9 $\pm$ 2.3 | 1.1 $\pm$ 0.1  | 17.9 $\pm$ 1.3 | 18.4 $\pm$ 0.9 | 1.8 $\pm$ 0.1   | 11.8 $\pm$ 1.6 | 3.6 $\pm$ 0.5  |
| 45-day     | 2019 | A4                     | 6.3 $\pm$ 2.1  | 10.5 $\pm$ 7.3 | 22.3 $\pm$ 8.3 | 7.5 $\pm$ 0.5  | 18.7 $\pm$ 3.6 | 11.7 $\pm$ 5.3 | 0.1 $\pm$ 0.9   | 16.0 $\pm$ 2.1 | 6.8 $\pm$ 2.6  |
| 45-day     | 2019 | A5                     | 0.1 $\pm$ 2.1  | 0.3 $\pm$ 5.0  | 1.3 $\pm$ 7.7  | 0.1 $\pm$ 3.1  | 21.7 $\pm$ 3.8 | 35.8 $\pm$ 3.8 | 28.8 $\pm$ 0.1  | 5.6 $\pm$ 2.9  | 6.3 $\pm$ 4.7  |
| 45-day     | 2019 | A6                     | 0              | 0 $\pm$ 0.1    | 0 $\pm$ 0.3    | 0              | 1.3 $\pm$ 4.3  | 19.2 $\pm$ 4.1 | 46.6 $\pm$ 6.7  | 3.7 $\pm$ 1.2  | 29.1 $\pm$ 2.3 |
| 45-day     | 2018 | A1                     | 12.7 $\pm$ 0.0 | 28.0 $\pm$ 0.0 | 33.0 $\pm$ 0.0 | 0.7 $\pm$ 0.0  | 15.3 $\pm$ 0.5 | 0.9 $\pm$ 3.5  | 0 $\pm$ 11.3    | 9.4 $\pm$ 1.2  | 0 $\pm$ 7.6    |
| 45-day     | 2018 | A2                     | 0.6 $\pm$ 3.8  | 53.1 $\pm$ 5.0 | 19.4 $\pm$ 7.3 | 0.8 $\pm$ 0.4  | 13.0 $\pm$ 5.6 | 3.1 $\pm$ 0.8  | 0               | 9.9 $\pm$ 5.2  | 0              |
| 45-day     | 2018 | A3                     | 0.1 $\pm$ 0.4  | 1.8 $\pm$ 7.2  | 19.4 $\pm$ 2.7 | 1.2 $\pm$ 0.5  | 27.3 $\pm$ 3.7 | 25.5 $\pm$ 1.6 | 2.5 $\pm$ 0.0   | 21.8 $\pm$ 5.3 | 0.4 $\pm$ 0.0  |

**Supplementary Table S2. Cont.**

| Simulation | Year | Source/     |  | A1        | A2        | A3        | A4        | A5        | A6        | A7         | A8        | A9        |
|------------|------|-------------|--|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|-----------|
|            |      | Target area |  |           |           |           |           |           |           |            |           |           |
| 45-day     | 2018 | A4          |  | 0.9 ±0.5  | 2.1 ±0.8  | 25.8 ±3.8 | 11.3 ±2.3 | 28.3 ±5.6 | 6.7 ±2.7  | 0          | 24.9 ±5.3 | 0         |
| 45-day     | 2018 | A5          |  | 0         | 0         | 1.3 ±0.5  | 0         | 16.6 ±3.2 | 37.8 ±4.3 | 30.5 ±8.8  | 10.0 ±3.7 | 3.8 ±2.0  |
| 45-day     | 2018 | A6          |  | 0         | 0         | 0         | 0         | 0.3 ±0.2  | 19.2 ±3.4 | 54.5 ±10.3 | 12.4 ±4.5 | 13.6 ±4.0 |
| 45-day     | 2017 | A1          |  | 16.1 ±4.5 | 46.2 ±7.3 | 29.5 ±7.9 | 1.1 ±1.1  | 6.0 ±4.3  | 0         | 0          | 1.0 ±0.6  | 0         |
