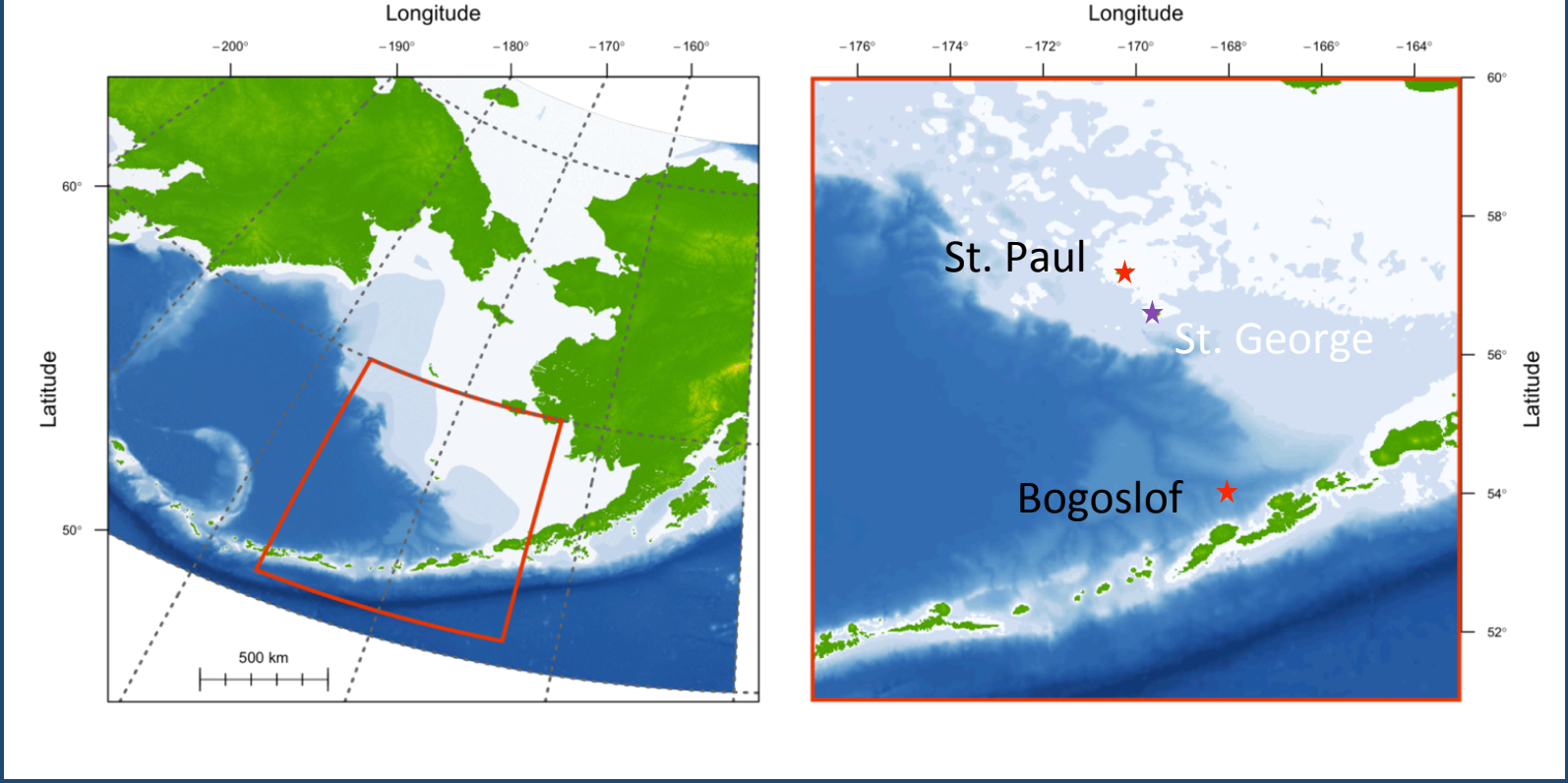
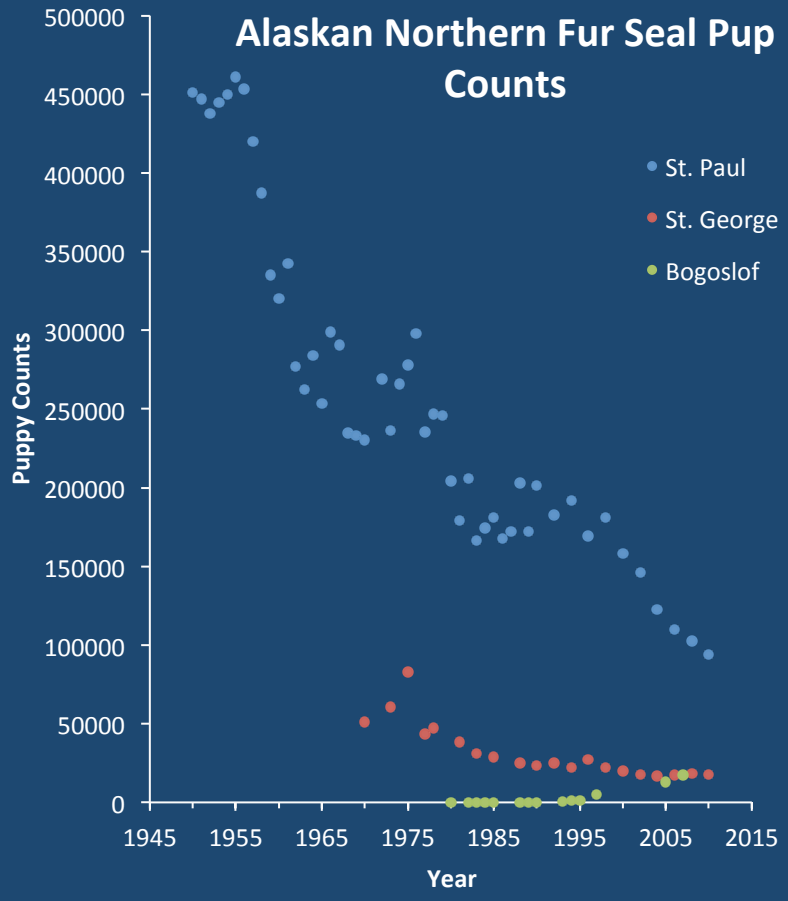
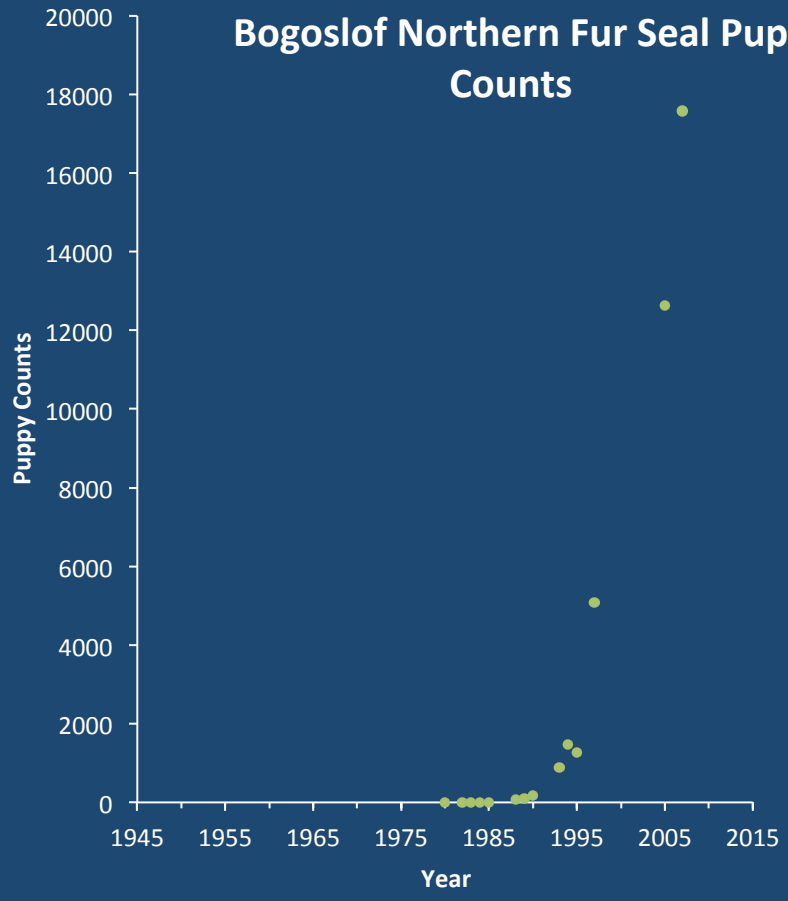
Comparing medium scale foraging behaviour of northern fur seals (*Callorhinus ursinus*) from two Bering Sea islands with dramatically different population trends.



Brian C. Battaile & Andrew W. Trites

Bering Sea Northern Fur Seal Population



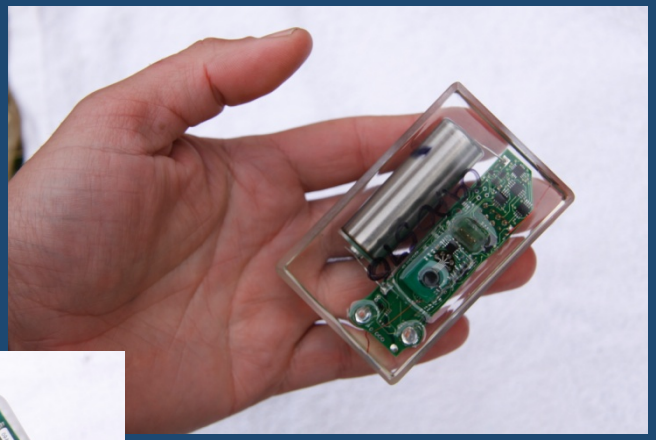


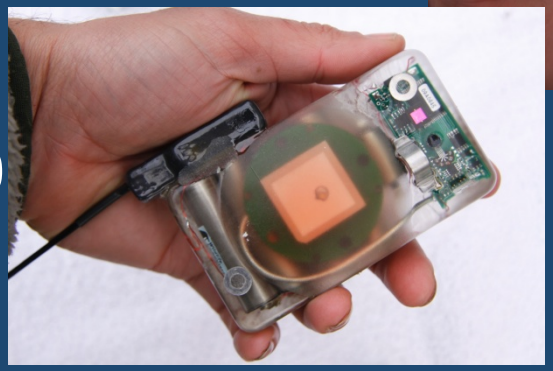
General Biology, foraging strategy

- Pelagic for 8 months of the year
- Return to natal island in late June, birth, breeding & nurse ~ November
- Income breeders- foraging trips, overnight to 14 days, fasting pups
- Condition of pups upon weaning might be key to island contrasts
- Differences in female ability to forage and provision pups likely cause
- Can comparing the medium scale diving behaviour tell us

The Tags-Wildlife Computers Daily Diary

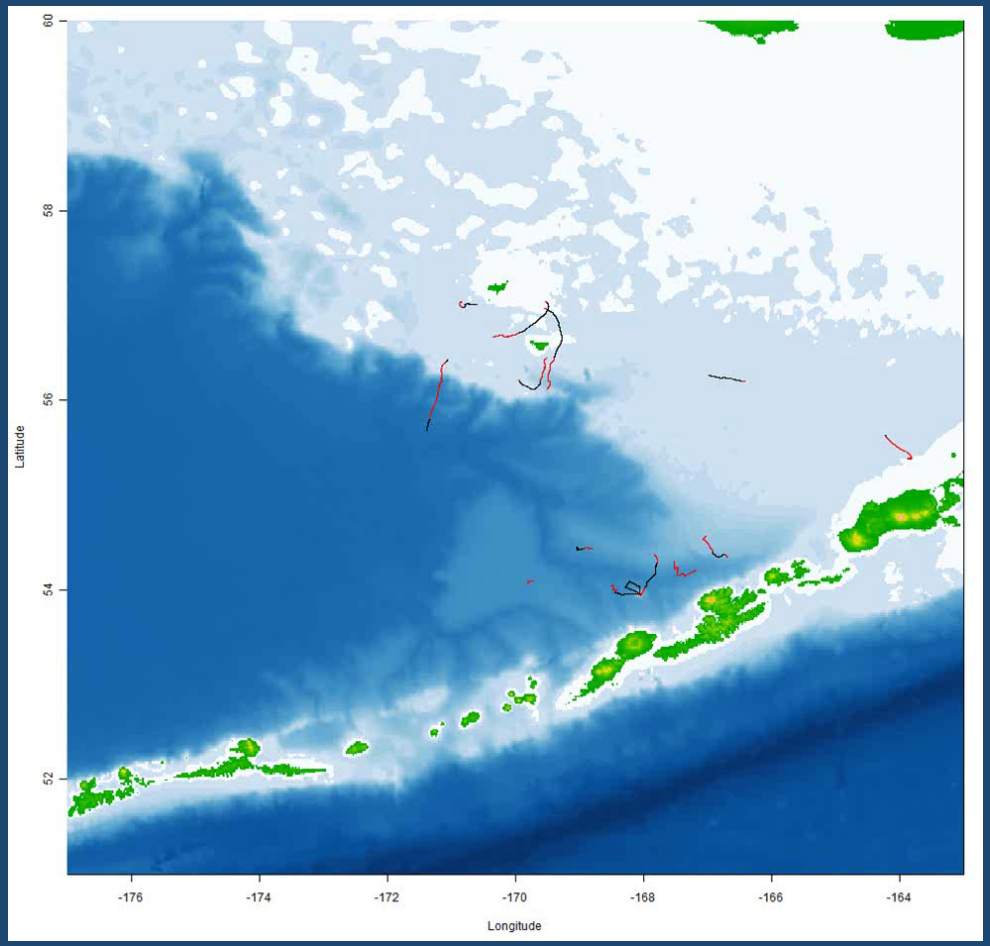
- First generation TDR with added 3D accelerometers and magnetometers
- Data collection up to 64 Hz, deployments up to 30 days, total of 70 days
- WC mk10-F
- ~41 lactating females from Bogoslof
- ~44 from St. Paul





