SynObs Kick-off Meeting

Crowdsourcing Ocean Observations in Partnership with the Fishing Sector and Coastal Ocean

16 November 2022

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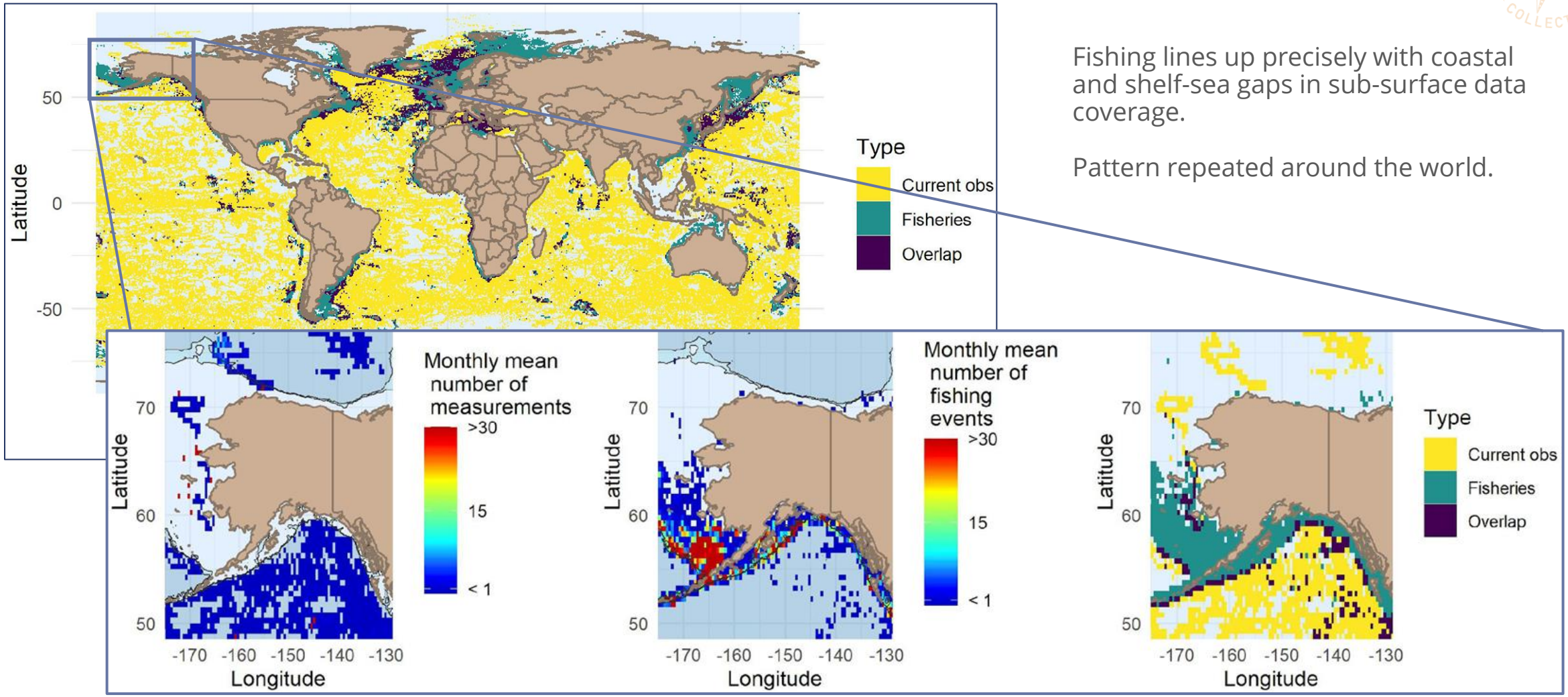
1. MetOcean Solutions (Meteorological Service of New Zealand), 2. Ocean Data Network, 3. University of New South Wales, 4. Zebra-Tech Ltd.

Beyond New Zealand's Waters: an International Vision

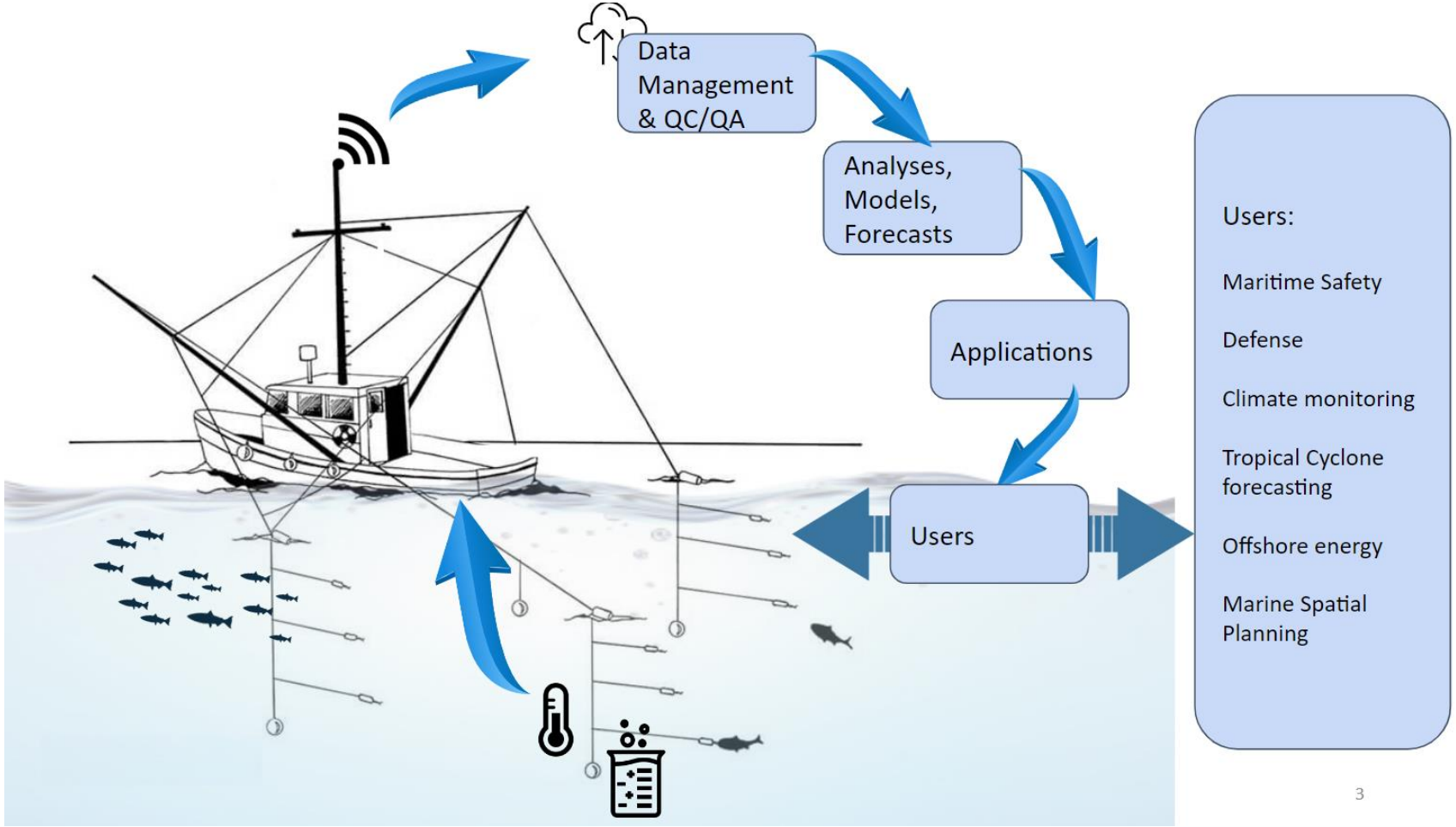


Fishing lines up precisely with coastal and shelf-sea gaps in sub-surface data coverage.

Pattern repeated around the world.