| 45-day     | 2017 | A2          |  | 1.6 ±0.4  | 57.0 ±7.0 | 28.4 ±4.4 | 0.5 ±0.5  | 10.6 ±6.6 | 0.3 ±0.2  | 0          | 1.6 ±0.7  | 0         |
| 45-day     | 2017 | A3          |  | 1.2 ±0.3  | 5.7 ±1.6  | 31.7 ±4.7 | 1.3 ±0.8  | 39.4 ±5.8 | 10.3 ±3.2 | 0.6 ±0.2   | 9.8 ±4.7  | 0         |
| 45-day     | 2017 | A4          |  | 4.1 ±1.0  | 11.2 ±2.2 | 34.8 ±4.0 | 8.9 ±3.1  | 30.6 ±7.9 | 0.9 ±0.6  | 0          | 9.6 ±3.2  | 0         |
| 45-day     | 2017 | A5          |  | 0         | 0.1 ±0.0  | 2.7 ±0.6  | 0.1 ±0.1  | 22.4 ±4.5 | 40.4 ±5.4 | 28.2 ±8.3  | 5.9 ±2.8  | 0.2 ±0.1  |
| 45-day     | 2017 | A6          |  | 0         | 0         | 0.2 ±0.1  | 0         | 0.6 ±0.2  | 22.9 ±3.8 | 65.8 ±6.5  | 6.1 ±2.5  | 4.4 ±1.4  |

**Supplementary Table S3.** Mean and standard deviation calculation for the particles connectivity between source and destination area. The data obtained is from the “Single day” release set up. The table shows data averaged for March, April, and May at each different depth (2 m, 6 m, and 10 m) for year 2021 (Mean ±Standard error).

| Year | Target area | Source/ |  | A1         | A2        | A3        | A4        | A5        | A6        | A7         | A8         | A9         |
|------|-------------|---------|--|------------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|
|      |             | Depth   |  |            |           |           |           |           |           |            |            |            |
| 2021 | A1          | 2       |  | 84.6 ±6.1  | 13.3 ±4.8 | 1.8 ±1.1  | 0         | 0.3 ±0.3  | 0         | 0          | 0          | 0          |
| 2021 | A1          | 6       |  | 83.1 ±5.4  | 15.6 ±4.7 | 1.3 ±0.7  | 0         | 0         | 0         | 0          | 0          | 0          |
| 2021 | A1          | 10      |  | 77.3 ±6.4  | 20.8 ±5.5 | 1.8 ±0.9  | 0         | 0         | 0         | 0          | 0          | 0          |
| 2021 | A2          | 2       |  | 30.4 ±5.6  | 54.1 ±8.9 | 12.3 ±3.1 | 0.2 ±0.1  | 2.3 ±0.8  | 0         | 0          | 0.7 ±0.6   | 0          |
| 2021 | A2          | 6       |  | 21.5 ±4.3  | 64.5 ±5.9 | 12.3 ±2.3 | 0.1 ±0.1  | 1.0 ±0.1  | 0         | 0          | 0.7 ±0.6   | 0          |
| 2021 | A2          | 10      |  | 17.5 ±2.4  | 69.5 ±2.0 | 11.4 ±0.2 | 0.1 ±0.0  | 1.0 ±0.3  | 0         | 0          | 0.5 ±0.3   | 0          |