Different Islands have different large scale foraging strategies

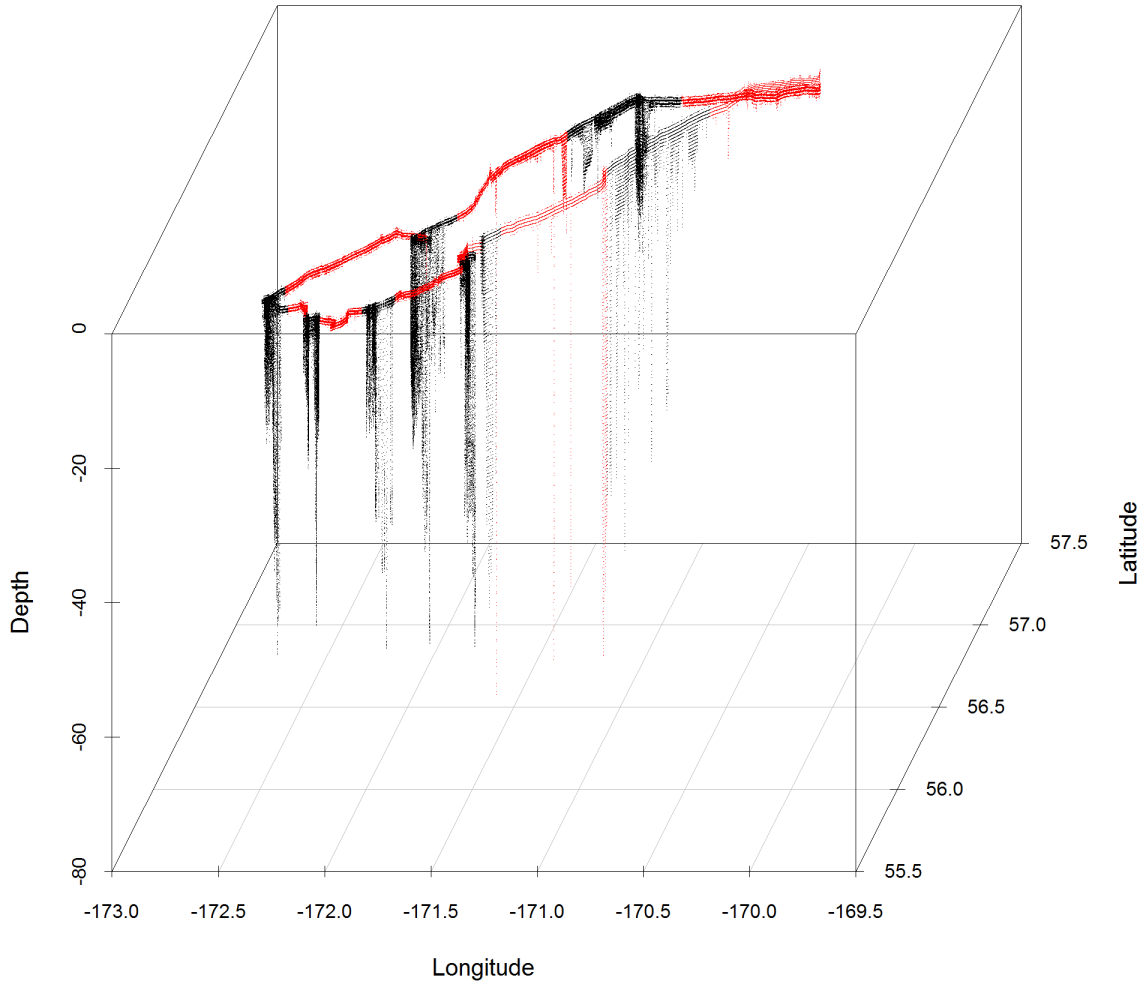
- Leave and return quickly
- St.Paul area > Bogoslof
- Some St. Paul animals stay on the shelf.
- Bogoslof animals are mostly deep water and don't travel South of the Aleutians
- No obvious grouping
- What do we see about patch exploitation strategy when we zoom in?



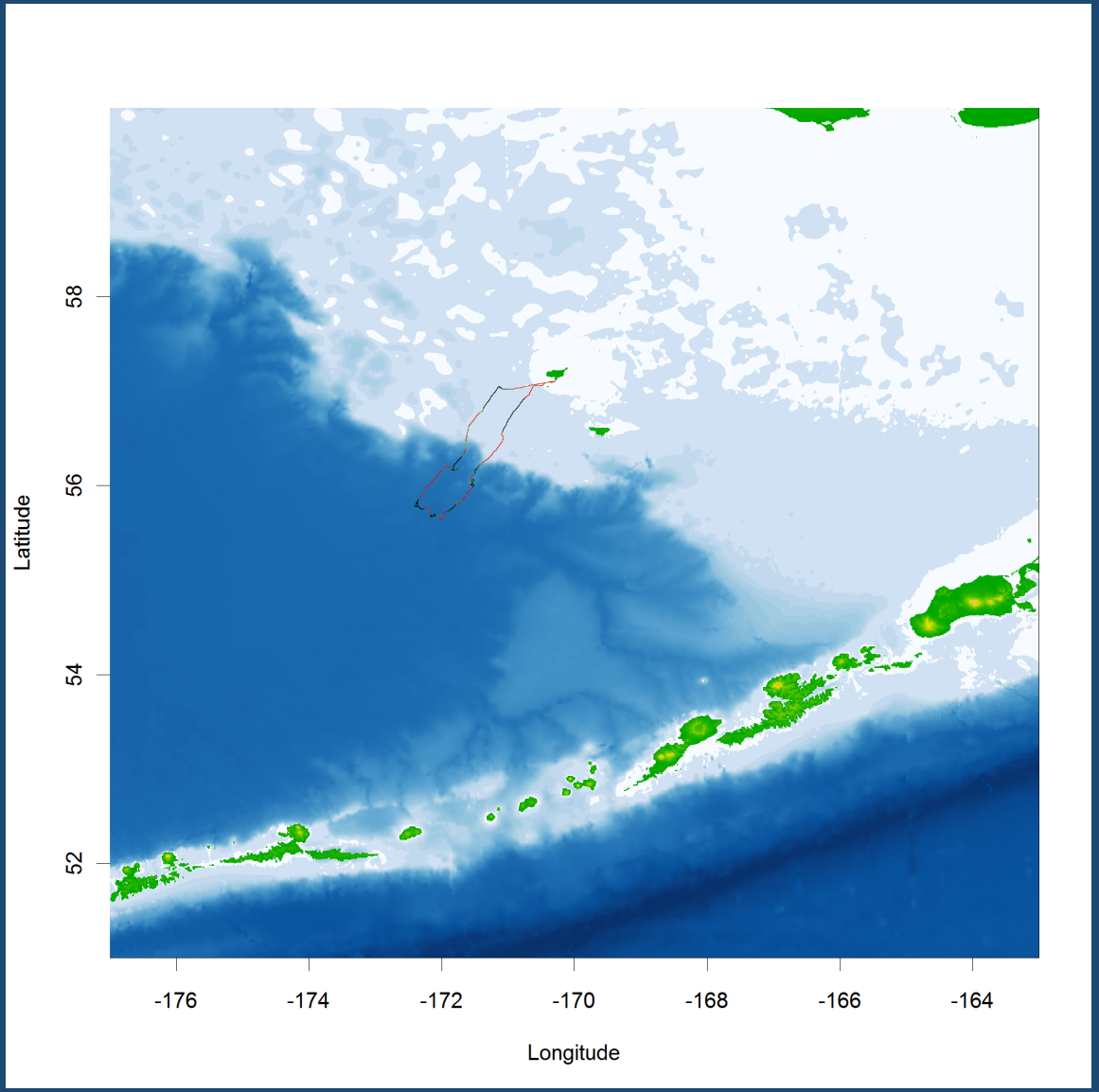
Dead Reckoning

Assigns dives to a specific location on the xy track

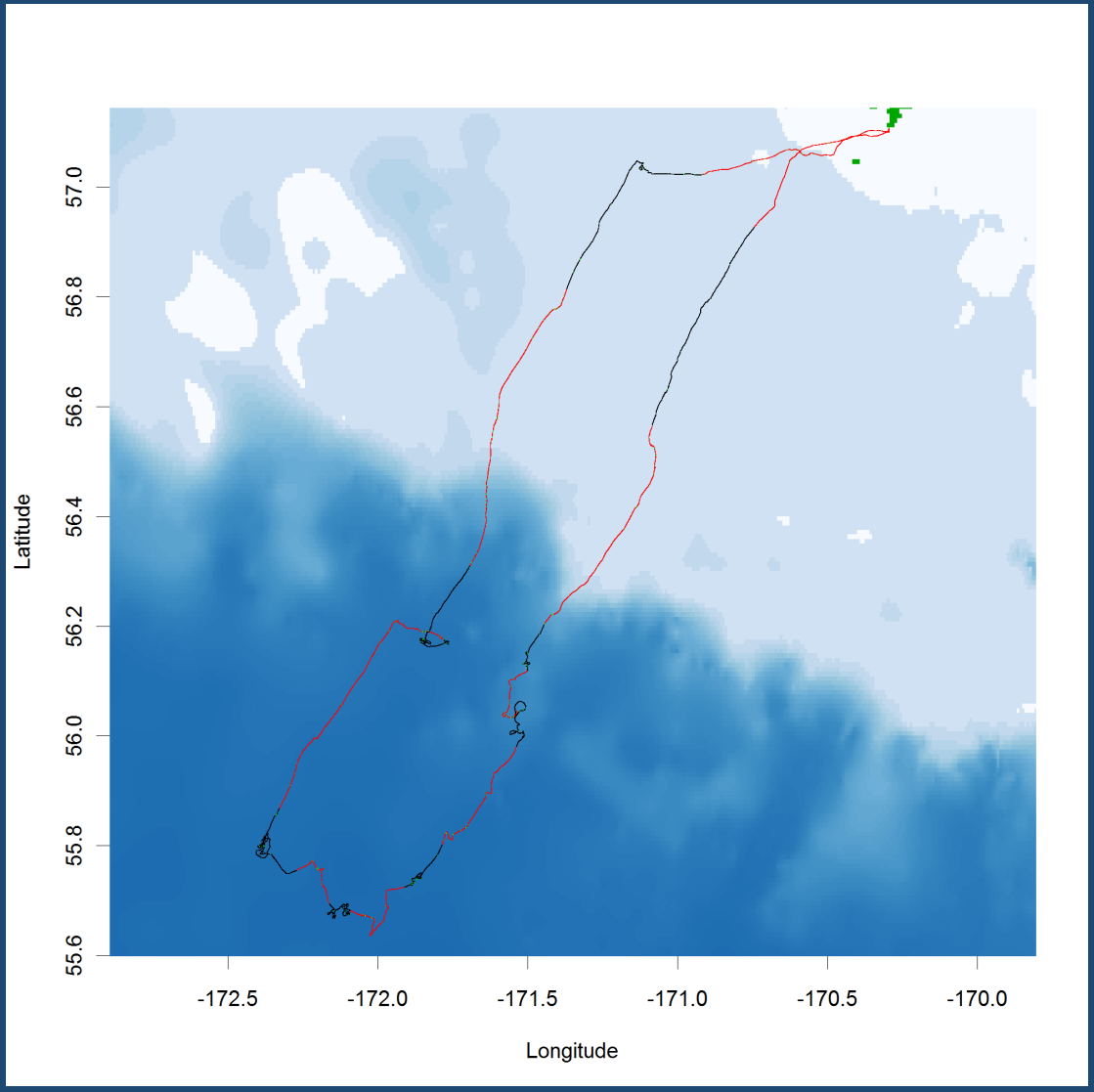
Unlike satellite position based interpolation where dives are placed in a straight line between fixes



