

FerryBox Magallanes: Autonomous monitoring system to measure physical biological and chemical processes in austral fjords and channels.

Challenges and opportunities.

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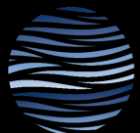


IDEAL
Centro de Investigación
Dinámica de Ecosistemas Marinos
de Altas Latitudes



FerryBox
Magallanes

JERICO-S3 and 11th FerryBox
Workshop 28-29 September 2022



FerryBox
EuroGOOS Task Team



Chilean Patagonia is
home to the last
icefields in
subantarctic systems
(excluding Subantarctic Islands)



Background

- The largest region in the country with an area of ca 130,000 km² (the size of Greece).
- Complex coastal geomorphology due to the presence of numerous channels and fjords.
- Low population density (1.20 hab. km⁻²)
- Much of the territory is unexplored, little information about the coastal dynamics of fjords and channels, "hotspots" of biological productivity, limited information on the freshwater discharge to channels and fjords, recruitment sites for species of commercial interest, among others.
- Limited land connectivity, an important part of the transport is carried out by sea.



Magellan strait and Beagle Channel.

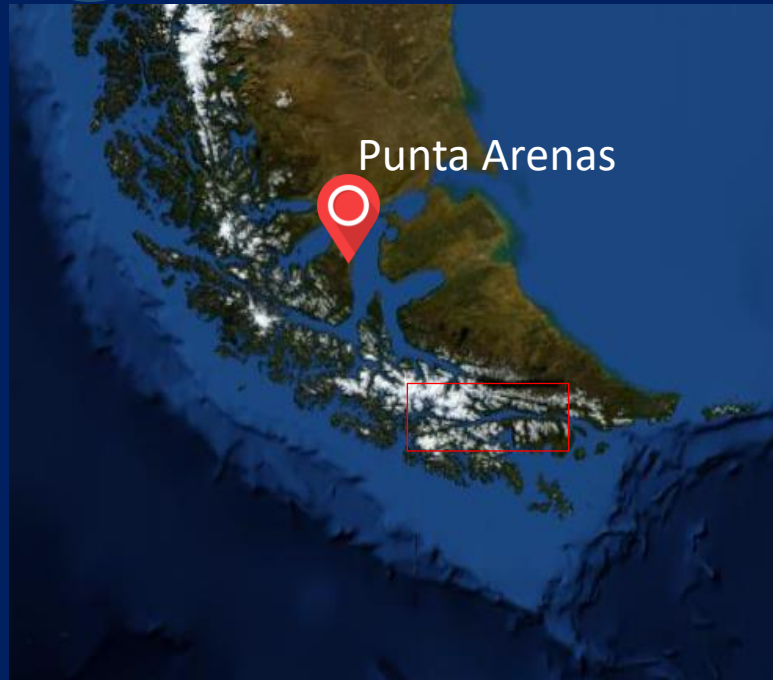
Areas of
interest





Threats & Challenges

Increase in the deglaciation process



Cordillera Darwin Ice Field is one of the last remnants of coastal glaciers in the southern hemisphere.

The Cryosphere, 7, 823–839, 2013
www.the-cryosphere.net/7/823/2013/
doi:10.5194/tc-7-823-2013
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The Cryosphere 

Satellite-derived volume loss rates and glacier speeds for the Cordillera Darwin Icefield, Chile

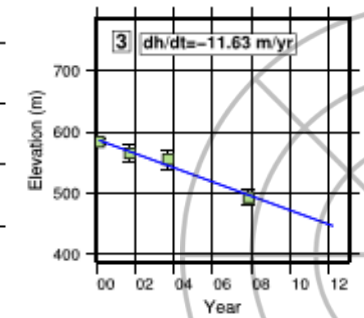
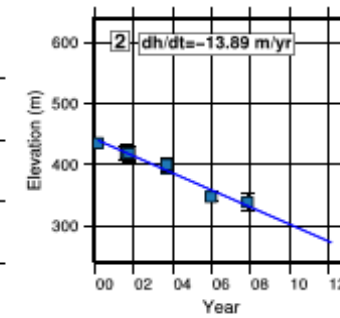
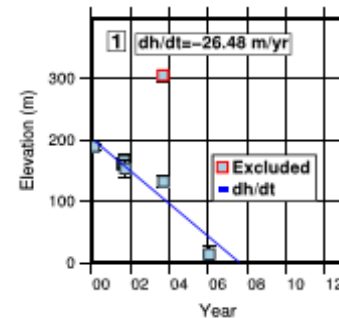
A. K. Melkonian¹, M. J. Willis¹, M. E. Pritchard¹, A. Rivera^{2,3}, F. Bown², and S. A. Bernstein⁴