| 2021 | A3          | 2       |  | 32.9 ±12.9 | 7.4 ±1.0  | 20.0 ±9.6 | 1.5 ±0.9  | 15.4 ±5.5 | 3.1 ±0.5  | 0.4 ±0.3   | 18.6 ±14.8 | 0.7 ±0.6   |
| 2021 | A3          | 6       |  | 30.2 ±9.3  | 11.1 ±0.6 | 18.9 ±1.4 | 1.4 ±0.4  | 16.7 ±5.3 | 4.6 ±1.6  | 0.1 ±0.1   | 16.9 ±12.2 | 0.1 ±0.1   |
| 2021 | A3          | 10      |  | 29.9 ±6.6  | 7.9 ±0.9  | 24.3 ±2.7 | 3.4 ±0.9  | 18.3 ±5.9 | 2.7 ±0.9  | 0.3 ±0.3   | 13.0 ±6.2  | 0          |
| 2021 | A4          | 2       |  | 16.1 ±4.5  | 6.3 ±3.5  | 7.3 ±2.6  | 13.9 ±4.7 | 4.1 ±1.8  | 9.4 ±7.0  | 2.0 ±2.0   | 40.8 ±13.4 | 0.1 ±0.1   |
| 2021 | A4          | 6       |  | 16.1 ±4.5  | 6.3 ±3.5  | 7.3 ±2.6  | 13.9 ±4.7 | 4.1 ±1.8  | 9.4 ±7.0  | 2.0 ±2.0   | 40.8 ±13.4 | 0.1 ±0.1   |
| 2021 | A4          | 10      |  | 18.1 ±7.2  | 3.4 ±0.6  | 6.5 ±1.4  | 41.6 ±4.3 | 1.5 ±1.0  | 2.8 ±2.6  | 1.6 ±1.6   | 24.4 ±8.8  | 0          |
| 2021 | A5          | 2       |  | 0.3 ±0.2   | 0.3 ±0.1  | 3.5 ±1.7  | 0.2 ±0.1  | 16.1 ±3.1 | 28.3 ±5.8 | 19.9 ±11.1 | 13.9 ±8.0  | 17.5 ±12.2 |
| 2021 | A5          | 6       |  | 0.3 ±0.1   | 0.4 ±0.2  | 1.8 ±0.5  | 0.2 ±0.1  | 22.5 ±3.4 | 31.2 ±2.5 | 22.5 ±13.6 | 9.9 ±5.3   | 11.1 ±6.4  |
| 2021 | A5          | 10      |  | 0.3 ±0.2   | 0.2 ±0.1  | 2.3 ±0.3  | 0.2 ±0.1  | 29.3 ±2.5 | 32.5 ±3.3 | 20.1 ±13.2 | 10.1 ±5.1  | 5.0 ±2.7   |
| 2021 | A6          | 2       |  | 0          | 0         | 0         | 0         | 1.7 ±0.5  | 16.1 ±2.7 | 40.6 ±20.7 | 3.0 ±1.5   | 38.5 ±22.7 |
| 2021 | A6          | 6       |  | 0          | 0         | 0         | 0         | 1.2 ±0.1  | 17.0 ±3.3 | 43.0 ±21.8 | 3.8 ±1.9   | 35.0 ±19.1 |
| 2021 | A6          | 10      |  | 0          | 0         | 0         | 0         | 1.7 ±0.2  | 15.2 ±3.0 | 47.8 ±19.9 | 5.7 ±2.8   | 29.7 ±14.6 |

**Supplementary Table S4.** Mean and standard deviation calculation for the particle connectivity between the source and destination area for March, April, and May 2021, at 2 m, 6 m and 10 m. The particle accumulations from the Single day release setup, where the accumulation for each source regions have been averaged for one month release (March, April, and May) and 45-day release with beginning points on 1<sup>st</sup> March, 1<sup>st</sup> April, and 1<sup>st</sup> May.