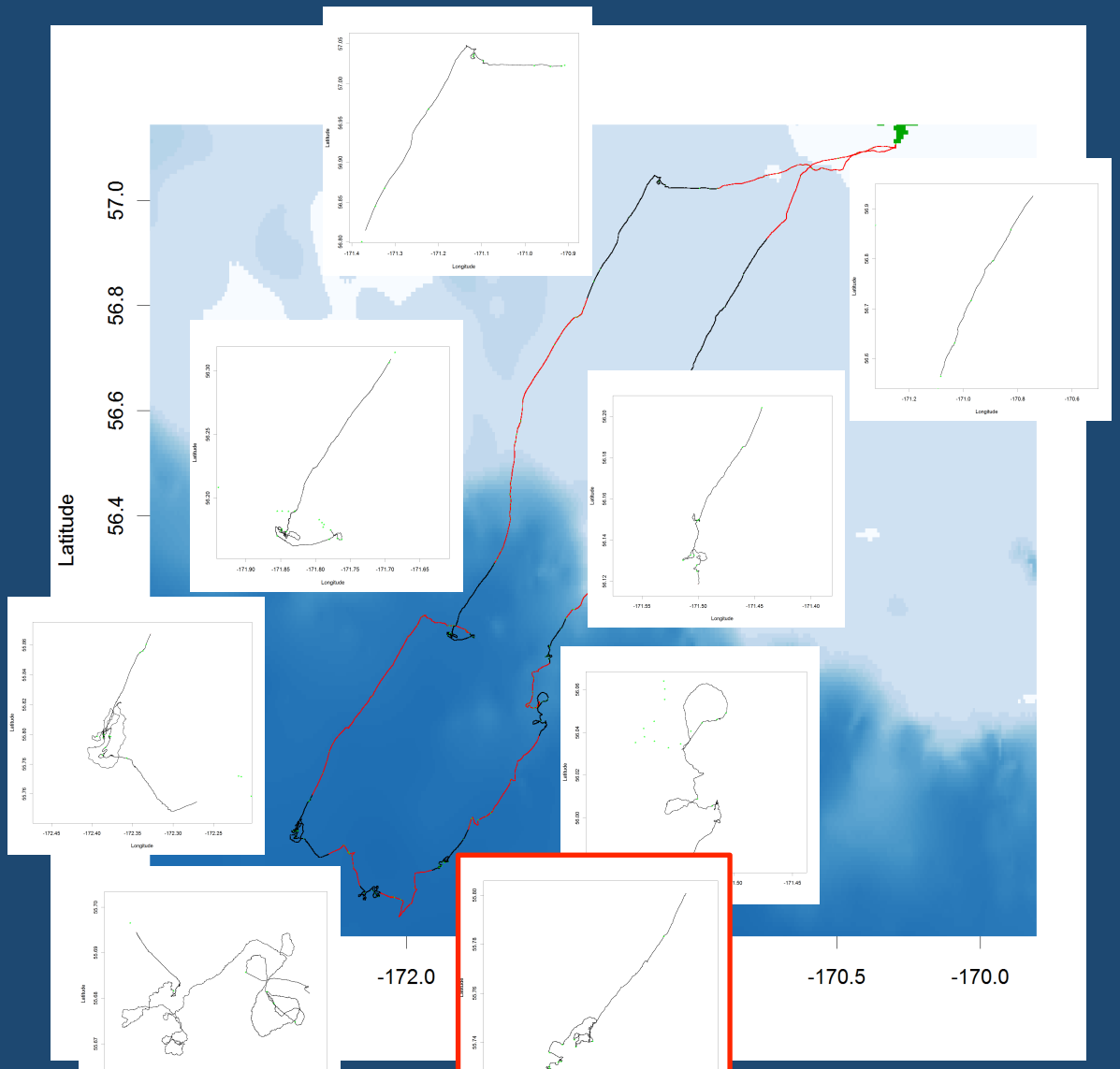
St. Paul off shelf



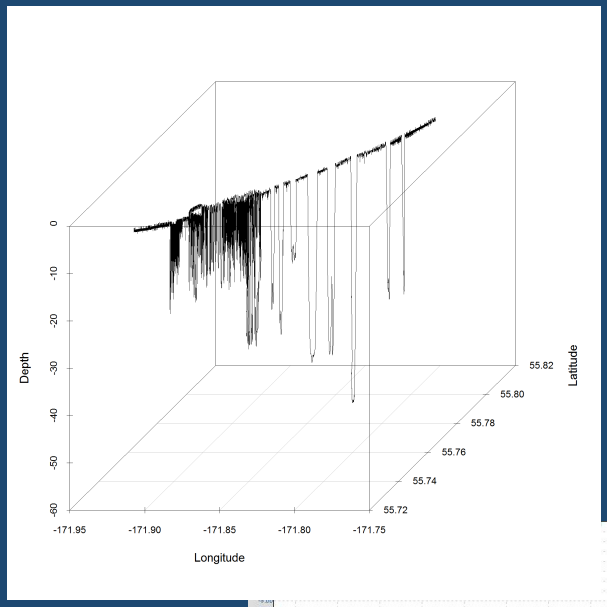
St. Paul off shelf

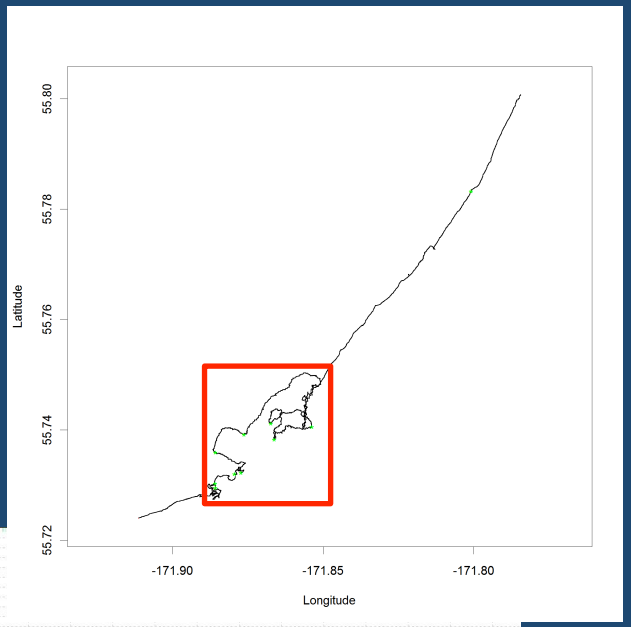


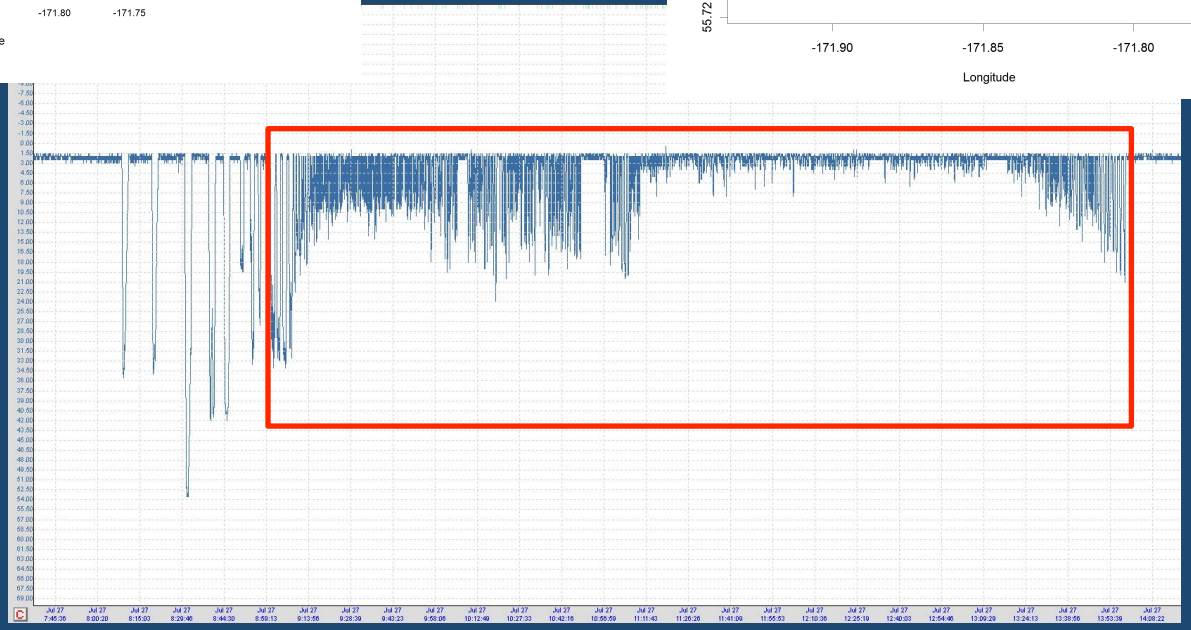
St. Paul off shelf



St. Paul off shelf







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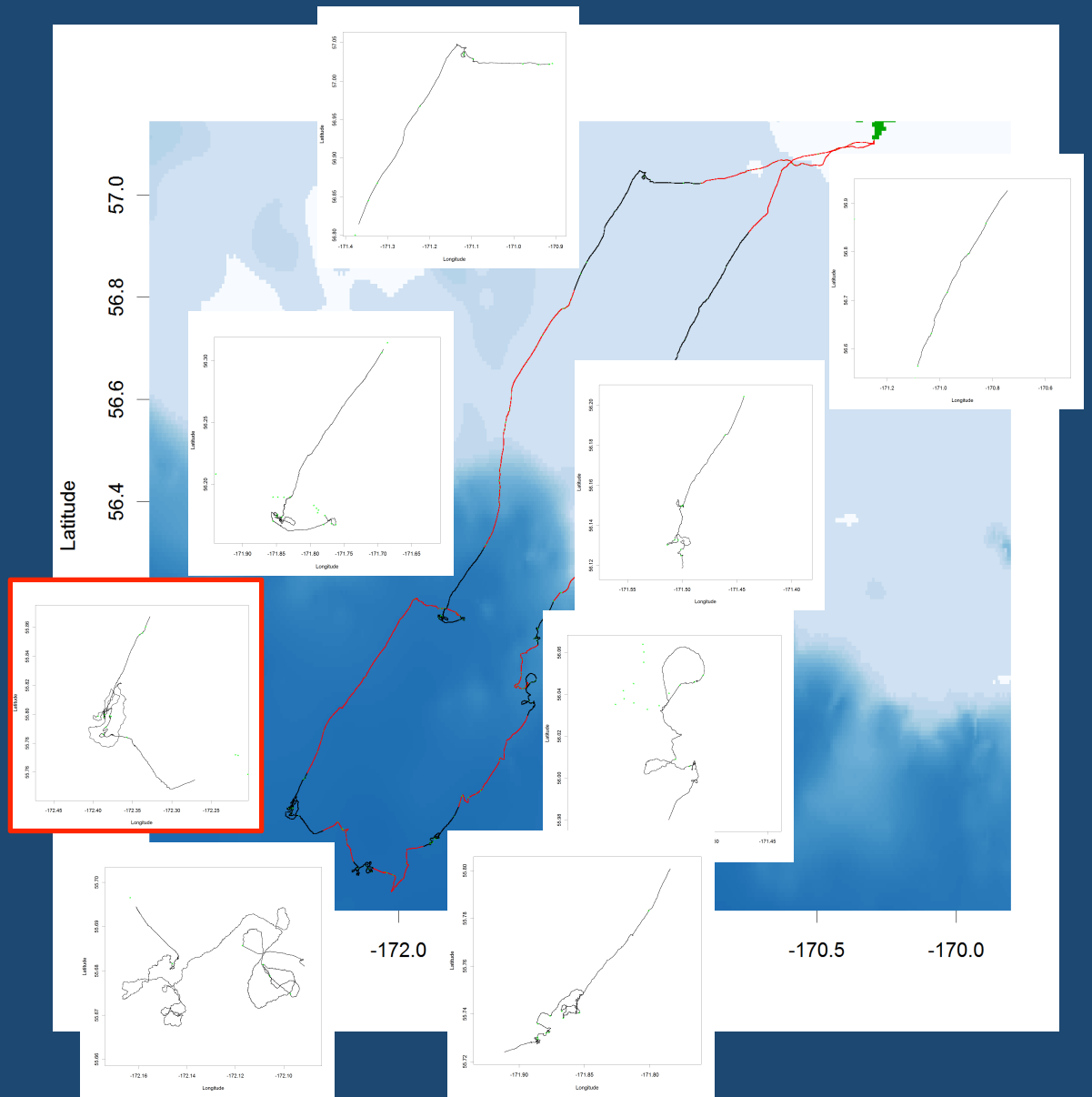
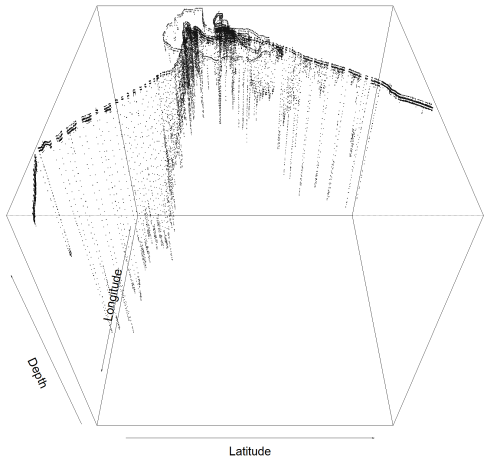
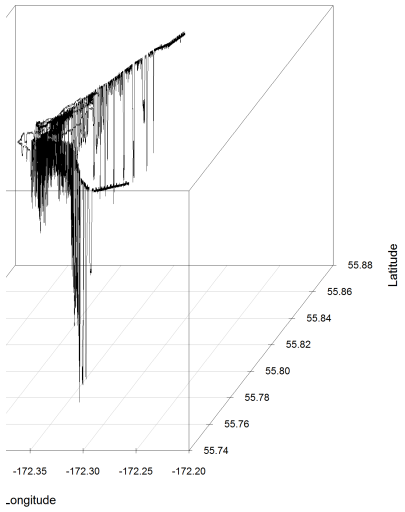
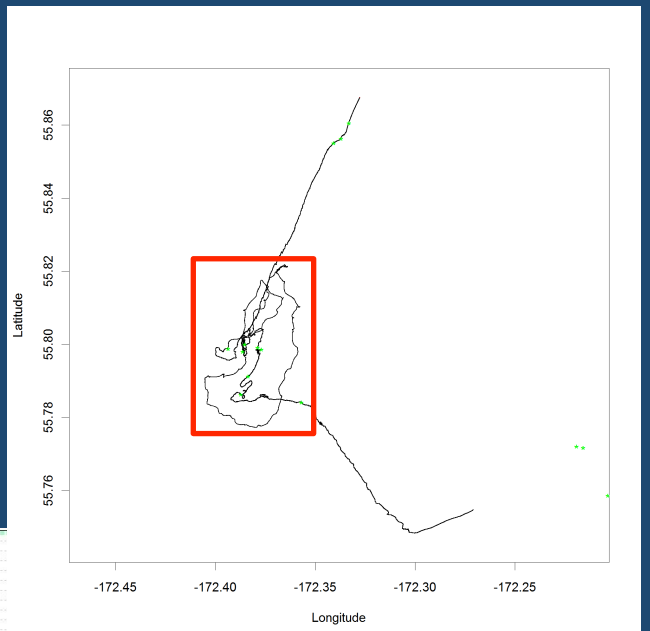