¹Department of Earth and Atmospheric Sciences, Cornell University, Ithaca, New York, USA

²Centro de Estudios Científicos (CECs), Valdivia, Chile

³Departamento de Geografía, Universidad de Chile, Santiago, Chile

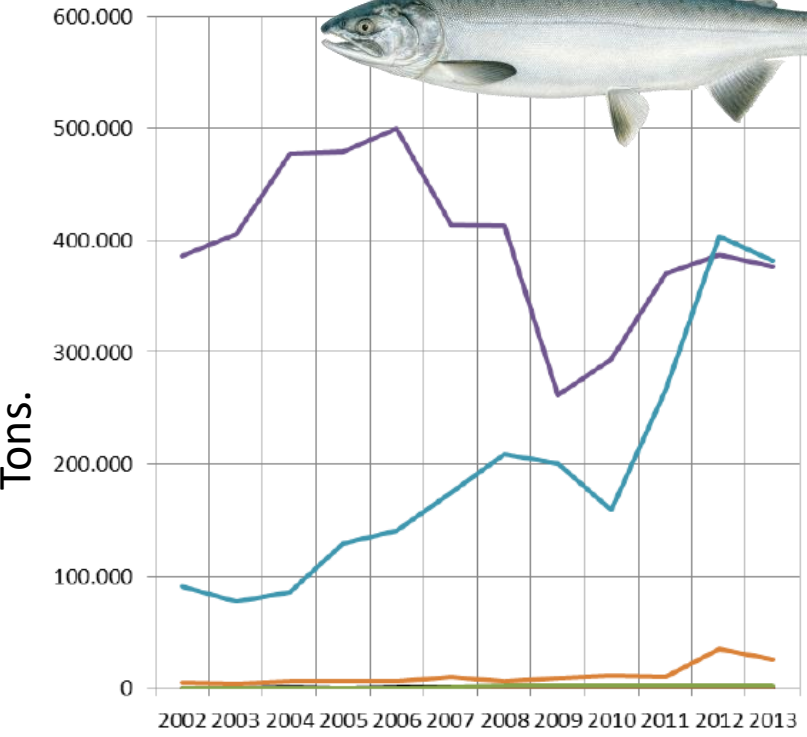
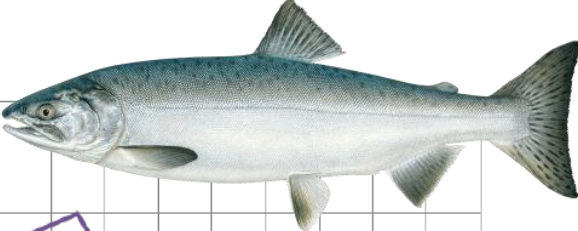
⁴St. Timothy's School, 8400 Greenspring Ave, Stevenson, MD 21153, USA