| Simulation | Month  | Depth | Source/Target | A1   | A2   | A3   | A4   | A5   | A6   | A7   | A8   | A9   |
|------------|--------|-------|---------------|------|------|------|------|------|------|------|------|------|
| 30-day     | Mar-21 | 2     | A1            | 93.0 | 6.4  | 0.2  | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | Mar-21 | 2     | A2            | 27.0 | 64.0 | 7.3  | 0    | 1.5  | 0    | 0    | 0    | 0    |
| 30-day     | Mar-21 | 2     | A3            | 24.0 | 6.1  | 39.0 | 0    | 26.0 | 2.1  | 1.1  | 1.6  | 0    |
| 30-day     | Mar-21 | 2     | A4            | 22.0 | 3.2  | 4.1  | 4.9  | 7.5  | 23.2 | 5.9  | 29.0 | 0.1  |
| 30-day     | Mar-21 | 2     | A5            | 0.2  | 0.3  | 6.8  | 0    | 22.0 | 31.9 | 38.2 | 0.4  | 0    |
| 30-day     | Mar-21 | 2     | A6            | 0    | 0    | 0    | 0    | 2.6  | 19.3 | 74.5 | 0    | 3.6  |
| 30-day     | Mar-21 | 6     | A1            | 92.0 | 7.5  | 0.1  | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | Mar-21 | 6     | A2            | 23.0 | 66.0 | 11.0 | 0    | 0.8  | 0.1  | 0    | 0.1  | 0    |
| 30-day     | Mar-21 | 6     | A3            | 31.0 | 11.0 | 21.0 | 0.6  | 27.0 | 7.0  | 0.4  | 2.3  | 0    |
| 30-day     | Mar-21 | 6     | A4            | 25.0 | 3.9  | 2.6  | 17.0 | 10.0 | 9.1  | 4.3  | 28.0 | 0.1  |
| 30-day     | Mar-21 | 6     | A5            | 0.4  | 0.4  | 2.3  | 0    | 20.0 | 29.2 | 47.2 | 0.4  | 0.1  |
| 30-day     | Mar-21 | 6     | A6            | 0    | 0    | 0    | 0    | 1.2  | 11.9 | 83.5 | 0    | 3.4  |
| 30-day     | Mar-21 | 10    | A1            | 90.0 | 10.0 | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | Mar-21 | 10    | A2            | 17.0 | 69.0 | 12.0 | 0    | 1.4  | 0    | 0    | 0.3  | 0    |
| 30-day     | Mar-21 | 10    | A3            | 28.0 | 9.6  | 19.0 | 3.2  | 30.0 | 4.0  | 1.0  | 5.0  | 0    |
| 30-day     | Mar-21 | 10    | A4            | 23.0 | 4.5  | 9.2  | 33.0 | 3.6  | 8.0  | 4.9  | 14.0 | 0    |
| 30-day     | Mar-21 | 10    | A5            | 0.2  | 0.2  | 2.8  | 0.1  | 25.0 | 25.8 | 44.9 | 1.1  | 0    |
| 30-day     | Mar-21 | 10    | A6            | 0    | 0    | 0    | 0    | 2.0  | 10.3 | 83.5 | 0.1  | 4.2  |
| 30-day     | Apr-21 | 2     | A1            | 73.0 | 22.0 | 3.8  | 0    | 0.9  | 0    | 0    | 0    | 0    |
| 30-day     | Apr-21 | 2     | A2            | 41.0 | 36.0 | 18.0 | 0.2  | 3.9  | 0    | 0    | 0.3  | 0    |
| 30-day     | Apr-21 | 2     | A3            | 58.0 | 9.3  | 13.0 | 1.5  | 7.6  | 3.6  | 0.1  | 6.0  | 0.2  |
