

THE UNIVERSITY OF
**WESTERN
AUSTRALIA**

Oceans Institute

Two decades of surface current observations using drifters

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Oceans Graduate School and UWA Oceans Institute

29 / November / 2023

Forum for Operational Oceanography

Coastal Oceanography



Acknowledgements

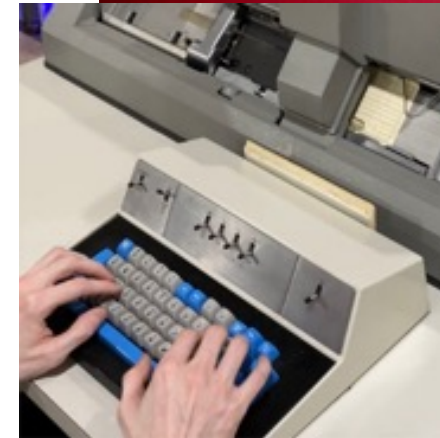
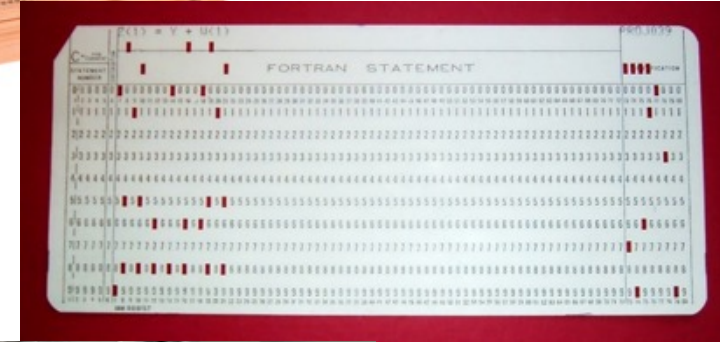
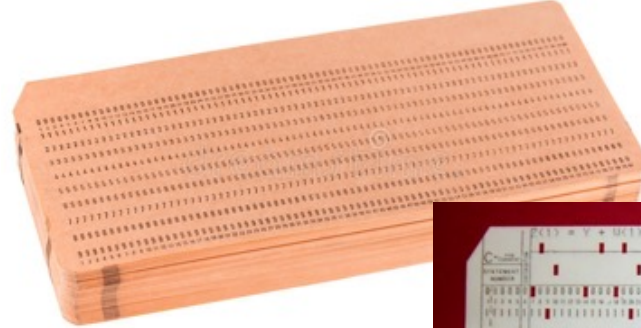
- David Johnson
- Alexio Mariani
- Florence Verspecht
- Dale Olsson[†]
- Eve Hollingsworth
- Rhys Jones
- Yasha Hetzel
- Ivica Janekovic
- Badema Grcic
- Mirjam van der Mheen
- Fengyao Jin
- Prescilla Siji
- Nick D'Adamo
- Dennis Stanley



- Jason McConochie
- Phil Watson
- Shell
- Woodside

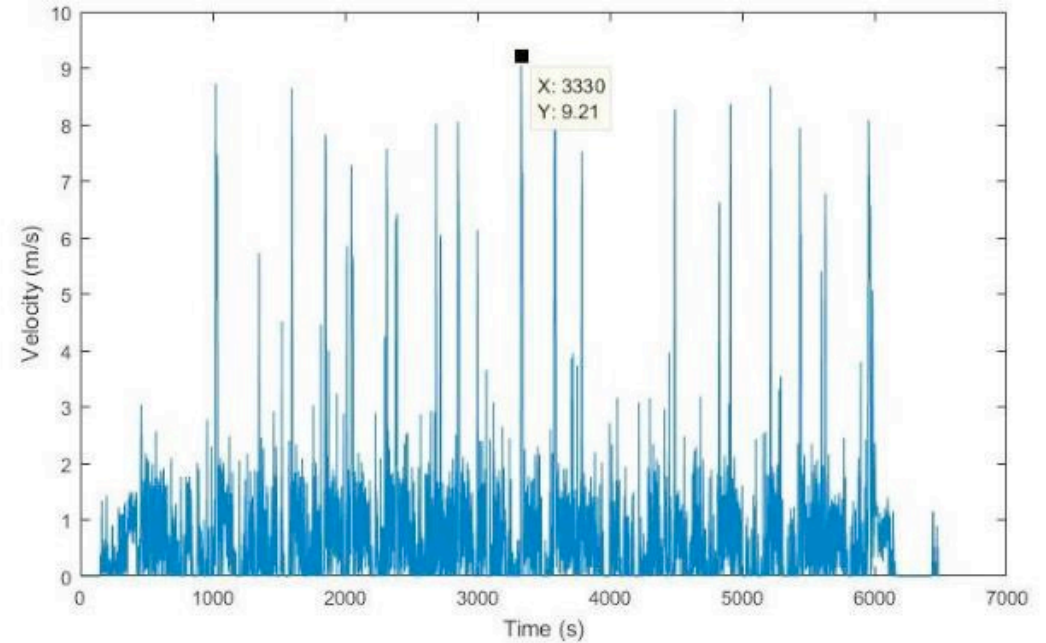
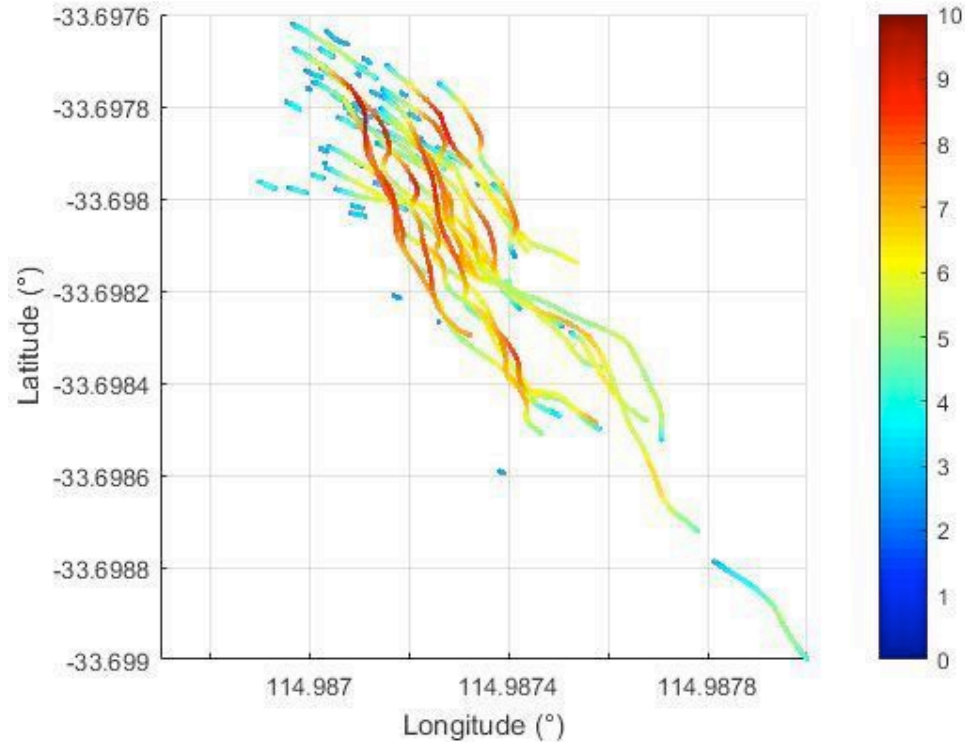


Historical

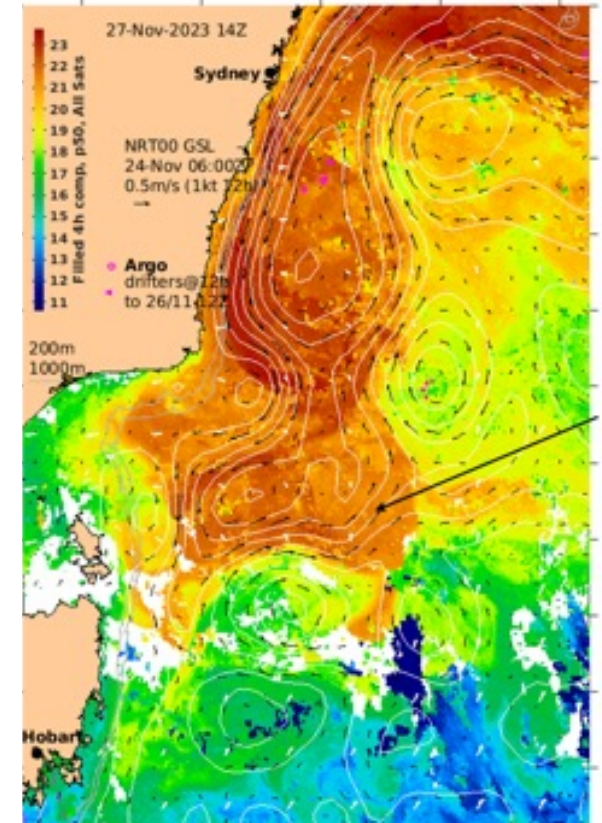
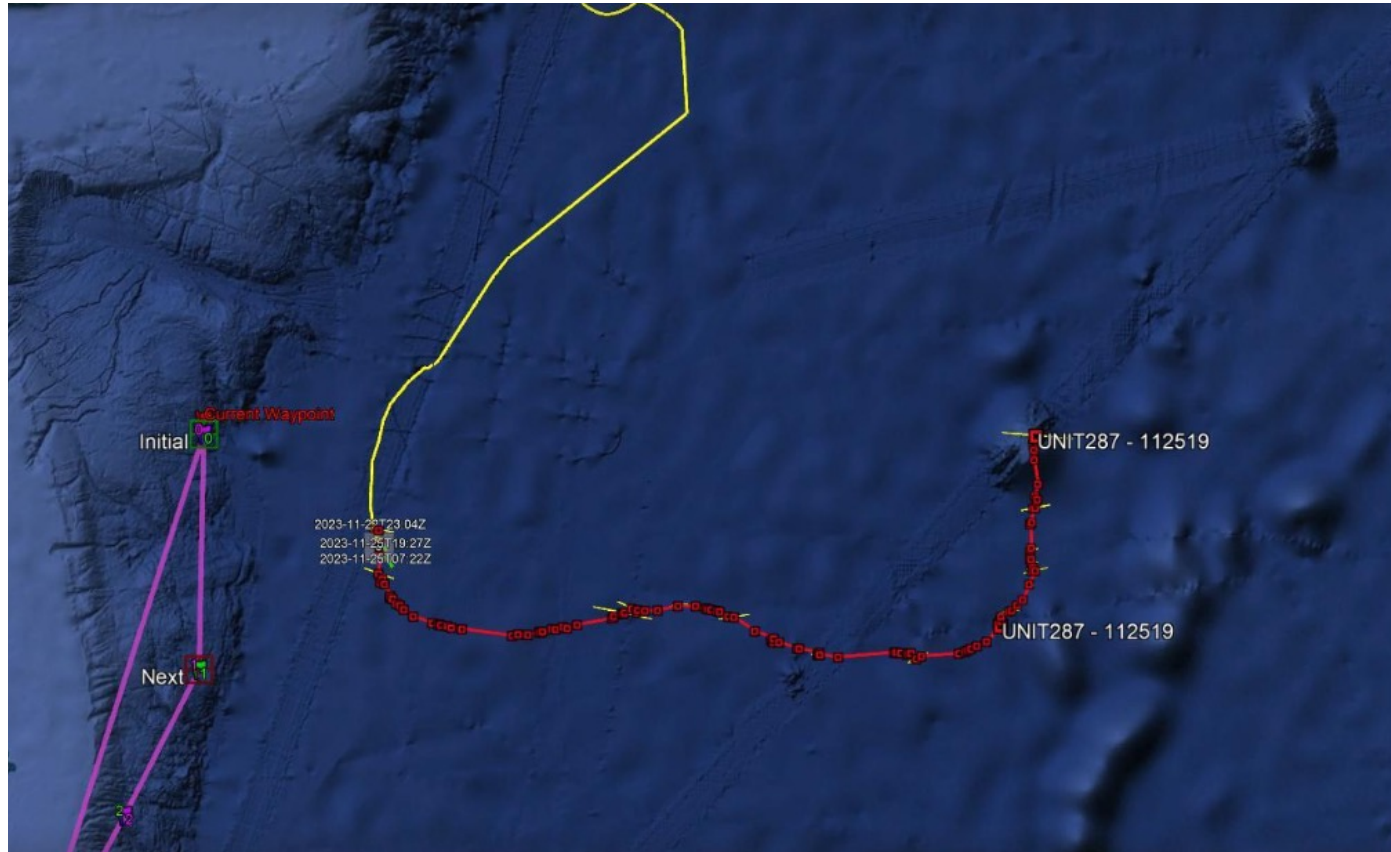


Challenger Expedition
1872 -1876

Human 'Drifter': surfer



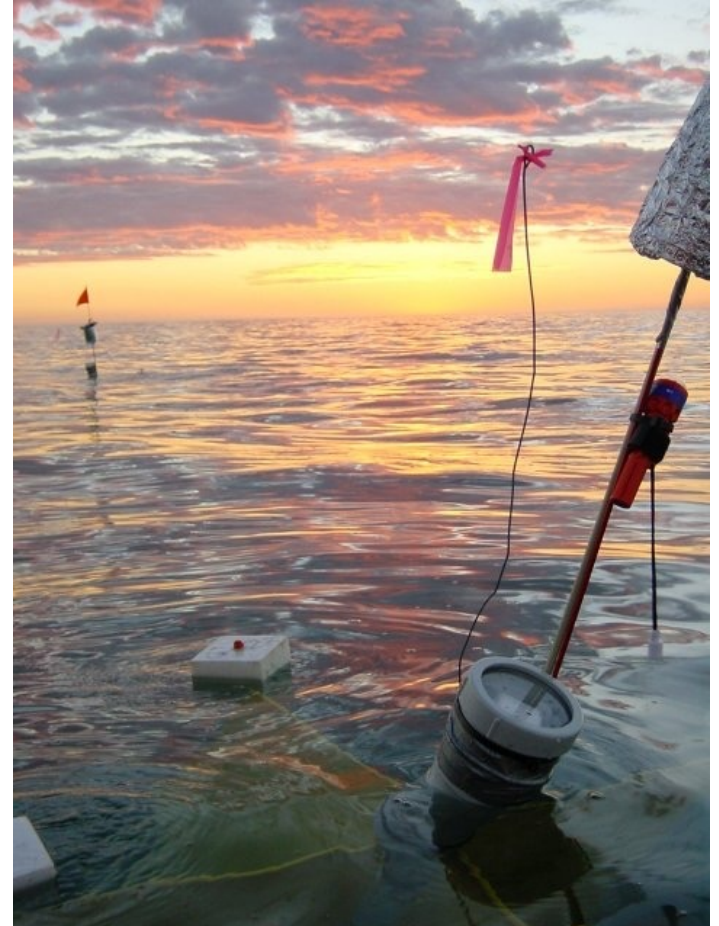
Glider 'Drifter'



Drifters (or *Lagrangian current followers*)

Instructions for use:

- Throw it in the water
- Somehow record where it goes
- Hope it behaves exactly like the volume of fluid it displaces would have
- Wish that it remains in the water without beaching