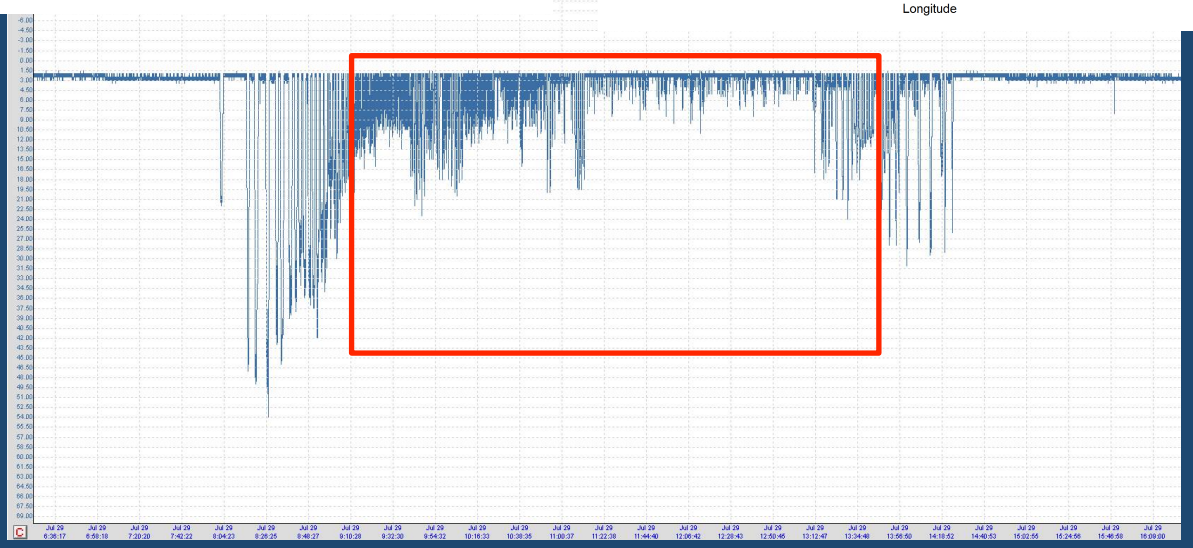
St. Paul off shelf



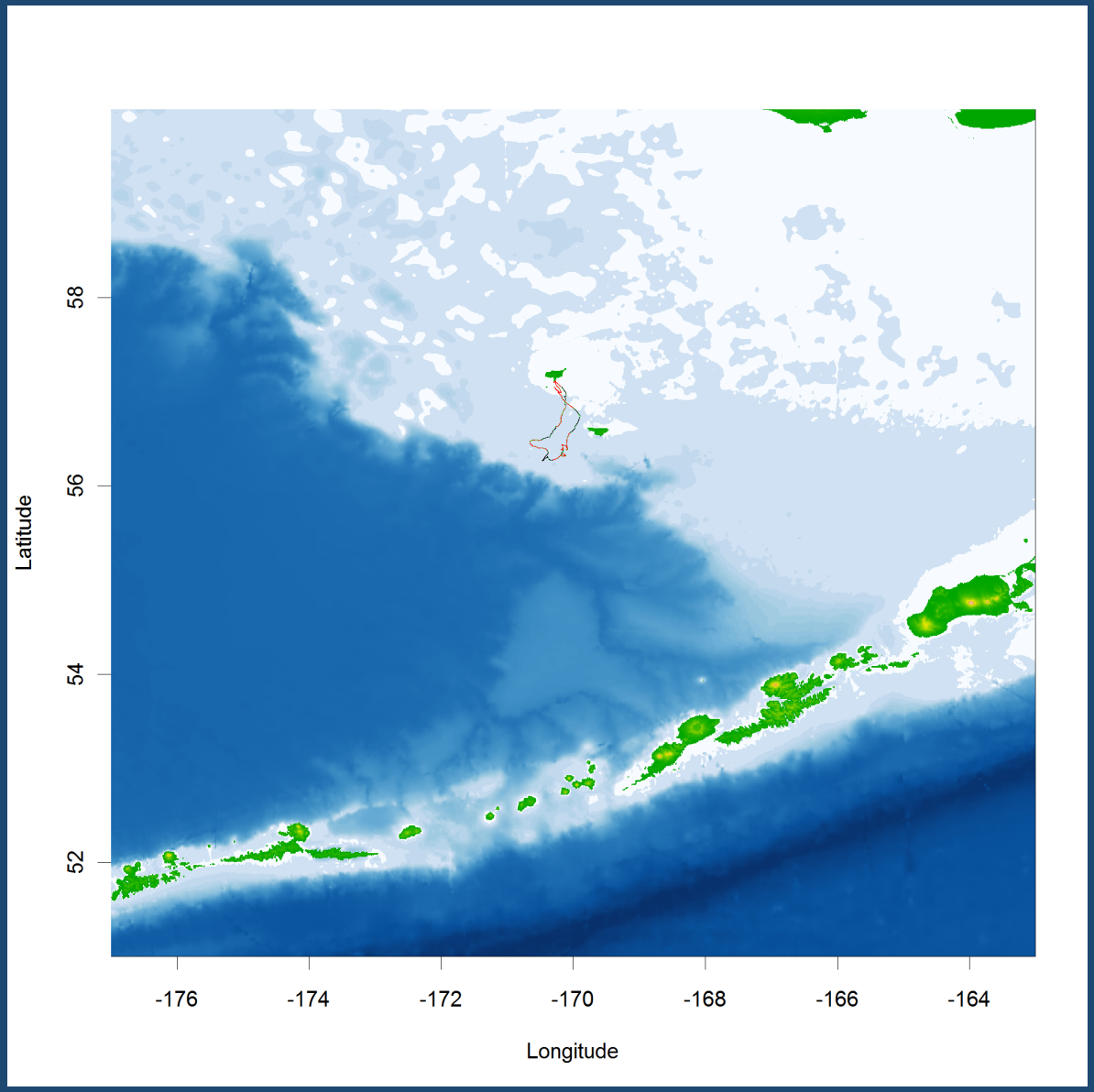




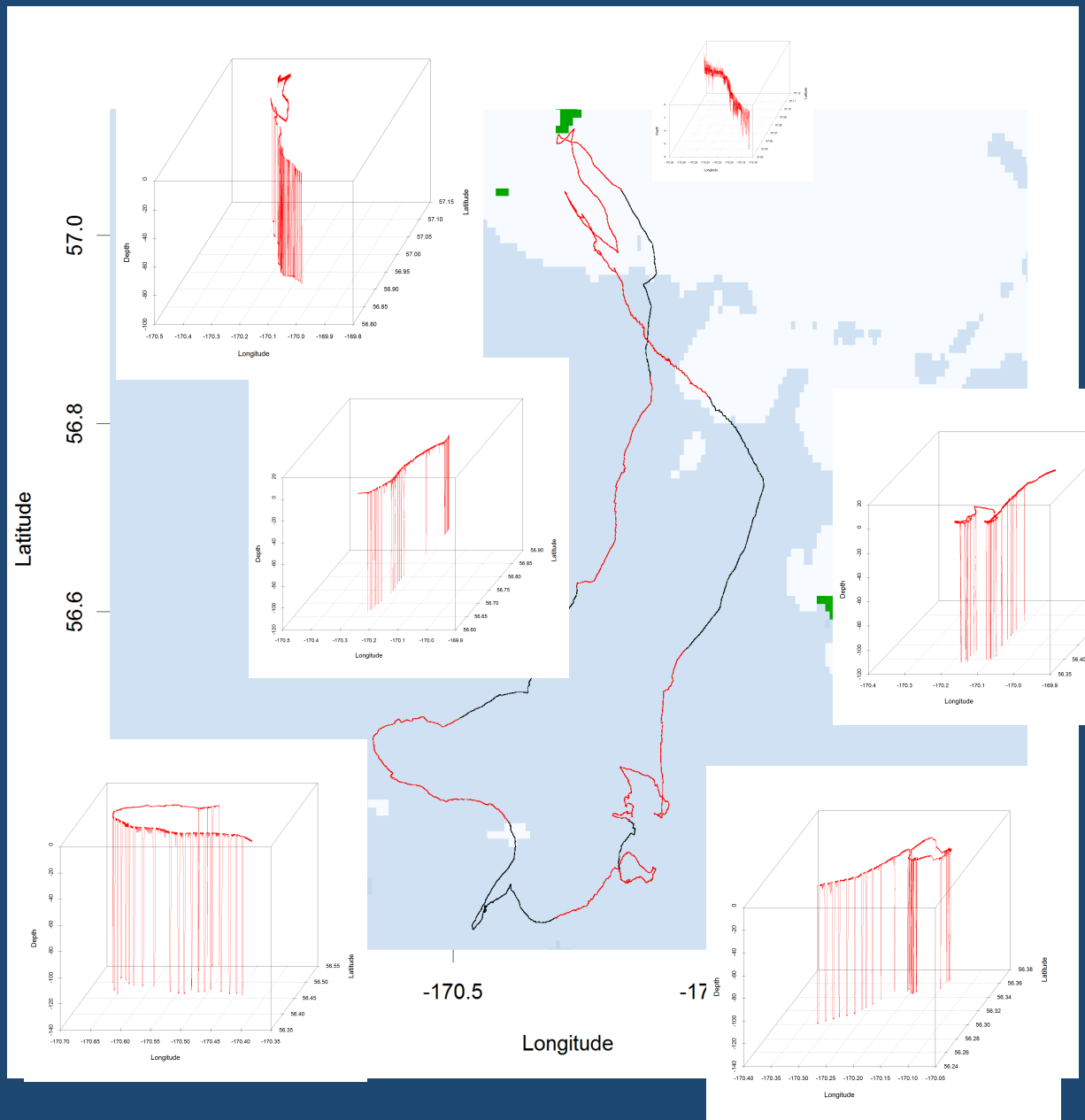
Random walk or is this a measure of patch size.