Van Vranken, C. H., Vastenhoud, B. M. J., Manning, J. P., Plet-Hansen, K. S., Jakoboski, J., Gorringe, P., & Martinelli, M. (2020). Fishing gear as a data collection platform: Opportunities to fill spatial and temporal gaps in operational sub-surface observation networks. Frontiers in Marine Science, 7, 864.

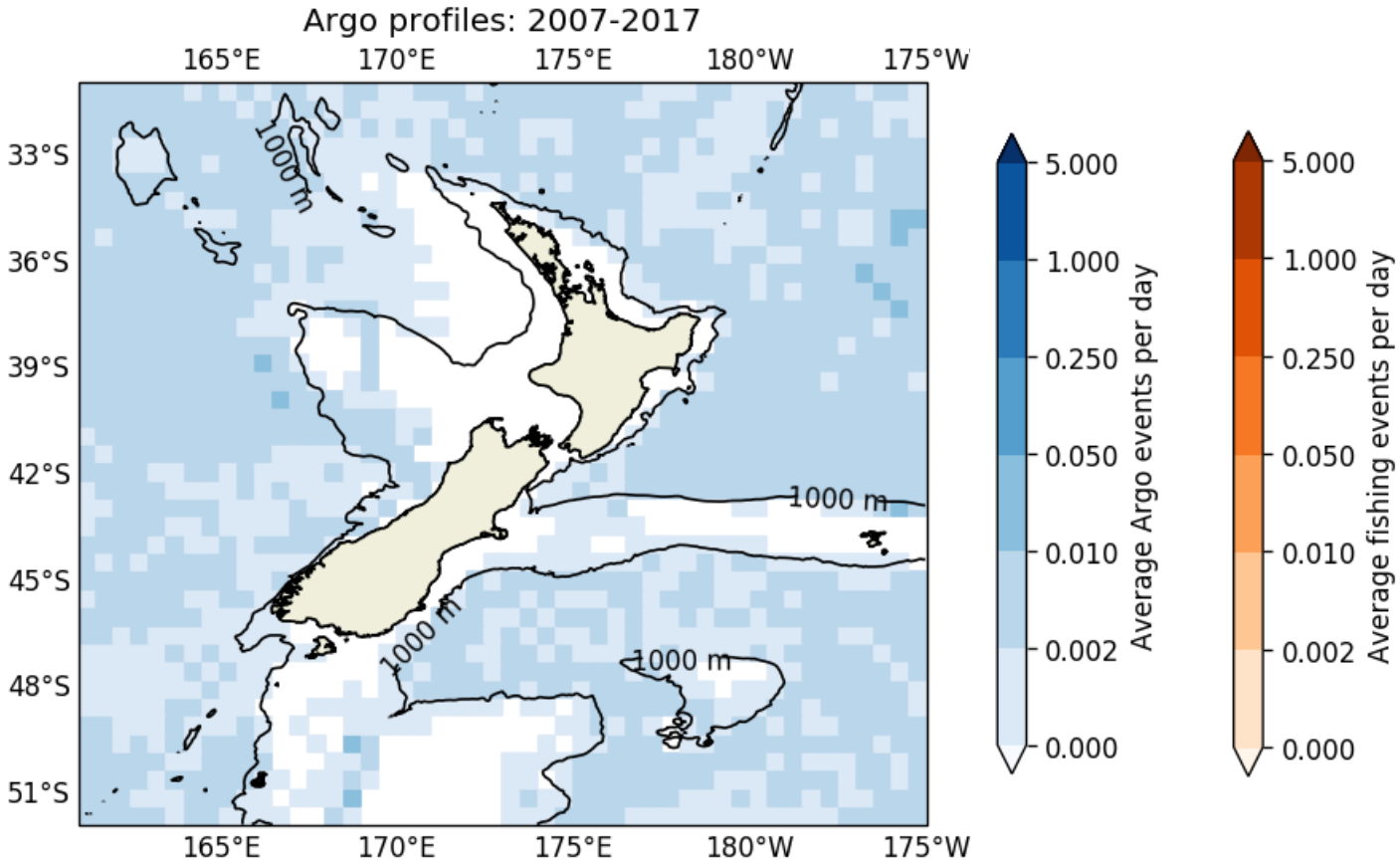
Fishing Observations Data Pathway



OCEAN DATA NETWORK

Moana PROJECT

Moana Temperature and Depth Sensors



Incorporating untapped resources to fill the gap

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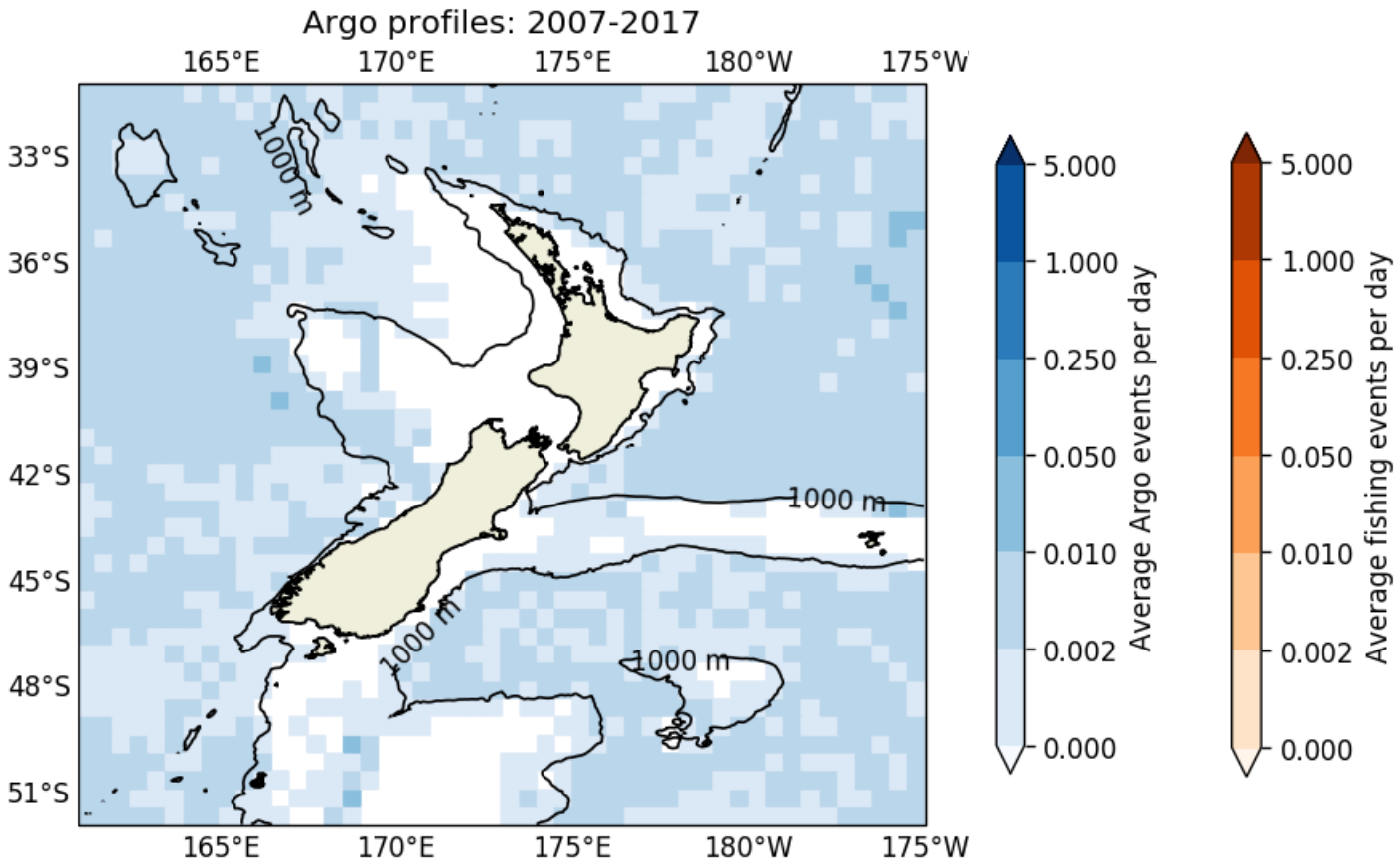
Moana Temperature and Depth Sensors