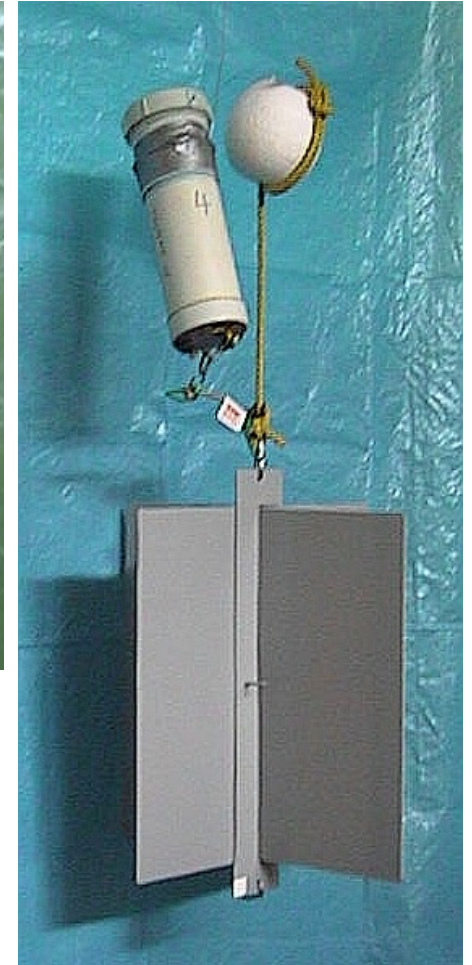
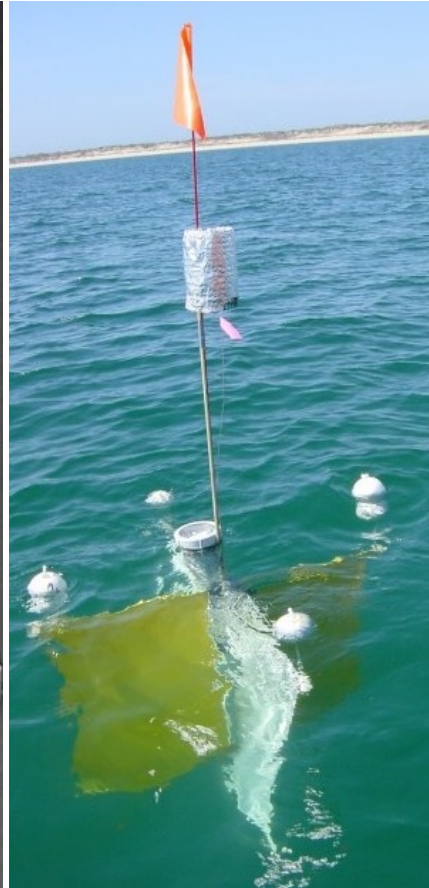
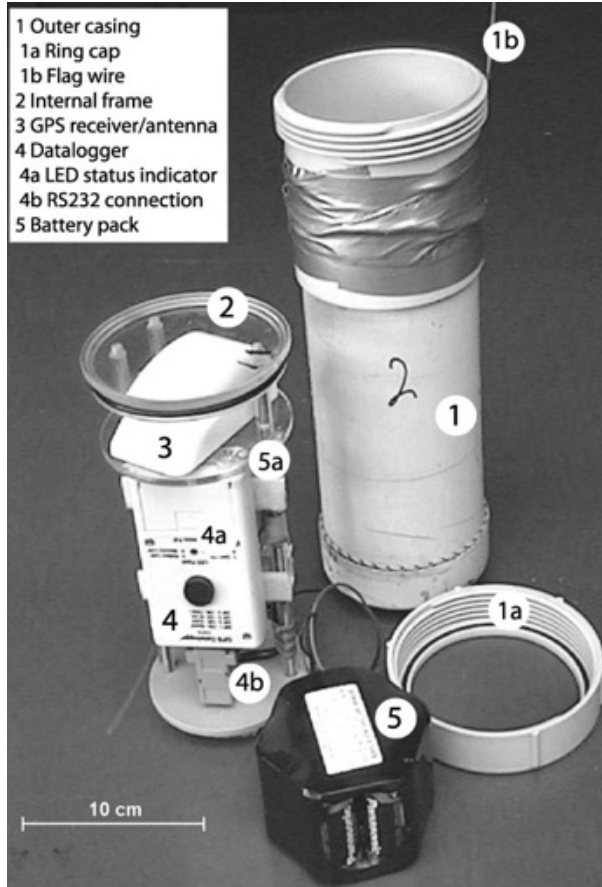


Drifter Design ('off-shelf')

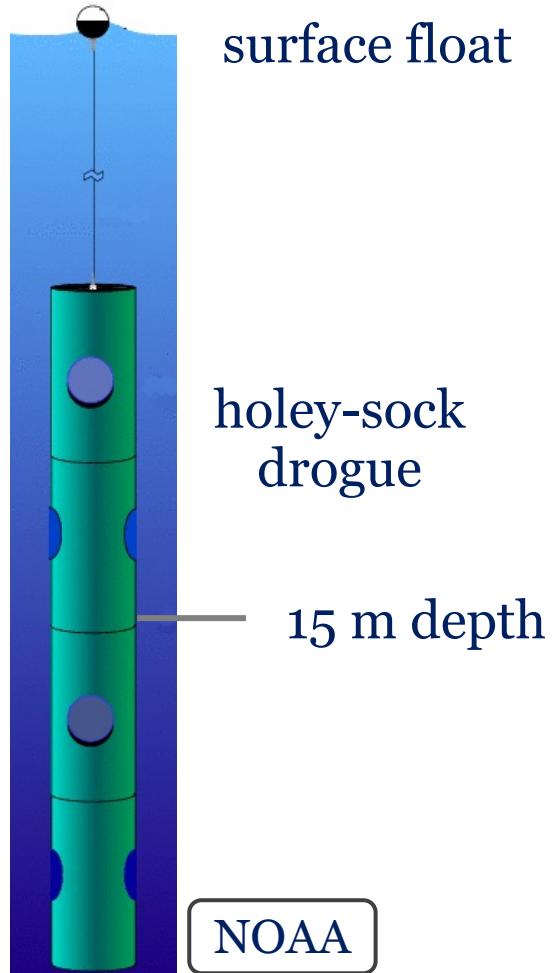
- Simple – easy to make
- Small – easy to deploy/recover
- Robust – able to survive harsh conditions
- Low cost – suitable for small research projects/budgets
- Accurate – good positioning accuracy



Drifter Design



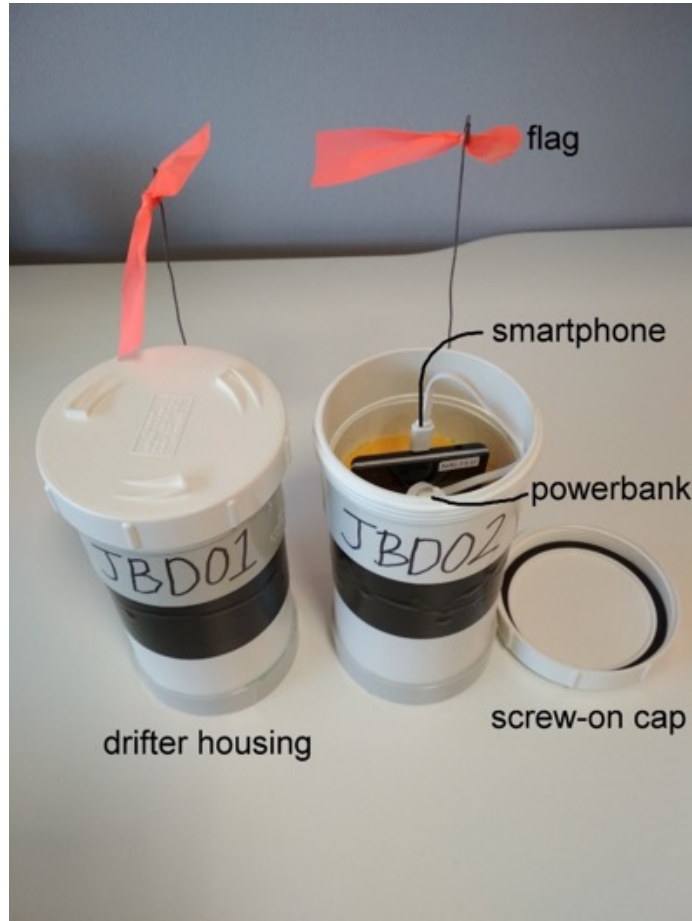
Ocean surface drifters



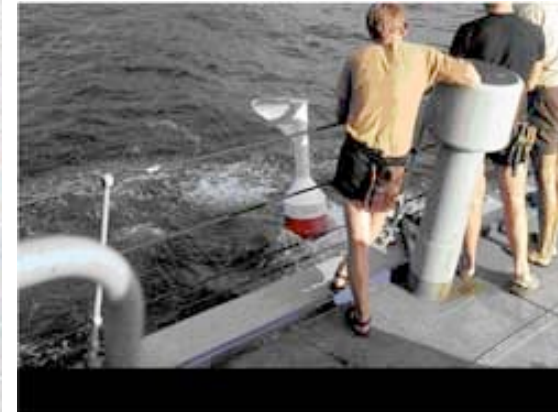
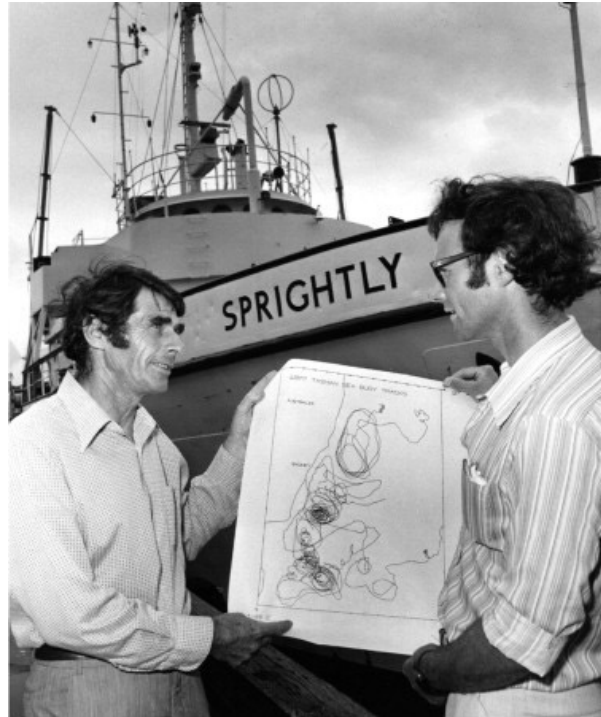
- Commercial drifters: A\$2000 – A\$15,000
- DIY drifters: ~A\$500
 - SPOT Trace
 - Batteries
 - Ballast
 - Housing
 - (Drogue)
 - Satellite subscription



Misc drifters



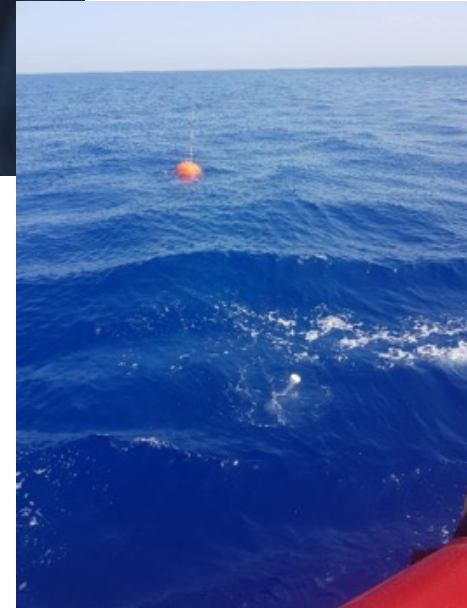
George Cresswell



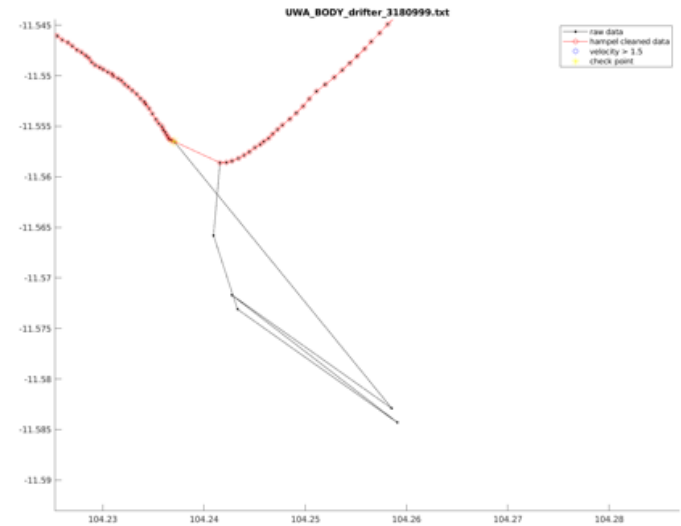
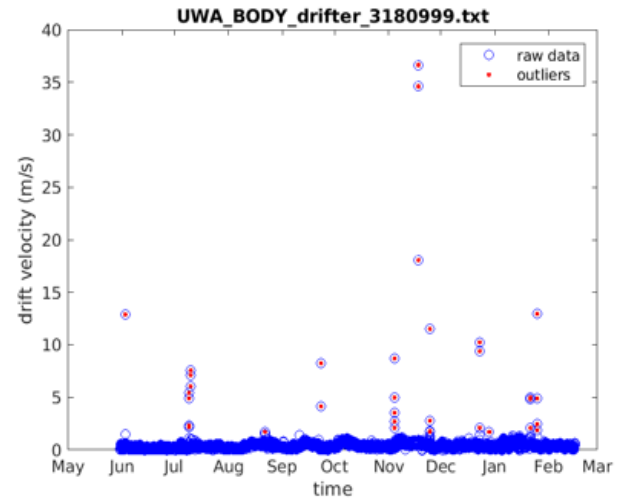
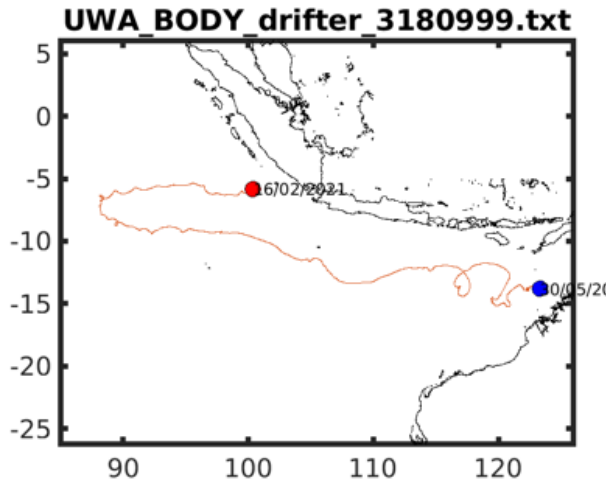
Deployment - 2009



