



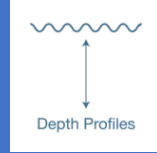
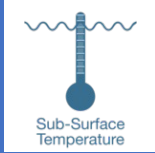
Animal Borne Ocean Sensors. AniBOS – Animals as Essential Ocean Observers

CLIVAR-GOOS Workshop: From global to coastal: Cultivating new solutions and partnerships for an enhanced Ocean Observing System in a decade of accelerating. change

Clive R. McMahon



Briefly



Endorsed: GOOS - OCG 2020, UNDOS 2021

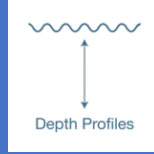
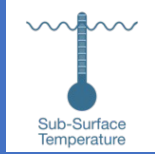
Our Vision: To enhance understanding and describe our changing oceans through the eyes of marine animals

Our Mission : Collect and make freely available oceanographic measurements from the most inaccessible regions of the global seas to understand our Changing Oceans



2021 United Nations Decade
2030 of Ocean Science
for Sustainable Development

Workshop Aims



Meet societal and scientific demand for climate information, forecasting, and prediction, the ocean observing community

Set priorities for expanding ocean observing systems

Develop integrated, **cost-effective** means to collect & maintain long-term ocean observations

Provide the **science i.e. the power**, for coastal communities to prepare and respond to changes in ocean structure & productivity

From global to coastal:
Cultivating new solutions and partnerships
for an enhanced Ocean Observing System in a decade
of accelerating change