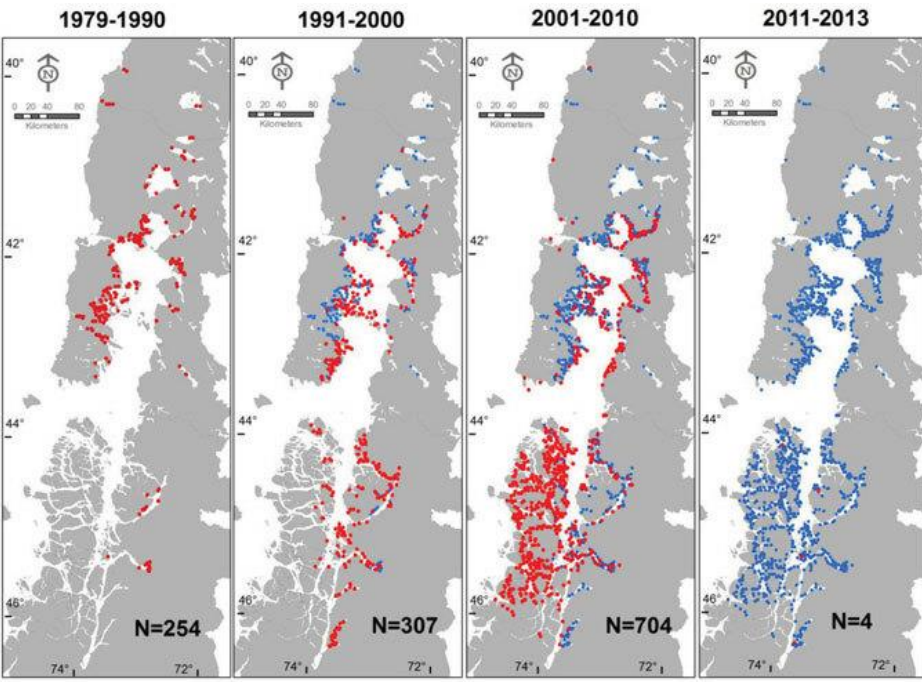


Aquaculture

Migration of the aquaculture industry to the south. 2002-2013.



Salmon farm expansion from north to south



From 1990-2008 there is an annual increase of 20% y^{-1} \$116 (1990) to \$2392 million USD (2008)

2020
 1 Norway 1.280.000 ton. y^{-1}
 2 Chile 840.000 ton. y^{-1}

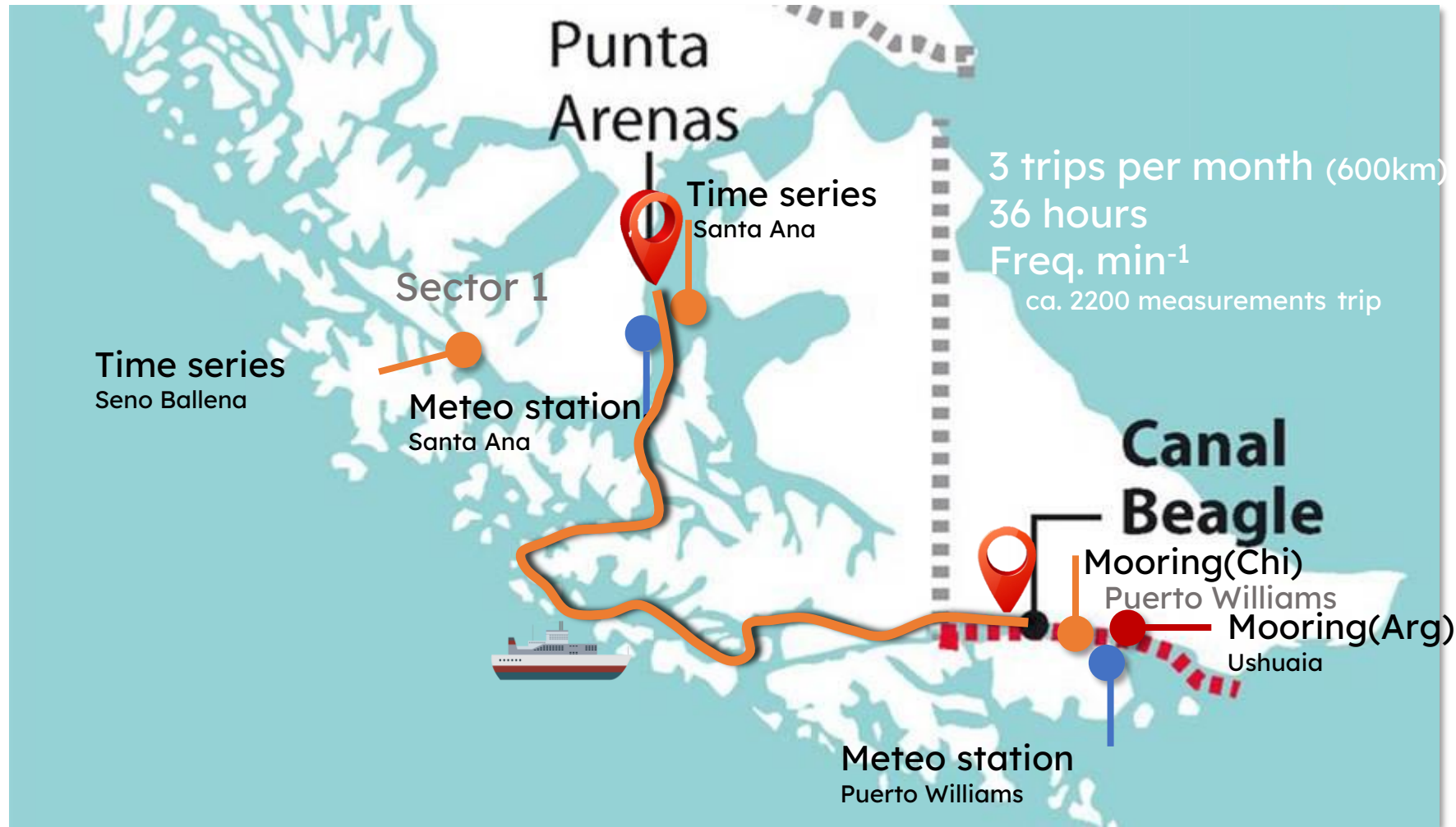
Tecklin (2016) Journal of International Wildlife Law & Policy.