Deployment

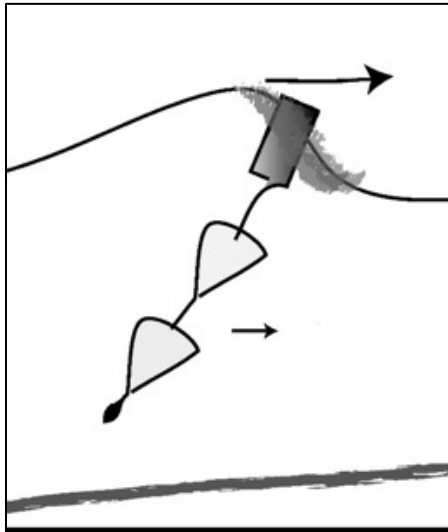


QA/QC data

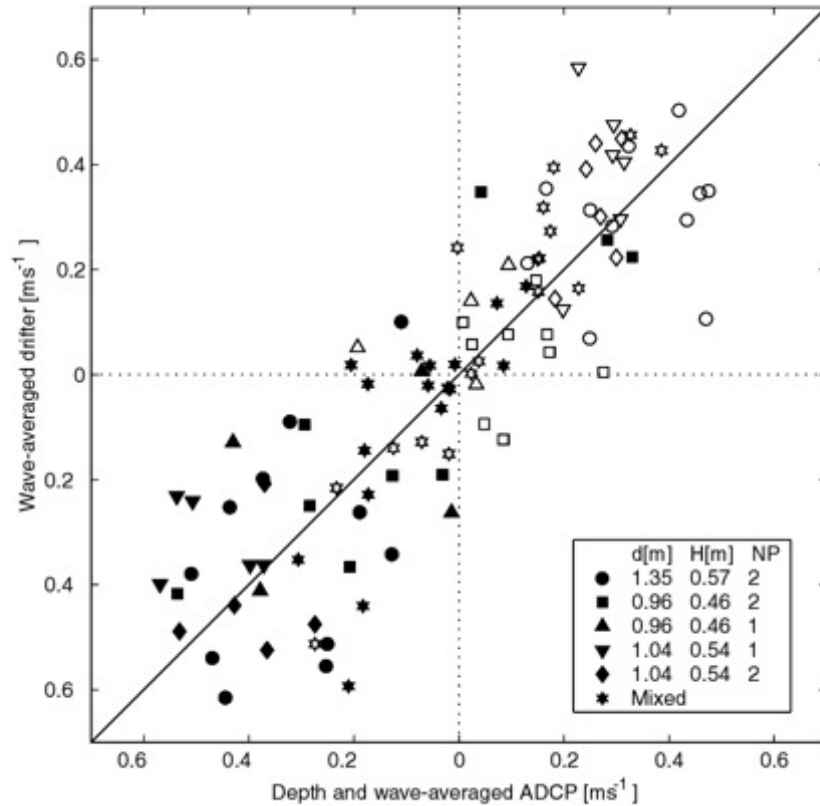


Surf zone drifters

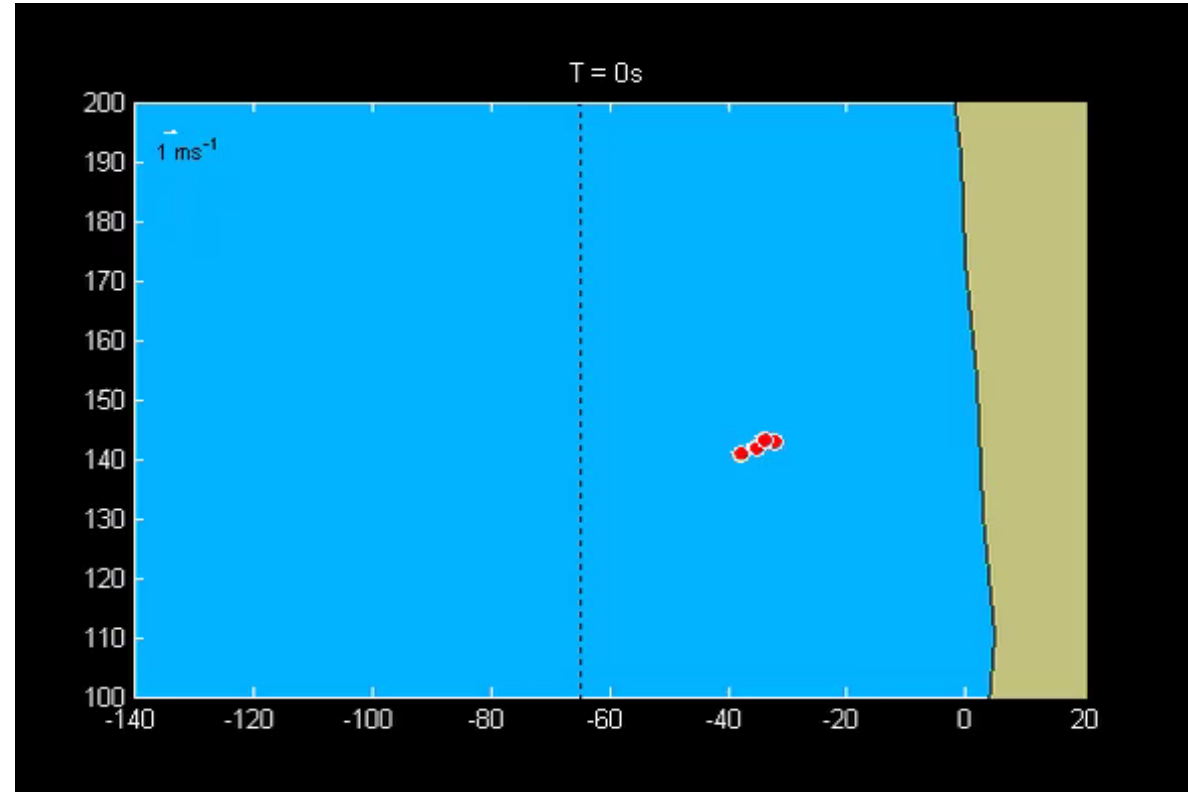
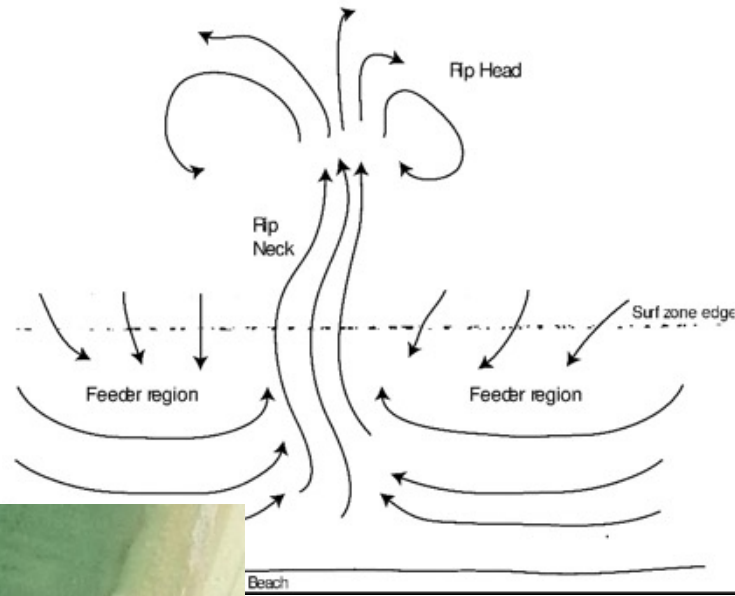
- Parachute type drogues are used to prevent surfing
- Data recovery still over 99% even in very energetic conditions



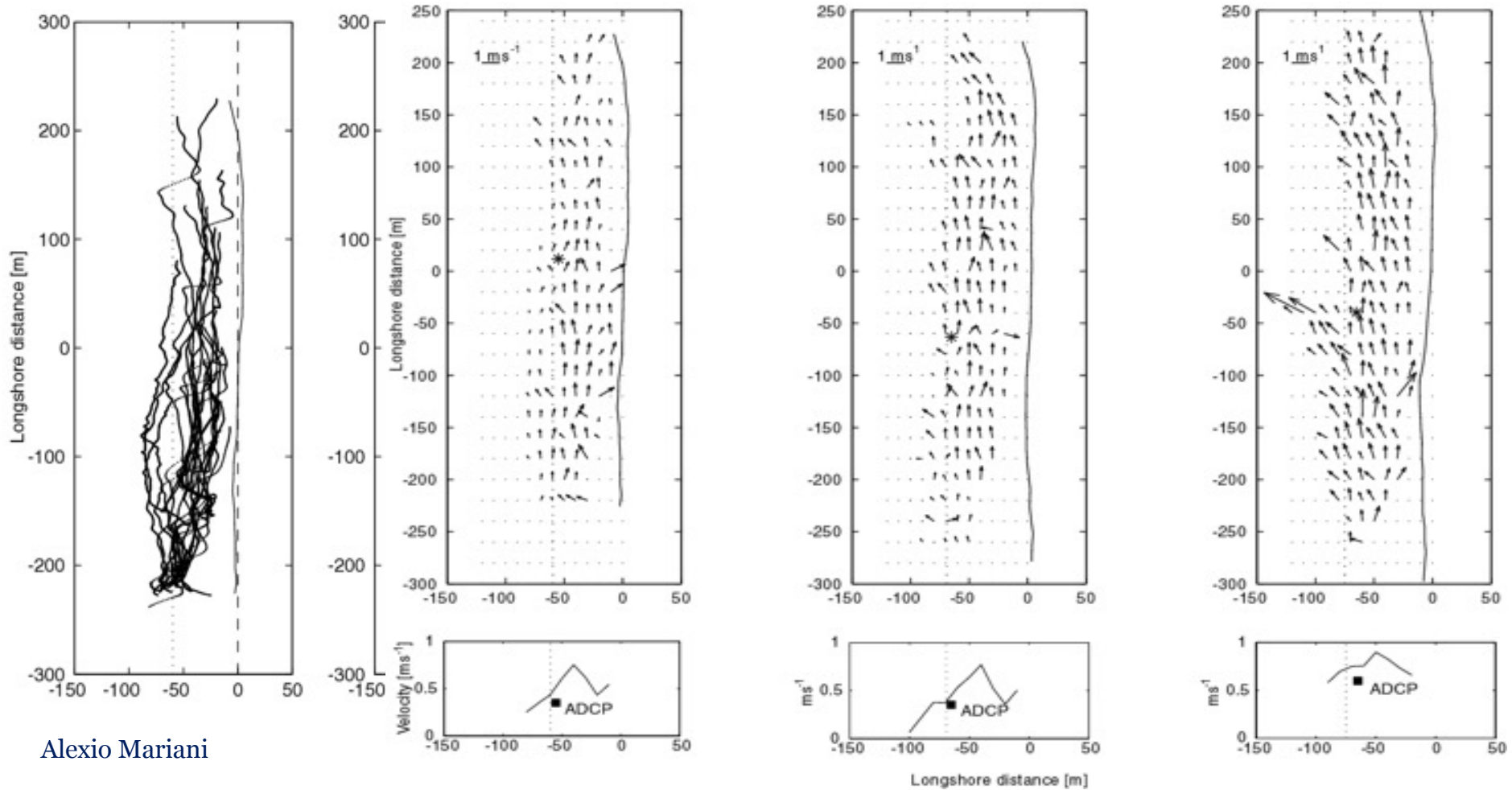
Surf zone validation



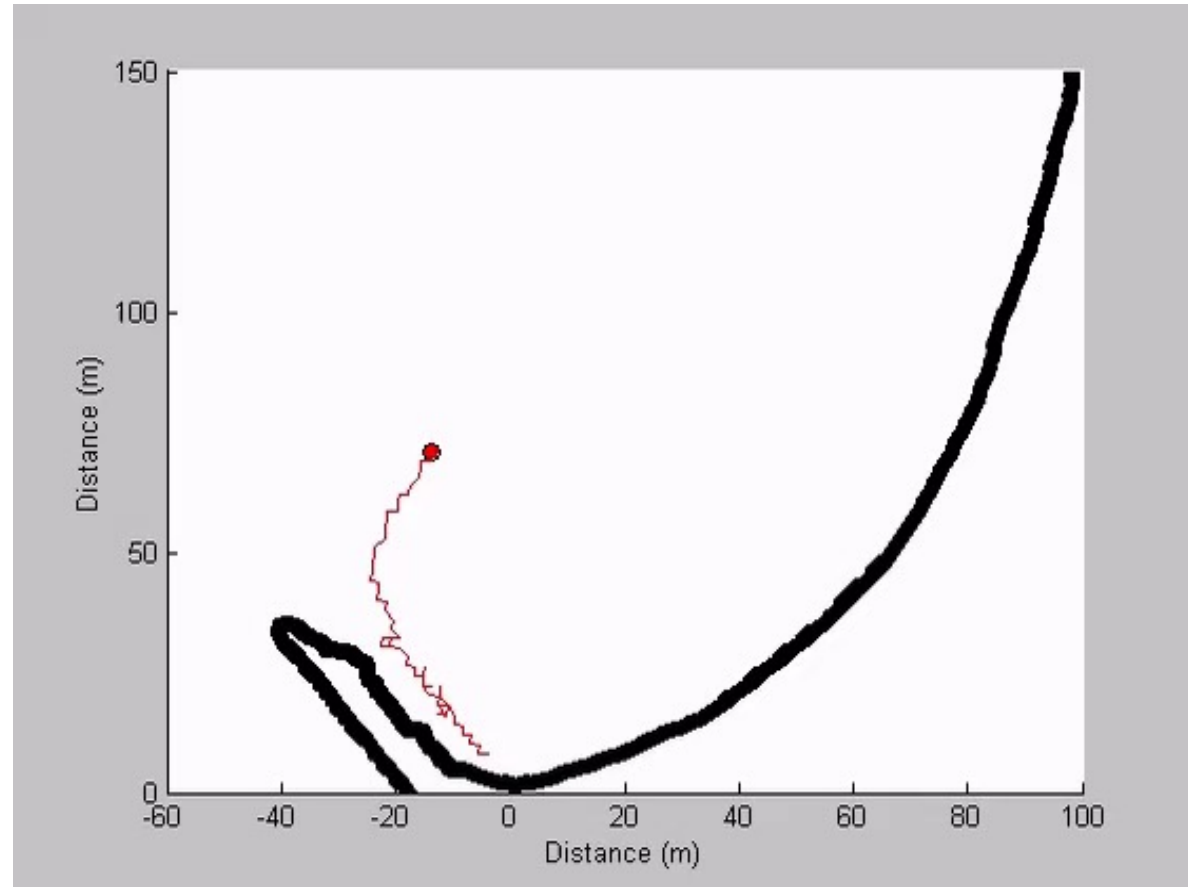
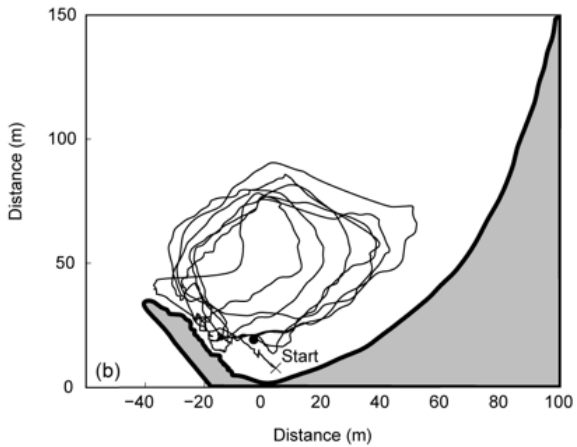
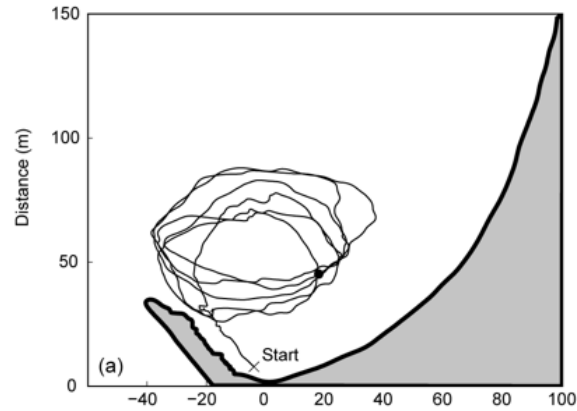
Rip currents