2021
2030 United Nations Decade
of Ocean Science
for Sustainable Development

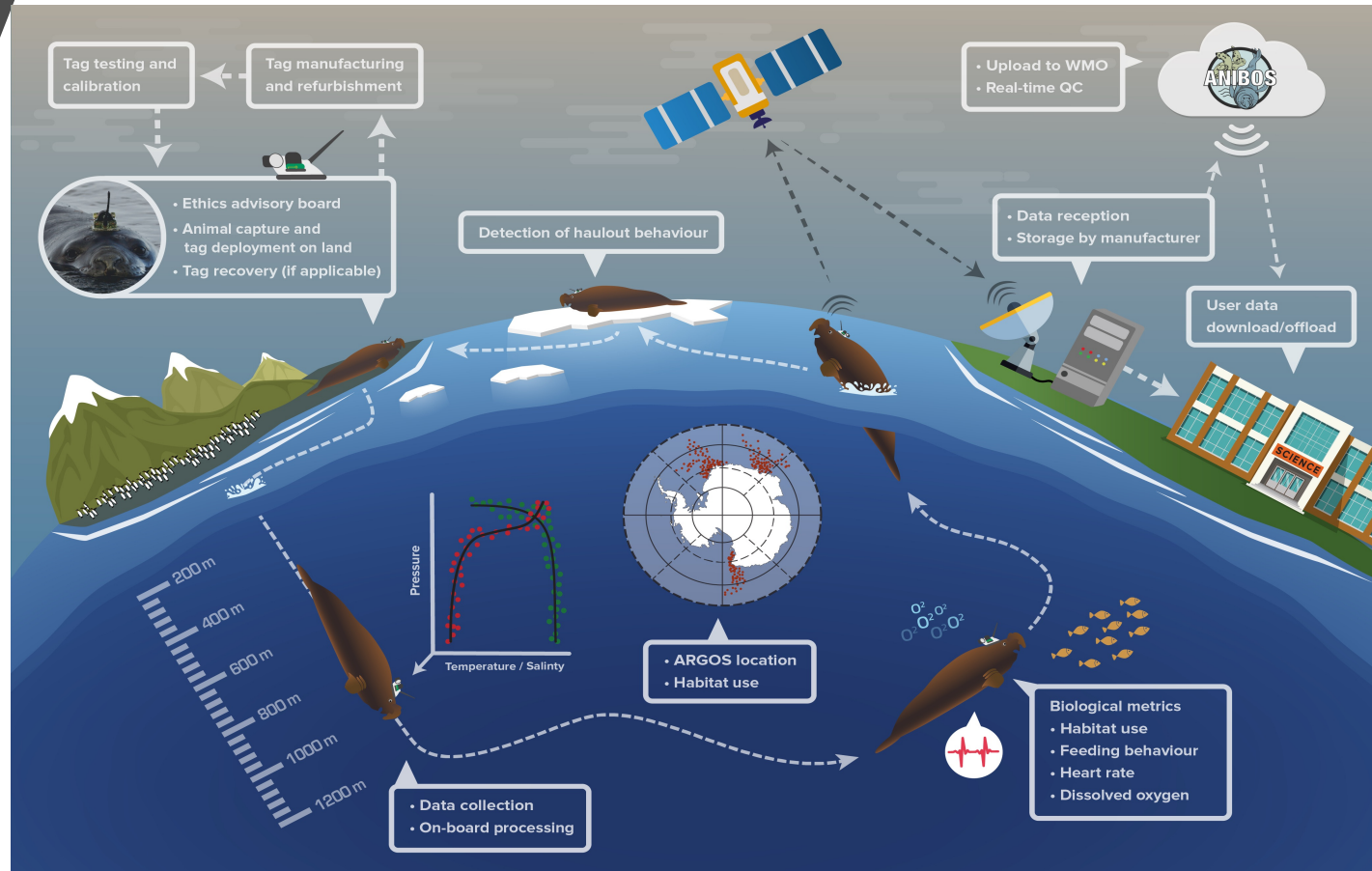
The How



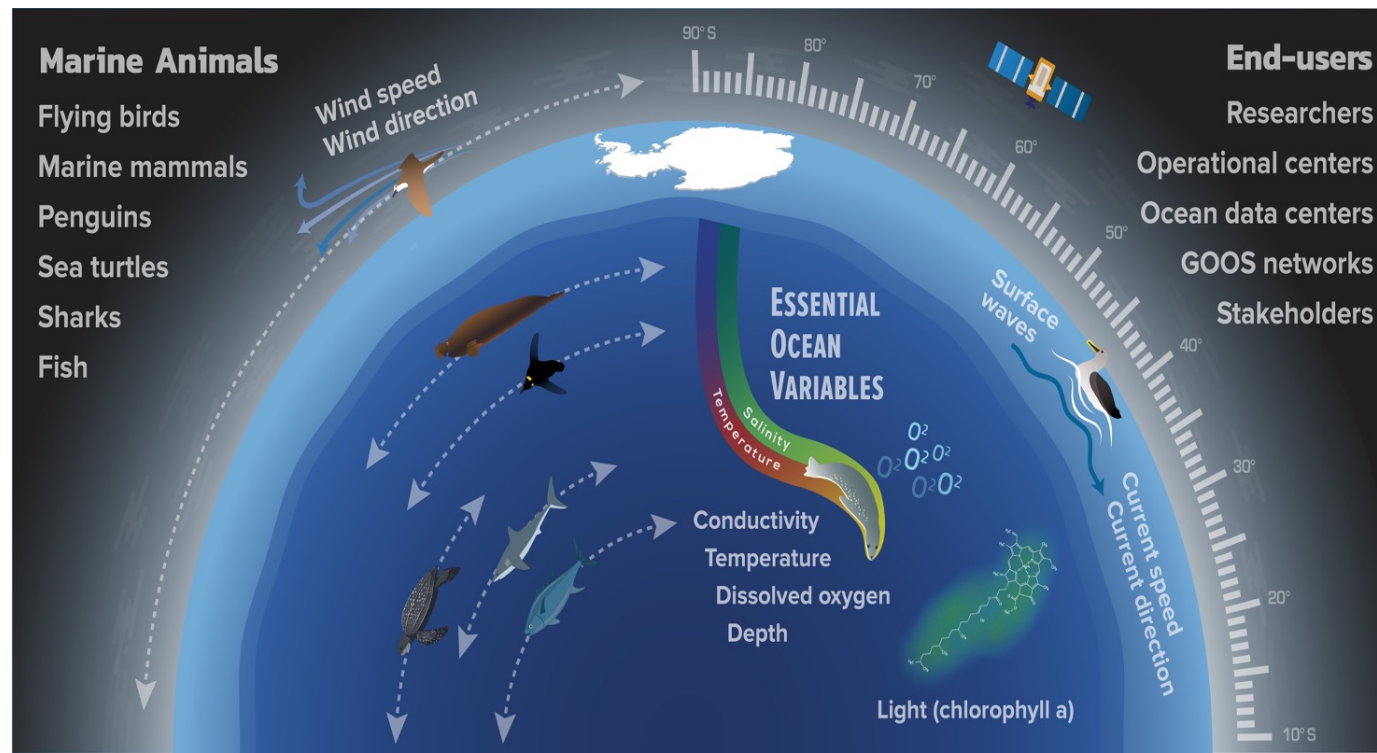
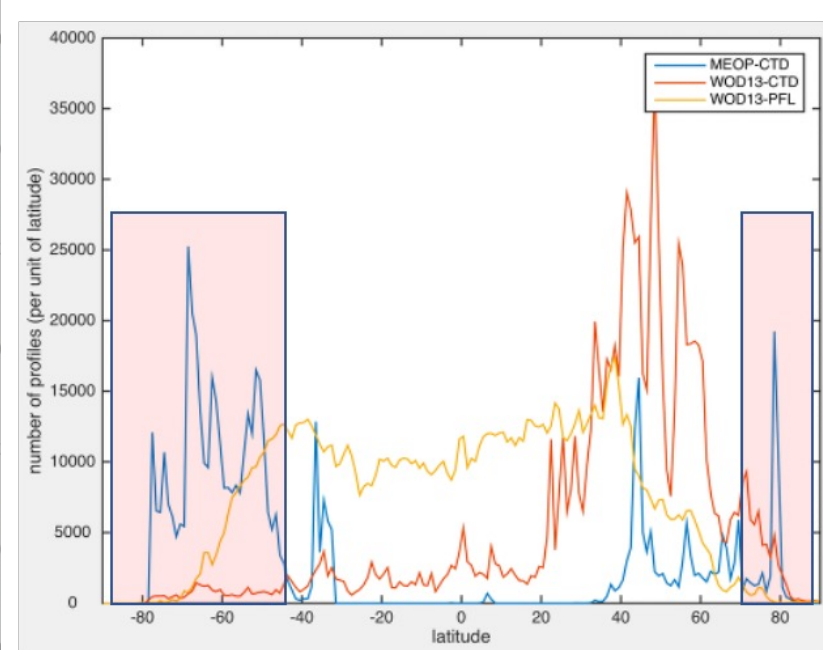
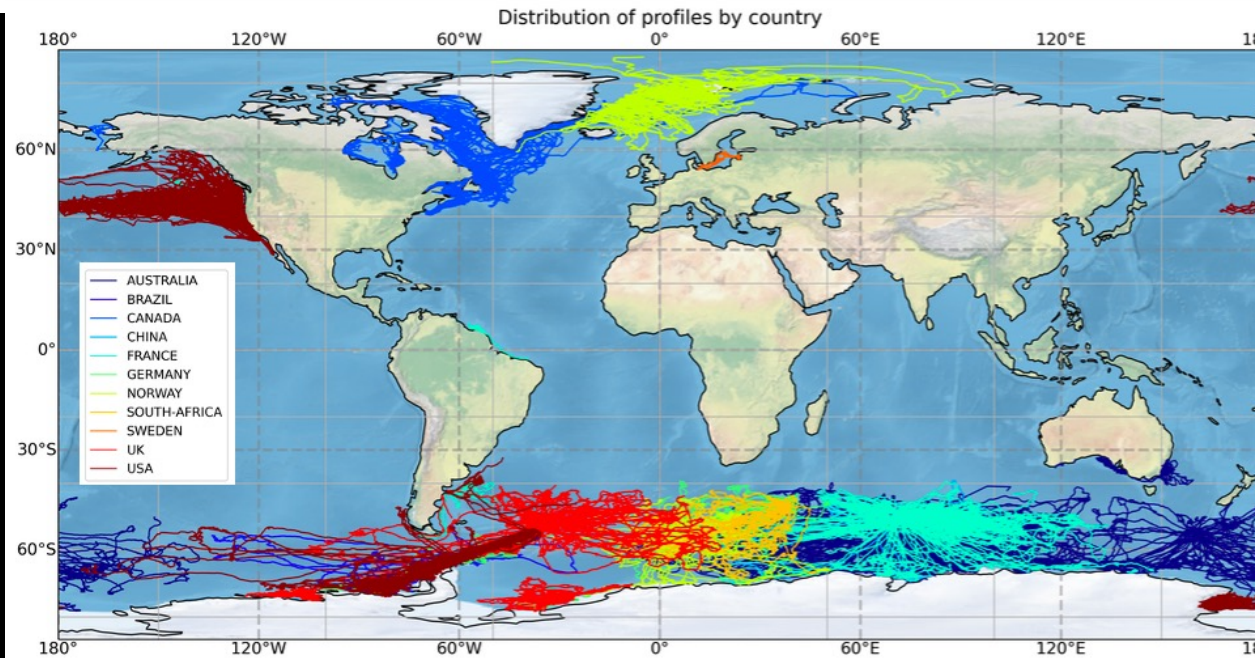
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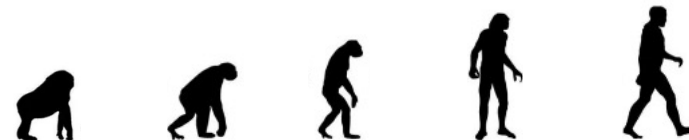