How to tackle the logistics
problem to cover such a vast
area.

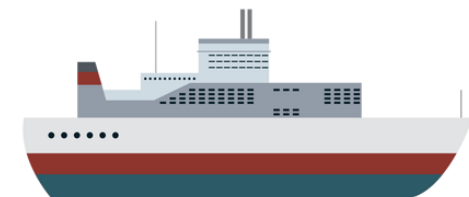
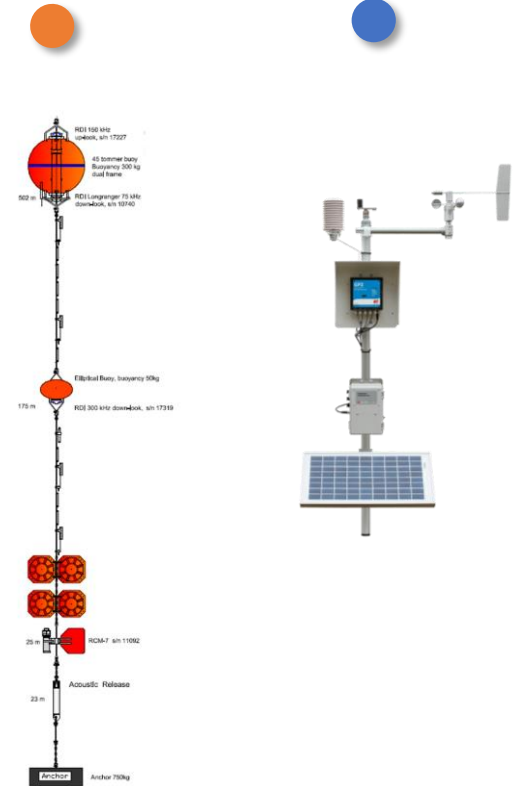
Monitoring platform for Magalanes

FerryBox



Mooring

Meteo station



Yaghan Ferry (Austral Broom)

Sensors



Temperature (SBE 38)

Thermo-salinograph (Seabird SBE45)

Dissolved oxygen (Aanderaa 4835)

pCO₂ (HydroC CO2FT)

pH (SAMI Flow-Thru, AFT-pH)

Chlorophyll- α , Turbidity, CDOM (Wetlabs Triplet)