Incorporating untapped resources to fill the gap

4.4 million square kilometers of Exclusive Economic Zone (EEZ).[1]

700 000 NZ people fish in the sea each year, spending around **$946 million**.[1]

~ 950 commercial fishing vessels

$7.7 billion estimated as the total marine economy value added in 2013.[2]

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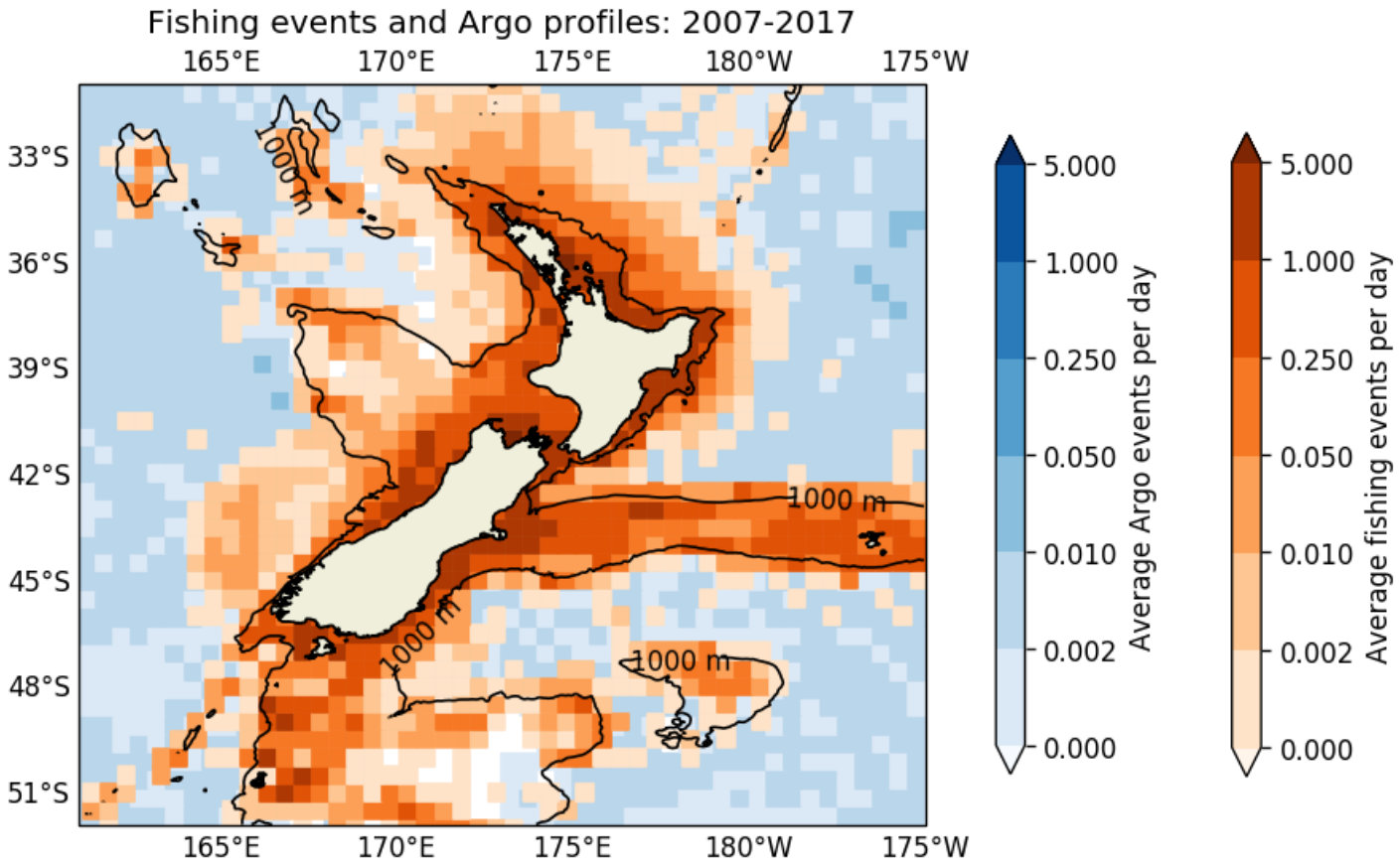
Moana Temperature and Depth Sensors



Fishing event data were provided by the New Zealand Ministry for Primary Industries (MPI) and prepared by David Middleton of Pisces Research Ltd.

Incorporating untapped resources to fill the gap

For more information: Van Vranken et al., 2020, "Fishing gear as a data collection platform: Opportunities to fill spatial and temporal gaps in operational sub-surface observation networks", *Frontiers in Marine Science*.

Moana PROJECT

Mangōpare Temperature and Depth Sensor

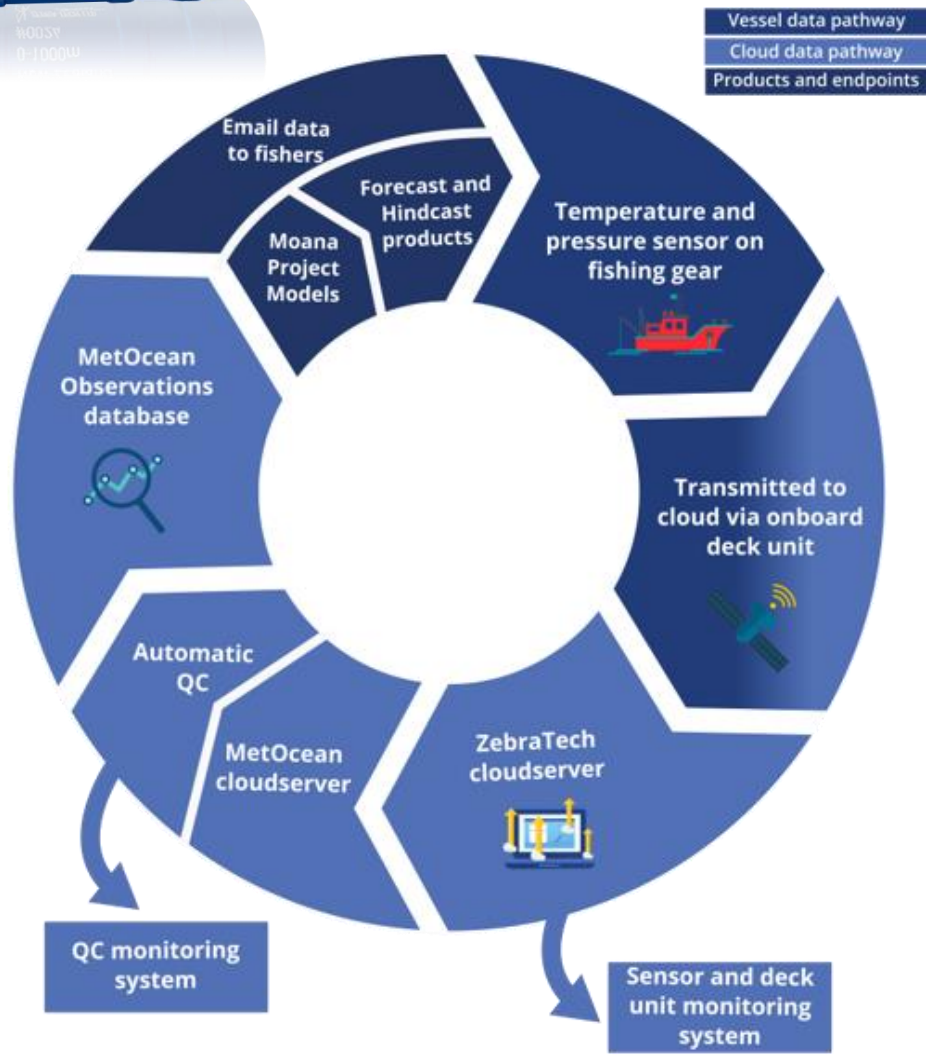
- No human intervention required for daily operations, sensor start and stop triggered by pressure change, automated data offload and transfer to the cloud
- "Mangōpare" named by Danny Paruru (Whakatōhea iwi)
- International collaboration with sensor trials and programmes abroad
- Near real-time data return and sensor requirements met