Longshore currents



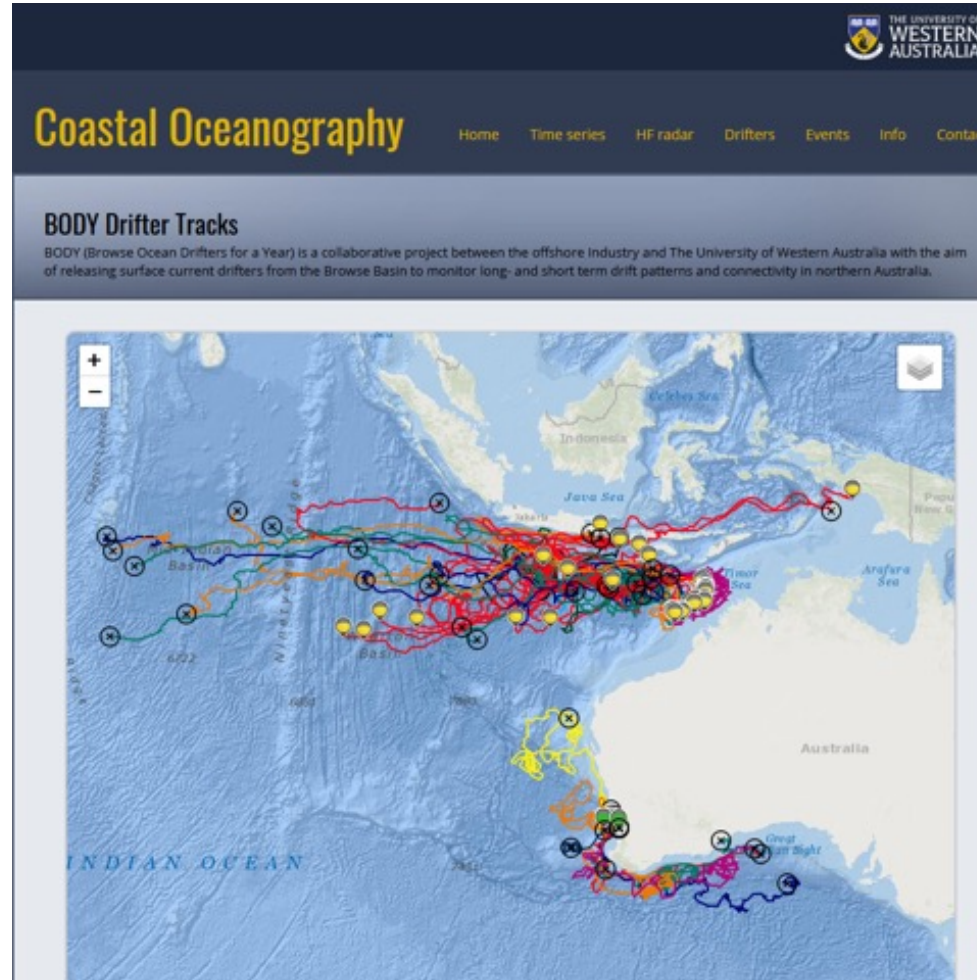
Rip currents: adjacent to structures



Ocean drifters

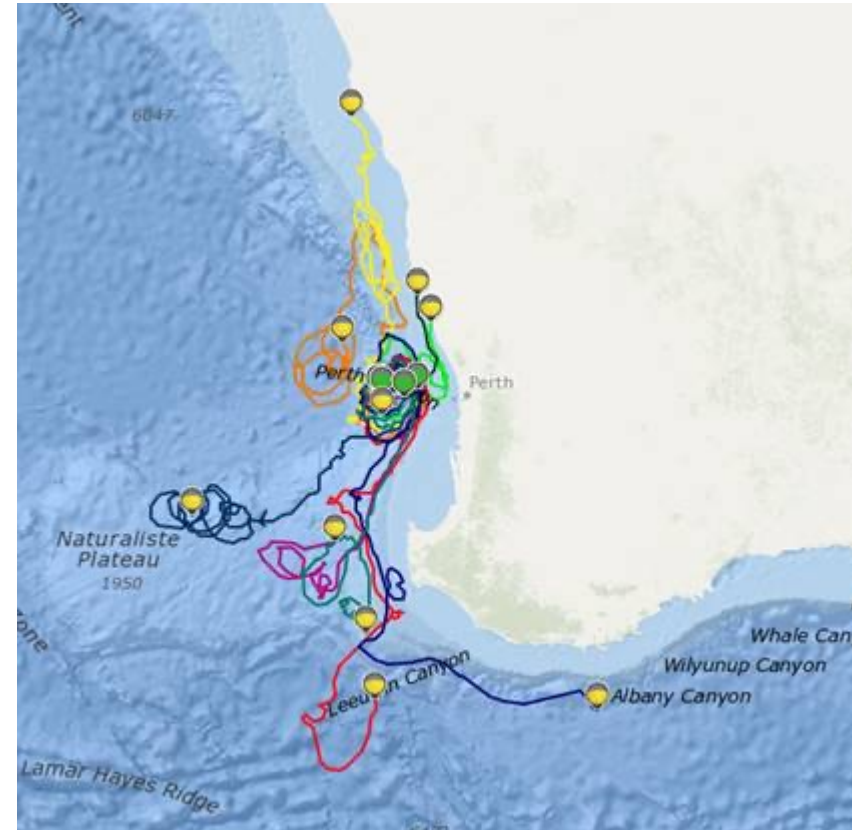
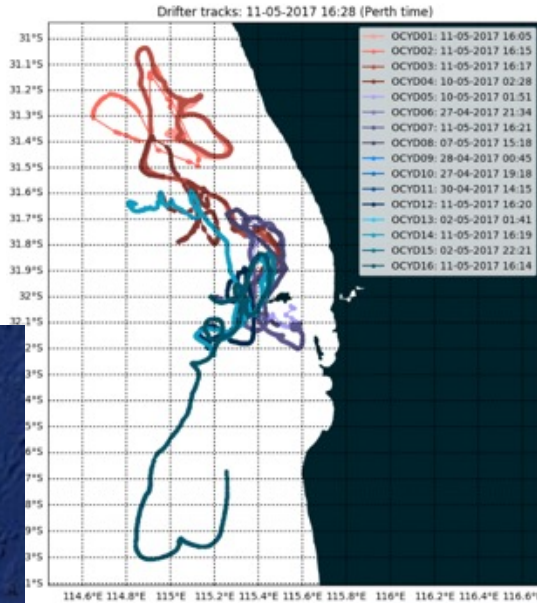
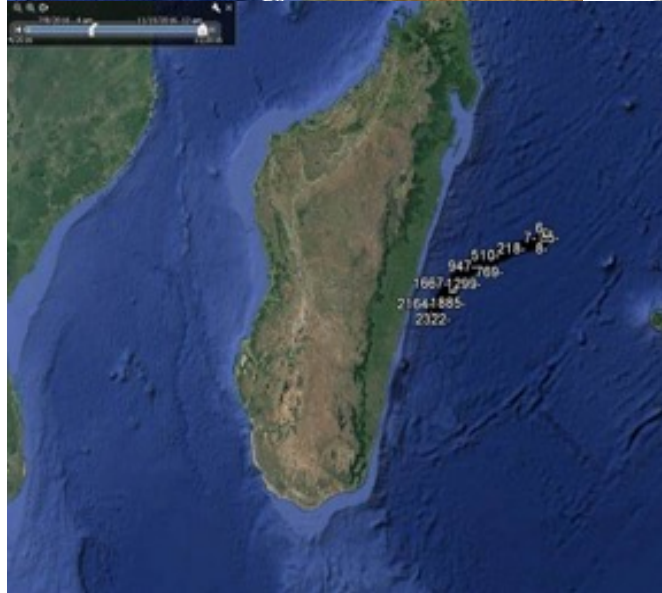


BODY (Browse Ocean Drifters for a Year)