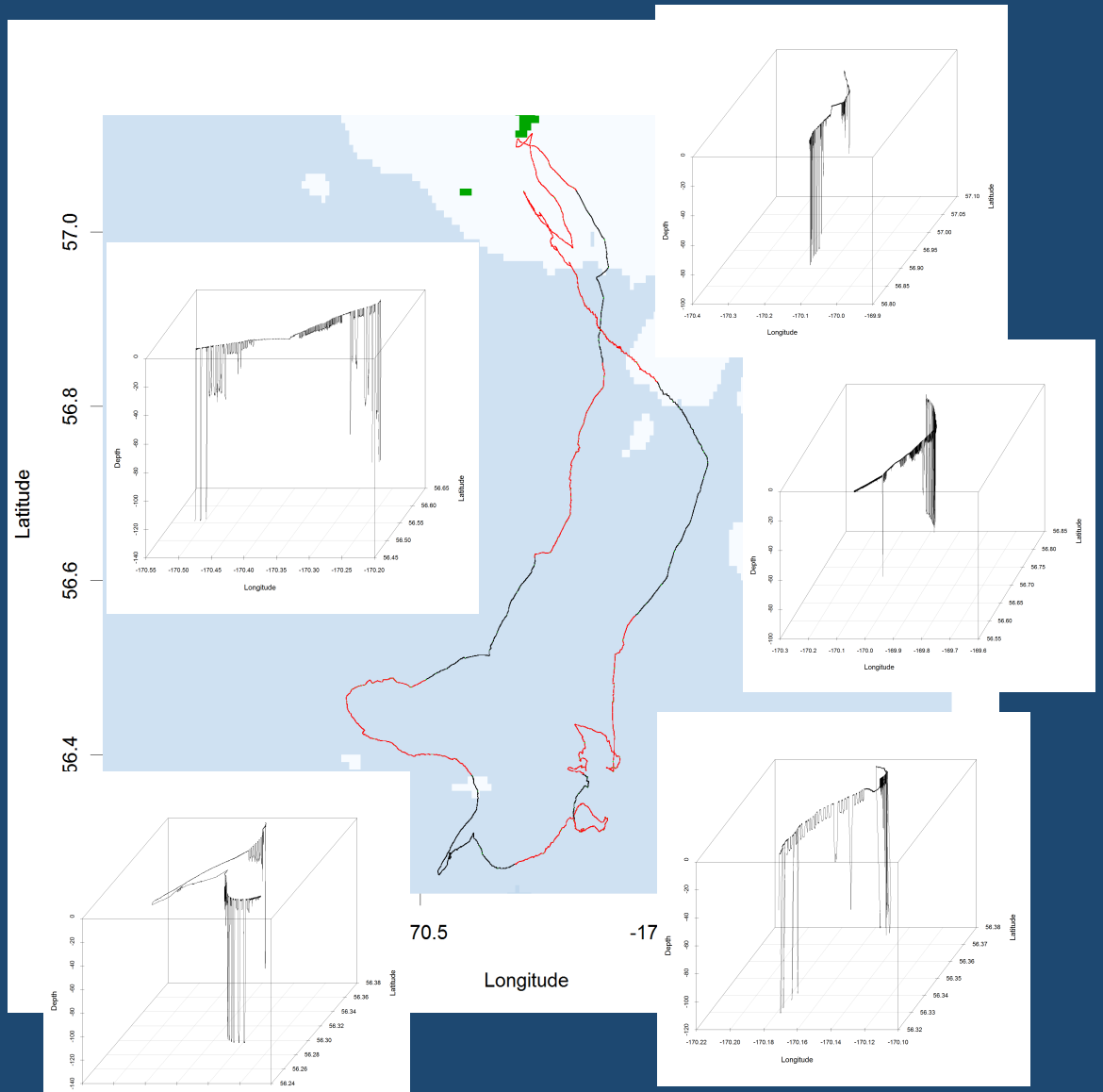
St. Paul on shelf



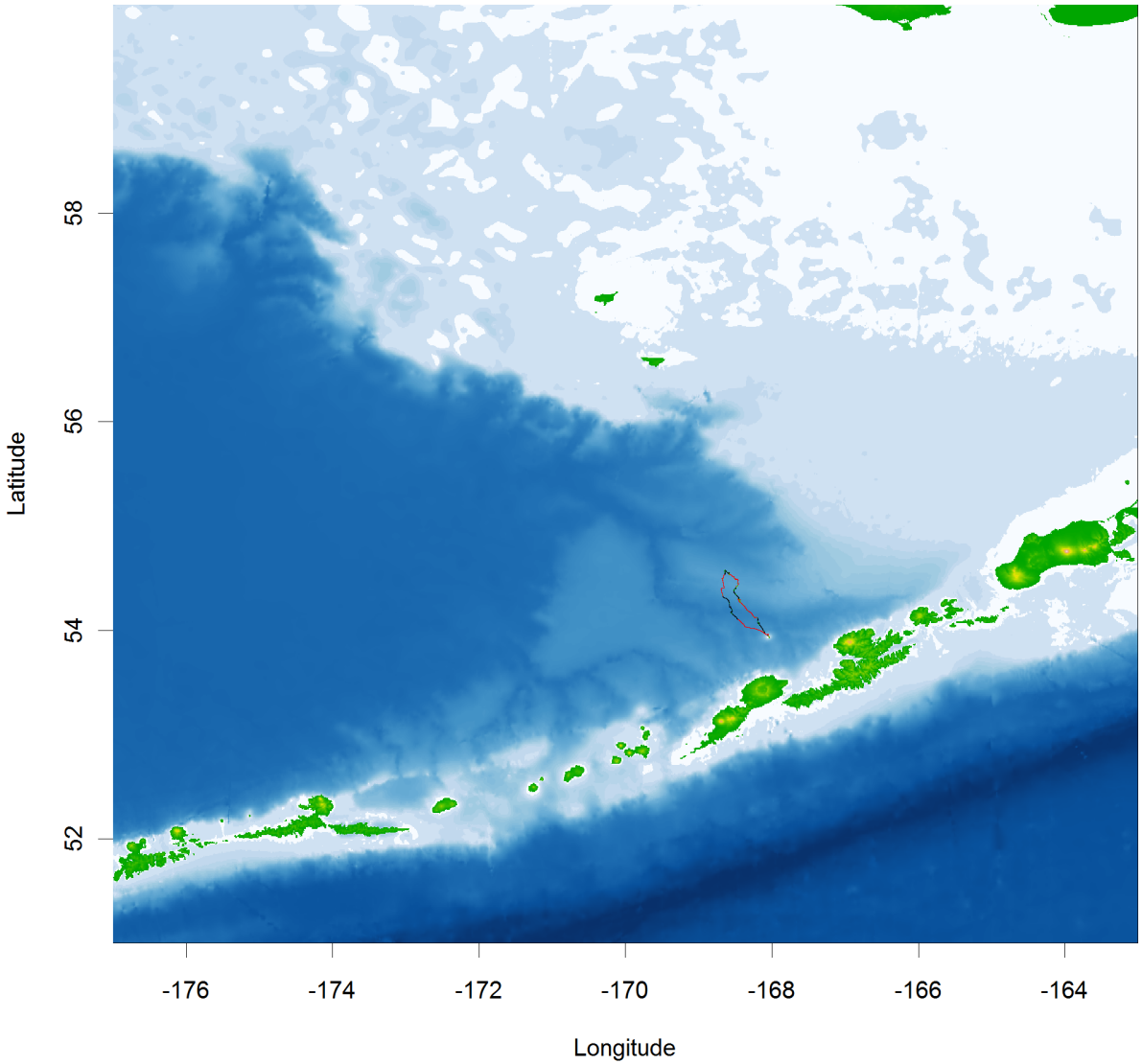
St. Paul on shelf



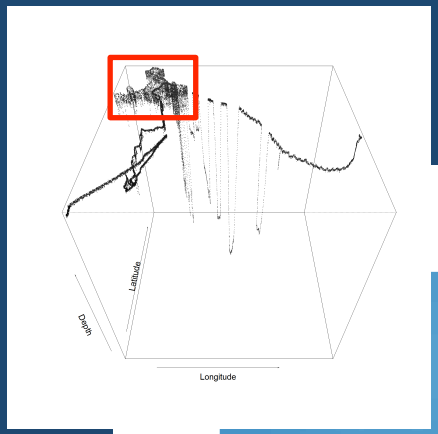
St. Paul on shelf

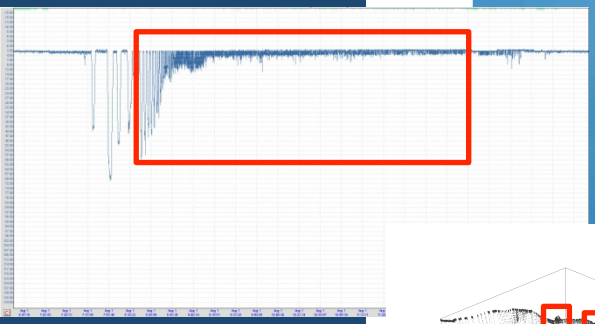


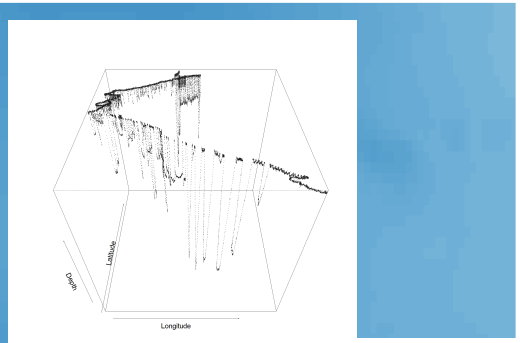
Bogoslof 1

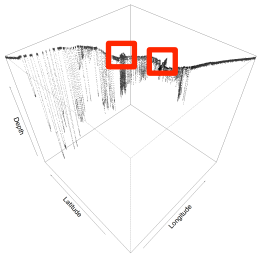


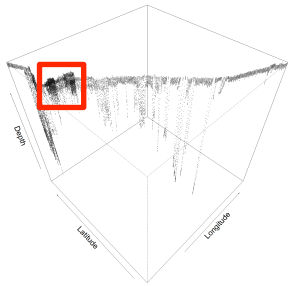
Bogoslof 1











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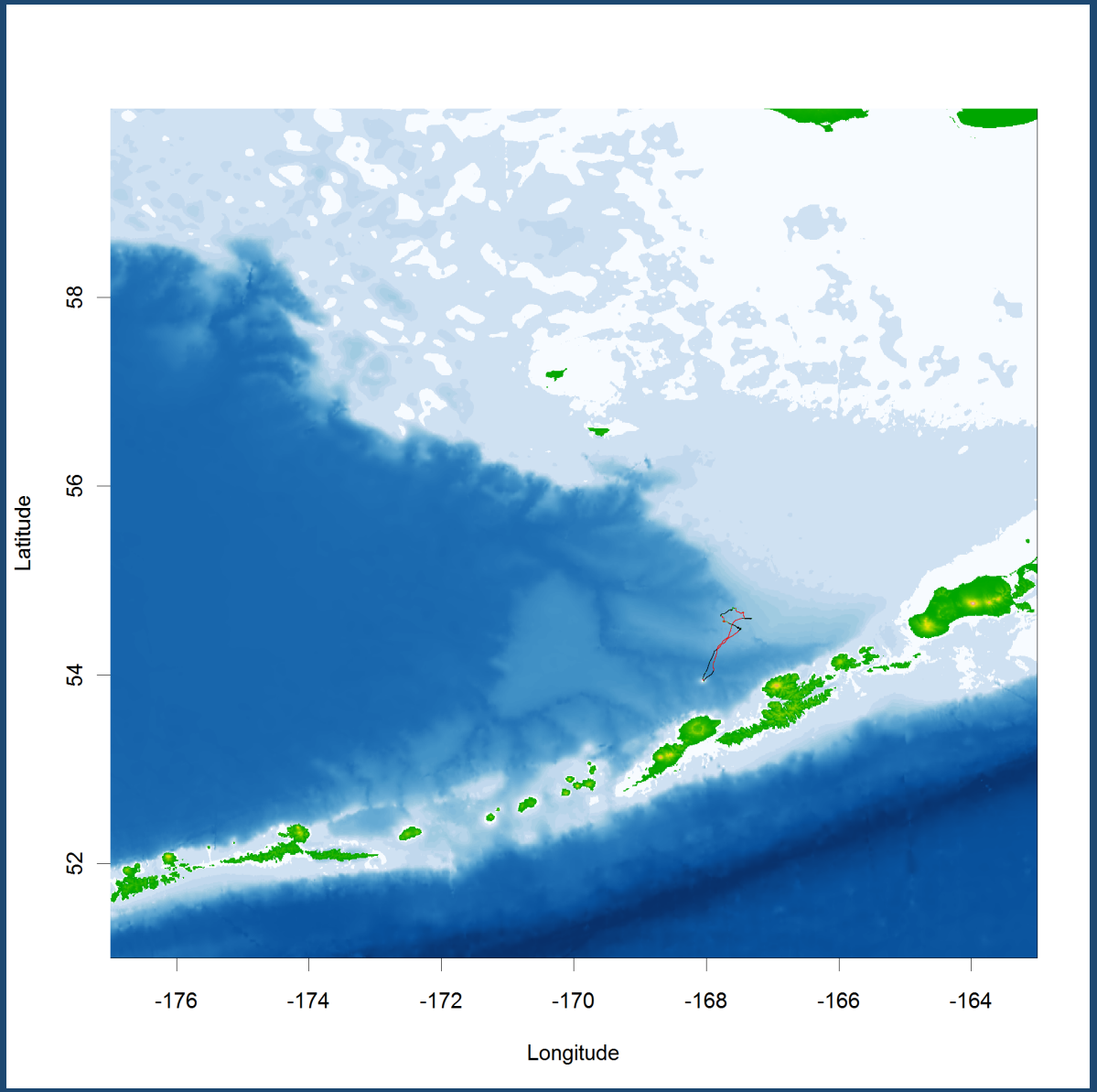
gitude

Bogoslof 2



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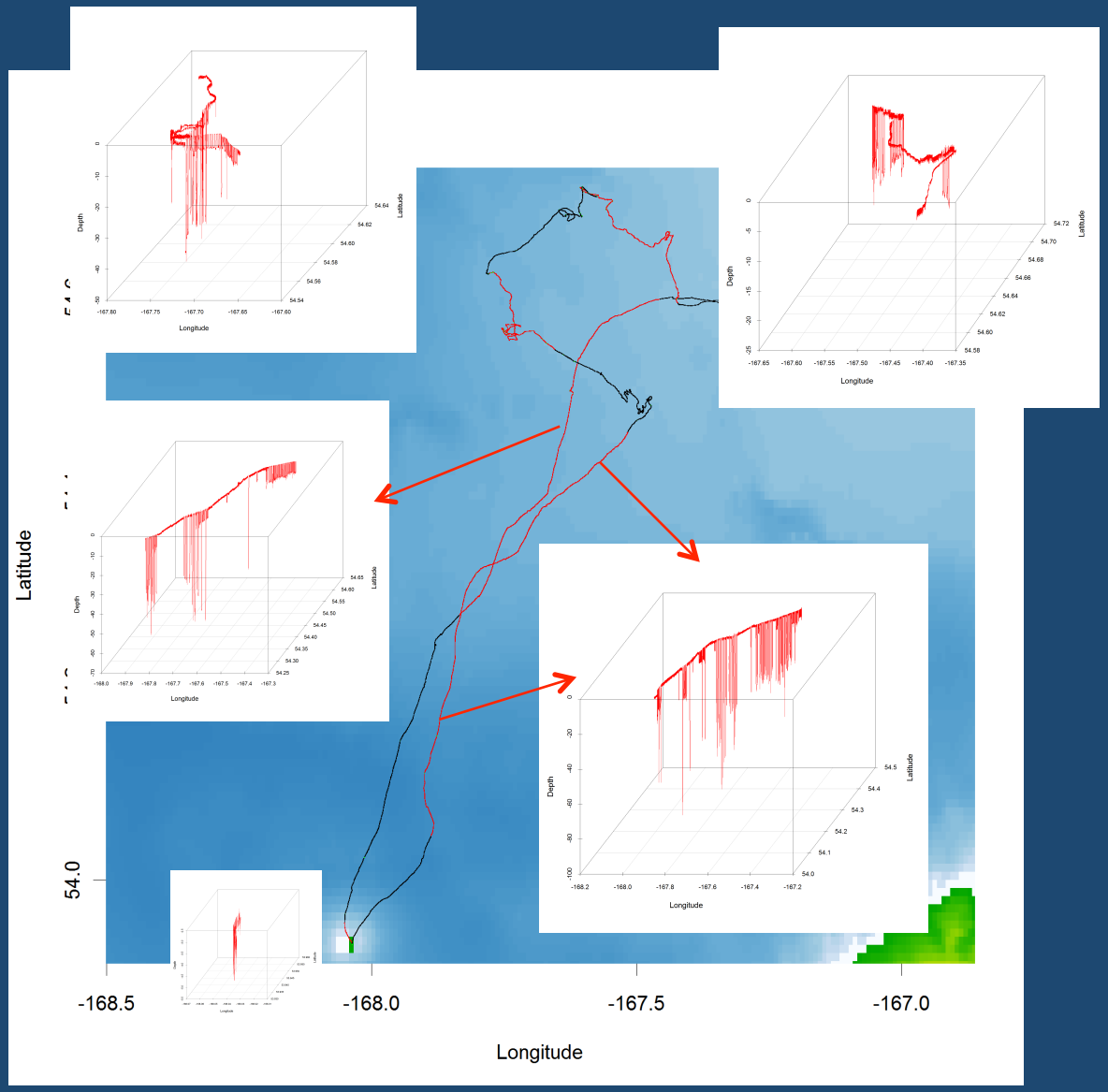
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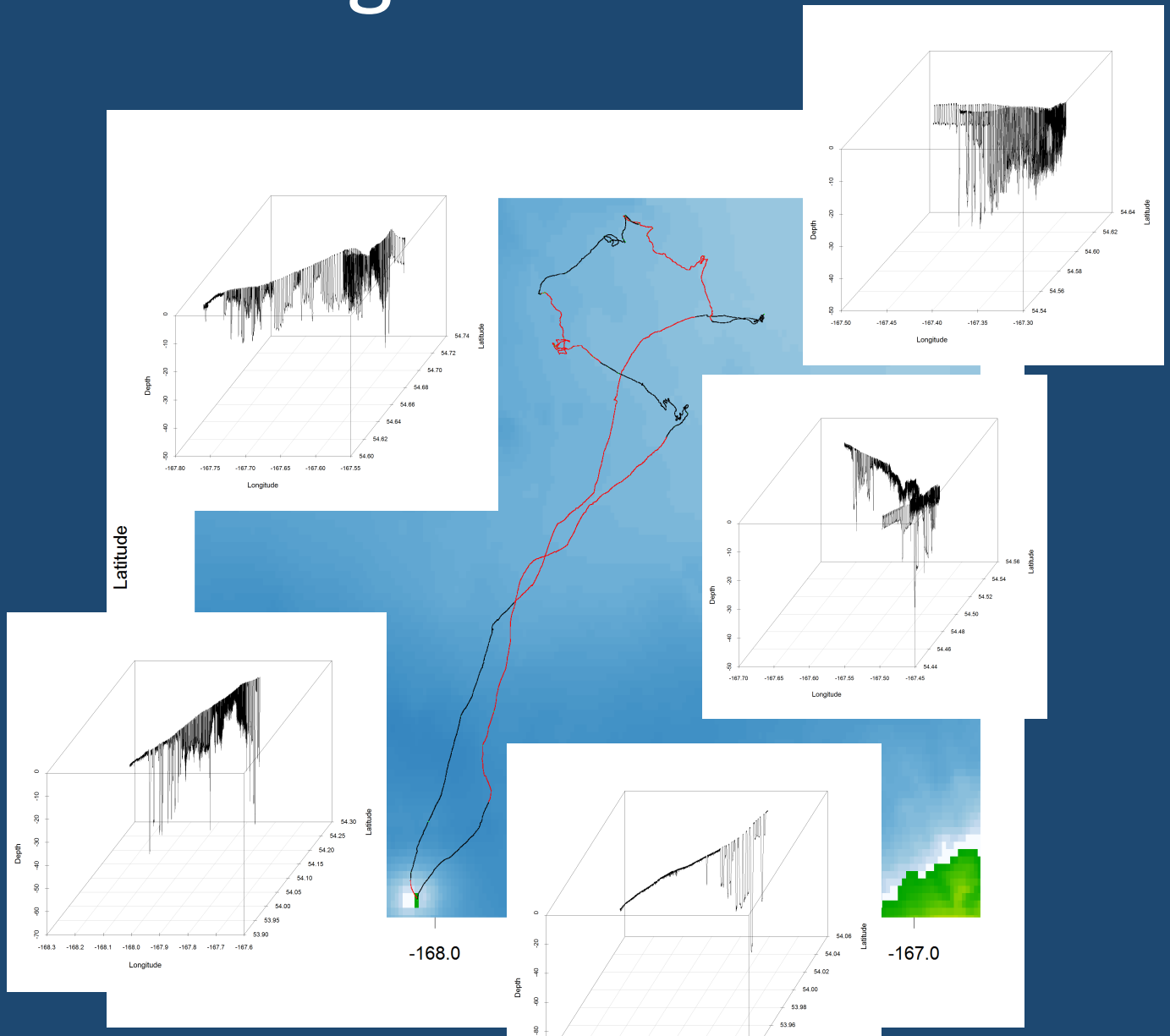
Longitude
Depth
Latitude
Longitude