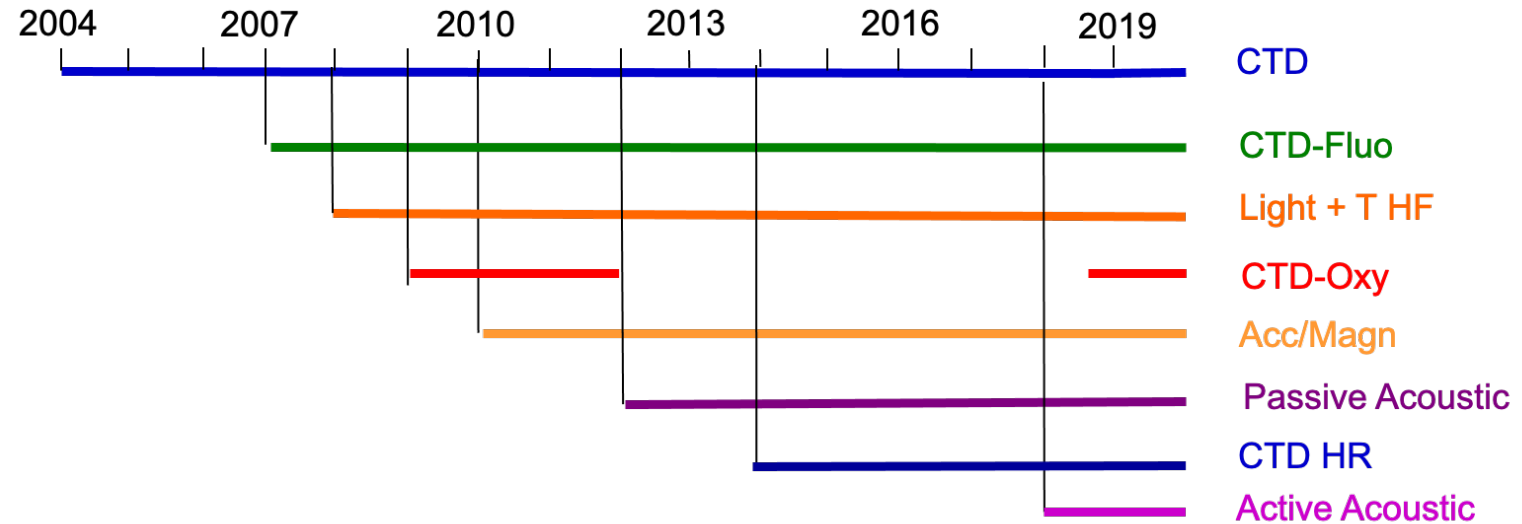
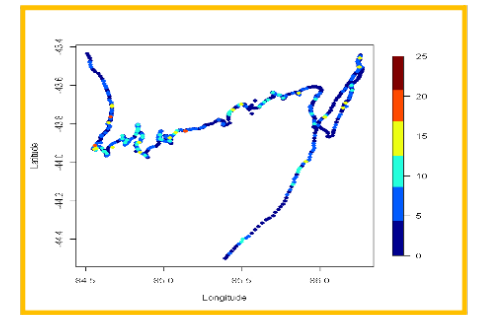
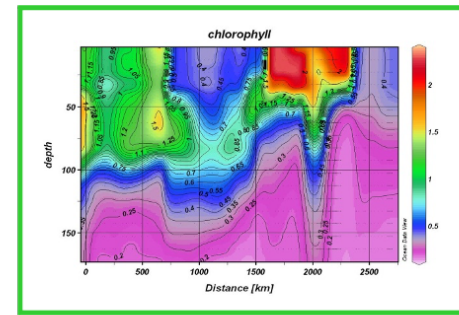
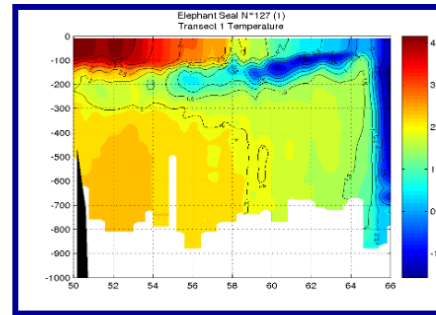
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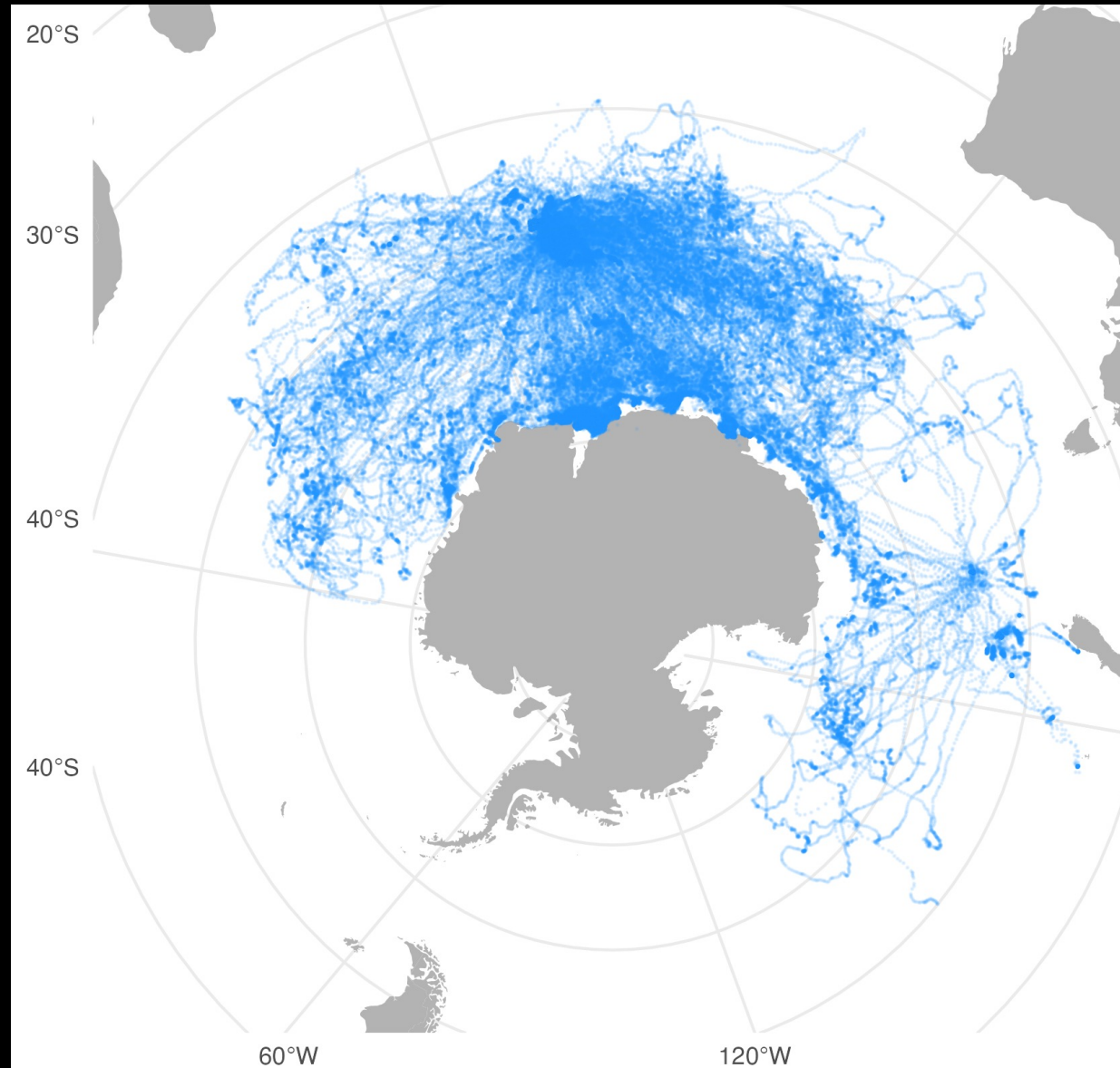
Where & What