Sensor

- Low cost, lightweight, battery life of 2 years
- Temperature accuracy of 0.1°C

Deck Unit

- Solar powered
- Cellular and Wi-Fi versions developed



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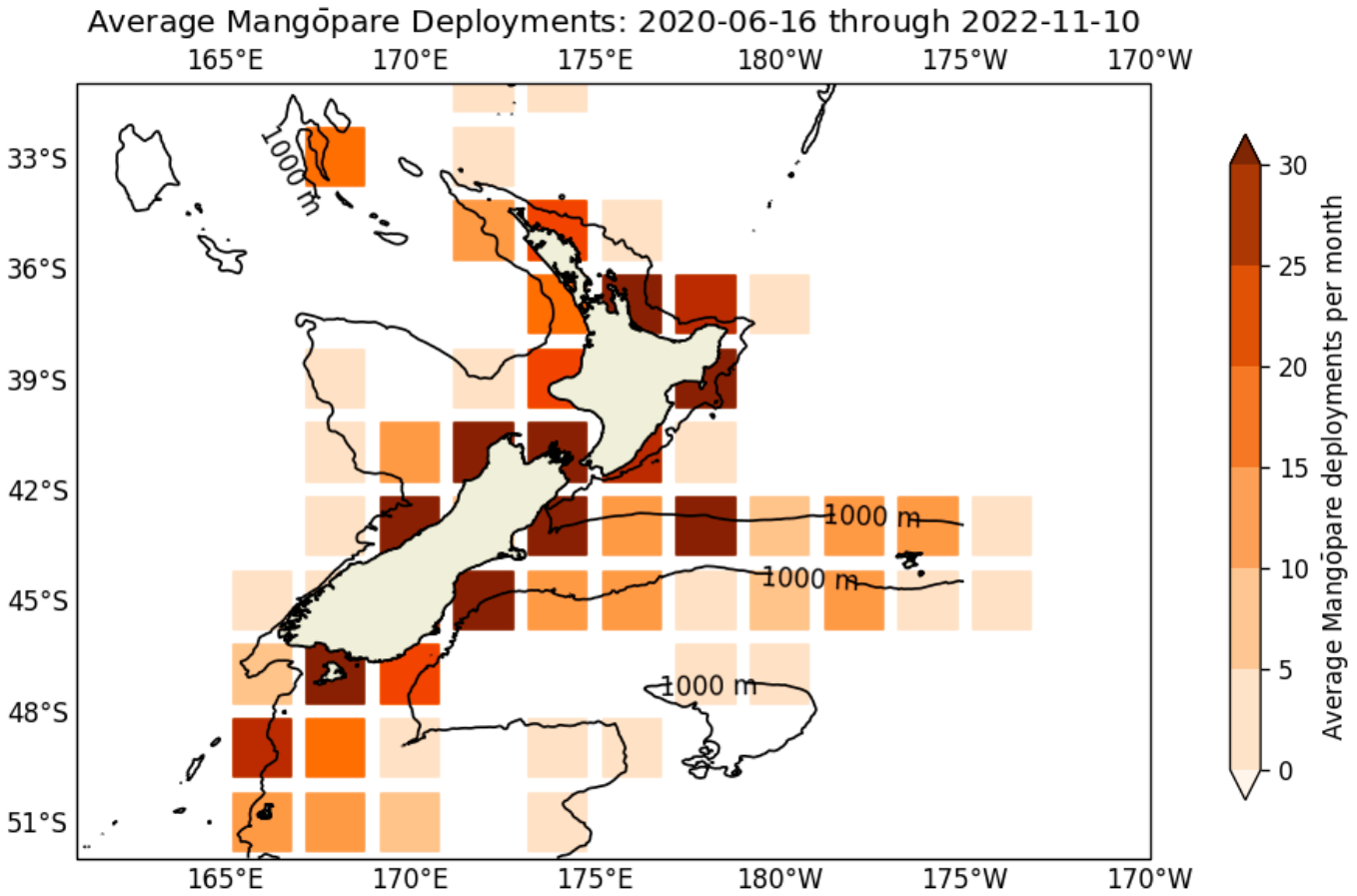
Sensor Roll Out in New Zealand

As of 10 November 2022:

- Total profiles reported: 25,468 (x2)
- Total measurements: 10.1 million
- Deepest profile: 1,507 m
- Combined time underwater by all sensors: 29 years
- Most measurements in a deployment: 31,144

Installed on 200+ vessels via partnership with Deepwater Group, Fisheries Inshore NZ, Southern Inshore Fisheries, NZ Rock Lobster, Pāua Industry Council, Seafood NZ Magazine, all 3 biggest NZ fishing companies + others, Independent fishers, research, education, industry vessels, waka