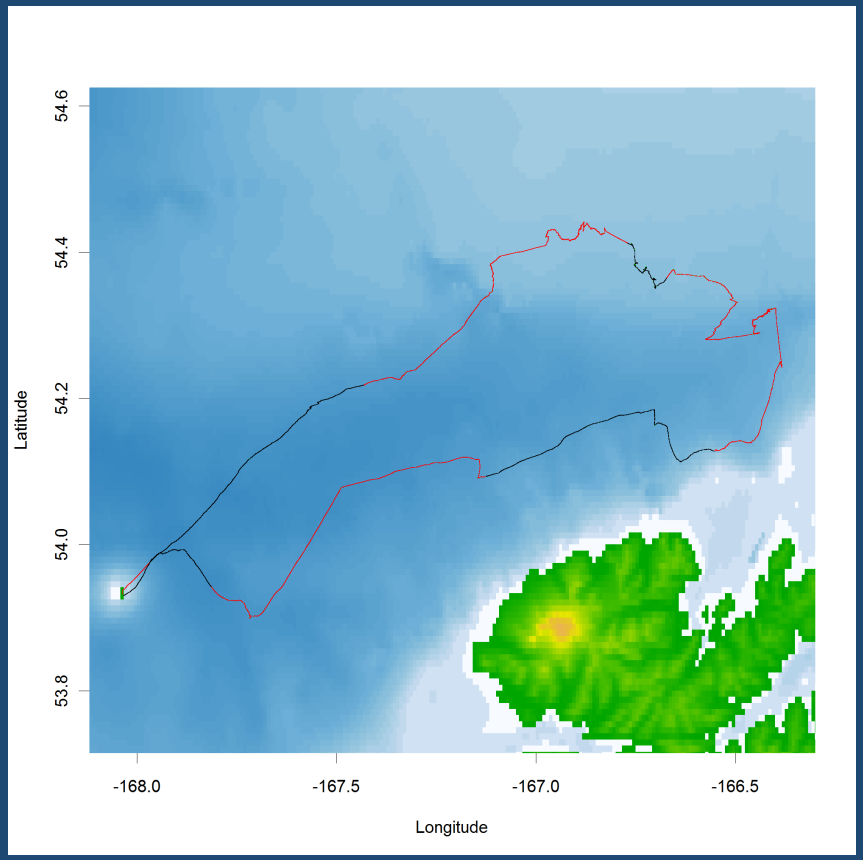
Bogoslof 2

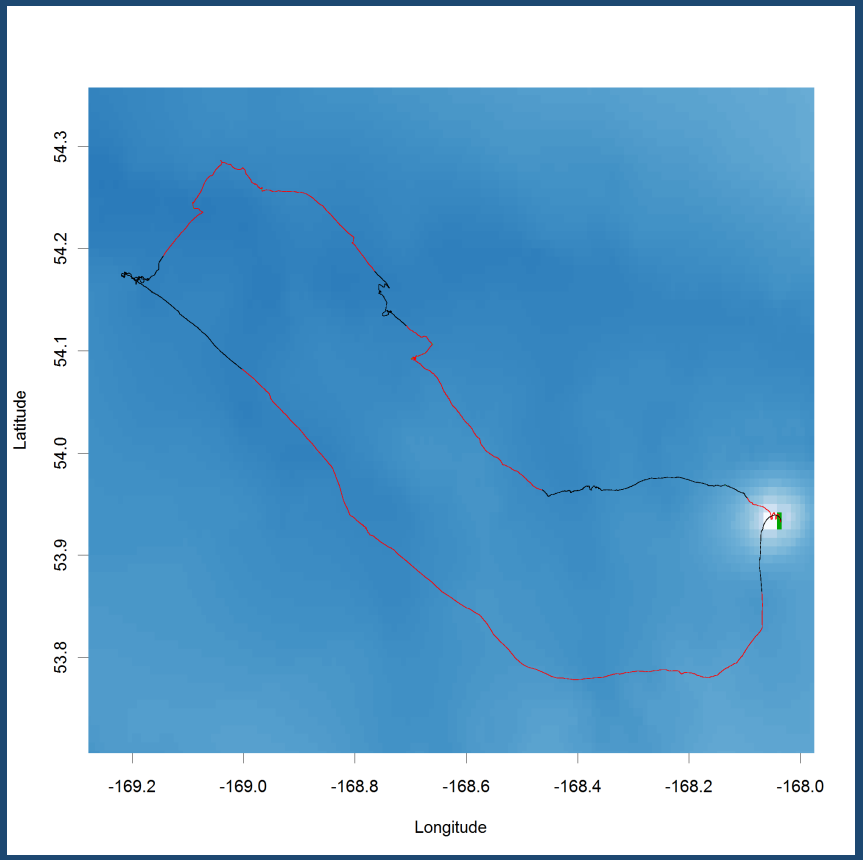


Interpretation / statistically unsubstantiated speculation (hypothesis)

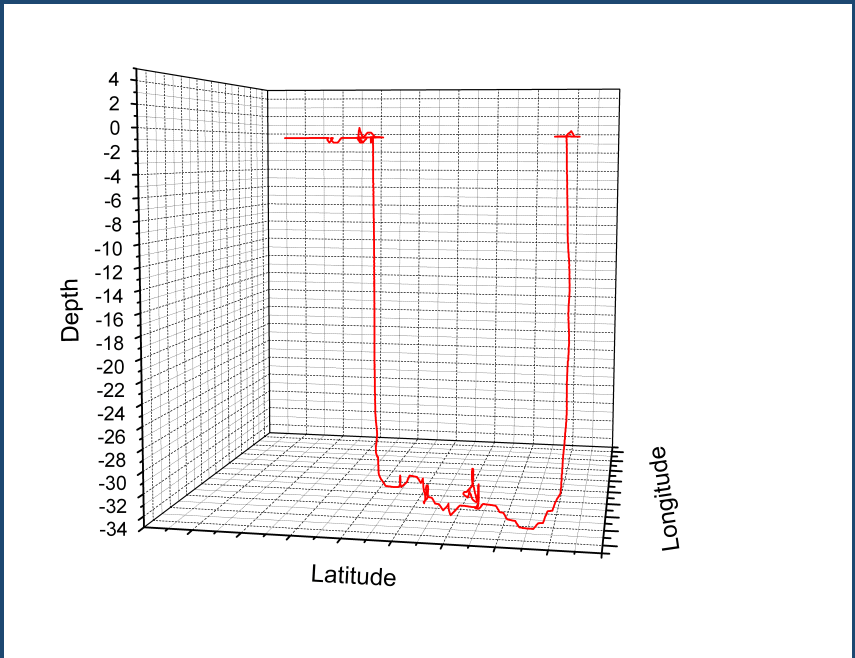
- Both island's animals show a similar range of behaviour
- Flexible-adaptable to local conditions offering different resources. Onshelf/offshelf; day/ night; benthic/midwater
- Adapted to successfully forage for patches that are ephemeral in space and time on the small scale, but generally consistent on the large scale

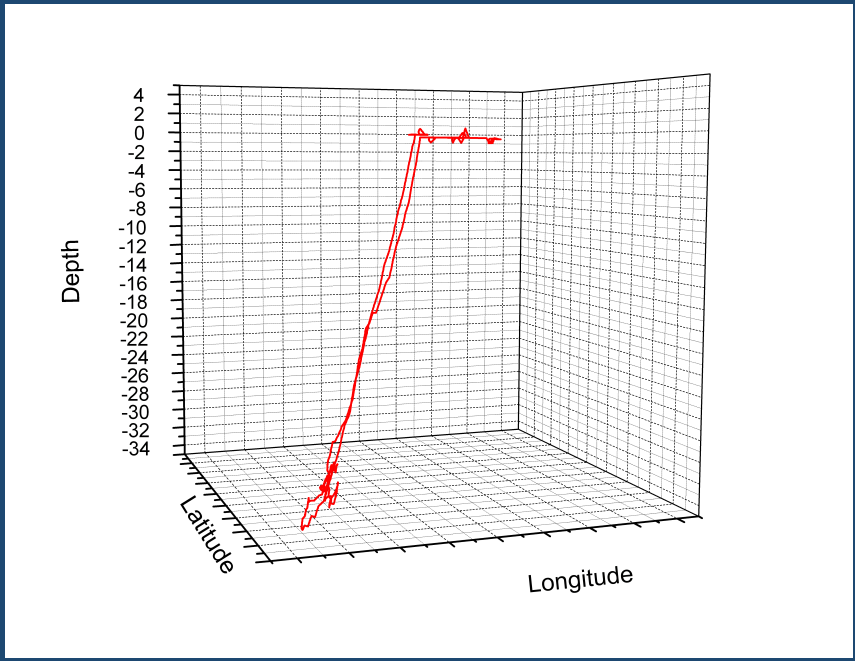
Mysterious Observation 1
“the down turn”





Mysterious Observation 2
similar ascent and descent angle

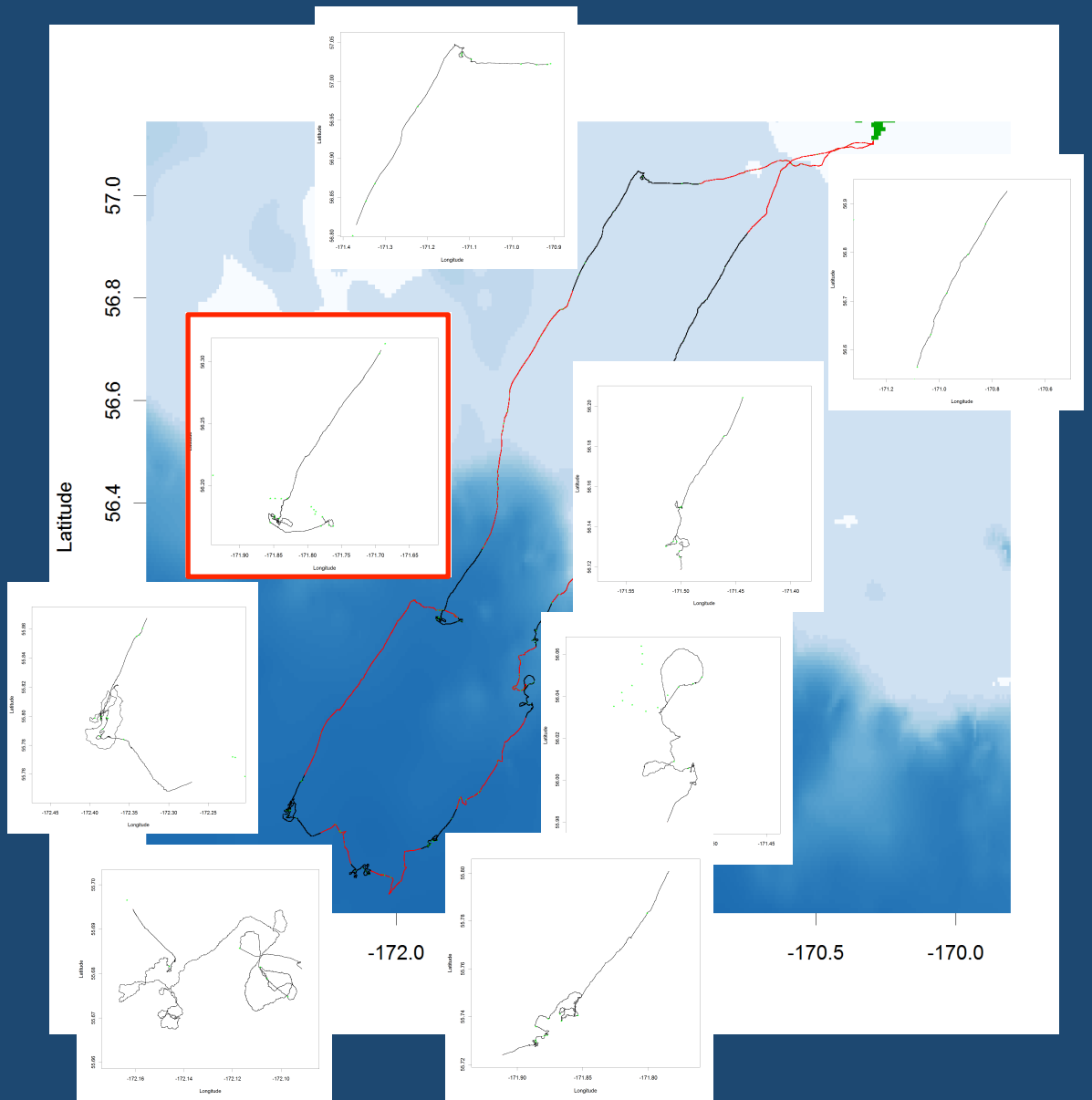




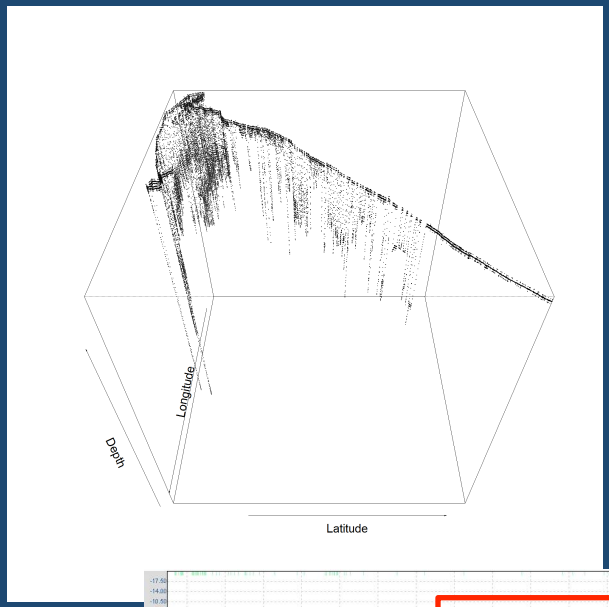
Acknowledgments

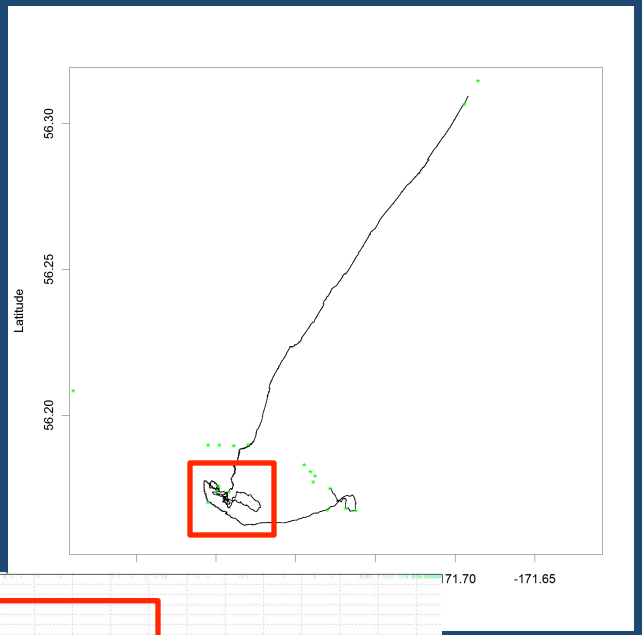
- NPRB funding
- Bogoslof and St. Paul field teams
- Rory Wilson lab
- Patch Dynamics and Bering Sea Integrated Research Program crew