| 30-day     | Apr-21 | 2     | A4            | 19.0 | 13.0 | 12.0 | 21.0 | 3.3  | 5.1  | 0    | 26.0 | 0.2  |
| 30-day     | Apr-21 | 2     | A5            | 0.6  | 0.5  | 2.9  | 0.2  | 13.0 | 36.1 | 21.6 | 13.0 | 12.0 |
| 30-day     | Apr-21 | 2     | A6            | 0    | 0    | 0    | 0    | 1.8  | 18.2 | 44.4 | 4.8  | 31.0 |
| 30-day     | Apr-21 | 6     | A1            | 74.0 | 24.0 | 2.5  | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | Apr-21 | 6     | A2            | 28.0 | 54.0 | 17.0 | 0.2  | 1.0  | 0    | 0    | 0.2  | 0    |
| 30-day     | Apr-21 | 6     | A3            | 46.0 | 12.0 | 19.0 | 1.7  | 8.7  | 5.2  | 0    | 7.2  | 0    |
| 30-day     | Apr-21 | 6     | A4            | 25.0 | 10.0 | 6.1  | 27.0 | 1.4  | 2.3  | 0    | 28.0 | 0    |
| 30-day     | Apr-21 | 6     | A5            | 0.4  | 0.7  | 2.2  | 0.4  | 18.0 | 36.2 | 20.4 | 10.0 | 11.0 |
| 30-day     | Apr-21 | 6     | A6            | 0    | 0    | 0    | 0    | 1.5  | 23.3 | 36.5 | 6.2  | 33.0 |
| 30-day     | Apr-21 | 10    | A1            | 74.0 | 23.0 | 2.5  | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | Apr-21 | 10    | A2            | 22.0 | 66.0 | 12.0 | 0.1  | 0.4  | 0    | 0    | 0.1  | 0    |
| 30-day     | Apr-21 | 10    | A3            | 42.0 | 7.3  | 26.0 | 2.1  | 11.0 | 3.2  | 0    | 8.9  | 0    |
| 30-day     | Apr-21 | 10    | A4            | 27.0 | 3.5  | 4.8  | 46.0 | 0.5  | 0.3  | 0    | 18.0 | 0    |
| 30-day     | Apr-21 | 10    | A5            | 0.8  | 0.2  | 2.3  | 0.3  | 29.0 | 35.9 | 15.3 | 10.0 | 5.6  |
| 30-day     | Apr-21 | 10    | A6            | 0    | 0    | 0    | 0    | 1.8  | 14.5 | 45.0 | 8.5  | 30.0 |
| 30-day     | May-21 | 2     | A1            | 88.0 | 11.0 | 1.3  | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | May-21 | 2     | A2            | 23.0 | 62.0 | 12.0 | 0.5  | 1.4  | 0    | 0    | 1.8  | 0    |
| 30-day     | May-21 | 2     | A3            | 16.0 | 6.7  | 7.7  | 3.1  | 12.0 | 3.7  | 0    | 48.0 | 1.9  |
| 30-day     | May-21 | 2     | A4            | 7.3  | 2.4  | 5.3  | 16.0 | 1.5  | 0    | 0    | 68.0 | 0    |
| 30-day     | May-21 | 2     | A5            | 0    | 0.1  | 0.8  | 0.3  | 13.0 | 17.0 | 0    | 28.0 | 41.0 |
| 30-day     | May-21 | 2     | A6            | 0    | 0    | 0    | 0    | 0.8  | 10.8 | 3.0  | 4.2  | 81.0 |
| 30-day     | May-21 | 6     | A1            | 83.0 | 15.0 | 1.3  | 0    | 0    | 0    | 0    | 0    | 0    |
| 30-day     | May-21 | 6     | A2            | 14.0 | 74.0 | 9.4  | 0.1  | 1.1  | 0    | 0    | 1.8  | 0    |