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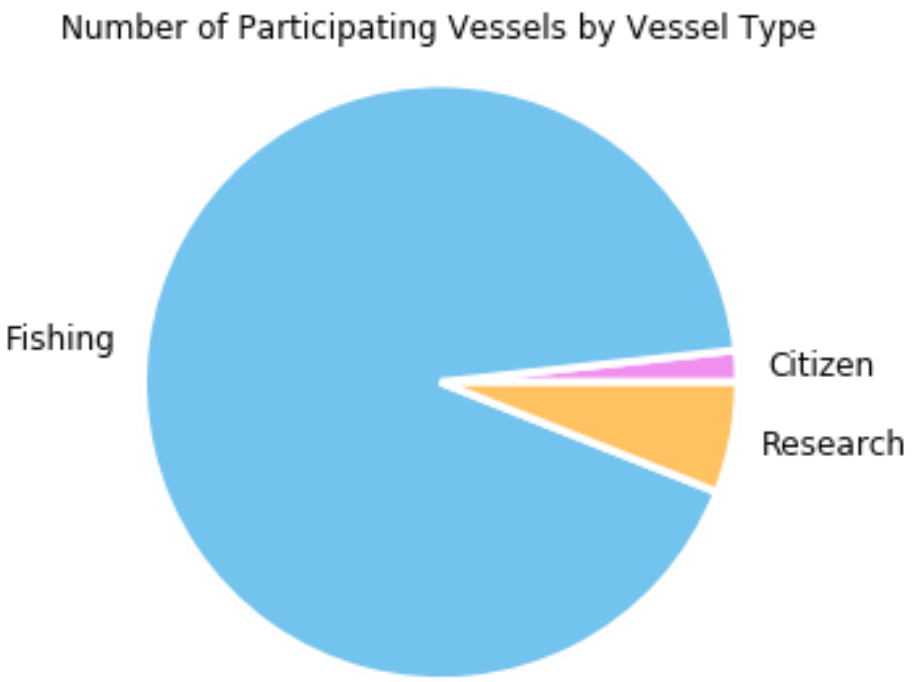
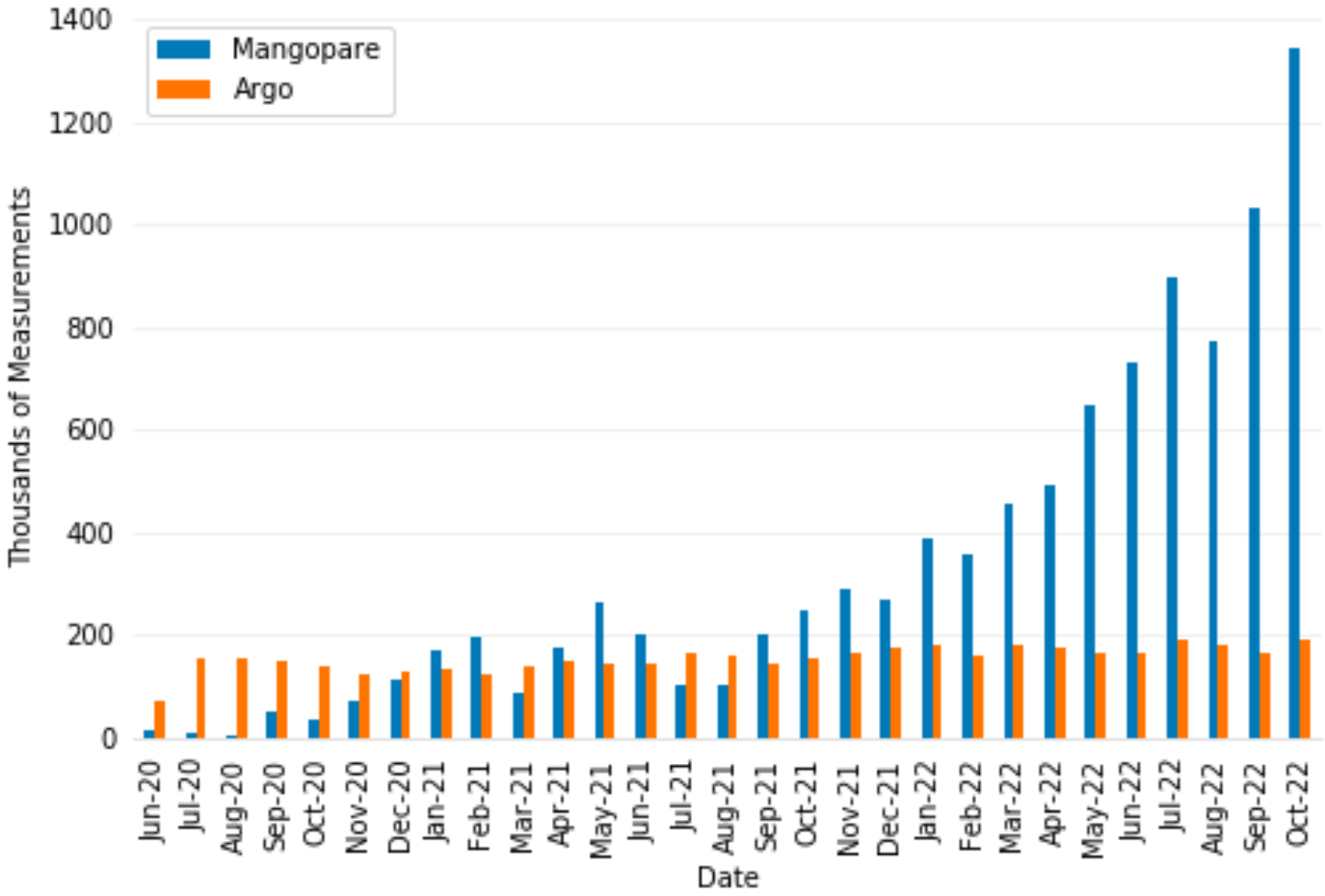
Sensor Roll Out in New Zealand





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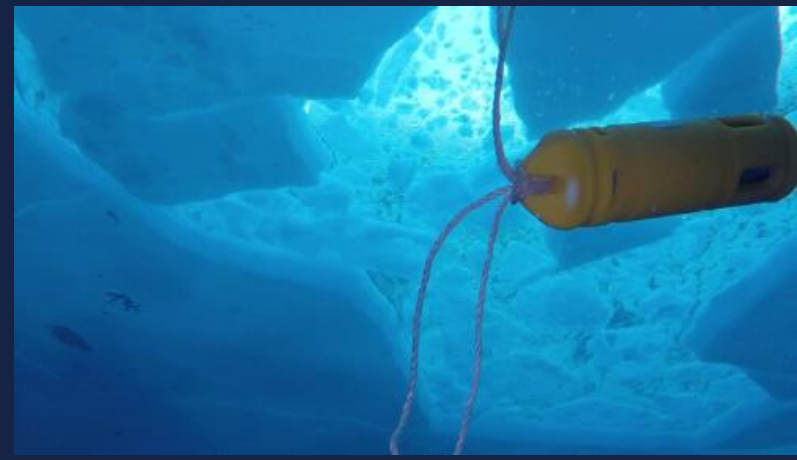
Fishing Vessel Ocean Observing Network (FVON)



Integrating with a Diversity of Fishers

- Protection options to withstand harsh conditions
- Developed with fisher feedback
- Versatile and flexible options
- Also surface-met and sea surface capabilities (CP-TT)

Inuit longline fishing
NKE (CTD)
NW Greenland

Trawl Door
ZebraTech Moana TD
New Zealand

Trolling
ZebraTech Moana TD
Southeast Alaska

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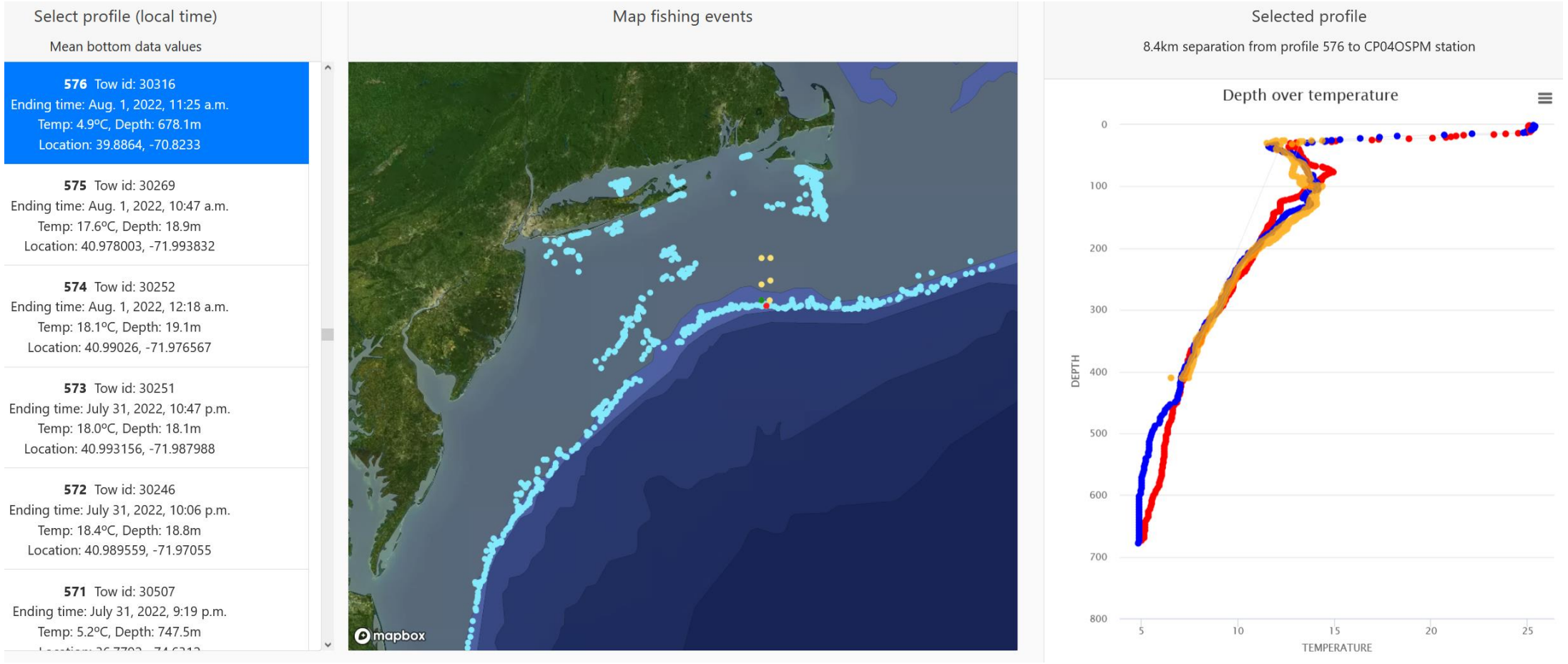
Ocean Observatories Initiate Pioneer Array Validation & Complementarity



This material is based upon work supported by the U.S. Office of Naval Research under Contract No. N00014-22-P-2003.