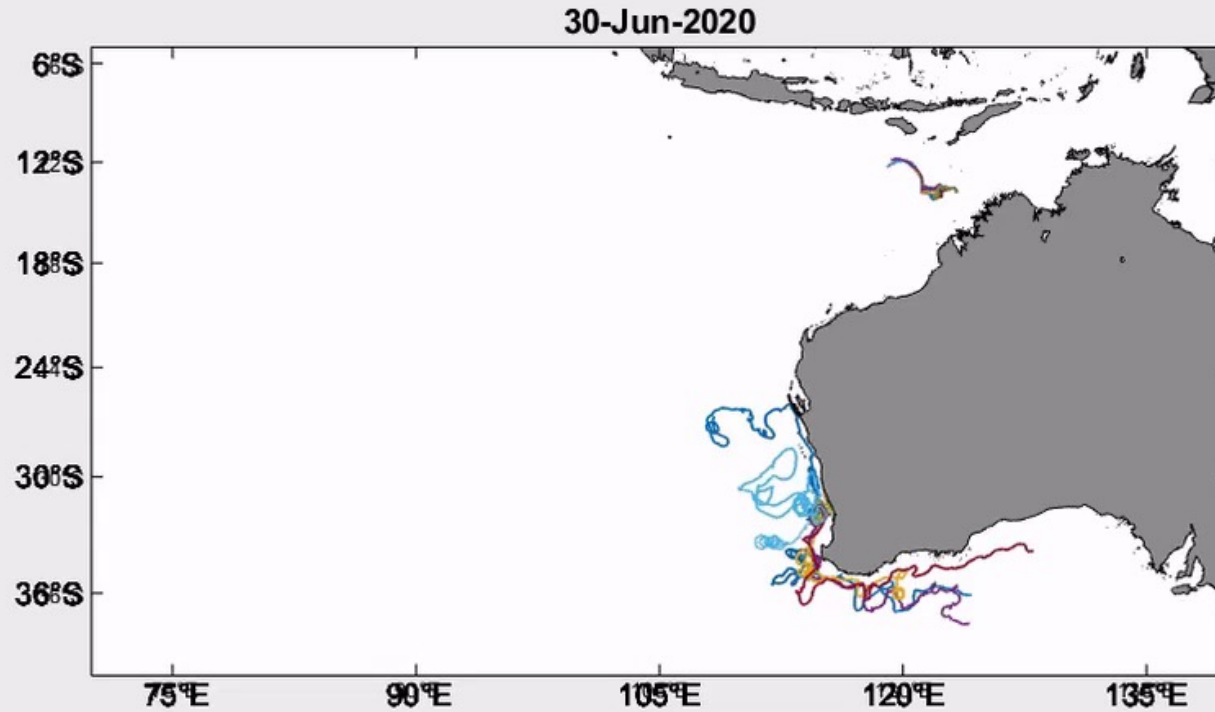


> 200 drifter tracks

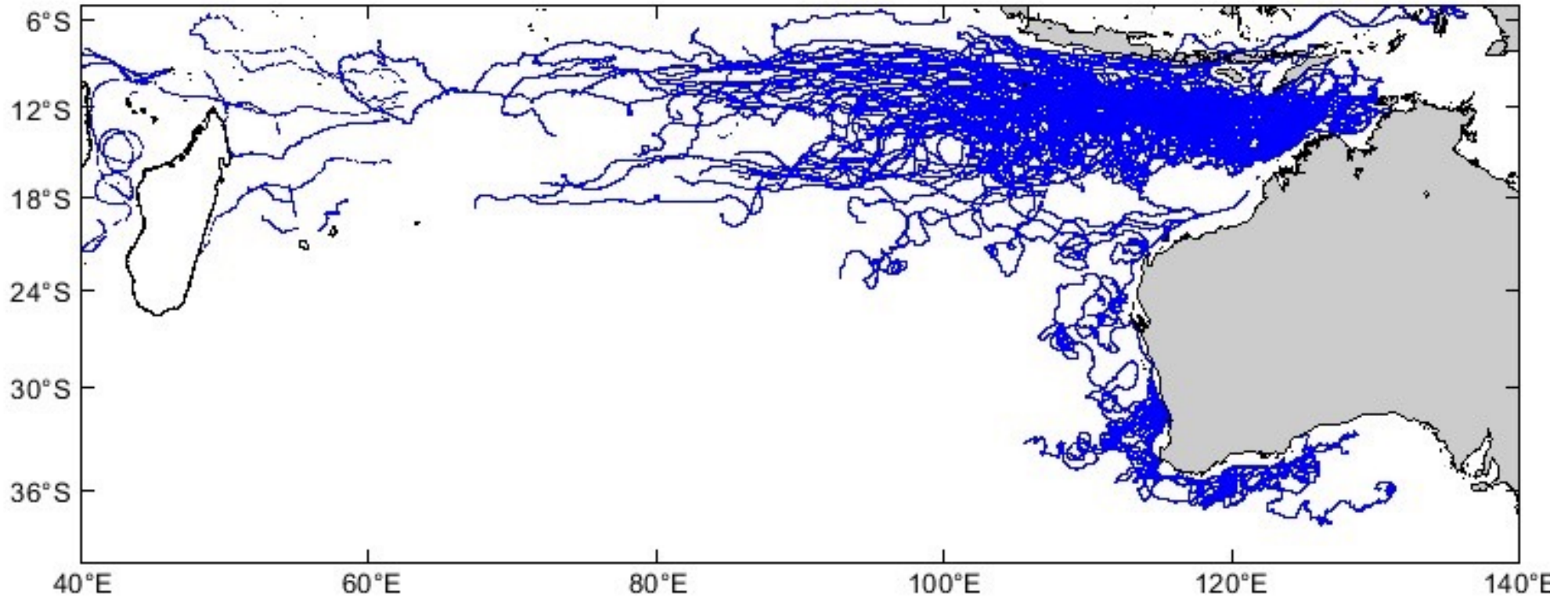
'All' drifters



'All' drifters

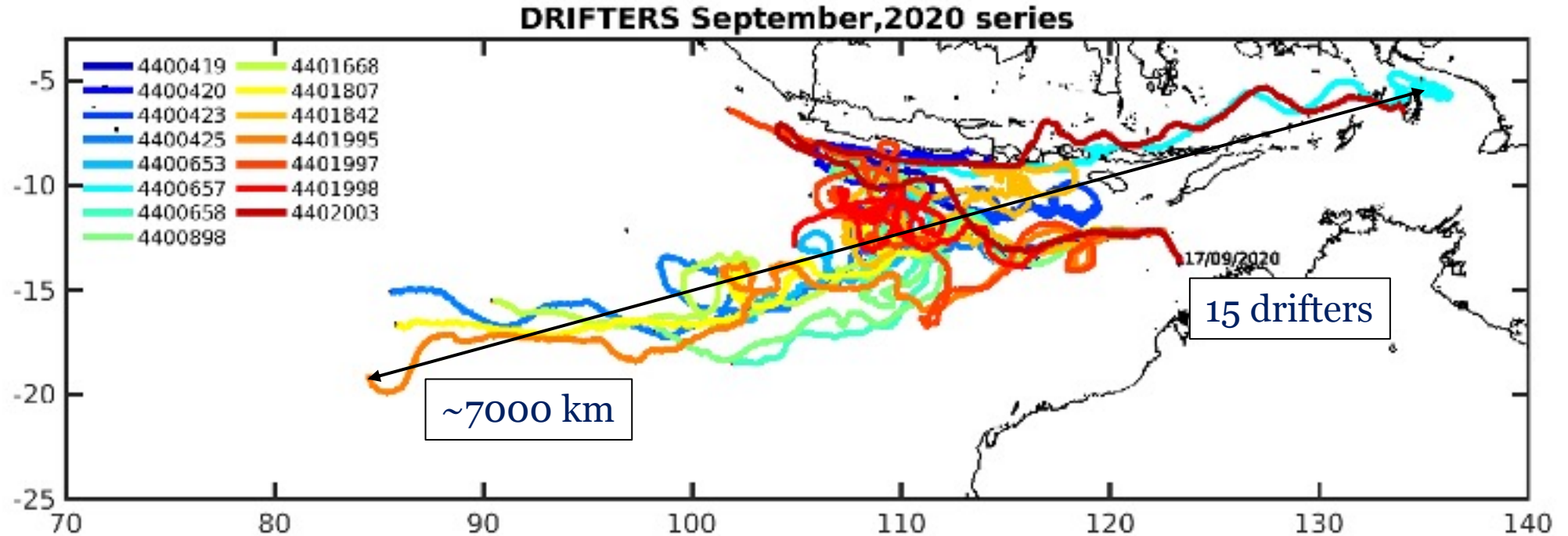


'All' drifters

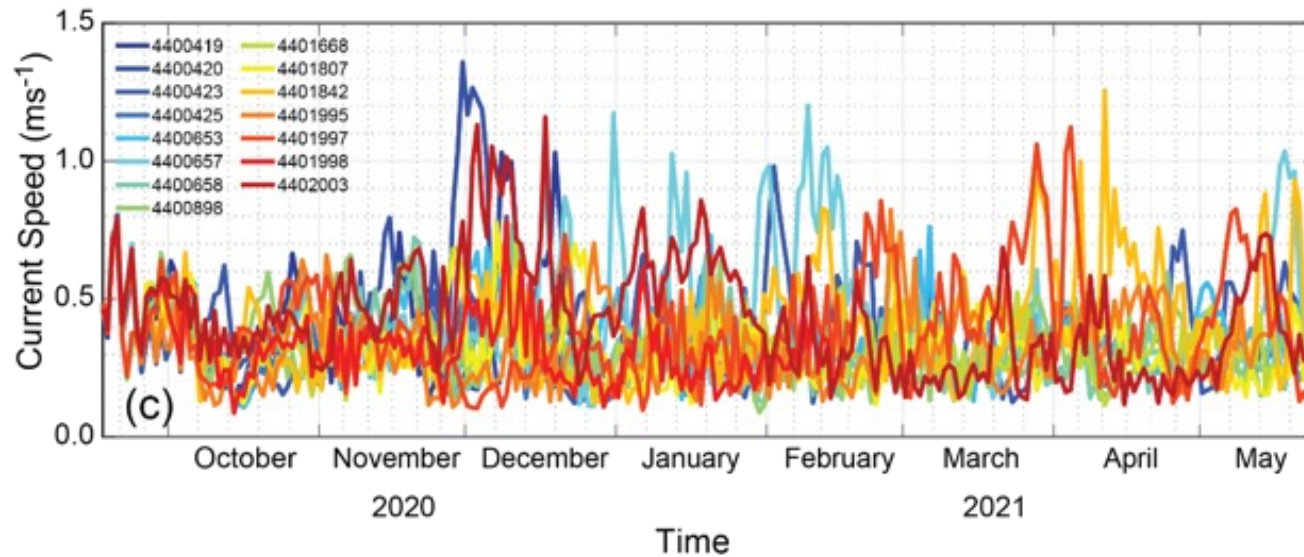
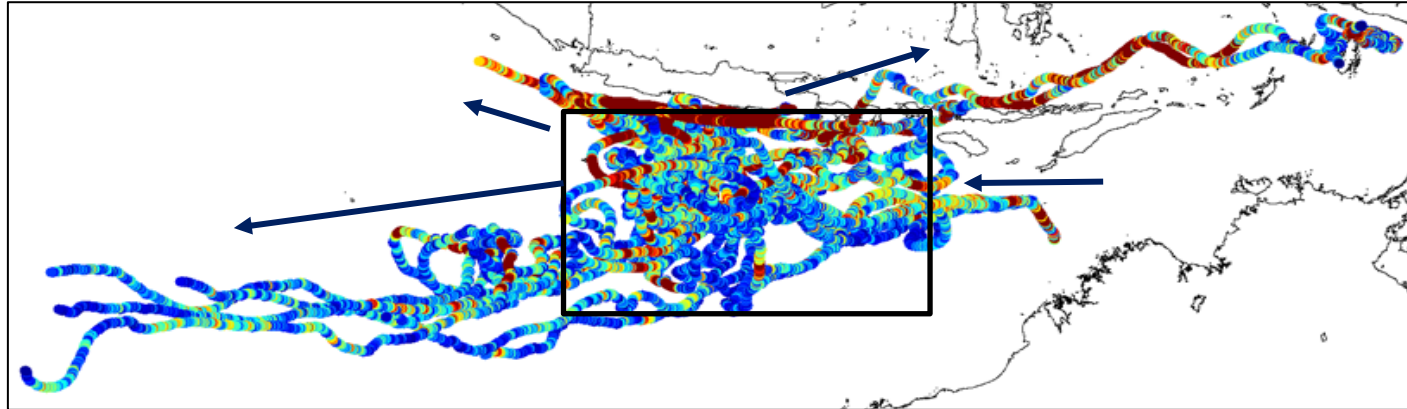


> 150 drifter tracks 2020-2023

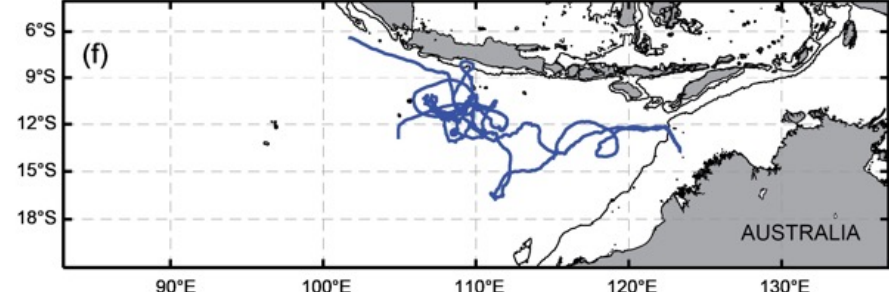
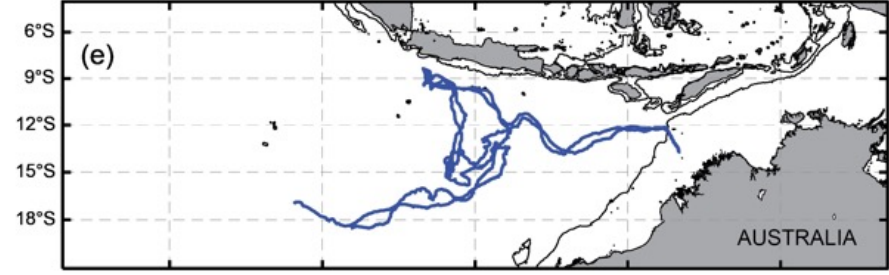
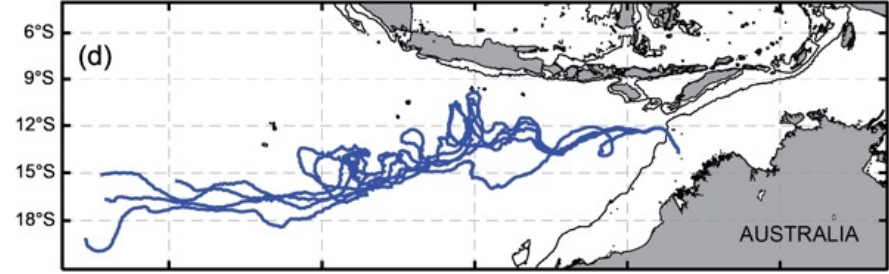
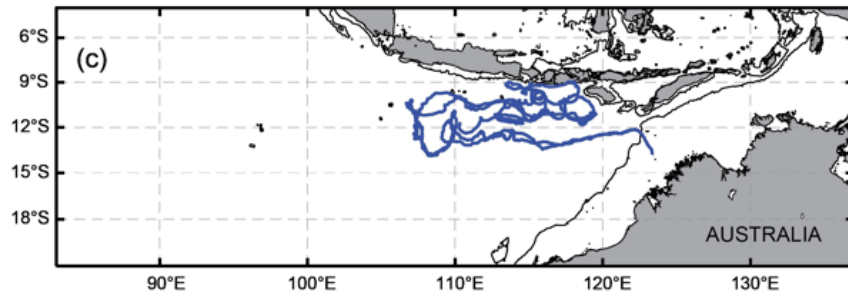
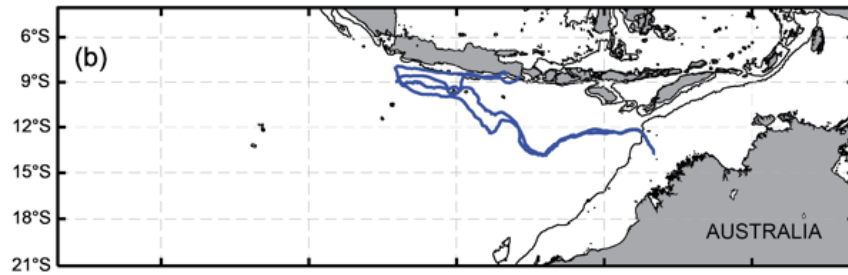
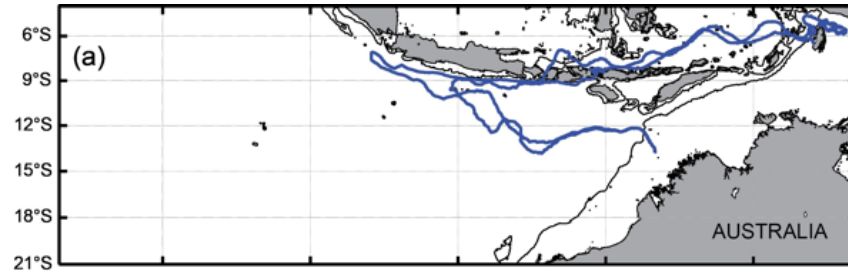
BODY (Browse Ocean Drifters for a Year)



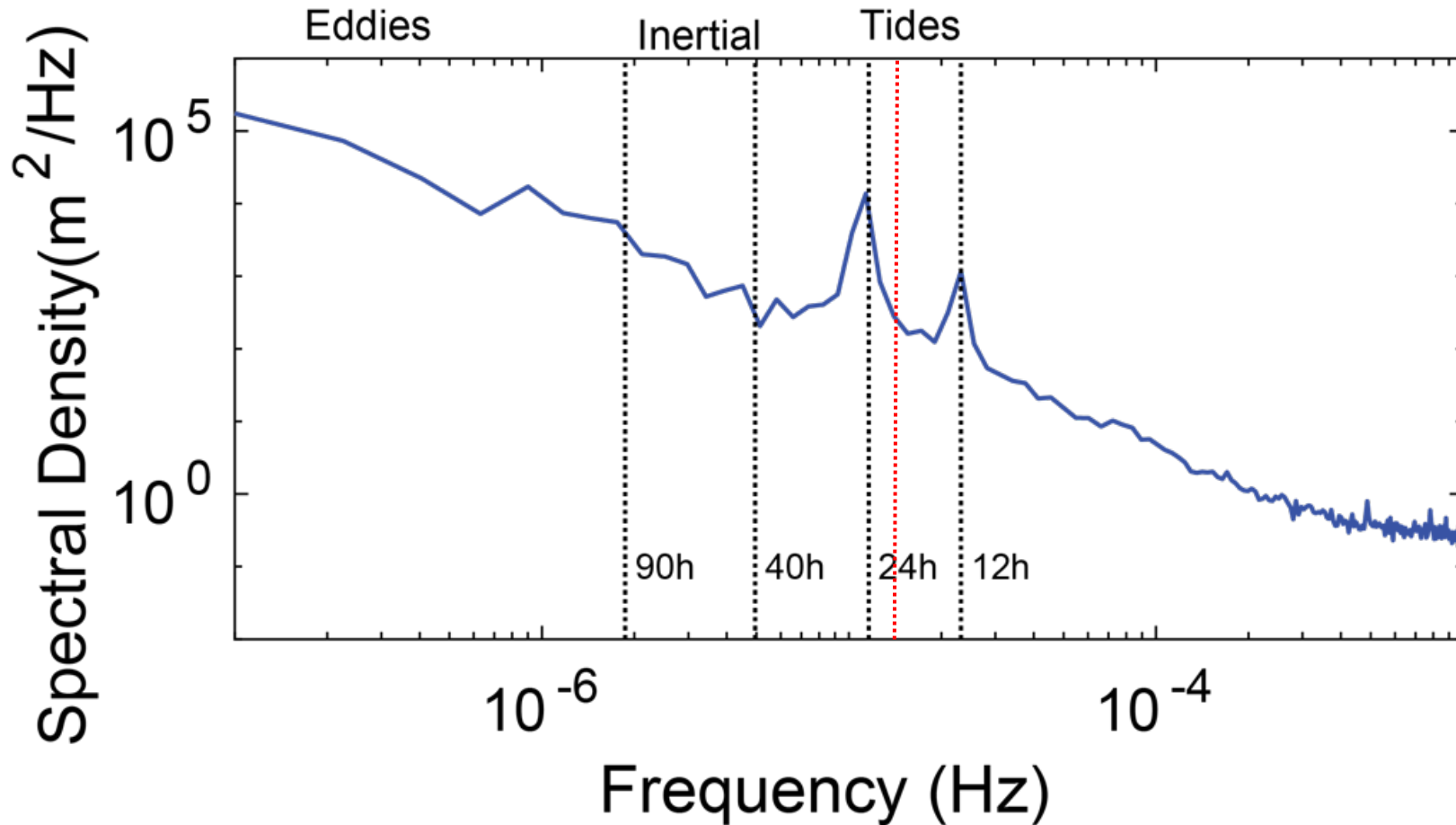
BODY drifters



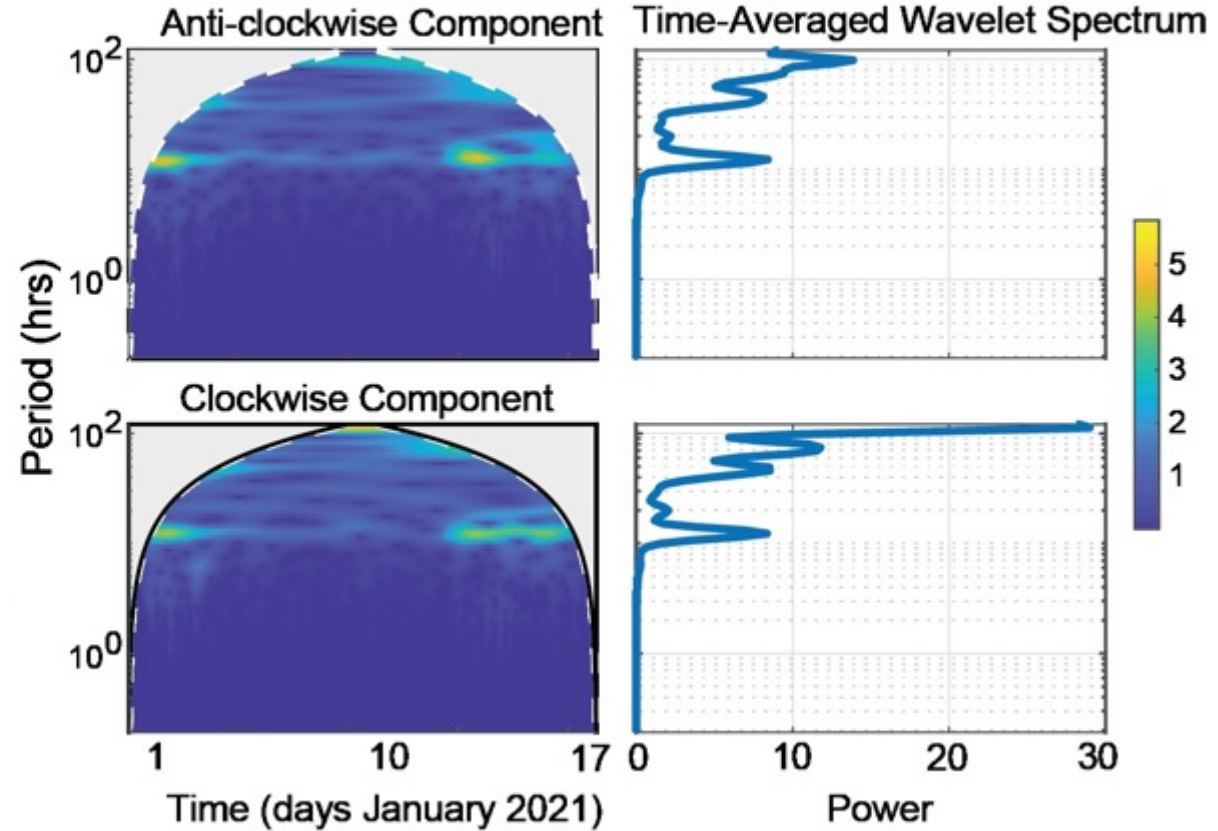
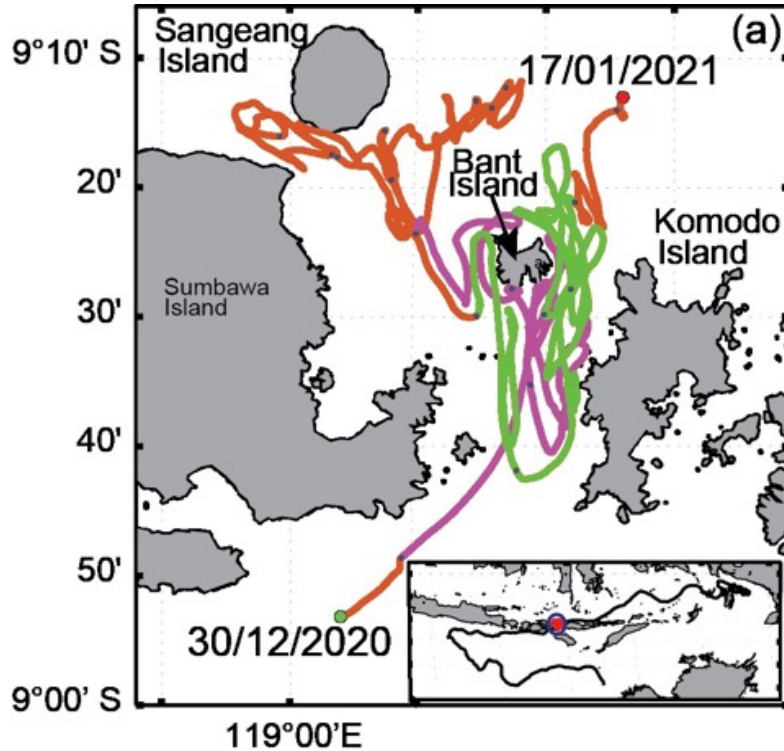
BODY drifters