| 30-day     | May-21 | 6     | A3            | 14.0 | 10.0 | 16.0 | 1.8  | 15.0 | 1.6  | 0    | 41.0 | 0.3  |

**Supplementary Table S4. Cont.**

| Simulation | Month  | Depth | Source/Target | A1   | A2   | A3   | A4   | A5   | A6   | A7   | A8   | A9   |
|------------|--------|-------|---------------|------|------|------|------|------|------|------|------|------|
| 30-day     | May-21 | 6     | A4            | 2.5  | 2.7  | 3.7  | 28.0 | 1.0  | 0    | 0    | 62.0 | 0    |
| 30-day     | May-21 | 6     | A5            | 0    | 0.1  | 1.0  | 0.2  | 29.0 | 28.3 | 0    | 19.0 | 22.0 |
| 30-day     | May-21 | 6     | A6            | 0    | 0    | 0    | 0    | 1.1  | 15.7 | 8.9  | 5.1  | 69.0 |
| 30-day     | May-21 | 10    | A1            | 68.0 | 29.0 | 3.1  | 0    | 0.1  | 0    | 0    | 0    | 0    |
| 30-day     | May-21 | 10    | A2            | 13.0 | 73.0 | 11.0 | 0.1  | 1.3  | 0    | 0    | 1.2  | 0    |
| 30-day     | May-21 | 10    | A3            | 19.0 | 6.7  | 28.0 | 5.1  | 14.0 | 1.1  | 0    | 25.0 | 0    |
| 30-day     | May-21 | 10    | A4            | 3.9  | 2.2  | 5.7  | 46.0 | 0.4  | 0    | 0    | 42.0 | 0    |
| 30-day     | May-21 | 10    | A5            | 0    | 0.1  | 1.8  | 0.2  | 34.0 | 35.7 | 0.2  | 19.0 | 9.4  |
| 30-day     | May-21 | 10    | A6            | 0    | 0    | 0    | 0    | 1.3  | 20.7 | 14.8 | 8.4  | 55.0 |
| 45-day     | Mar-21 | 2     | A1            | 99.0 | 1.3  | 0.1  | 0    | 0    | 0    | 0    | 0    | 0    |
| 45-day     | Mar-21 | 2     | A2            | 61.0 | 35.0 | 1.6  | 0    | 0.7  | 0.3  | 0    | 1.1  | 0    |
| 45-day     | Mar-21 | 2     | A3            | 53.0 | 4.2  | 9.3  | 0.6  | 6.9  | 6.7  | 1.6  | 18.0 | 0.4  |
| 45-day     | Mar-21 | 2     | A4            | 30.0 | 0.9  | 1.2  | 4.5  | 0.8  | 6.8  | 6.9  | 42.0 | 7.3  |
| 45-day     | Mar-21 | 2     | A5            | 2.8  | 0.8  | 2.2  | 0.3  | 12.0 | 21.4 | 45.3 | 10.0 | 4.6  |
| 45-day     | Mar-21 | 2     | A6            | 0    | 0    | 0    | 0    | 0.3  | 16.9 | 76.9 | 1.0  | 4.8  |
| 45-day     | Mar-21 | 6     | A1            | 94.0 | 5.9  | 0.2  | 0    | 0    | 0    | 0    | 0    | 0    |
| 45-day     | Mar-21 | 6     | A2            | 42.0 | 51.0 | 5.0  | 0    | 0.6  | 0.2  | 0    | 0.4  | 0    |
| 45-day     | Mar-21 | 6     | A3            | 52.0 | 4.5  | 8.7  | 1.8  | 7.3  | 9.5  | 2.4  | 12.0 | 1.3  |
| 45-day     | Mar-21 | 6     | A4            | 36.0 | 1.1  | 1.0  | 16.0 | 0.8  | 15.5 | 4.3  | 22.0 | 3.7  |
| 45-day     | Mar-21 | 6     | A5            | 1.5  | 0.3  | 1.8  | 0.1  | 7.7  | 21.3 | 55.1 | 7.9  | 4.2  |