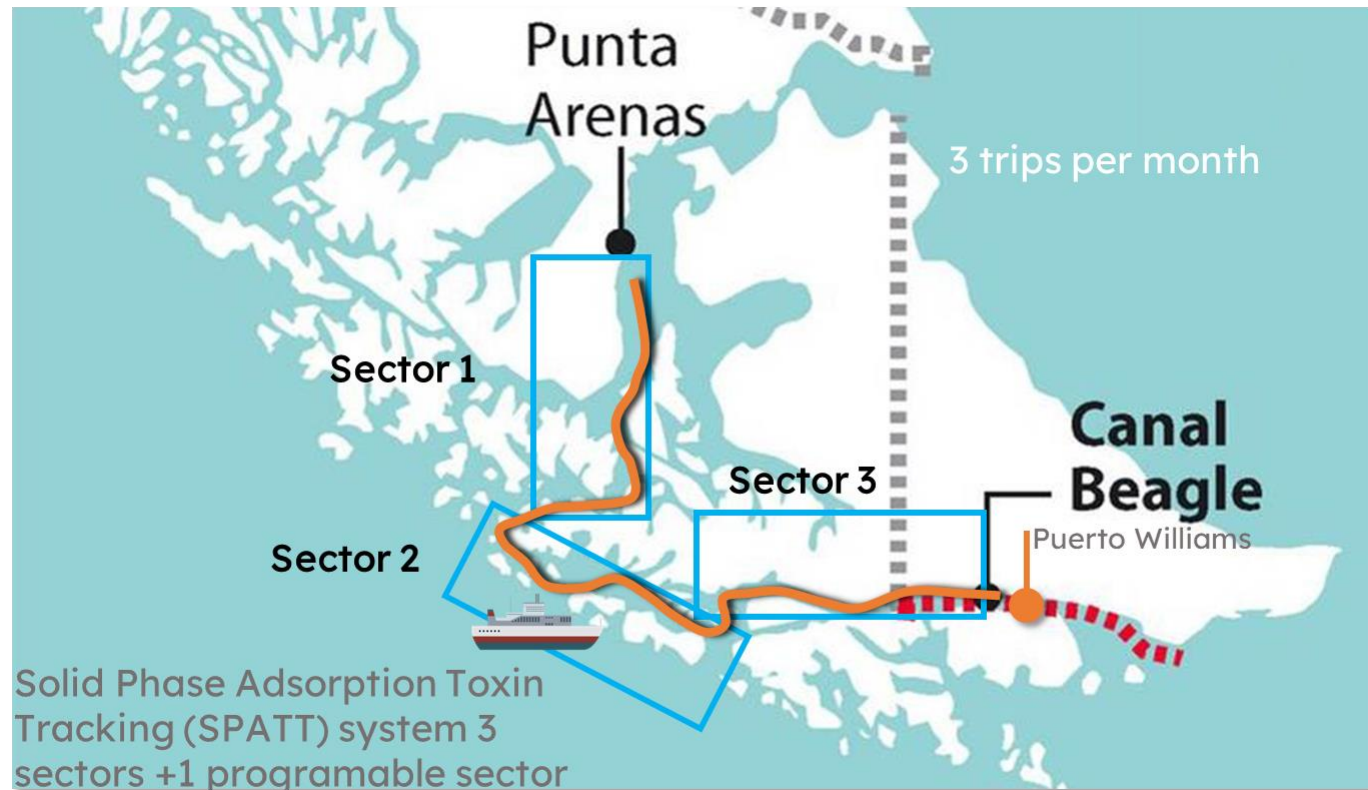