SynObs <> FVON synergies

Observation capabilities in complex ocean regions

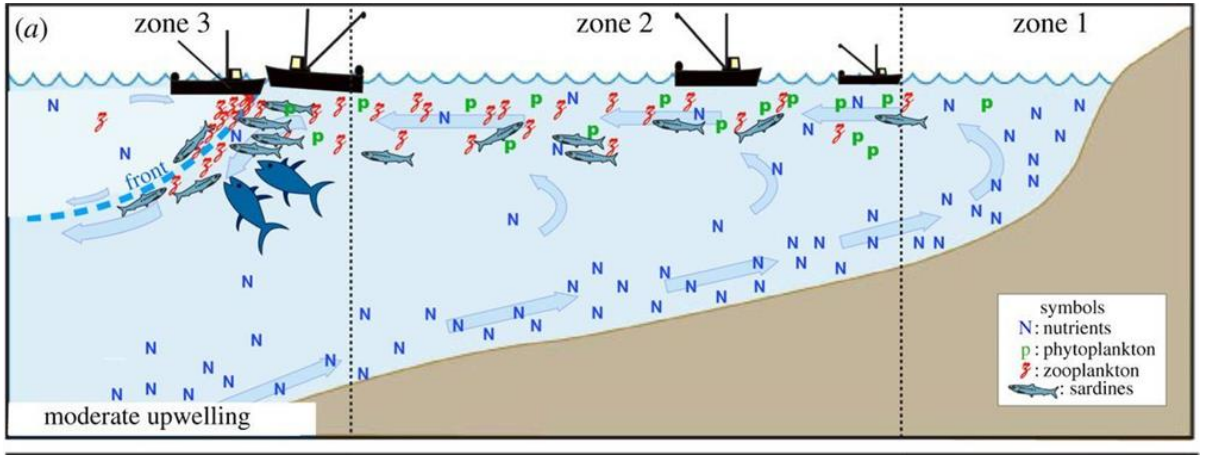
- Shelf & coastal
- Frontal mixing zones
- Upwelling
- Sea Ice edges

Features complicating Argo & drifter operation form basis for productive ecosystems.

These productive zones are the best fishing spots, which pulls in FV obs.

Compliment conventional observing platforms and networks.

What are the impacts for future observation network design?



Bakun et al., 2017 https://doi.org/10.1098/rsta.2016.0327

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FVON & the Emerging Network

Expanding the emerging global community

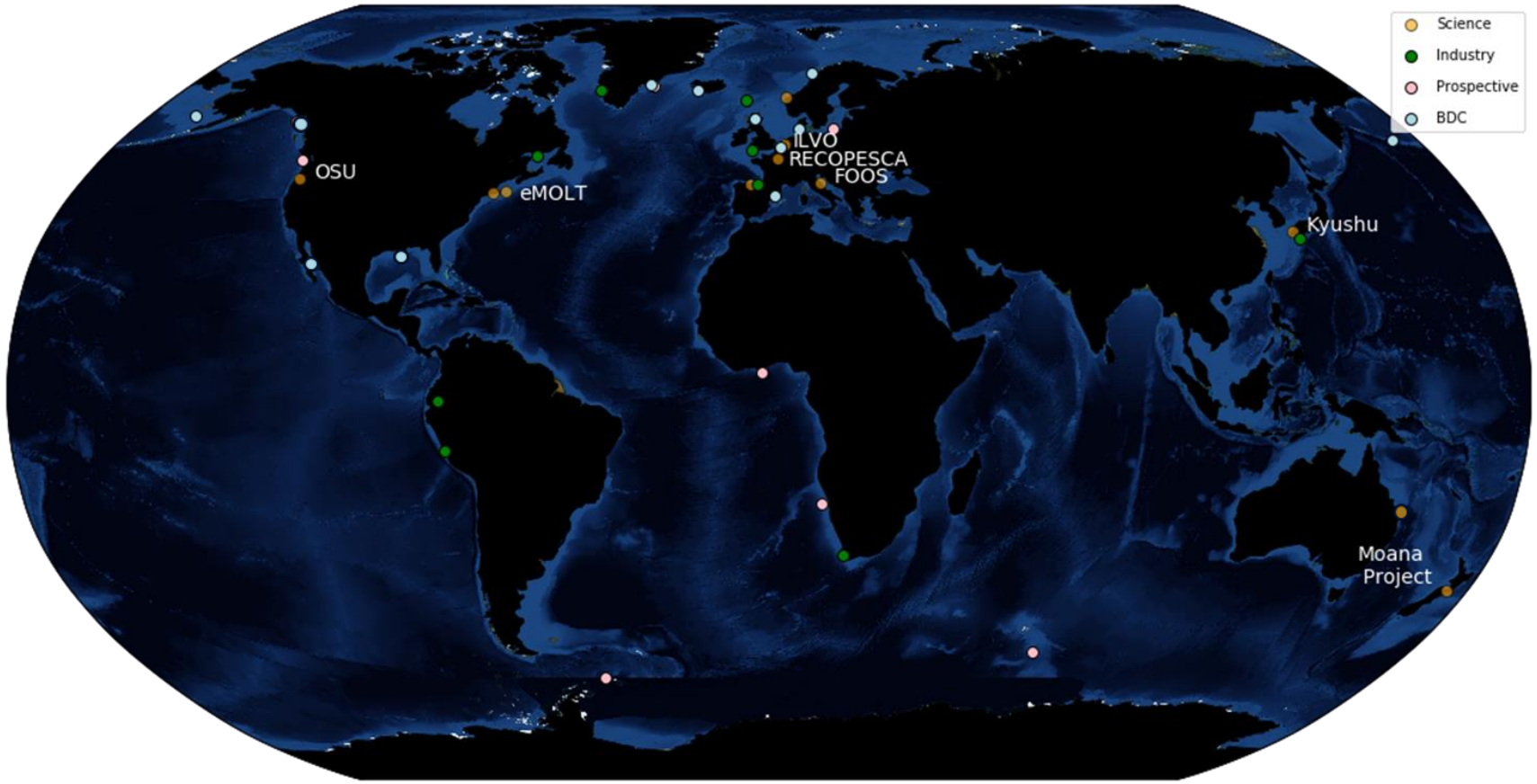
Increasing to more EOVs & ECVs

Series of workshops as part of next EMODnet Phase

Steering Committee

UN Decade Project

GOOS network



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FVON: Benefits and Impacts

- Improved understanding of ocean dynamics (i.e. marine heatwaves): operational ocean model data assimilation, improved forecasts and hindcasts
- Access to data: measurements made public when possible and agreed upon
- Contribution to marine environmental knowledge to support sustainability
- Custom products and tools to support productivity, operational efficiencies, catch optimization, co-designed with the fishing sector
- Contribute to fisheries management decision making
- Community engagement

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Land Information
New Zealand
Toitū te whenua


CAWTHRON
The power of science®


Auckland
Council
Te Kaunihera o Tāmaki Makaurau


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WAIKATO
Te Whare Wānanga o Waikato


UNIVERSITY
of
OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND


dta
Defence Technology Agency


THE UNIVERSITY OF
AUCKLAND
NEW ZEALAND


deepwater
group


UNSW
AUSTRALIA


UNIVERSITY OF HAWAI'I


Seafood
New Zealand


MetOcean
SOLUTIONS


MetService
TE RATONGA TIRORANGI


VICTORIA
UNIVERSITY
WELLINGTON


Australian Government
Bureau of Meteorology


TERRA MOANA
natural capital coaching


ZEBRA-TECH LTD


DRAGONFLY
Data Science


Ministry for Primary Industries
Manatū Ahu Matua


Whakatōhea
Māori Trust Board


TRIDENT
SYSTEMS


FISHERIES
INSHORE NEW ZEALAND


SOUTHERN INSHORE
FISHERIES


PĀUA INDUSTRY
COUNCIL


The Elshire
Group Ltd.