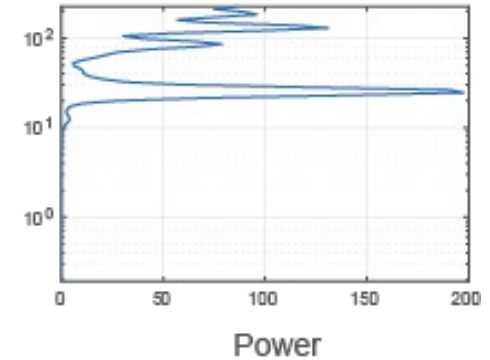
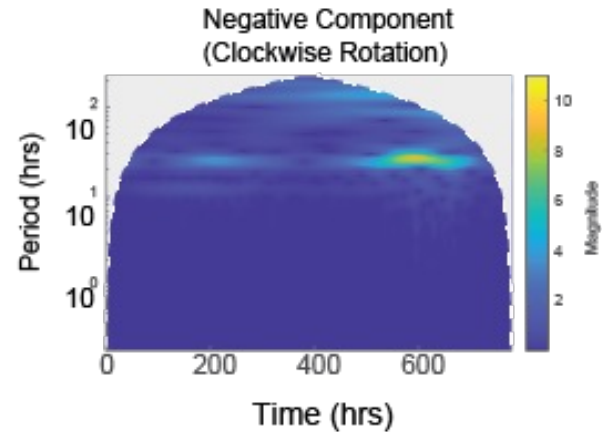
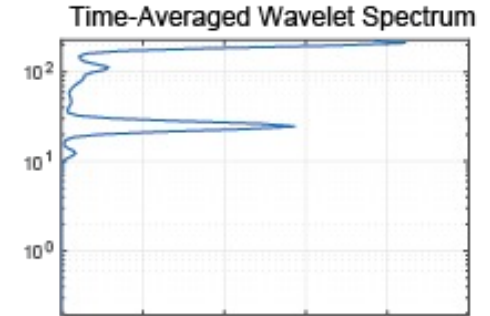
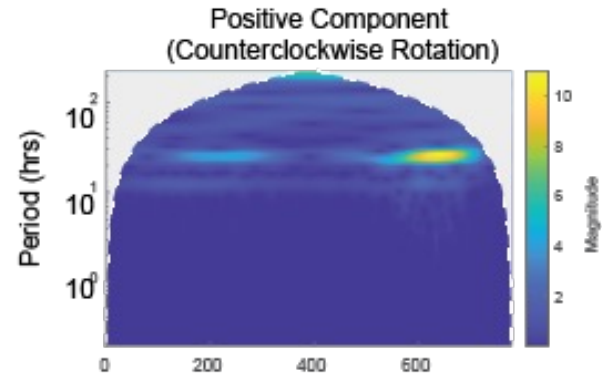
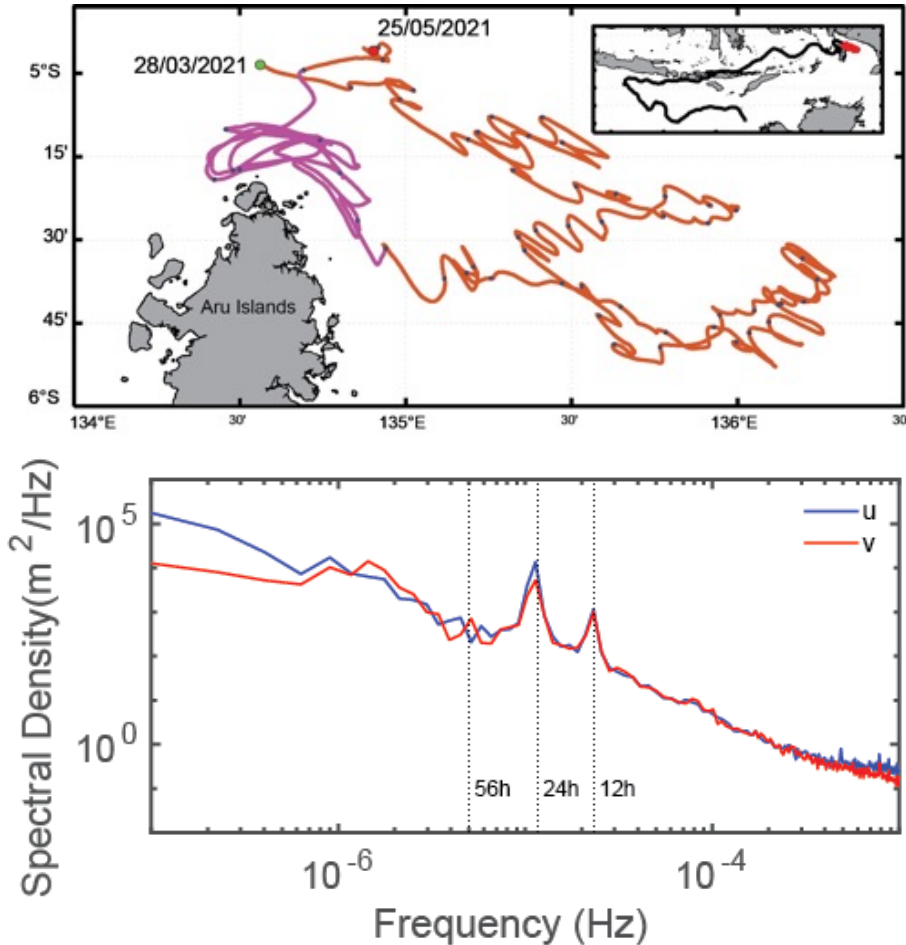
Forcing (BODY)



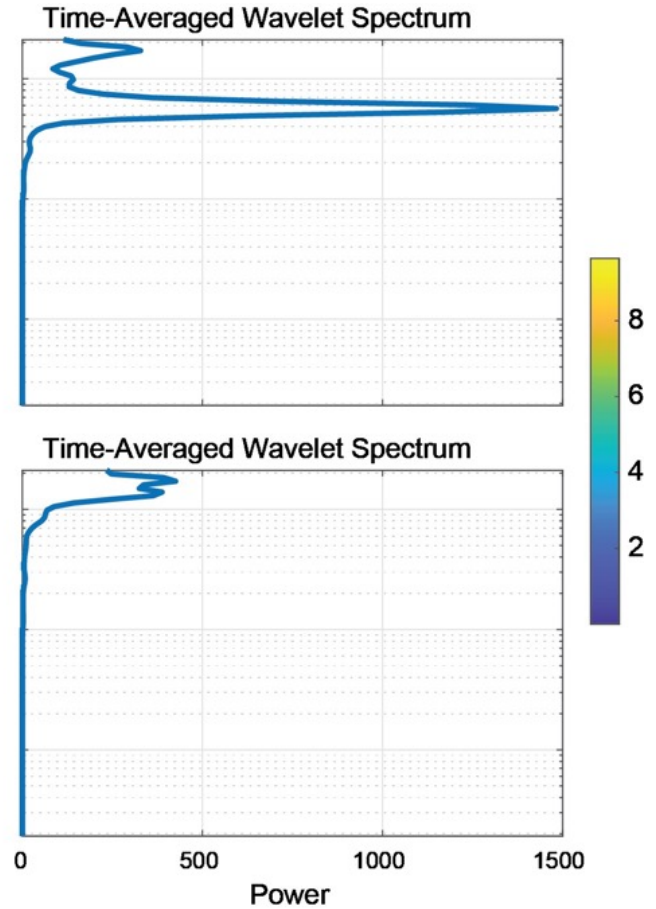
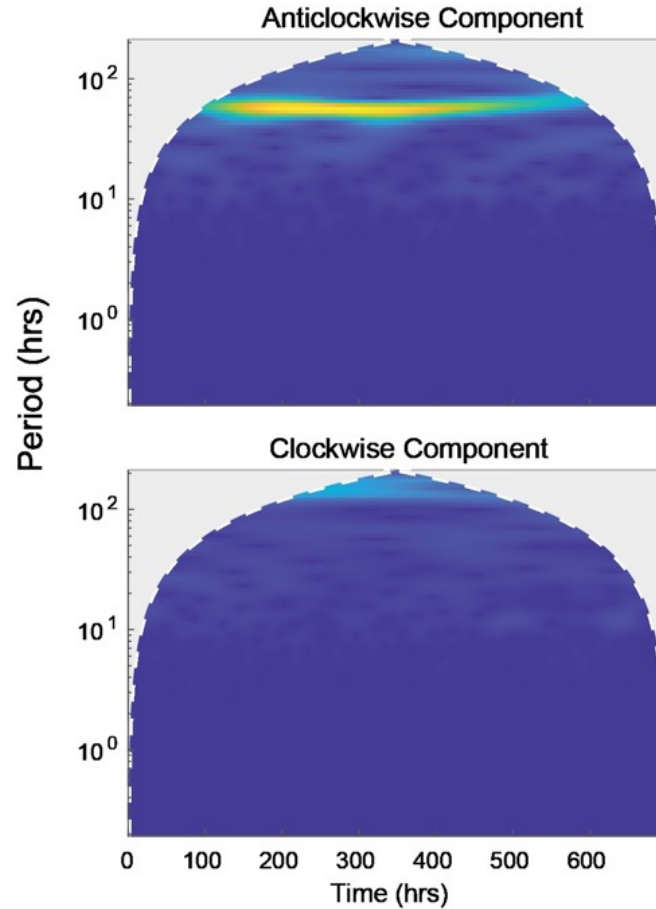
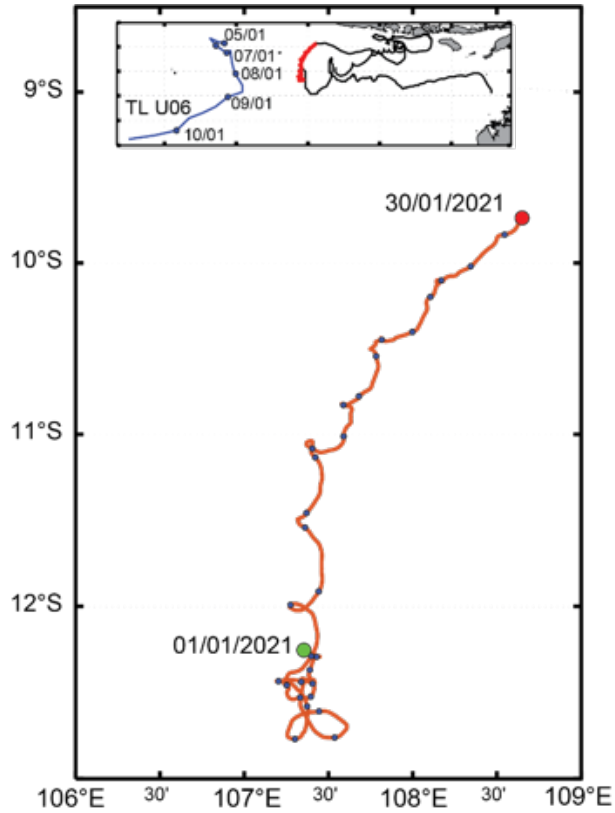
Forcing: semi-diurnal



