Foraging Destinations of Short-tailed Albatrosses (*Phoebastria albatrus*) in the Northwest Pacific Ocean, Gulf of Alaska, and Bering Sea

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  USGS-Oregon Cooperative Wildlife Research Unit, Oregon State University
- David Anderson
  Wake Forest University
Historic Breeding Colonies
Birds Captured in Japan & Alaska

- Torishima (30.5° N)
- Seguam Pass (52.4° N)
PTT Deployments  
2002 & 2003

<table>
<thead>
<tr>
<th>Animal ID</th>
<th>Age (yrs)</th>
<th>Sex</th>
<th>Deploy Loc</th>
<th>Satellite Tacking</th>
<th># Days Tracked</th>
<th># Locations (unfiltered)</th>
<th>Duty cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1076</td>
<td>5</td>
<td>F</td>
<td>Japan</td>
<td>8-May-02 23-Sep-02</td>
<td>138</td>
<td>417</td>
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<tr>
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<tr>
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<td>-</td>
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<td>618</td>
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</table>

Total 7785
## Filtering Location Data

<table>
<thead>
<tr>
<th>Always retain</th>
<th>Speed ≤ 80 km/ hr</th>
<th>Maximum Redundant Distance ≤ 1 km</th>
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</thead>
<tbody>
<tr>
<td>Loc Quality 3</td>
<td></td>
<td>Rate coefficient = 5 (smaller α permitted)</td>
</tr>
</tbody>
</table>

For best quality data (1, 2, 3), speeds ≤ 80 included 95% of locations


**Retained 6709 locations (86%)**

*SAS Filtering algorithm courtesy of David Douglas, USGS, Alaska Science Center*
### Location Accuracy

(“Bench Test” after filtering)

<table>
<thead>
<tr>
<th>Loc Class</th>
<th>n</th>
<th>Mean Error (km)</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>0.80</td>
<td>0.72</td>
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<tr>
<td>1</td>
<td>15</td>
<td>1.21</td>
<td>0.66</td>
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<tr>
<td>2</td>
<td>37</td>
<td>0.47</td>
<td>0.43</td>
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<tr>
<td>3</td>
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<td>0.22</td>
<td>0.17</td>
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<td>A</td>
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<td>0.50</td>
<td>0.62</td>
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<tr>
<td>B</td>
<td>58</td>
<td>7.14</td>
<td>15.31</td>
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<tr>
<td>Z</td>
<td>2</td>
<td>3.20</td>
<td>4.11</td>
</tr>
</tbody>
</table>
At-Sea Distribution

14 Individuals
Tracked May-Nov
During 2002 and 2003
Long-term Avg. Wind Speeds
(1999-2004)
SST & STAL Locations
May
SST & STAL Locations
June
SST & STAL Locations
August

°C
< 0
14
27
First-Passage Time


First-Passage Time

10 km FPT Radius
First-Passage Time

10 km FPT Radius
First-Passage Time

10 km FPT Radius
First-Passage Time

20 km FPT Radius
First-Passage Time

30 km FPT Radius
First-Passage Time

40 km FPT Radius
FPT Results

Radii: 10 to 450 km by 10 km increments

N = 14 birds
Location of Maximum FPT for Each Bird
FPT Median Depth

Example for STAL #899

Median Depth = 960 m
SE = 315
Range = 340 – 2400 m

All Max FPT Locations

Median Depth of all locations = 2030 m
FPT Median Bathymetric Gradient

Example for STAL #837

All Max FPT Locations

X = 6.1 %
SE = 1.6
Range = 2.3 – 10.2
Bering Sea SST Fronts

Long-term persistent thermal fronts
May – Nov, 1985-1996
9 km resolution

Data courtesy of Igor Belkin, University of Rhode Island
Bering Sea SST Fronts

Long-term persistent thermal fronts
May – Nov, 1985-1996
9 km resolution

Data courtesy of Igor Belkin, University of Rhode Island
Polar Front Crossings

Courtesy of Igor Belkin, University of Rhode Island
Belkin et al. 2002. Geophysical Research Letters. 29(9)
Conclusions

- Individuals ranged along the Pacific Rim above 30° N, primarily remaining over continental shelf break and slope regions.

- High use areas in W Pacific basin included productive waters of the Kuroshio and Oyashio current regions off Japan and Kuril Islands, Russia.

- In the Aleutian Islands, STAL often occurred within straits, particularly along western part of chain (e.g., Near Strait, Buldir and Seguam Passes).

- In the Bering Sea, STAL occupied waters along N continental shelf break and Kamchatka Current region and showed some association with thermal fronts.
FPT analysis appears to successfully identify regions of Area Restricted Search patterns, which are important in assessing how specific marine habitats are being used.

Overall short-tailed albatrosses concentrate their activities in oceanic areas characterized by specific bathymetric and hydrographic features.
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