**Supplementary Tables and Figures**

Table S1. Summary of environmental variables used in the study

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Spatial Resolution (˚)** | **Temporal Resolution** | **Description** |
| Bathymetry (m) | 0.0167 | NA | Sourced from ETOPO180 |
| Rugosity | 0.25 | NA | Standard deviation of bathymetry |
| Sea Surface Temperature (SST; ºC) | 0.05 | daily | Pathfinder AVHRR version 5 level-4. Sourced from CMEMS. |
| Sea Surface Temperature standard deviation | 0.05 | daily | Standard deviation of SST |
| Sea Surface Height (SSH; m) | 0.25 | daily | SSALTO/DUACS Delayed-Time level-4. Sourced from CMEMS |
| Sea Surface Height standard deviation | 0.25 | daily | Standard deviation of SSH |
| Chlorophyll-a (mg m-3) | 0.04 | 8-day composite | GlobColour version 2 level-4. Sourced from CMEMS. |
| Oxygen at 100 m depth (ml l-1) | 1 | monthly climatology | Sourced from World Ocean Atlas 2013 |
| Total Kinetic Energy (TKE; m2 s-2) | 0.25 | daily | Computed from northward and eastward surface currents from SSALTO/DUACS Delayed-Time level-4. Sourced from CMEMS |
| Mixed Layer Depth (MLD; m) | 0.25 | daily | Mercator Glorys2V4. Sourced from CMEMS. |

Table S2. Count of state-space-modeled location estimates by month and year used for presence data in the study (n = 14,206).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** |
| **2000** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 55 | 31 | 1 | 0 |
| **2001** | 0 | 0 | 6 | 41 | 35 | 22 | 41 | 16 | 5 | 0 | 5 | 5 |
| **2002** | 4 | 4 | 0 | 6 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 23 |
| **2003** | 31 | 28 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2006** | 0 | 0 | 0 | 0 | 4 | 48 | 60 | 60 | 34 | 62 | 50 | 39 |
| **2007** | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **2009** | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 112 | 120 | 116 | 64 | 62 |
| **2010** | 56 | 0 | 0 | 0 | 0 | 0 | 0 | 198 | 207 | 131 | 95 | 25 |
| **2011** | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 108 | 146 | 115 | 28 |
| **2012** | 0 | 12 | 100 | 200 | 70 | 30 | 31 | 197 | 339 | 309 | 178 | 150 |
| **2013** | 46 | 63 | 87 | 194 | 209 | 291 | 243 | 225 | 257 | 282 | 370 | 371 |
| **2014** | 367 | 295 | 263 | 124 | 110 | 95 | 69 | 152 | 236 | 250 | 269 | 254 |
| **2015** | 226 | 126 | 65 | 60 | 66 | 99 | 244 | 417 | 481 | 490 | 548 | 544 |
| **2016** | 490 | 337 | 229 | 117 | 110 | 120 | 135 | 59 | 28 | 0 | 0 | 13 |
| **2017** | 1 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Table S3. Blue marlin deployments used in the study (n = 144). DAL: days at liberty (deployment duration).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Deployment Date | Deployment Latitude | Deployment Longitude | Pop-up Date | Pop-up Longitude | Pop-up Latitude | DAL |
| 5500002 | 8/2/2000 | -156.016 | 19.495 | 9/1/2000 | -155.088 | 20.530 | 30 |