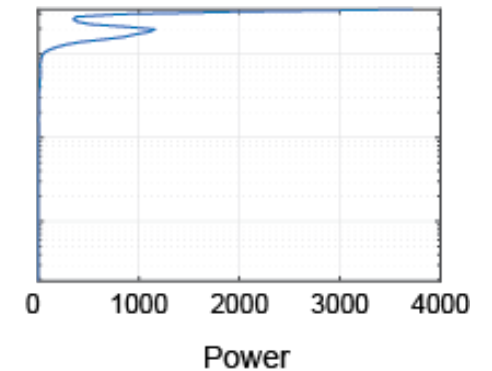
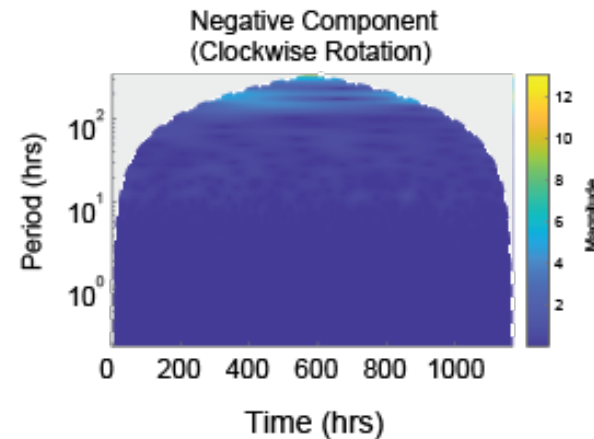
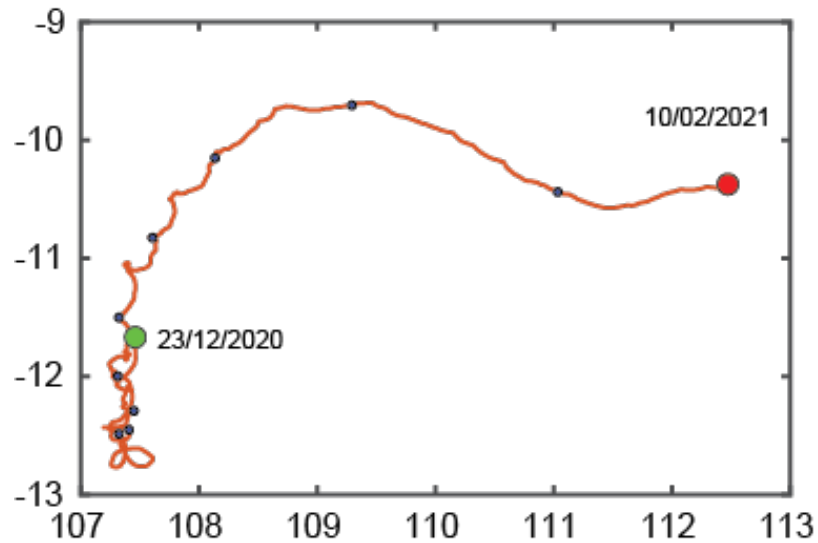
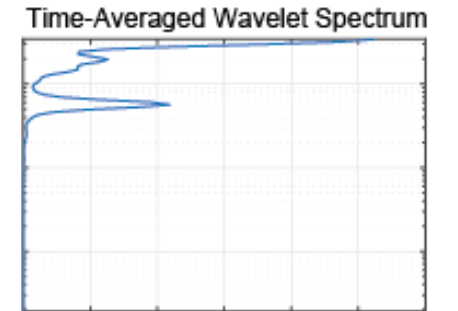
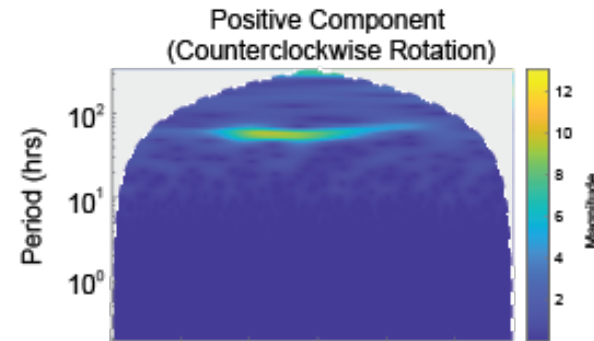
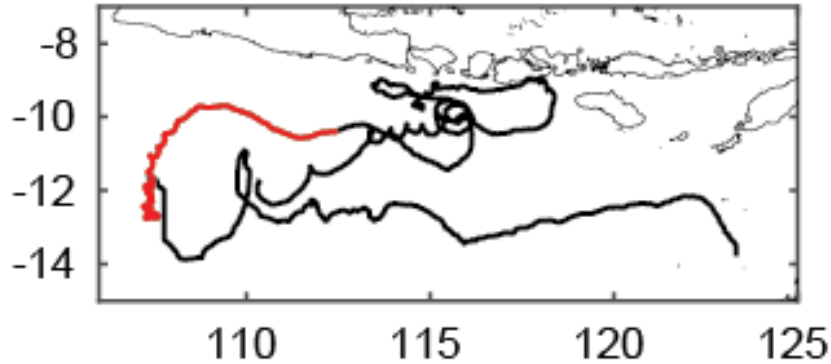
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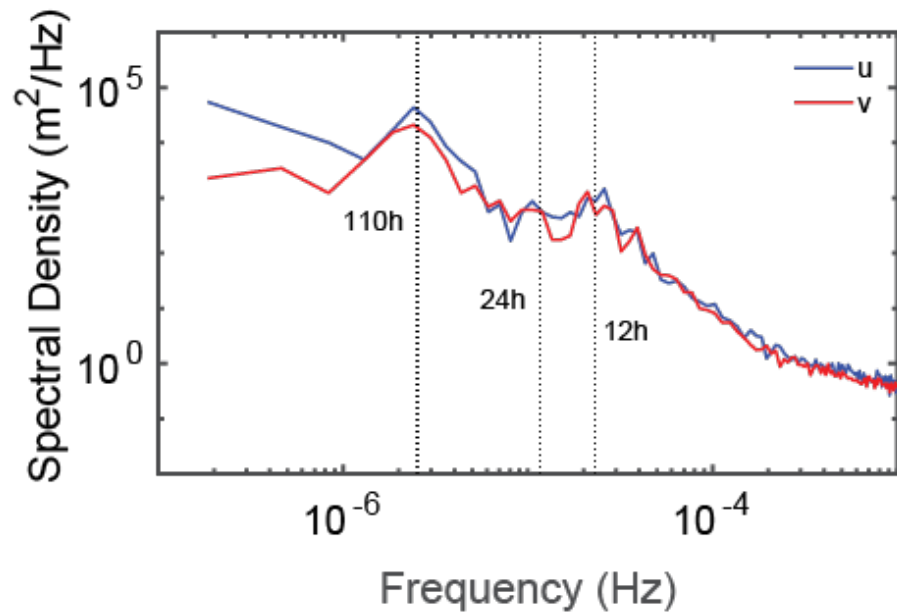
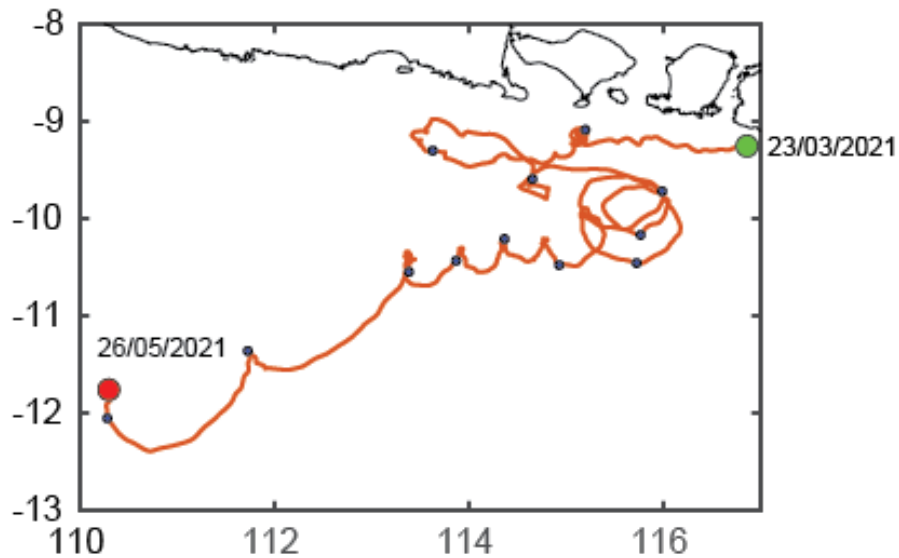
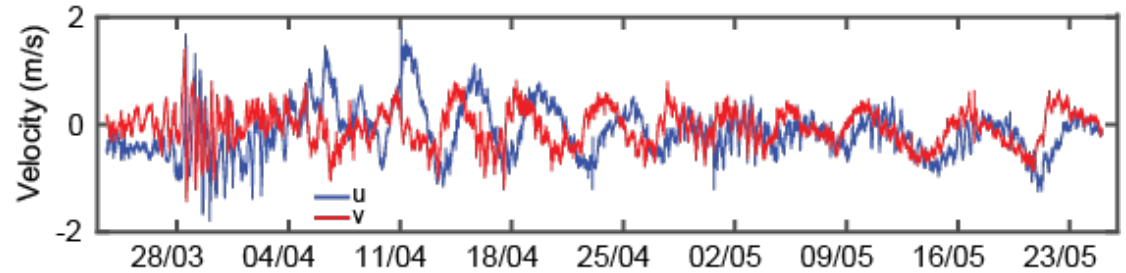
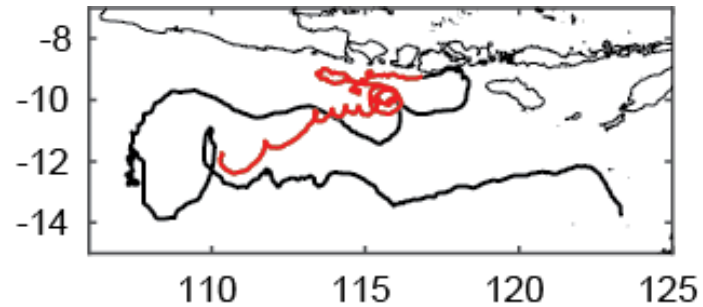
Forcing: inertial



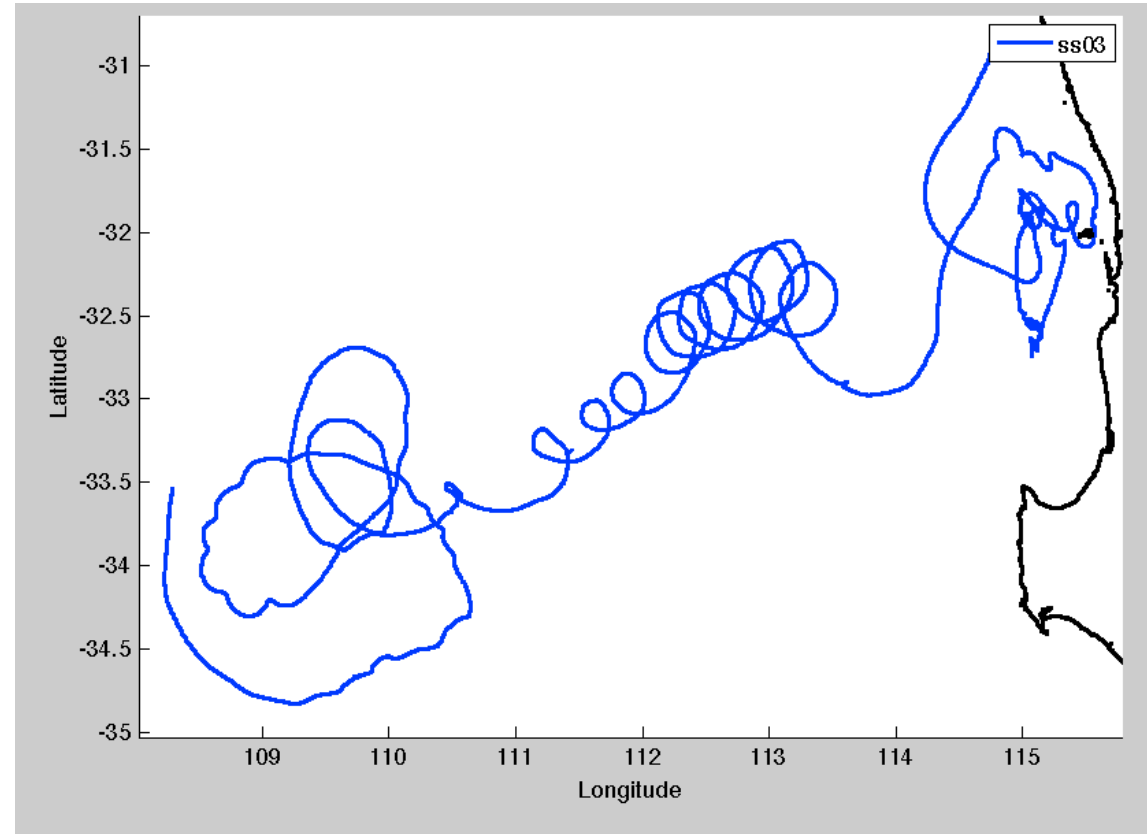
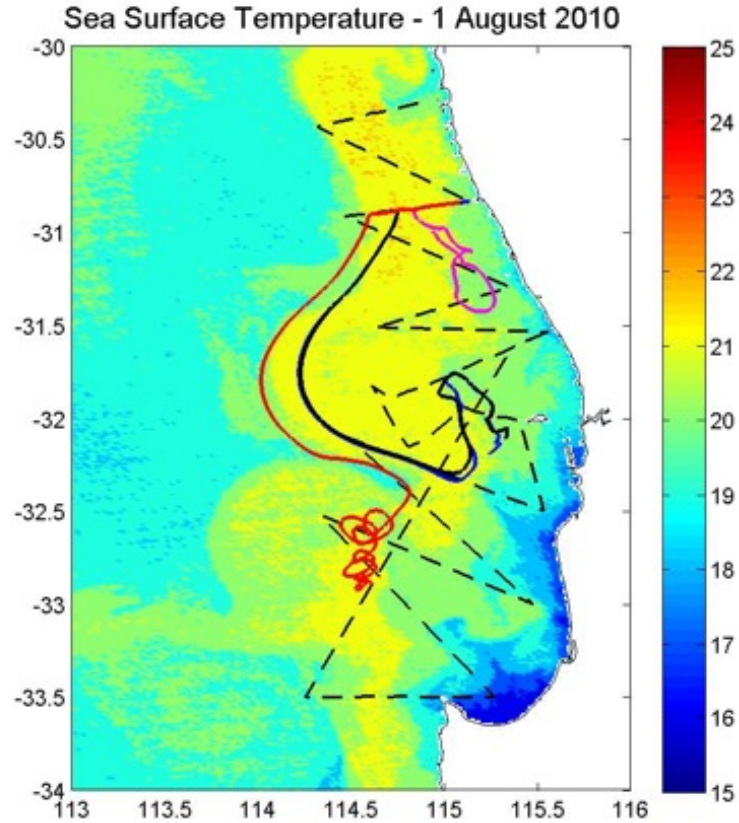
Forcing: inertial



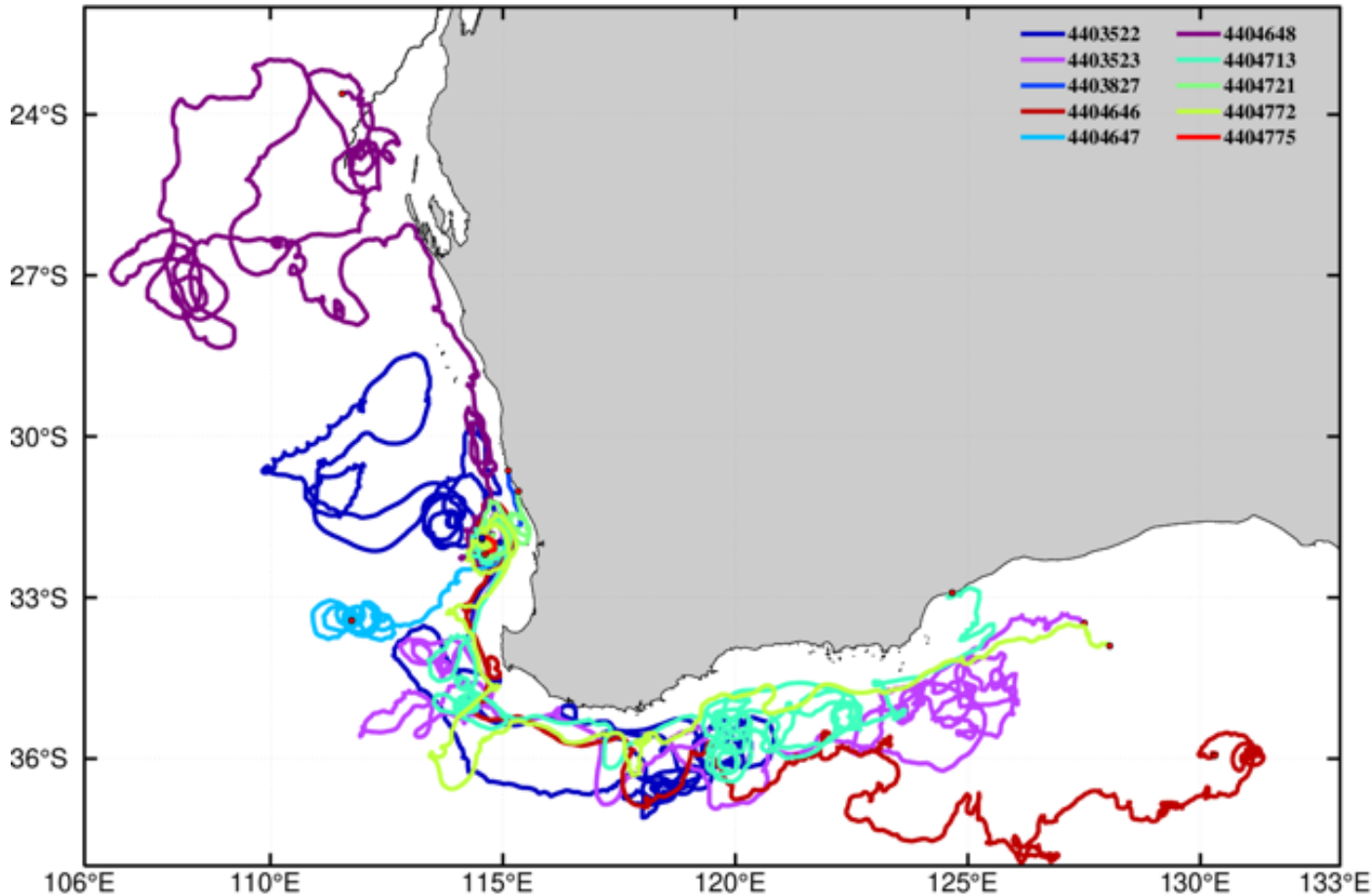
Forcing: eddies



SW Australia: Southern Surveyor 2010



RV Falkor 2020



10 Drifters deployed

At 5 locations

February 21st - 23rd

In Perth Canyon

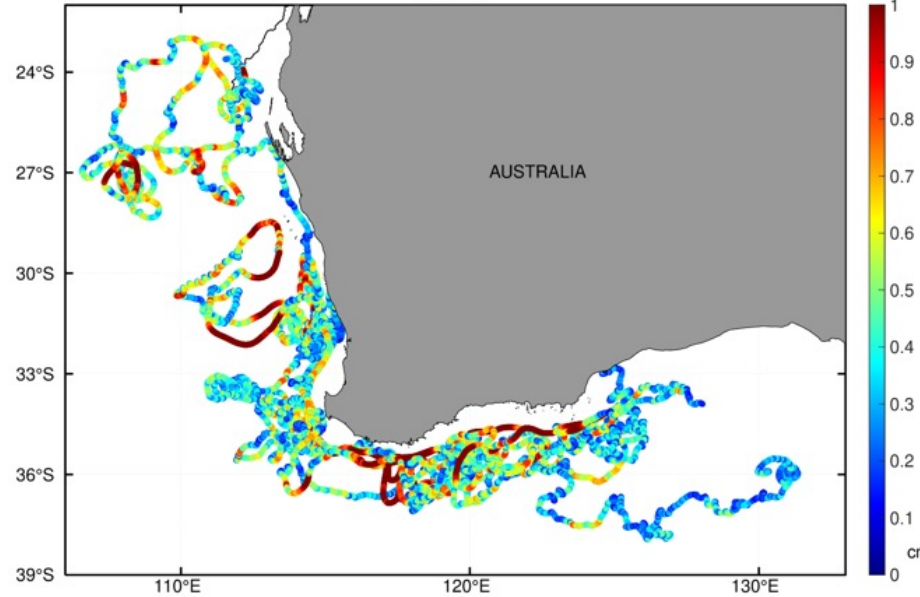
Excursion (~9 months):