Deployment chronology & the sensors used: > 470 deployments (2004-2022)

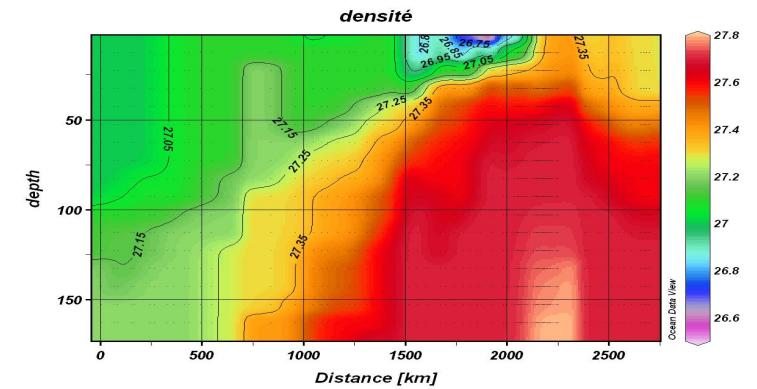
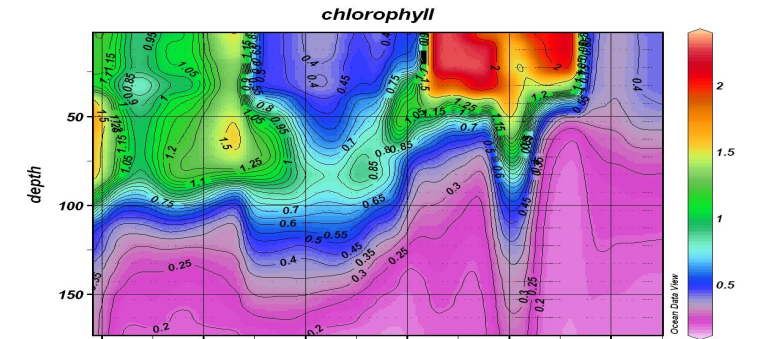
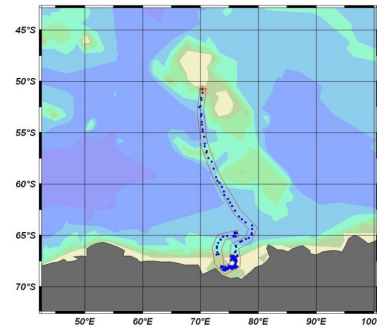


Filling Physical & Biological Observational Gaps in Eastern Antarctica

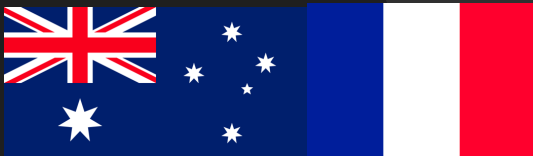


Measurement of biogeochemical variable

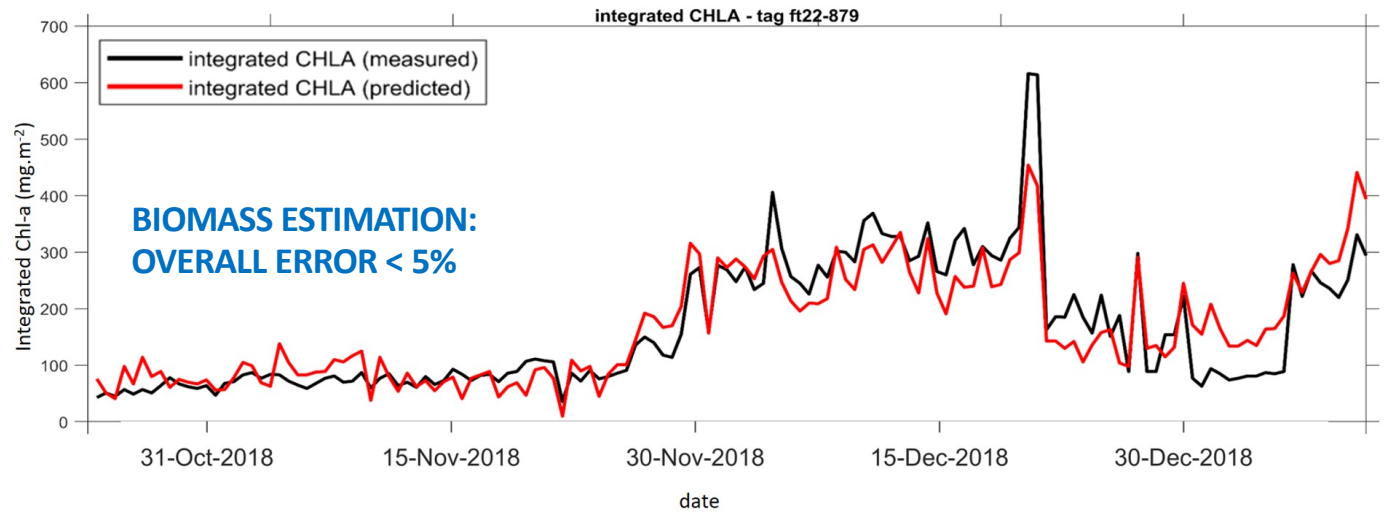
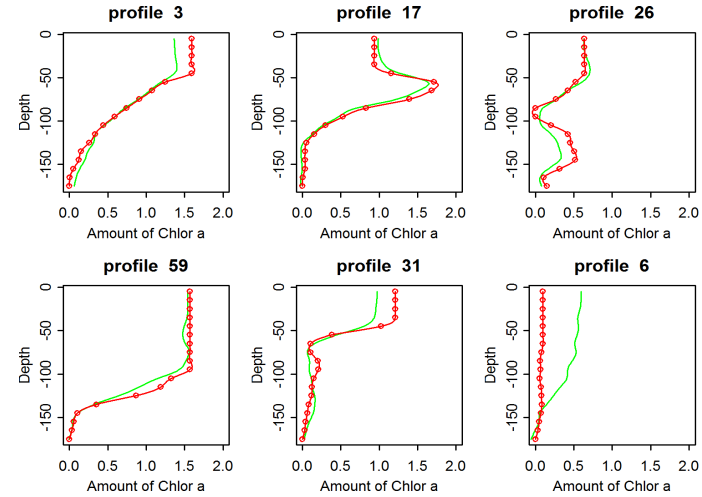
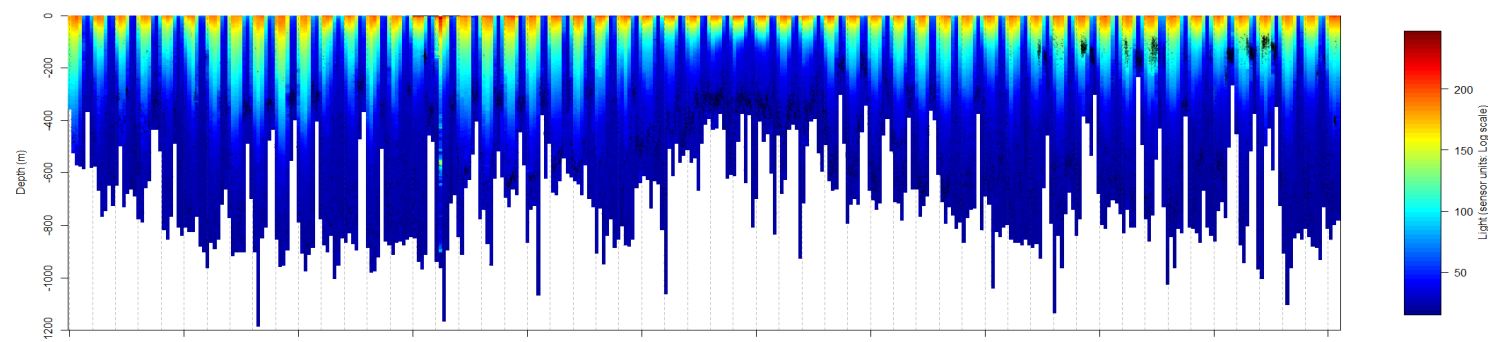
Fluorescence