NIWA
Taihoro Nukurangi


NAVY


SEAFOOD INNOVATIONS


RUTGERS
School of Environmental
and Biological Sciences


EDF
ENVIRONMENTAL
DEFENSE FUND
Finding the ways that work


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DATA
NETWORK


IMOS
Integrated Marine
Observing System


fishwell
CONSULTING


BERRING DATA
COLLECTIVE


Office of Naval Research
ONR
Science & Technology


EMODnet
European Marine
Observation and
Data Network

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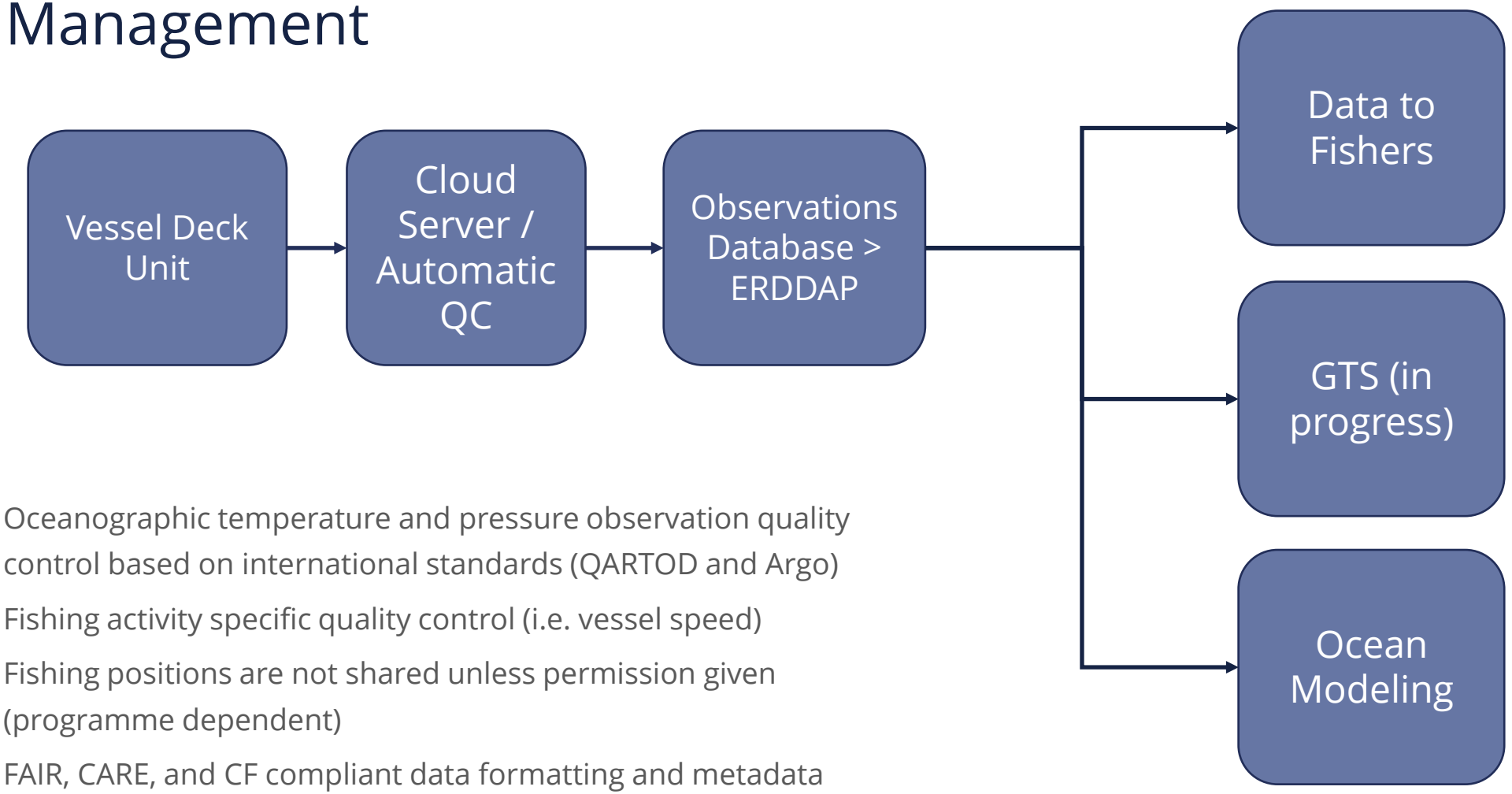
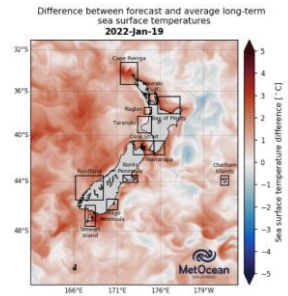
Thank you

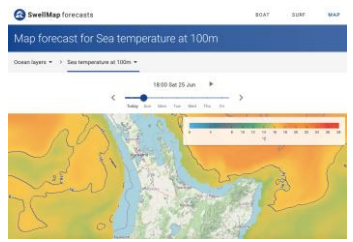
Cooper Van Vranken
https://oceandata.net
cooper@oceandata.net

Data Management



- Oceanographic temperature and pressure observation quality control based on international standards (QARTOD and Argo)
- Fishing activity specific quality control (i.e. vessel speed)
- Fishing positions are not shared unless permission given (programme dependent)
- FAIR, CARE, and CF compliant data formatting and metadata