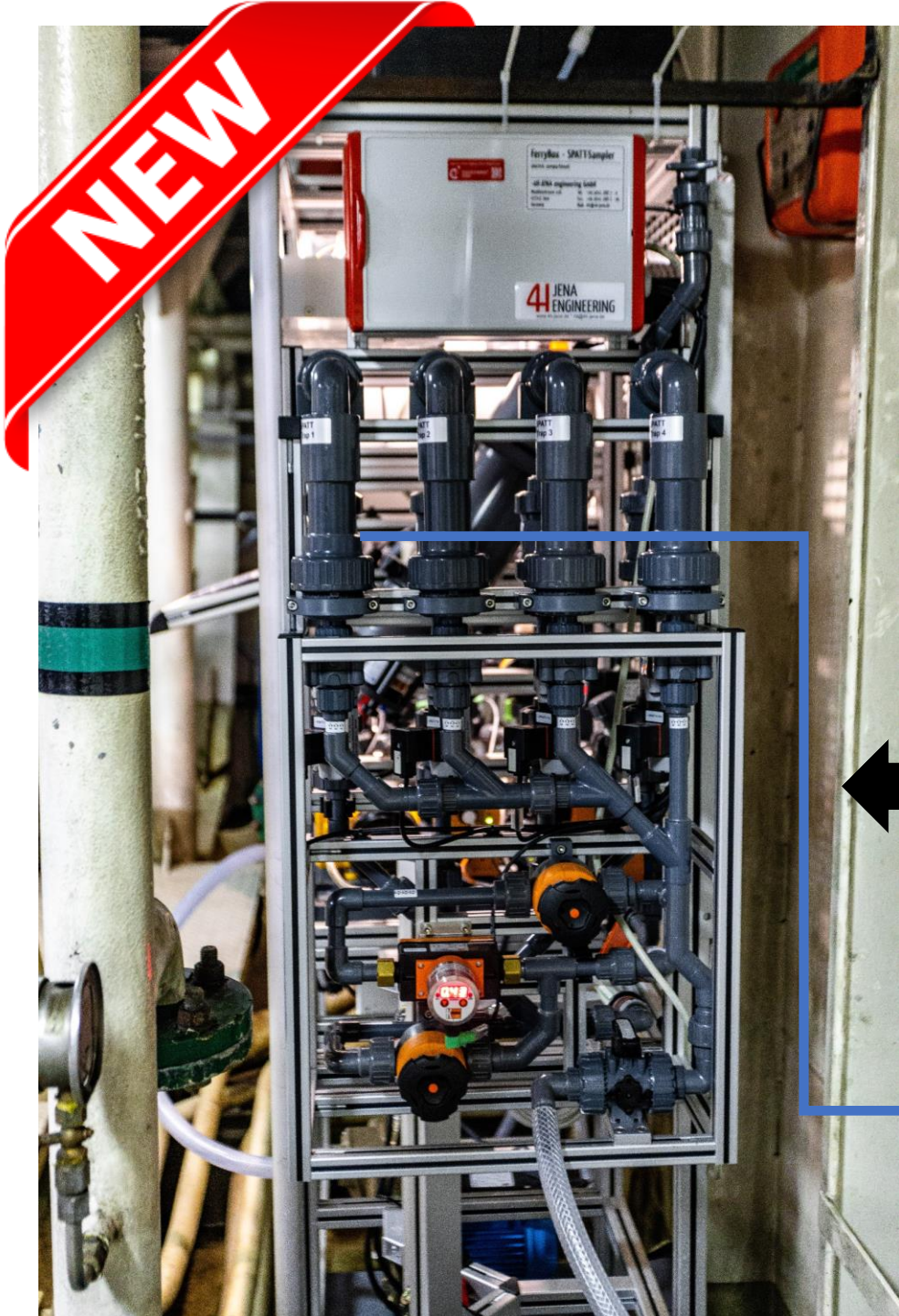
Nitrate analyzer (SUNA V2)