Biological activity in time and space



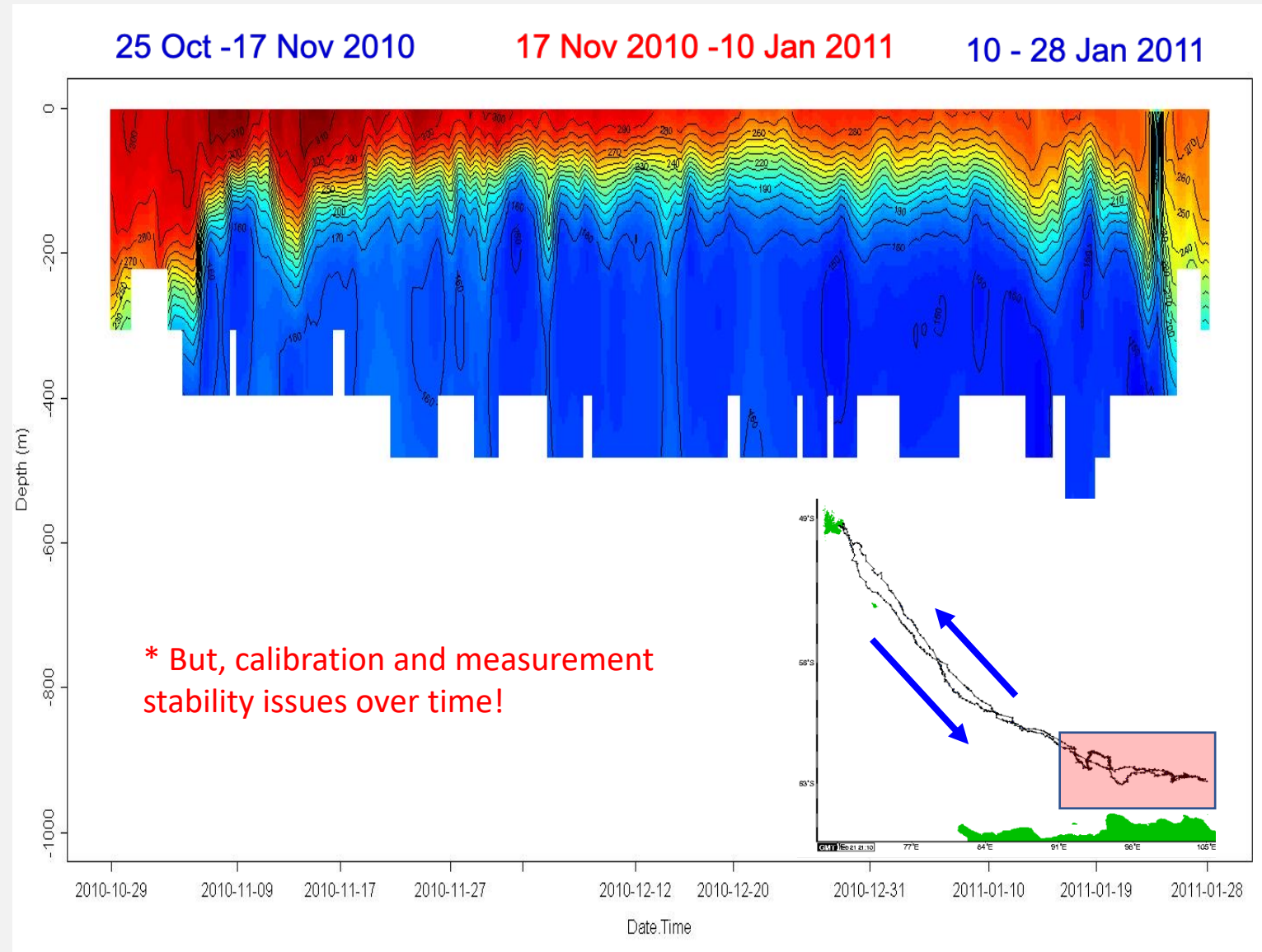
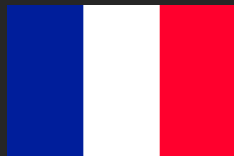
Chl-a profiles from light attenuation data