| 5500003 | 8/3/2000 | -156.088 | 19.635 | 10/1/2000 | -155.880 | 15.406 | 59 |
| 5500004 | 9/2/2000 | -155.964 | 19.430 | 11/1/2000 | -166.150 | 16.106 | 60 |
| 5501001 | 3/24/2001 | -0.387 | 5.585 | 5/1/2001 | 0.070 | 5.381 | 38 |
| 5501002 | 3/24/2001 | -0.383 | 5.583 | 7/1/2001 | 7.020 | 3.500 | 99 |
| 5501003 | 4/9/2001 | -0.407 | 5.592 | 7/16/2001 | -1.380 | 1.450 | 98 |
| 5501005 | 3/29/2001 | -0.278 | 5.555 | 10/9/2001 | 0.146 | 4.984 | 194 |
| 5501006 | 6/28/2001 | -24.362 | 16.413 | 8/15/2001 | -38.670 | 22.960 | 48 |
| 5501009 | 8/24/2001 | -156.048 | 19.544 | 2/20/2002 | -176.310 | 19.355 | 180 |
| 5502001 | 12/9/2002 | 57.250 | -20.490 | 3/8/2003 | 61.186 | -3.255 | 89 |
| 5502491 | 4/23/2002 | -93.288 | 27.737 | 5/20/2002 | -91.150 | 25.097 | 27 |
| 5506002 | 5/27/2006 | -17.242 | 27.983 | 7/3/2006 | -21.130 | 15.400 | 37 |
| 5506003 | 6/15/2006 | -16.878 | 32.608 | 8/29/2006 | -47.370 | 28.720 | 75 |
| 5506005 | 6/23/2006 | -17.293 | 32.707 | 7/14/2006 | -17.700 | 32.000 | 21 |
| 5506010 | 7/25/2006 | -17.156 | 32.850 | 9/27/2006 | -20.780 | 21.020 | 64 |
| 5506011 | 9/26/2006 | -13.850 | 29.000 | 1/10/2007 | -0.553 | 0.282 | 106 |
| 5506012 | 9/28/2006 | -13.217 | 29.550 | 12/2/2006 | -20.329 | 13.541 | 65 |
| 5509003 | 7/22/2009 | -156.000 | 19.433 | 10/23/2009 | -135.808 | -11.798 | 93 |
| 5509007 | 7/23/2009 | -155.983 | 19.467 | 8/1/2009 | -155.937 | 18.429 | 9 |
| 5509008 | 8/3/2009 | -156.044 | 19.629 | 1/26/2010 | -138.324 | 15.897 | 176 |
| 5509009 | 8/4/2009 | -155.951 | 19.443 | 1/30/2010 | -127.309 | -14.577 | 179 |
| 5509010 | 8/7/2009 | -155.922 | 19.334 | 11/4/2009 | -143.375 | -8.813 | 89 |
| 5510001 | 8/3/2010 | -156.088 | 19.683 | 12/1/2010 | -117.526 | 11.084 | 120 |
| 5510002 | 8/3/2010 | -155.979 | 19.334 | 10/7/2010 | -132.291 | 16.324 | 65 |
| 5510003 | 8/4/2010 | -155.979 | 19.334 | 9/9/2010 | -148.369 | 10.472 | 36 |
| 5510004 | 8/9/2010 | -155.950 | 19.417 | 9/24/2010 | -146.058 | 11.828 | 46 |
| 5510005 | 8/10/2010 | -155.909 | 19.295 | 11/5/2010 | -142.461 | 8.965 | 87 |
| 5510006 | 8/11/2010 | -156.013 | 19.544 | 9/8/2010 | -149.639 | 13.857 | 28 |
| 5510008 | 8/11/2010 | -156.030 | 19.340 | 12/10/2010 | -157.053 | 20.625 | 121 |
| 5510009 | 8/16/2010 | -156.119 | 19.746 | 12/14/2010 | -159.847 | 5.008 | 120 |
| 5510010 | 8/16/2010 | -156.008 | 19.458 | 9/17/2010 | -157.285 | 18.713 | 32 |
| 5511004 | 7/28/2011 | -156.061 | 19.596 | 9/4/2011 | -153.455 | 11.364 | 38 |
| 5511006 | 7/29/2011 | -156.038 | 19.747 | 10/4/2011 | -141.321 | 10.191 | 67 |
| 5511007 | 7/29/2011 | -156.062 | 19.614 | 9/25/2011 | -143.863 | 6.385 | 58 |
| 5511009 | 8/2/2011 | -155.975 | 19.483 | 11/30/2011 | -137.042 | -3.015 | 120 |
| 5511012 | 8/28/2011 | -156.044 | 19.620 | 11/9/2011 | -146.948 | 18.343 | 73 |
| 5511013 | 9/7/2011 | -66.050 | 18.533 | 11/20/2011 | -63.829 | 16.498 | 74 |