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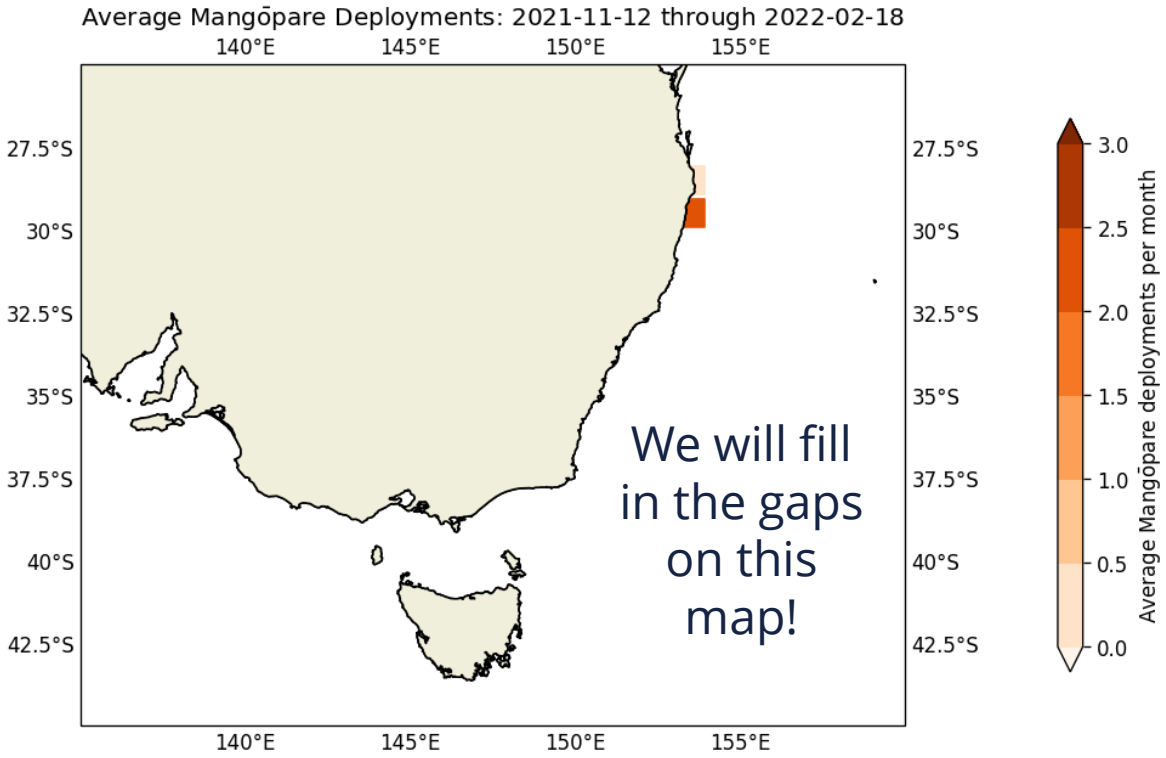
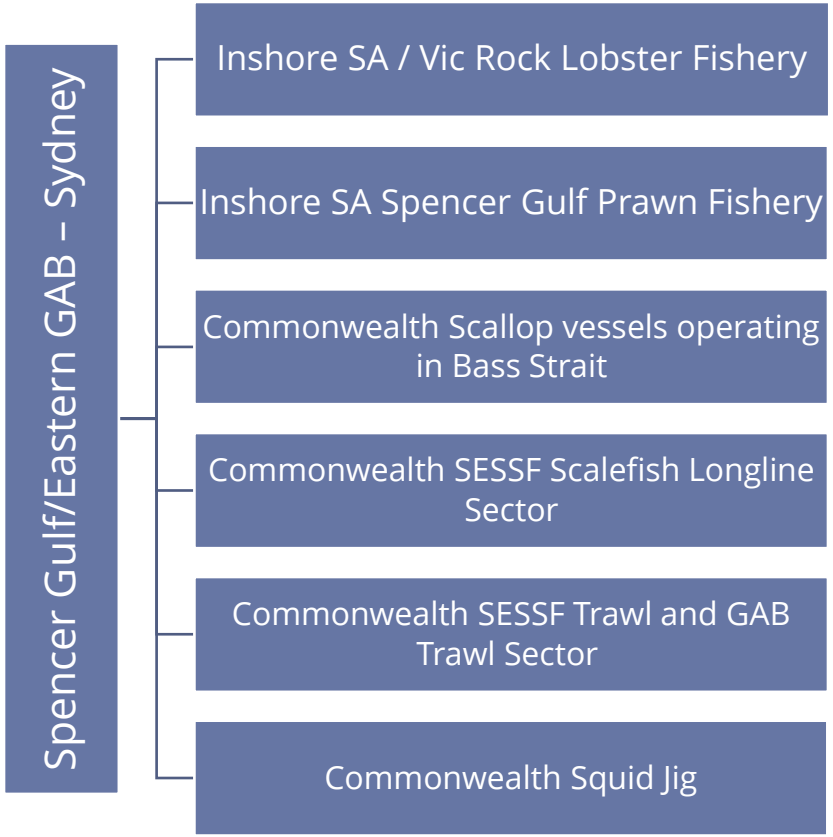
Looking Forward in Australia



- Two-year project from 1 July 2022 through June 2024, $300 k FRDC grant
- Trial: ~20 vessels across southeastern Australia
- Proof of concept: a range of gear types, fishing depths and methods to trial
- 2-5 sensors per vessel
- Working on near real time data pathways to IMOS and seafood sector data repositories



fishwell CONSULTING

IMOS Integrated Marine Observing System

UNSW SYDNEY

FRDC FISHERIES RESEARCH & DEVELOPMENT CORPORATION

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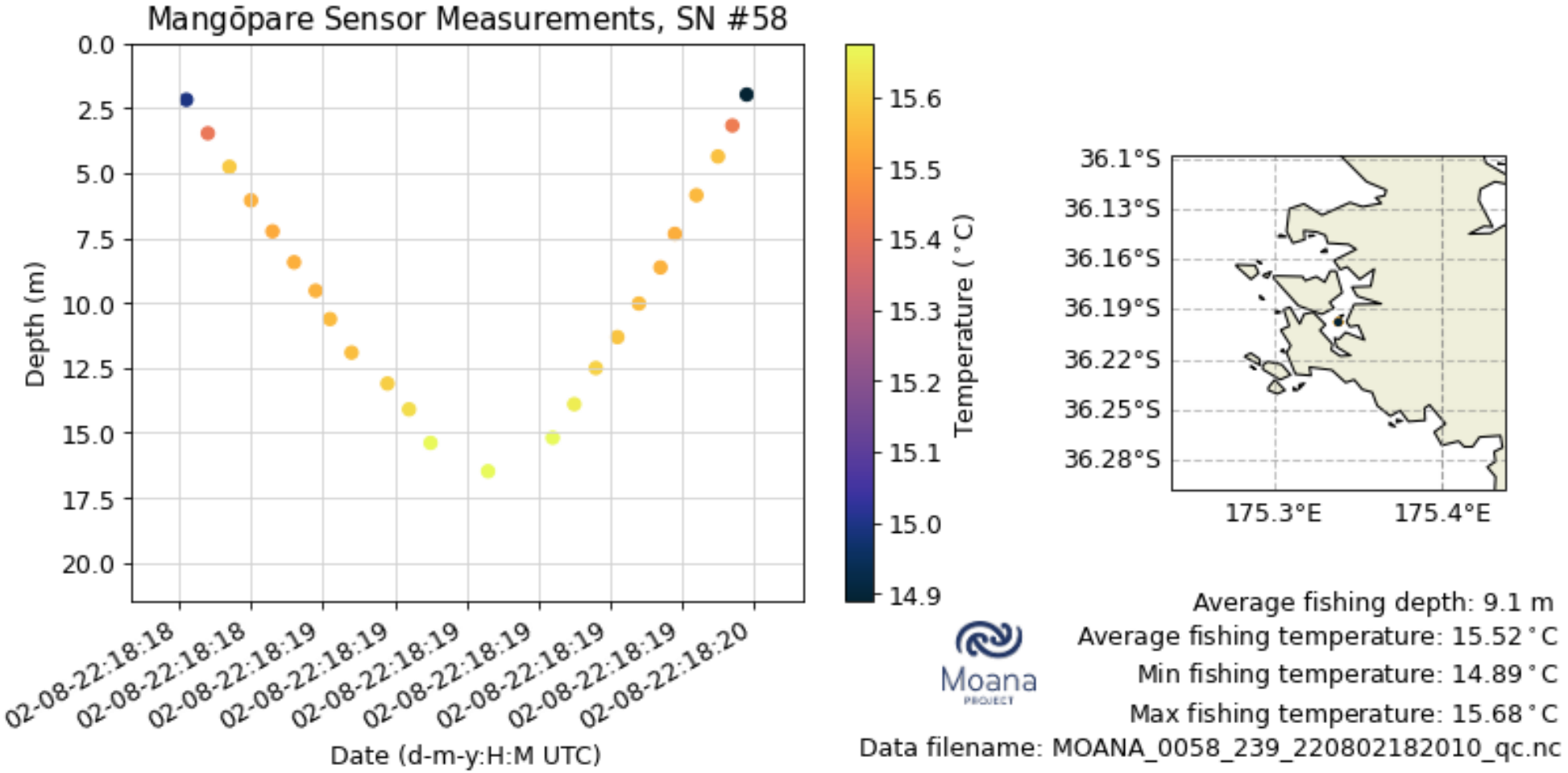
Return Measurements to Vessel / Data User

- **Feedback from seafood/fishing sector**
- Automatic emails: summary statistics, plot, processed csv spreadsheet
- Best example coming up later from Noaki Hirose



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