Measurement of biogeochemical variables

Dissolved Oxygen

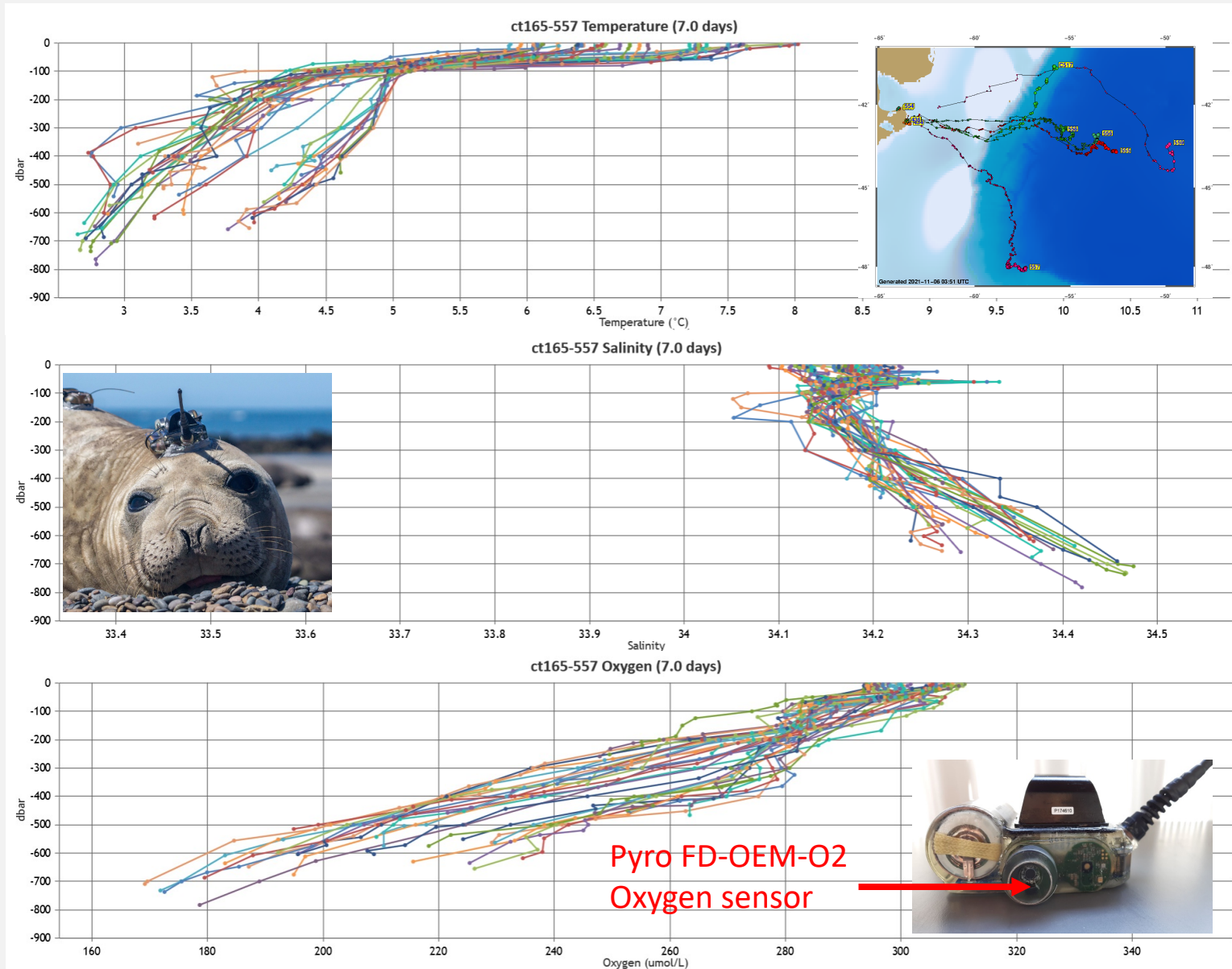
Optode Aandera & Oxygen Optode 4330F



Measurement of biogeochemical variables

Dissolved Oxygen

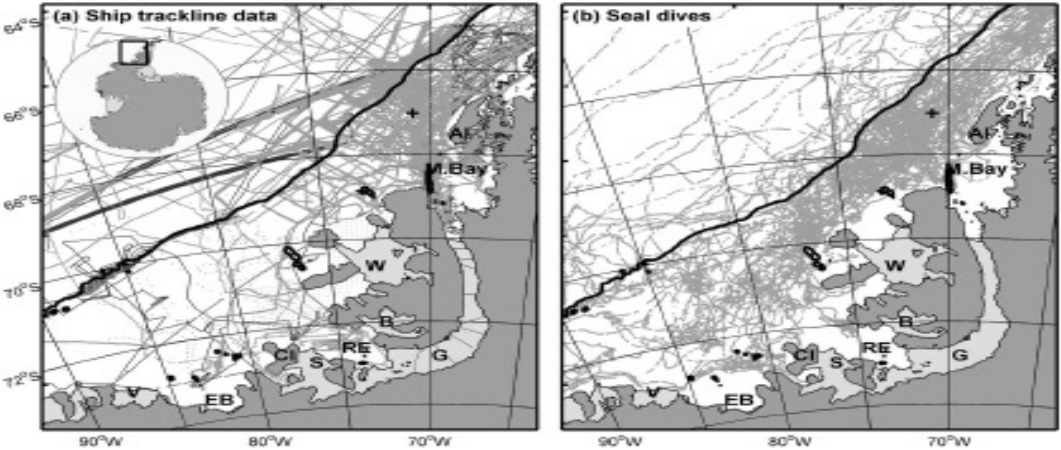
Pyro FD-OEM-O2Oxygen sensor



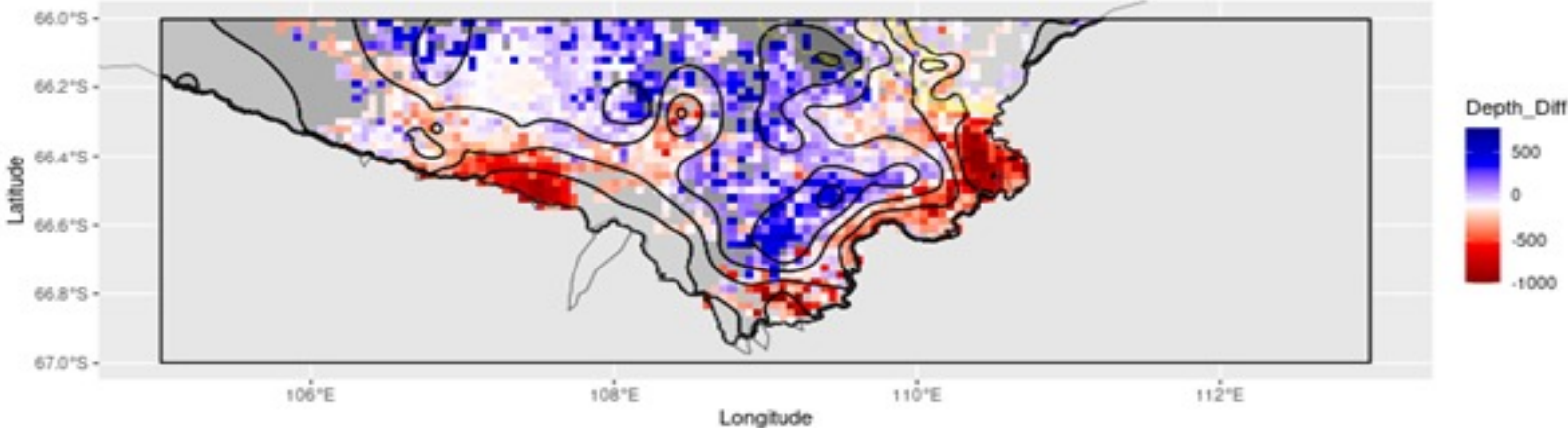
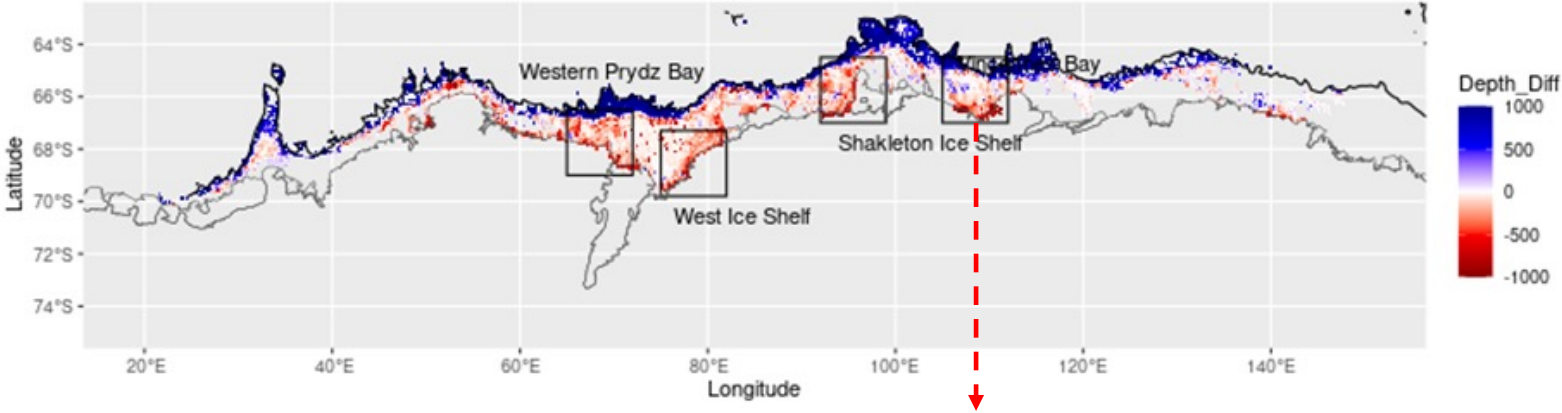
The results are promising – deployments still active