| 45-day     | Mar-21 | 6     | A6            | 0    | 0    | 0    | 0    | 0.3  | 10.1 | 85.1 | 0.4  | 4.1  |
| 45-day     | Mar-21 | 10    | A1            | 91.0 | 8.7  | 0.1  | 0    | 0    | 0    | 0    | 0    | 0    |
| 45-day     | Mar-21 | 10    | A2            | 36.0 | 52.0 | 11.0 | 0.1  | 0.8  | 0.2  | 0    | 0.4  | 0    |
| 45-day     | Mar-21 | 10    | A3            | 41.0 | 6.8  | 14.0 | 5.1  | 15.0 | 5.7  | 2.5  | 9.6  | 0.8  |
| 45-day     | Mar-21 | 10    | A4            | 33.0 | 3.1  | 5.9  | 28.0 | 0.8  | 8.1  | 5.5  | 12.0 | 3.7  |
| 45-day     | Mar-21 | 10    | A5            | 0.9  | 0.3  | 2.3  | 0.2  | 16.0 | 16.7 | 54.2 | 6.1  | 3.1  |
| 45-day     | Mar-21 | 10    | A6            | 0    | 0    | 0    | 0    | 1.8  | 7.8  | 84.7 | 0.4  | 5.4  |
| 45-day     | Apr-21 | 2     | A1            | 93.0 | 3.5  | 0.9  | 0    | 0.8  | 0    | 0    | 2.2  | 0    |
| 45-day     | Apr-21 | 2     | A2            | 54.0 | 25.0 | 5.7  | 0    | 4.0  | 0    | 0    | 11.0 | 0    |
| 45-day     | Apr-21 | 2     | A3            | 68.0 | 2.4  | 3.1  | 0.1  | 5.3  | 1.9  | 0    | 14.0 | 5.0  |
| 45-day     | Apr-21 | 2     | A4            | 33.0 | 3.1  | 4.1  | 12.0 | 3.2  | 0.2  | 0    | 37.0 | 7.1  |
| 45-day     | Apr-21 | 2     | A5            | 1.4  | 0.4  | 0.5  | 0    | 5.8  | 19.4 | 9.0  | 12.0 | 51.0 |
| 45-day     | Apr-21 | 2     | A6            | 0    | 0    | 0    | 0    | 1.7  | 12.5 | 38.0 | 6.6  | 41.0 |
| 45-day     | Apr-21 | 6     | A1            | 81.0 | 14.0 | 2.9  | 0    | 0.9  | 0    | 0    | 0.8  | 0    |
| 45-day     | Apr-21 | 6     | A2            | 36.0 | 41.0 | 11.0 | 0    | 6.2  | 0    | 0    | 6.9  | 0    |
| 45-day     | Apr-21 | 6     | A3            | 56.0 | 4.9  | 5.4  | 0.3  | 9.4  | 4.8  | 0.1  | 14.0 | 5.5  |
| 45-day     | Apr-21 | 6     | A4            | 36.0 | 1.6  | 2.1  | 18.0 | 2.8  | 0.5  | 0    | 31.0 | 7.7  |
| 45-day     | Apr-21 | 6     | A5            | 1.1  | 0.2  | 0.6  | 0    | 11.0 | 18.7 | 10.6 | 8.8  | 48.0 |
| 45-day     | Apr-21 | 6     | A6            | 0    | 0    | 0    | 0    | 1.6  | 17.7 | 25.1 | 3.6  | 52.0 |
| 45-day     | Apr-21 | 10    | A1            | 80.0 | 17.0 | 2.5  | 0    | 0.5  | 0    | 0    | 0.3  | 0    |
| 45-day     | Apr-21 | 10    | A2            | 28.0 | 58.0 | 10.0 | 0.2  | 2.1  | 0    | 0    | 2.1  | 0    |
| 45-day     | Apr-21 | 10    | A3            | 48.0 | 9.9  | 14.0 | 1.5  | 8.8  | 2.6  | 0.3  | 12.0 | 3.2  |