| 5511014 | 9/7/2011 | -66.050 | 18.533 | 12/19/2011 | -62.597 | 17.711 | 103 |
| 5511016 | 9/8/2011 | -66.272 | 18.562 | 12/7/2011 | -56.717 | 15.008 | 90 |
| 5511017 | 9/8/2011 | -66.233 | 18.566 | 10/23/2011 | -67.515 | 11.685 | 45 |
| 5511018 | 9/9/2011 | -66.157 | 18.537 | 12/7/2011 | -59.052 | 13.896 | 89 |
| 5512001 | 2/22/2012 | 32.397 | -28.816 | 4/5/2012 | 15.251 | -37.987 | 43 |
| 5512002 | 2/24/2012 | 32.416 | -28.793 | 5/4/2012 | 34.337 | -26.441 | 70 |
| 5512004 | 3/28/2012 | 32.559 | -28.337 | 4/29/2012 | 35.473 | -24.063 | 32 |
| 5512005 | 3/14/2012 | 113.853 | -21.743 | 5/22/2012 | 109.382 | -24.369 | 69 |
| 5512007 | 3/24/2012 | 113.750 | -21.950 | 4/23/2012 | 113.815 | -21.520 | 30 |
| 5512008 | 3/25/2012 | 113.967 | -21.582 | 4/23/2012 | 114.421 | -20.983 | 29 |
| 5512009 | 3/29/2012 | 113.019 | -19.972 | 7/27/2012 | 100.181 | -7.998 | 120 |
| 5512012 | 3/28/2012 | 32.403 | -28.709 | 5/13/2012 | 43.364 | -24.645 | 46 |
| 5512013 | 8/3/2012 | -17.299 | 32.756 | 8/31/2012 | -15.503 | 32.111 | 28 |
| 5512014 | 8/13/2012 | -155.990 | 19.394 | 11/12/2012 | -151.409 | -0.059 | 91 |
| 5512016 | 8/13/2012 | -155.600 | 19.220 | 11/8/2012 | -141.483 | -5.920 | 87 |
| 5512017 | 8/14/2012 | -156.067 | 19.867 | 9/18/2012 | -145.515 | 6.913 | 35 |
| 5512018 | 8/14/2012 | -156.086 | 19.751 | 9/30/2012 | -138.296 | 13.264 | 47 |
| 5512019 | 8/14/2012 | -156.007 | 19.440 | 10/16/2012 | -161.424 | 9.780 | 63 |
| 5512020 | 8/16/2012 | -156.100 | 19.784 | 10/21/2012 | -158.290 | 18.583 | 66 |
| 5512021 | 8/17/2012 | -156.095 | 19.598 | 10/17/2012 | -156.512 | 17.108 | 61 |
| 5512022 | 8/21/2012 | -156.070 | 19.470 | 9/25/2012 | -154.503 | 25.191 | 35 |
| 5512023 | 9/6/2012 | -155.924 | 19.403 | 1/1/2013 | -150.099 | 12.968 | 117 |
| 5512025 | 9/26/2012 | -66.083 | 18.500 | 1/1/2013 | -49.463 | 7.796 | 97 |
| 5512026 | 9/30/2012 | -66.062 | 18.596 | 11/20/2012 | -62.097 | 13.180 | 51 |
| 5512027 | 9/30/2012 | -66.000 | 18.500 | 3/29/2013 | -61.853 | 11.268 | 180 |
| 5512028 | 7/24/2012 | -13.258 | 29.283 | 10/11/2012 | -20.537 | 22.841 | 79 |
| 5512029 | 8/10/2012 | -17.295 | 32.754 | 11/8/2012 | -25.164 | 15.431 | 90 |
| 5512030 | 8/23/2012 | -17.295 | 32.757 | 11/12/2012 | -13.306 | 27.750 | 81 |
| 5512031 | 11/16/2012 | 113.950 | -21.624 | 1/6/2013 | 113.007 | -24.355 | 51 |
| 5513001 | 2/21/2013 | -149.890 | -17.612 | 10/19/2013 | -166.574 | 2.153 | 240 |
| 5513003 | 3/10/2013 | -149.769 | -17.582 | 9/6/2013 | -147.629 | -15.399 | 180 |
| 5513005 | 3/23/2013 | -149.944 | -17.457 | 5/21/2013 | -151.499 | -12.068 | 59 |
| 5513007 | 3/30/2013 | -150.007 | -17.536 | 11/25/2013 | -162.049 | -14.865 | 240 |
| 5513010 | 4/7/2013 | -145.850 | -15.917 | 10/23/2013 | -146.760 | -15.659 | 199 |
| 5513011 | 4/12/2013 | -146.158 | -16.085 | 12/10/2013 | -170.788 | 1.926 | 242 |
| 5513013 | 4/20/2013 | 153.915 | -27.745 | 7/15/2013 | 152.951 | -19.706 | 86 |