Bathymetry

< 25% of Antarctic (& World) bathymetry is mapped

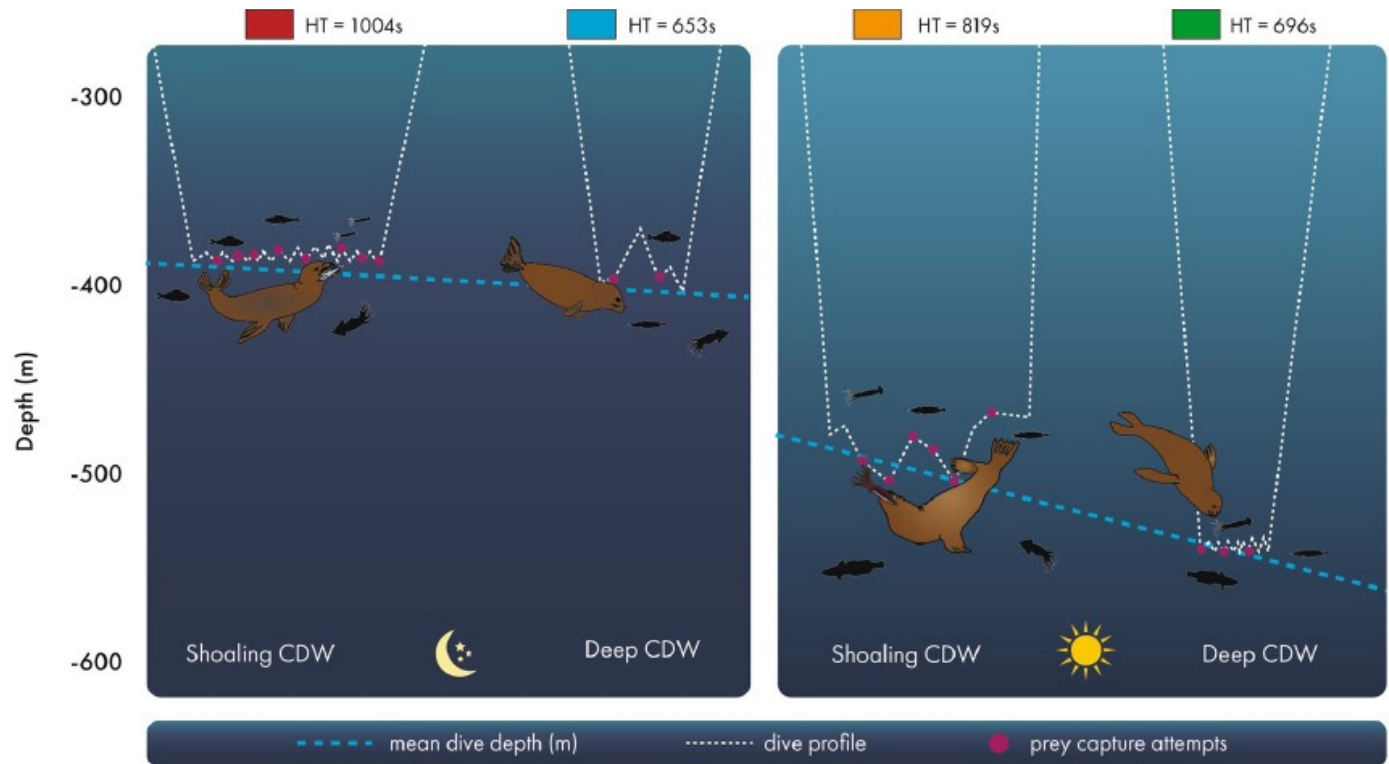
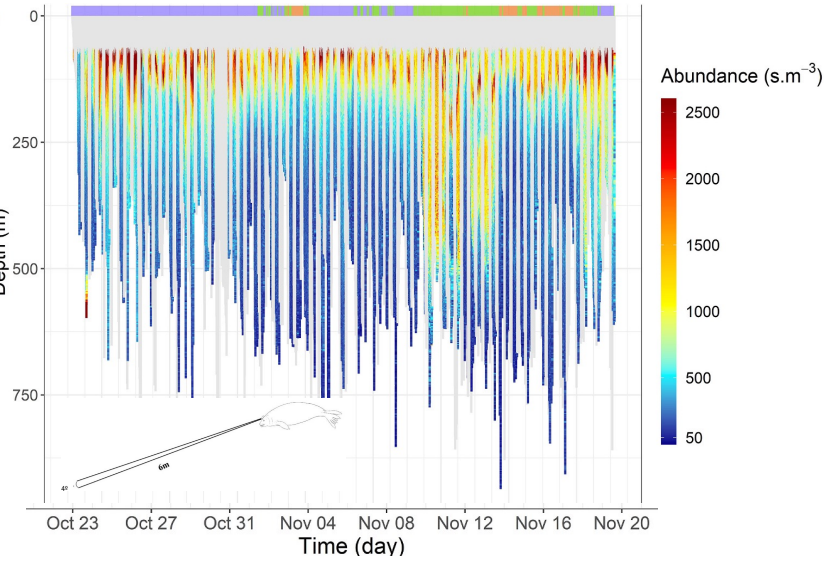
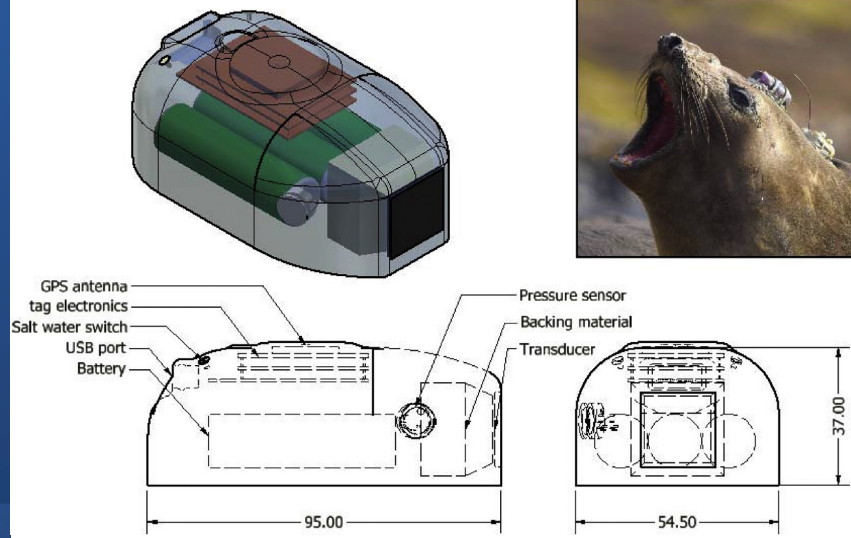