| 45-day     | Apr-21 | 10    | A4            | 31.0 | 2.5  | 3.6  | 24.0 | 0.9  | 0.7  | 0    | 34.0 | 3.0  |
| 45-day     | Apr-21 | 10    | A5            | 1.1  | 0.3  | 1.2  | 0.2  | 22.0 | 19.5 | 11.6 | 13.0 | 30.0 |
| 45-day     | Apr-21 | 10    | A6            | 0    | 0    | 0    | 0    | 1.7  | 12.5 | 38.0 | 6.6  | 41.0 |
| 45-day     | May-21 | 2     | A1            | 74.0 | 20.0 | 5.1  | 0    | 0.4  | 0    | 0    | 0.1  | 0    |
| 45-day     | May-21 | 2     | A2            | 24.0 | 44.0 | 21.0 | 0    | 7.1  | 2.3  | 0    | 2.1  | 0    |
| 45-day     | May-21 | 2     | A3            | 12.0 | 7.1  | 7.4  | 0    | 8.8  | 39.0 | 12.4 | 3.7  | 9.5  |
| 45-day     | May-21 | 2     | A4            | 5.1  | 4.0  | 5.4  | 6.3  | 1.6  | 26.0 | 11.4 | 32.0 | 8.7  |
| 45-day     | May-21 | 2     | A5            | 0    | 0.1  | 0.4  | 0    | 7.3  | 11.9 | 47.5 | 0.4  | 33.0 |

**Supplementary Table S4. *Cont.***

| Simulation | Month  | Depth | Source/Target | A1   | A2   | A3   | A4   | A5   | A6   | A7   | A8   | A9   |
|------------|--------|-------|---------------|------|------|------|------|------|------|------|------|------|
| 45-day     | May-21 | 2     | A6            | 0    | 0    | 0    | 0    | 0.9  | 13.0 | 75.5 | 0.1  | 11.0 |
| 45-day     | May-21 | 6     | A1            | 72.0 | 24.0 | 3.8  | 0    | 0.3  | 0    | 0    | 0.1  | 0    |
| 45-day     | May-21 | 6     | A2            | 16.0 | 62.0 | 17.0 | 0    | 3.1  | 1.1  | 0    | 1.1  | 0    |
| 45-day     | May-21 | 6     | A3            | 15.0 | 7.8  | 16.0 | 0.4  | 14.0 | 35.3 | 3.3  | 6.8  | 2.6  |
| 45-day     | May-21 | 6     | A4            | 3.6  | 1.6  | 3.6  | 17.0 | 2.5  | 37.8 | 1.1  | 30.0 | 2.2  |
| 45-day     | May-21 | 6     | A5            | 0.1  | 0.1  | 0.6  | 0    | 25.0 | 17.9 | 31.1 | 1.0  | 24.0 |
| 45-day     | May-21 | 6     | A6            | 0    | 0    | 0    | 0    | 2.5  | 24.1 | 55.7 | 0.3  | 17.0 |
| 45-day     | May-21 | 10    | A1            | 66.0 | 24.0 | 8.5  | 0    | 0.6  | 0    | 0    | 0.3  | 0    |
| 45-day     | May-21 | 10    | A2            | 17.0 | 61.0 | 15.0 | 0.1  | 3.6  | 0.2  | 0    | 2.7  | 0    |
| 45-day     | May-21 | 10    | A3            | 22.0 | 5.5  | 25.0 | 3.9  | 15.0 | 11.5 | 0.6  | 16.0 | 0.1  |
| 45-day     | May-21 | 10    | A4            | 6.2  | 0.7  | 3.7  | 47.0 | 1.3  | 10.9 | 0.1  | 30.0 | 0    |
| 45-day     | May-21 | 10    | A5            | 0.1  | 0.1  | 1.6  | 0.1  | 26.0 | 33.9 | 26.7 | 11.0 | 0    |
| 45-day     | May-21 | 10    | A6            | 0    | 0    | 0    | 0    | 0.3  | 19.0 | 51.0 | 1.4  | 28.0 |