| 5513015 | 1/25/2013 | -81.461 | -2.075 | 5/1/2013 | -79.284 | 2.112 | 96 |
| 5513016 | 6/1/2013 | 154.035 | -27.835 | 8/5/2013 | 156.627 | -18.521 | 65 |
| 5513017 | 6/1/2013 | 154.036 | -27.835 | 10/1/2013 | 153.831 | -30.744 | 122 |
| 5513018 | 5/29/2013 | -15.772 | 27.669 | 7/13/2013 | -15.178 | 31.245 | 45 |
| 5513020 | 8/9/2013 | -155.923 | 19.928 | 2/5/2014 | -132.884 | -22.537 | 180 |
| 5513021 | 8/20/2013 | -156.020 | 19.562 | 12/12/2013 | -135.865 | 17.433 | 114 |
| 5513023 | 9/5/2013 | -156.067 | 19.733 | 2/26/2014 | -145.199 | -13.623 | 174 |
| 5513024 | 9/13/2013 | -156.073 | 19.593 | 3/12/2014 | -156.884 | 20.565 | 180 |
| 5513025 | 9/16/2013 | -156.043 | 19.577 | 3/15/2014 | -158.304 | 19.659 | 180 |
| 5513028 | 10/18/2013 | -85.000 | 9.000 | 6/15/2014 | -80.315 | 2.885 | 240 |
| 5513030 | 10/18/2013 | -85.000 | 9.000 | 6/15/2014 | -88.095 | 7.340 | 240 |
| 5513031 | 10/19/2013 | -85.000 | 9.000 | 4/17/2014 | -78.847 | 4.409 | 180 |
| 5513034 | 10/19/2013 | -85.000 | 9.000 | 6/7/2014 | -82.741 | 0.620 | 231 |
| 5513035 | 10/23/2013 | -109.608 | 22.842 | 3/28/2014 | -93.294 | 2.657 | 156 |
| 5513038 | 12/14/2013 | 40.228 | -3.060 | 2/19/2014 | 41.965 | -3.566 | 67 |
| 5514002 | 2/22/2014 | -135.097 | -23.108 | 3/3/2014 | -133.457 | -22.414 | 9 |
| 5514005 | 3/15/2014 | 152.647 | -33.441 | 3/30/2014 | 150.653 | -36.549 | 15 |
| 5514006 | 5/15/2014 | -76.894 | 26.426 | 11/11/2014 | -39.086 | 38.422 | 180 |
| 5514007 | 6/6/2014 | -77.095 | 25.847 | 12/3/2014 | -78.157 | 16.140 | 180 |
| 5514009 | 7/28/2014 | -156.040 | 19.380 | 1/1/2015 | -119.257 | 5.936 | 157 |
| 5514011 | 7/29/2014 | -156.133 | 19.800 | 8/30/2014 | -160.647 | 11.297 | 32 |
| 5514013 | 8/2/2014 | -64.812 | 18.724 | 1/29/2015 | -43.042 | 12.625 | 180 |
| 5514015 | 8/28/2014 | -156.038 | 19.608 | 2/26/2015 | -146.912 | 16.694 | 182 |
| 5514016 | 9/2/2014 | -156.056 | 19.513 | 3/3/2015 | -151.854 | -9.770 | 182 |
| 5514017 | 9/4/2014 | -155.988 | 19.485 | 3/3/2015 | -113.233 | 4.364 | 180 |
| 5514019 | 8/20/2014 | -74.722 | 37.080 | 2/16/2015 | -36.297 | 14.100 | 180 |
| 5514021 | 11/7/2014 | -156.117 | 19.751 | 5/6/2015 | -111.922 | 7.771 | 180 |
| 5514022 | 11/29/2014 | 55.367 | -5.178 | 1/25/2015 | 45.818 | -2.135 | 57 |
| 5514024 | 10/30/2014 | -156.040 | 19.420 | 1/18/2015 | -138.352 | -11.390 | 80 |
| 5515002 | 2/22/2015 | -85.343 | 9.307 | 8/21/2015 | -92.917 | 2.043 | 180 |
| 5515003 | 5/14/2015 | -76.854 | 26.494 | 12/3/2015 | -77.038 | 23.503 | 203 |
| 5515005 | 6/6/2015 | -76.876 | 26.251 | 6/13/2015 | -77.156 | 26.064 | 7 |
| 5515008 | 6/30/2015 | -65.012 | 32.059 | 8/9/2015 | -64.831 | 31.470 | 40 |
| 5515009 | 7/6/2015 | -64.799 | 32.197 | 3/2/2016 | -41.657 | 10.563 | 240 |
| 5515010 | 7/10/2015 | -65.188 | 31.931 | 11/18/2015 | -26.850 | 16.006 | 131 |
| 5515011 | 7/16/2015 | -65.012 | 32.067 | 3/13/2016 | -24.990 | 14.345 | 241 |
| 5515013 | 7/18/2015 | -65.117 | 32.051 | 2/13/2016 | -57.053 | 11.317 | 210 |