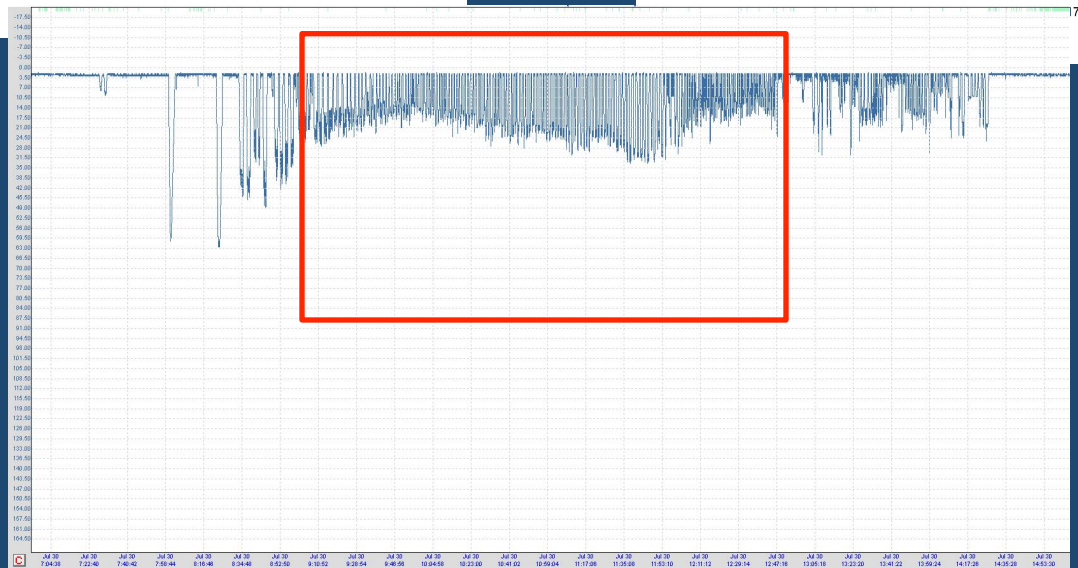
St. Paul off shelf



St. Paul off shelf

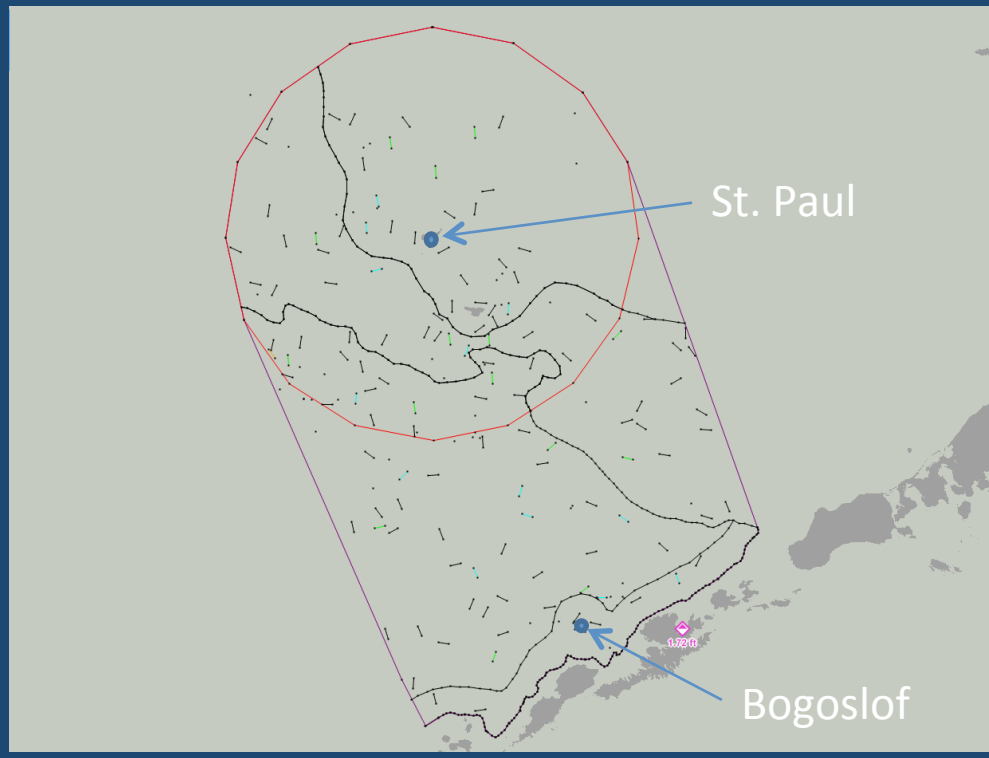






Patch Dynamics Integrated Program

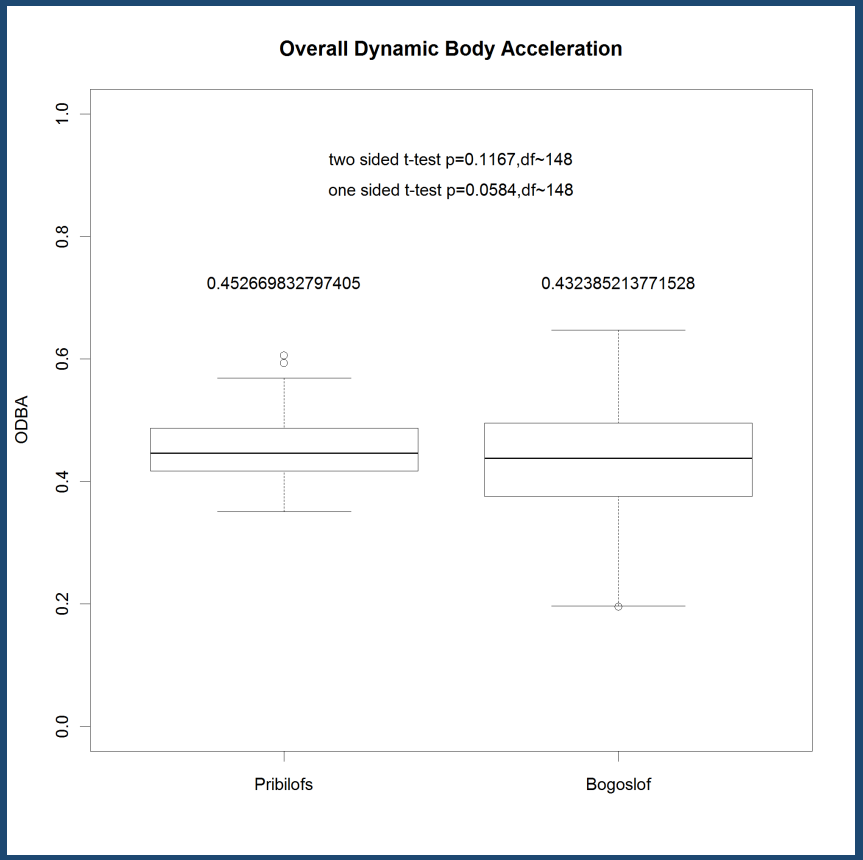
- Fine scale, physical oceanography to top predators
- St. Paul vs. Bogoslof
  - Eco-regions
  - Top predator dynamics
  - Characterize prey patches, how do they exploit them.
- What do the differences tell us about their future on a rapidly changing planet



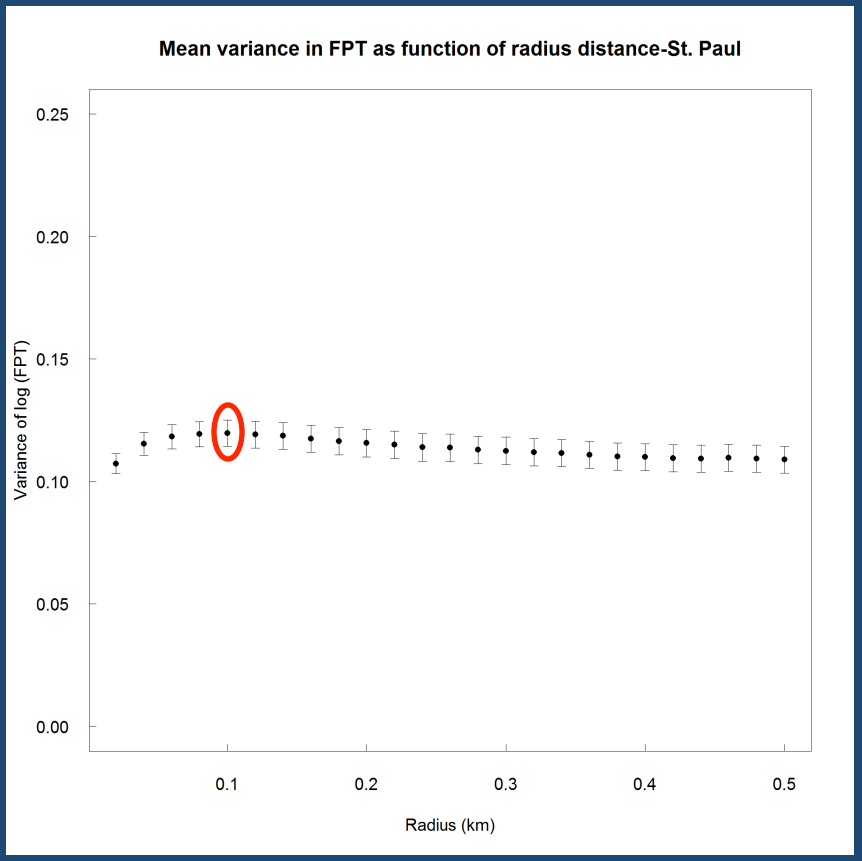
Fun Things “Being Perpendicular”

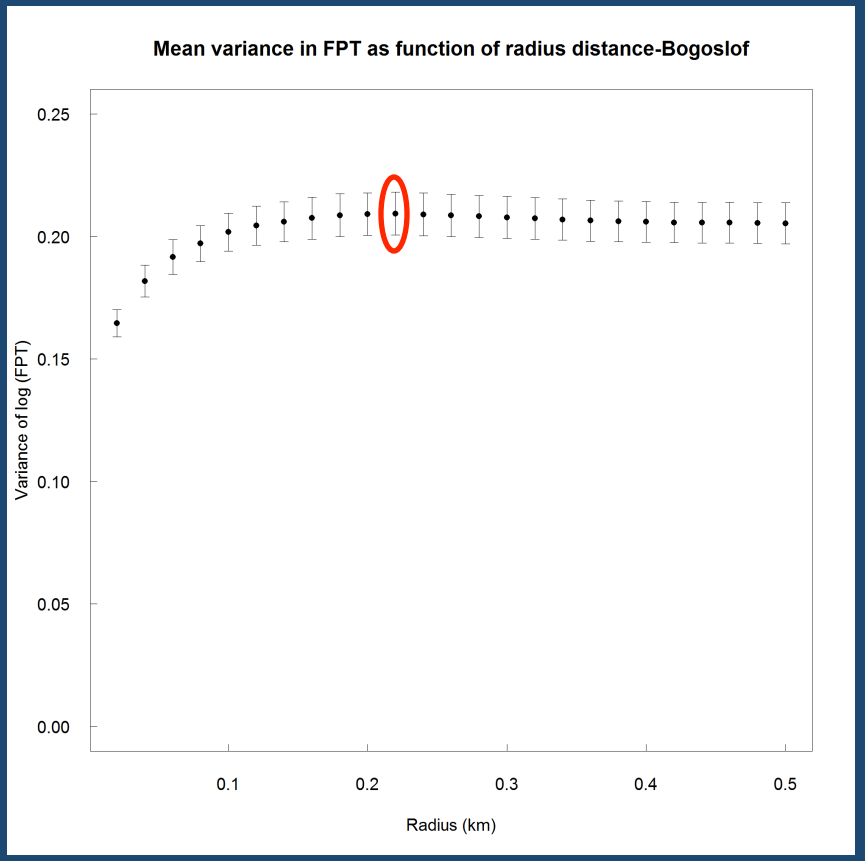
Overall Dynamic Body Acceleration

- A sum of the 3 acceleration channels minus gravitational signal.