1000 km north

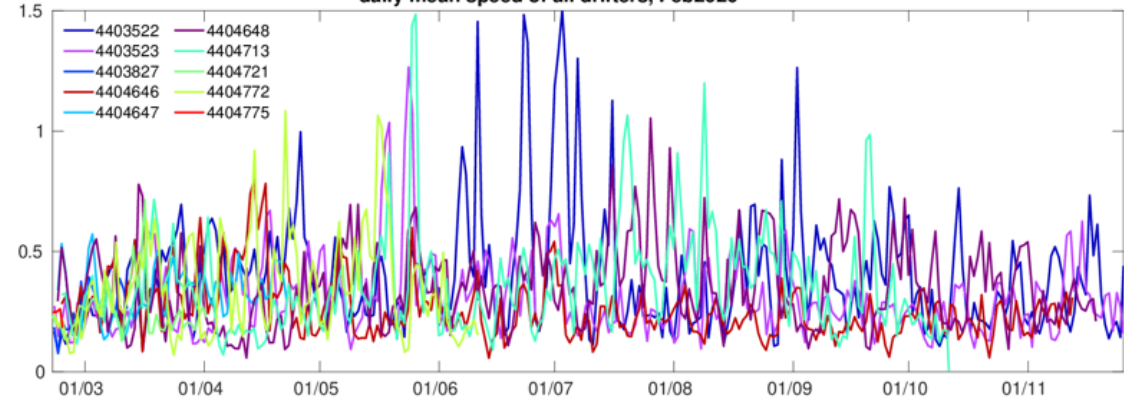
2000 km south

South-west Australia

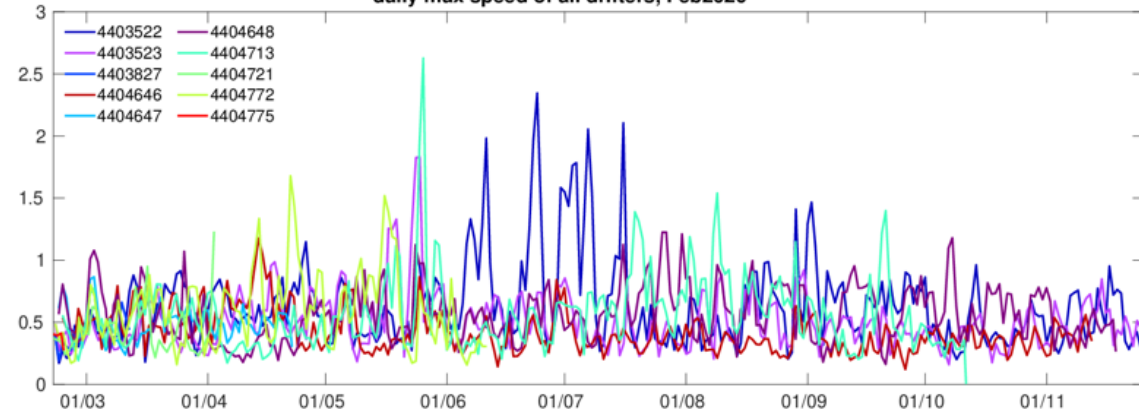
SPEED



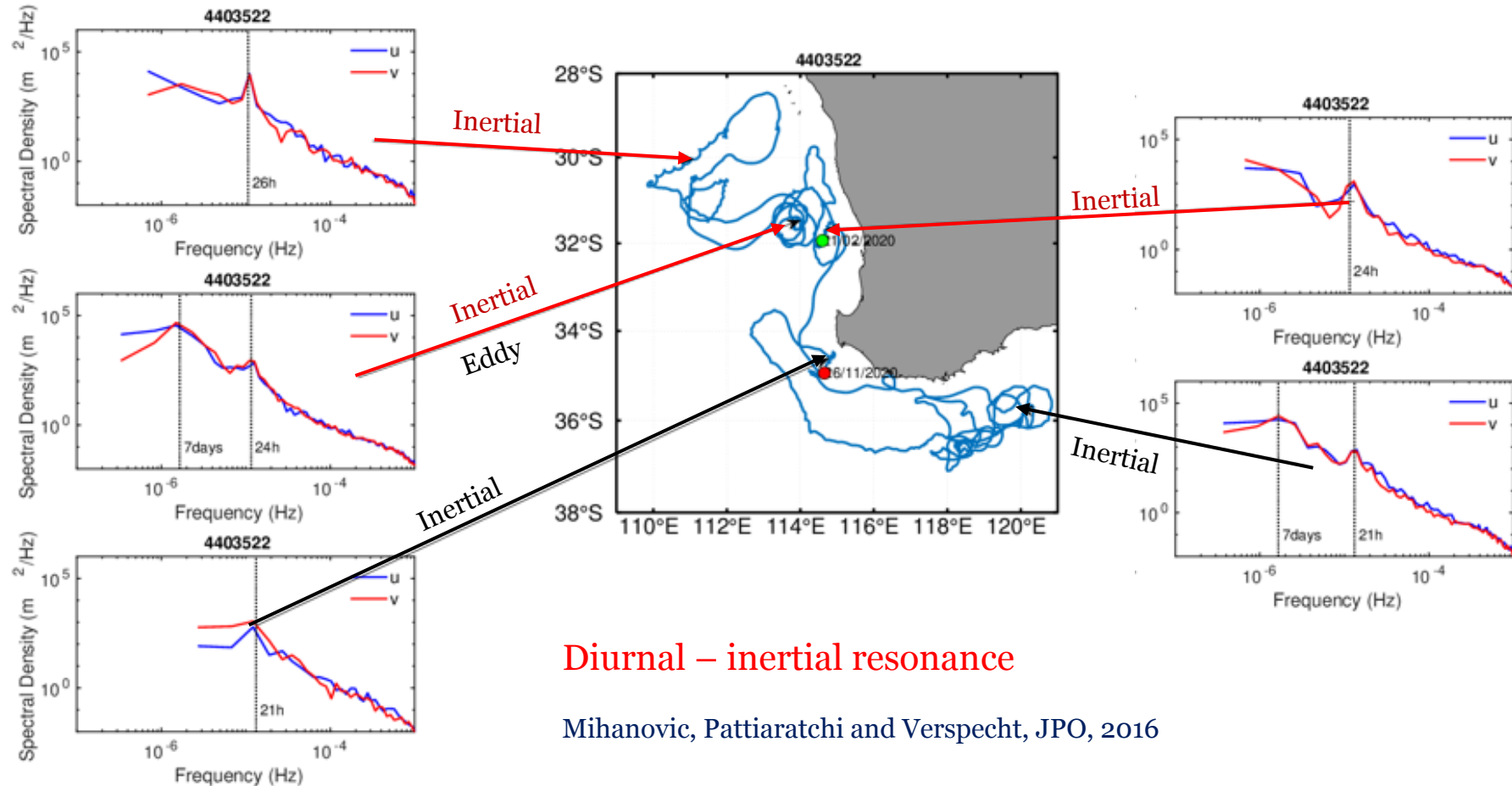
daily mean speed of all drifters, Feb2020



daily max speed of all drifters, Feb2020



Drifter 4403522



Diurnal – inertial resonance

Mihanovic, Pattiaratchi and Verspecht, JPO, 2016

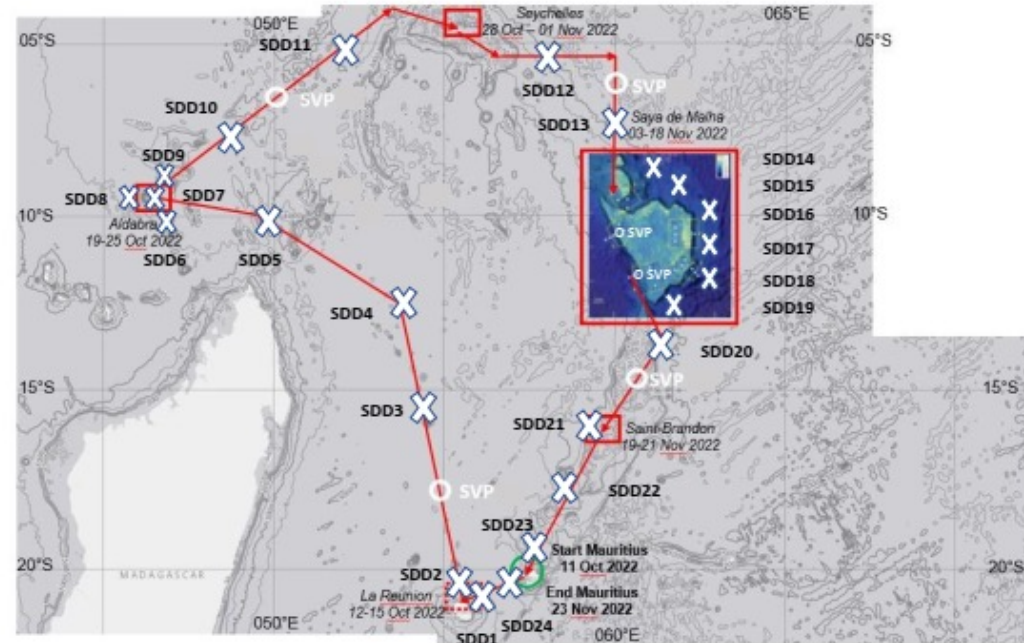
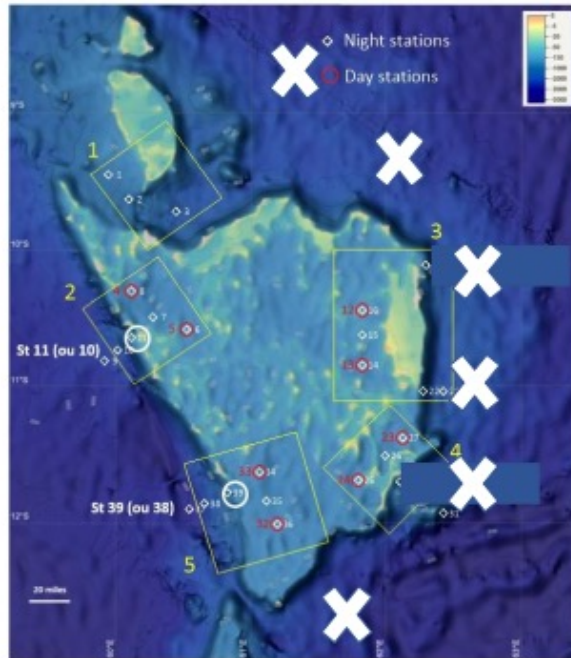
Western Indian Ocean

Monaco Explorations Indian Ocean Expedition (ME-IOE)

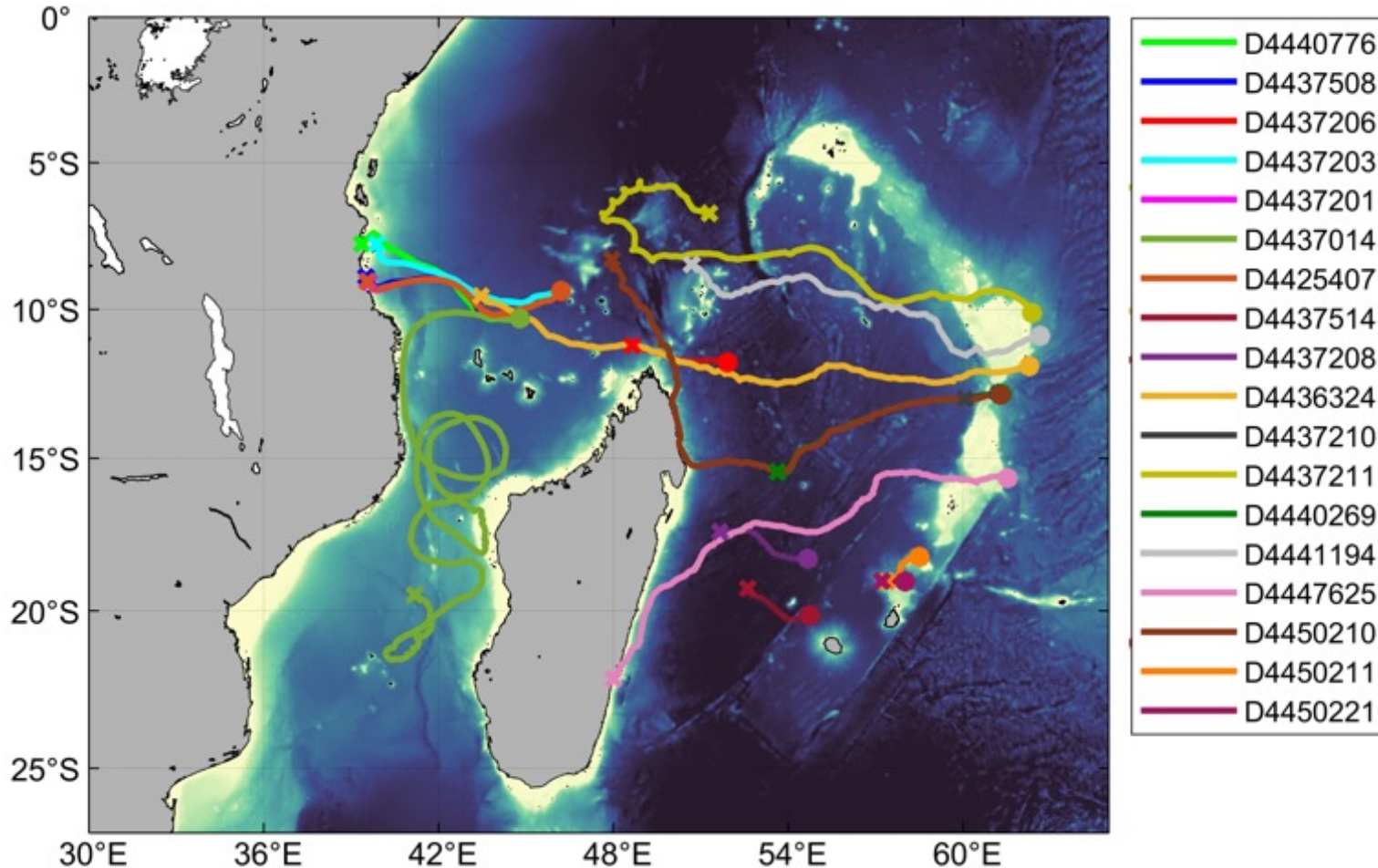
Nick D'Adamo

24 x UWA-OI PVC-housed surface drifter drogues (SSD) (symbol X on the chart)

6 Meteo-France (SVP) drogues (symbol O on the chart)



Western Indian Ocean



Future ?



Drifter manufacture