| 5515016 | 5/21/2015 | -17.333 | 28.267 | 7/31/2015 | -17.052 | 27.860 | 71 |
| 5515017 | 7/16/2015 | -65.017 | 32.017 | 3/12/2016 | -35.860 | 8.804 | 240 |
| 5515018 | 7/19/2015 | 139.000 | 34.333 | 9/14/2015 | 148.484 | 40.011 | 57 |
| 5515019 | 7/19/2015 | 139.000 | 34.333 | 3/16/2016 | 134.129 | 21.861 | 241 |
| 5515023 | 8/11/2015 | -156.005 | 19.387 | 2/3/2016 | -149.422 | -4.620 | 176 |
| 5515024 | 8/11/2015 | -156.126 | 19.738 | 4/7/2016 | -130.699 | 8.025 | 240 |
| 5515025 | 8/11/2015 | -155.934 | 19.119 | 2/14/2016 | -162.006 | 2.247 | 187 |
| 5515026 | 8/13/2015 | -156.993 | 19.483 | 4/9/2016 | -131.441 | 3.074 | 240 |
| 5515027 | 8/14/2015 | -155.933 | 19.317 | 1/19/2016 | -157.846 | 21.309 | 158 |
| 5515028 | 8/14/2015 | -156.035 | 19.618 | 4/11/2016 | -104.987 | 14.582 | 241 |
| 5515029 | 8/18/2015 | -156.094 | 19.736 | 4/15/2016 | -161.081 | 23.592 | 241 |
| 5515031 | 8/20/2015 | -156.133 | 19.933 | 1/23/2016 | -137.189 | 3.673 | 156 |
| 5515032 | 11/20/2015 | 152.500 | -4.033 | 12/13/2015 | 152.251 | -4.156 | 23 |
| 5515033 | 11/21/2015 | 55.850 | -5.319 | 7/19/2016 | 56.362 | -5.960 | 241 |
| 5515035 | 11/14/2015 | 152.533 | -4.083 | 5/20/2016 | 147.938 | -5.948 | 188 |
| 5515036 | 11/14/2015 | 152.549 | -4.078 | 12/3/2015 | 152.049 | -3.940 | 19 |
| 5515037 | 11/15/2015 | 152.562 | -4.100 | 2/17/2016 | 160.508 | -6.825 | 94 |
| 5515039 | 10/31/2015 | -110.240 | 22.821 | 11/8/2015 | -110.652 | 23.444 | 8 |
| 5515041 | 11/28/2015 | -109.367 | 23.083 | 1/4/2016 | -107.563 | 16.275 | 37 |
| 5515043 | 10/21/2015 | -109.985 | 22.864 | 10/26/2015 | -110.749 | 22.943 | 5 |
| 5515044 | 9/13/2015 | -156.041 | 19.506 | 1/29/2016 | -110.709 | 10.829 | 138 |
| 5516002 | 4/16/2016 | 71.761 | -5.462 | 5/9/2016 | 74.128 | -6.785 | 23 |
| 5516003 | 5/12/2016 | -72.470 | 26.390 | 7/7/2016 | -76.236 | 31.425 | 56 |
| 5516004 | 5/14/2016 | -76.838 | 26.580 | 7/18/2016 | -60.443 | 19.818 | 65 |
| 5516005 | 5/20/2016 | -76.736 | 26.842 | 8/4/2016 | -69.260 | 25.988 | 76 |
| 5516007 | 7/6/2016 | -64.512 | 32.380 | 7/28/2016 | -58.776 | 32.254 | 22 |
| 5516009 | 7/15/2016 | -64.573 | 32.383 | 9/28/2016 | -52.840 | 42.314 | 75 |
| 5516010 | 7/16/2016 | -65.020 | 32.042 | 8/18/2016 | -61.561 | 34.146 | 33 |
| 5516011 | 7/18/2016 | -65.009 | 32.039 | 7/24/2016 | -63.976 | 33.965 | 6 |
| 5516012 | 8/1/2016 | -156.060 | 19.655 | 8/6/2016 | -156.574 | 19.339 | 5 |
| 5516022 | 12/1/2016 | -156.017 | 19.567 | 12/13/2016 | -156.531 | 20.373 | 12 |
| 5517002 | 1/31/2017 | -156.075 | 19.642 | 2/20/2017 | -155.916 | 15.173 | 20 |
| 5517004 | 2/3/2017 | -155.992 | 19.474 | 2/22/2017 | -156.055 | 18.344 | 19 |
| 5517005 | 2/12/2017 | -156.065 | 19.622 | 2/19/2017 | -158.316 | 20.145 | 7 |

Figure S1. The distribution of geolocation errors for latitude and longitude for state-space-modeled location estimates used in the study.