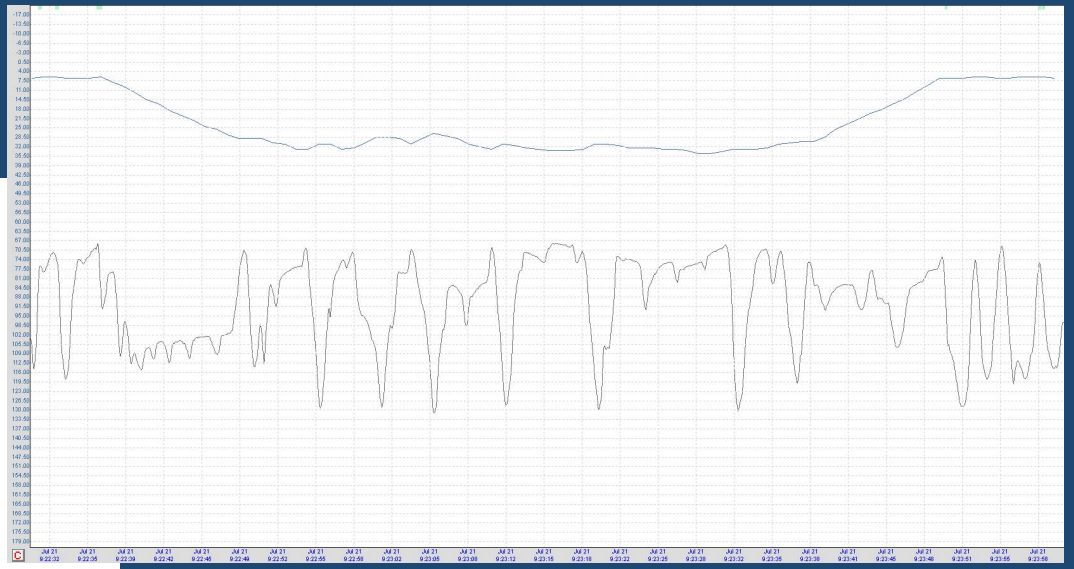


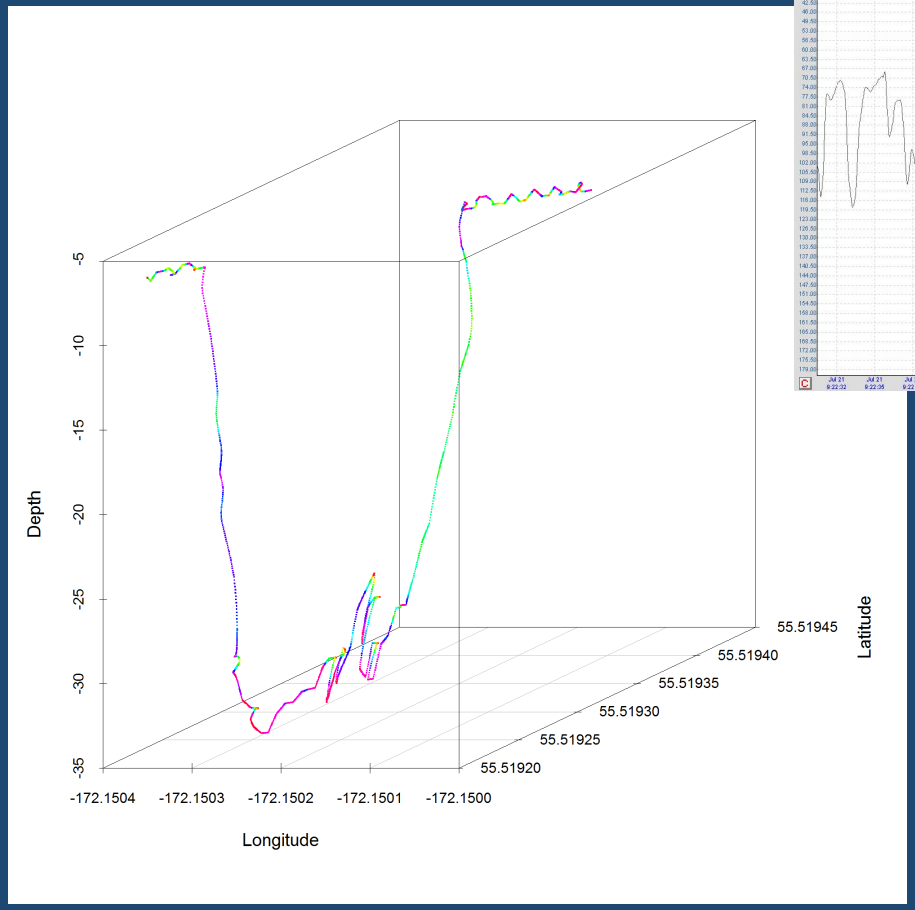
First Passage Time





Single Dive

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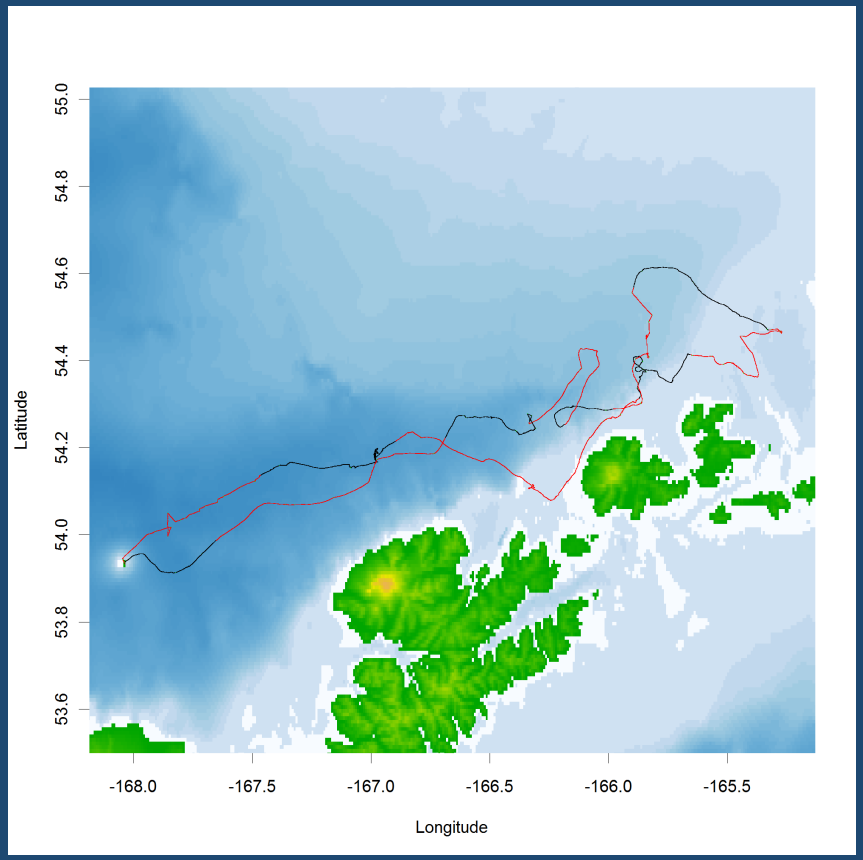
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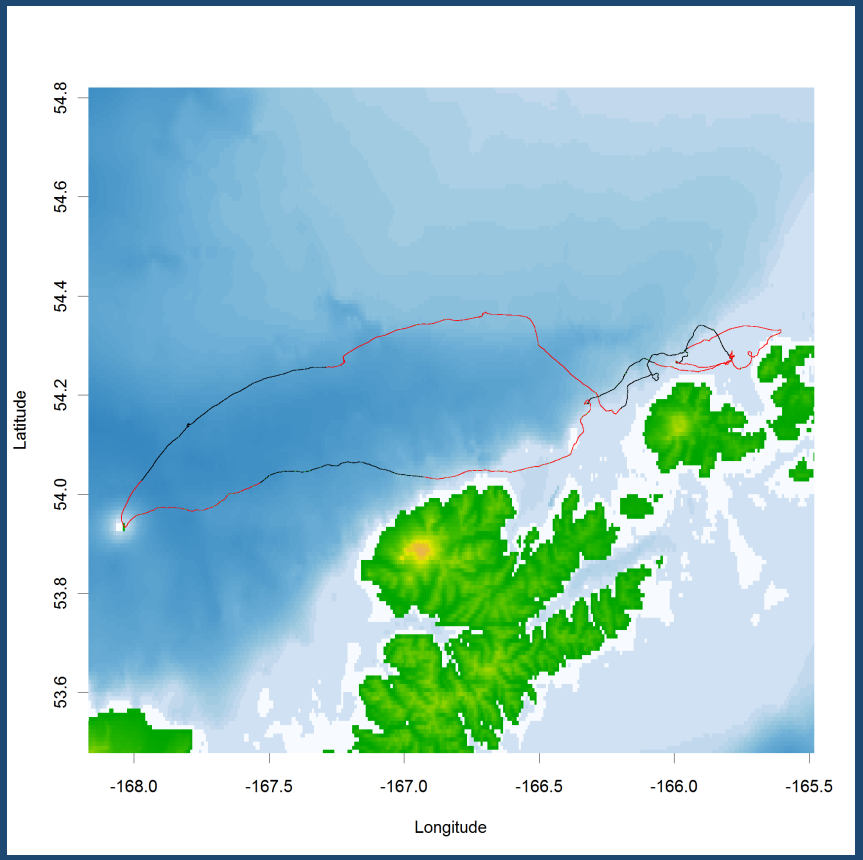
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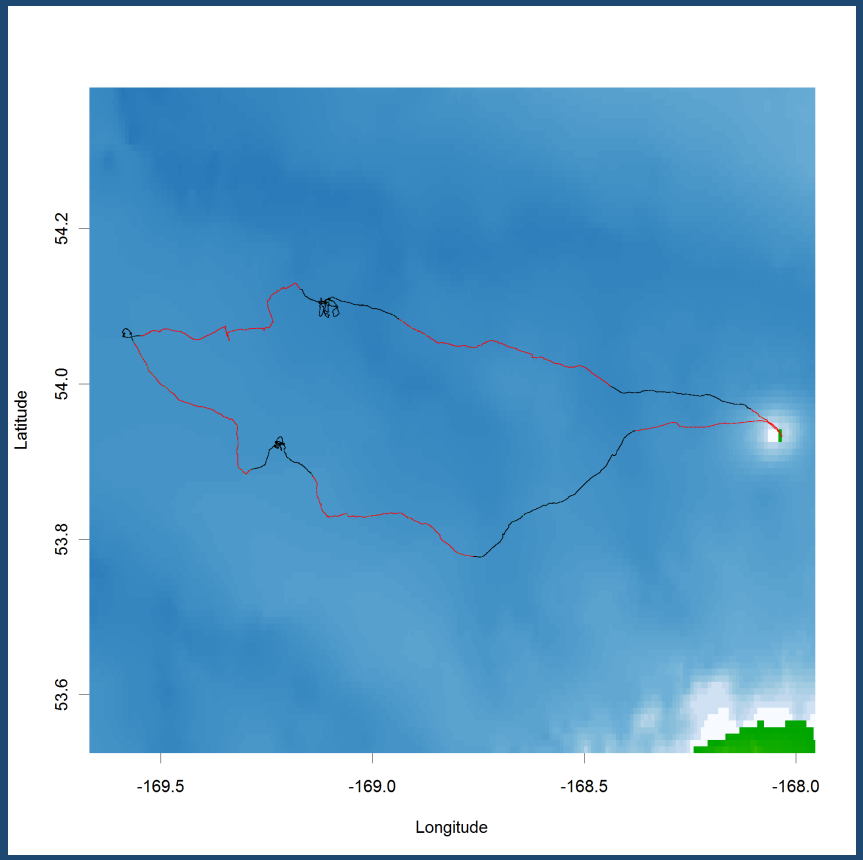
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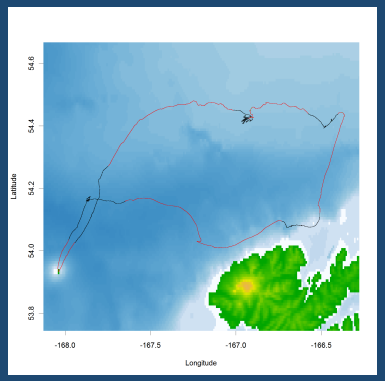
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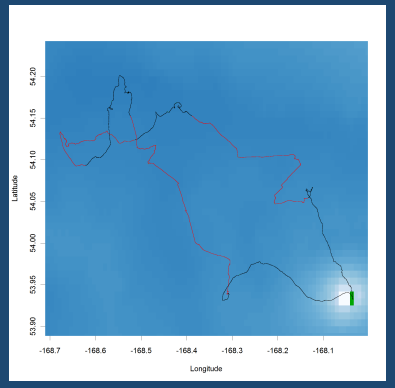
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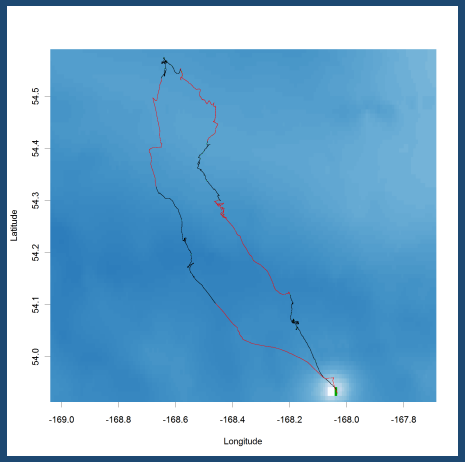
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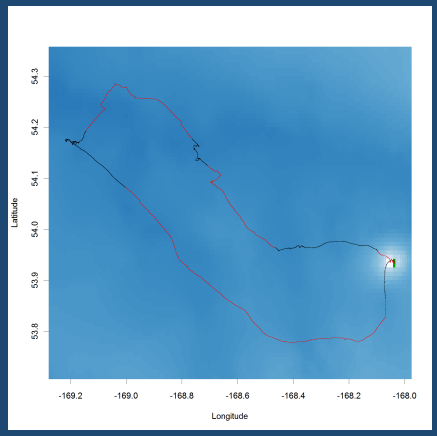
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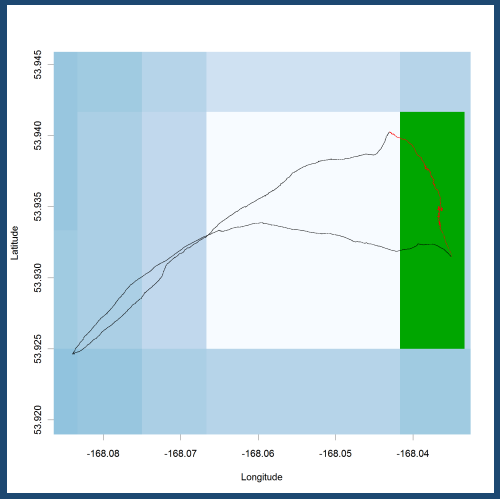
Longitude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53.940
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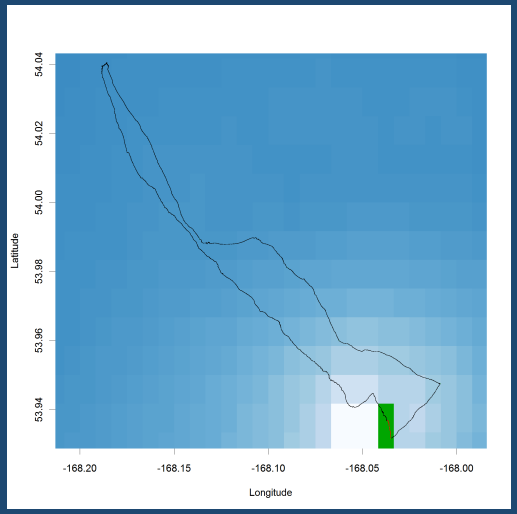
53.930
53.925
53.920
-168.08
-168.07
-168.06
-168.05
-168.04
Longitude


Latitude
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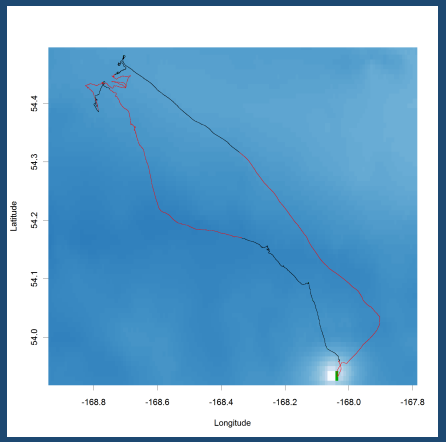
54.02
54.00
53.98
53.96
53.94
-168.20
-168.15
-168.10
-168.05
-168.00
Longitude


Latitude
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54.3
54.2
54.1
54.0
-168.8
-168.6
-168.4
-168.2
-168.0
-167.8
Longitude

Activity Budget