Number of Dives = 563568



Measuring Prey Fields

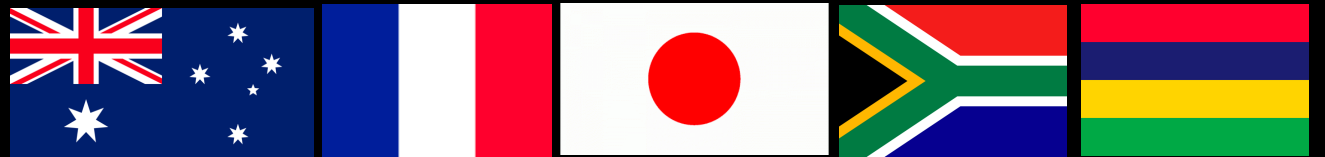
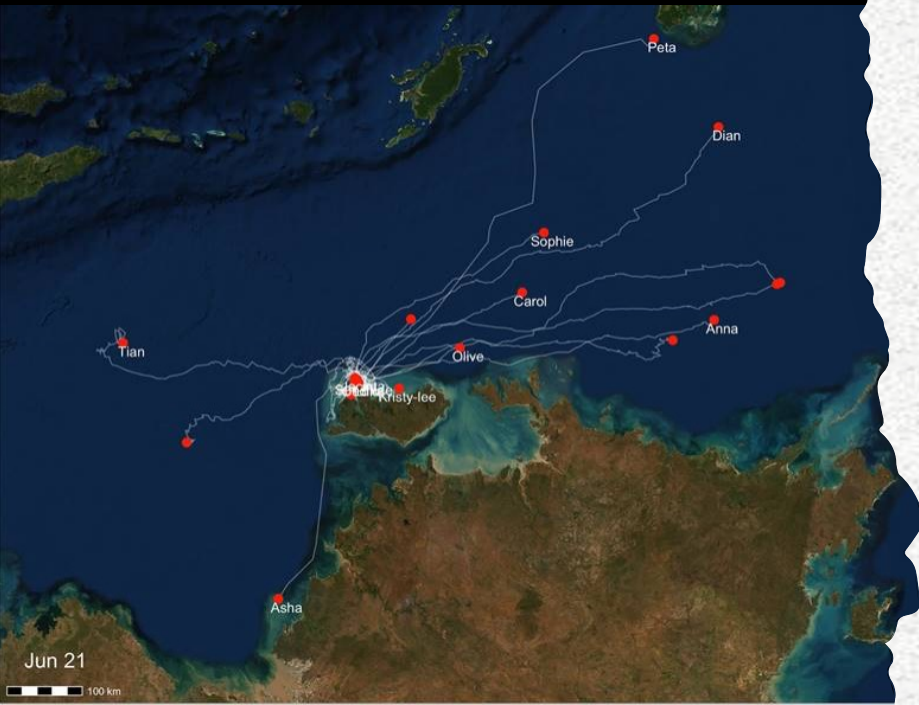
Sonar & Behaviour





... but most people live in
tropics
& sub-tropics

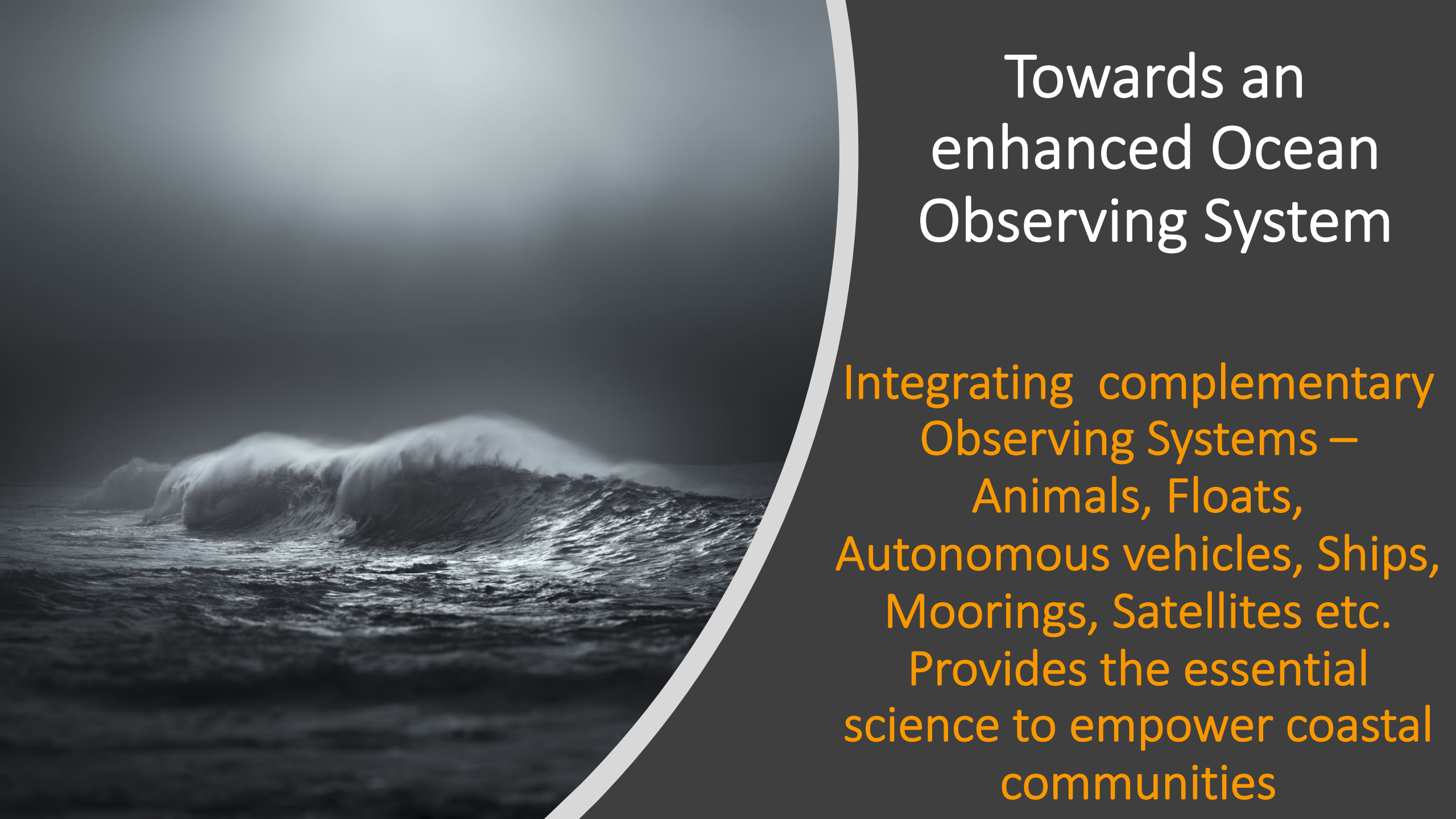
Turtles carrying CTDs can provide essential observations in coastal areas where most people live & improve weather & climate forecasting *e.g.* JCOPE2M





Towards an
enhanced Ocean
Observing System

Animals measure many of the
the oceans' attributes that are
needed for sustained ocean
observing systems



Towards an enhanced Ocean Observing System

Integrating complementary
Observing Systems –
Animals, Floats,
Autonomous vehicles, Ships,
Moorings, Satellites etc.
Provides the essential
science to empower coastal
communities

Thank-you & Questions

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