Crude Oil (Turner Trios-Cyclops)

Water sampler (MaxxSampler TP5, 24x700ml)

Plug and Play for Imaging FlowCytobot

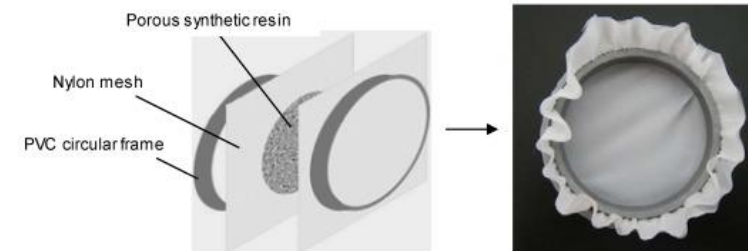
(Gutiérrez UdeC)



Automatic Solid Phase Adsorption Toxin Tracking (SPATT) sampling system. For Lipophilic Toxins and Domoic acid.



4 cartridges filled with synthetic resin for passive adsorption of biotoxins





Radiometers on the bridge

Institute for Chemistry and Biology of the Marine
Environment, Oldenburg University



Toxin analysis

- HABs toxin analysis by Dr. Bernd Krock of Biosciences | Ecological Chemistry laboratory, Alfred Wegener Institut.

Time series of HAB toxin 3 -4 trips per month (along 600 km), 3 to 4 sections.



Bio-optics

- Bio-optical properties of sea surface and solar incident light.



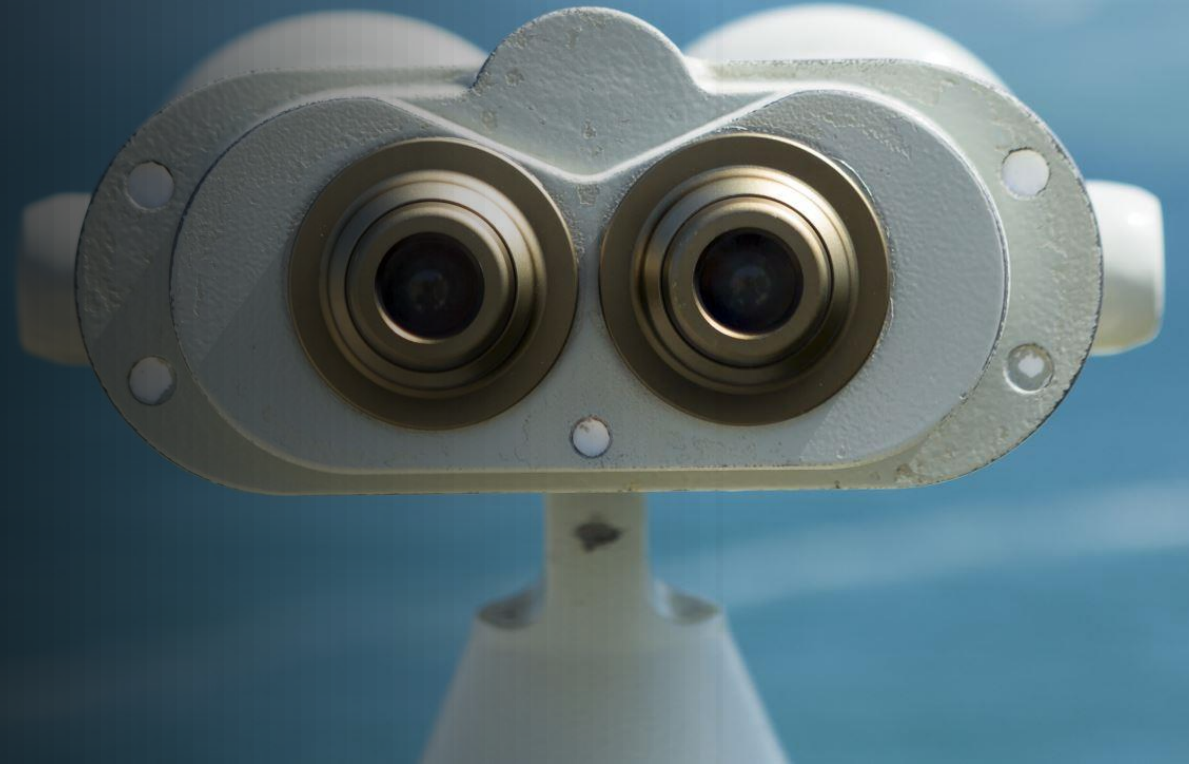
Dr. Jochen Wollschlaeger
ICBM, University of
Oldenburg

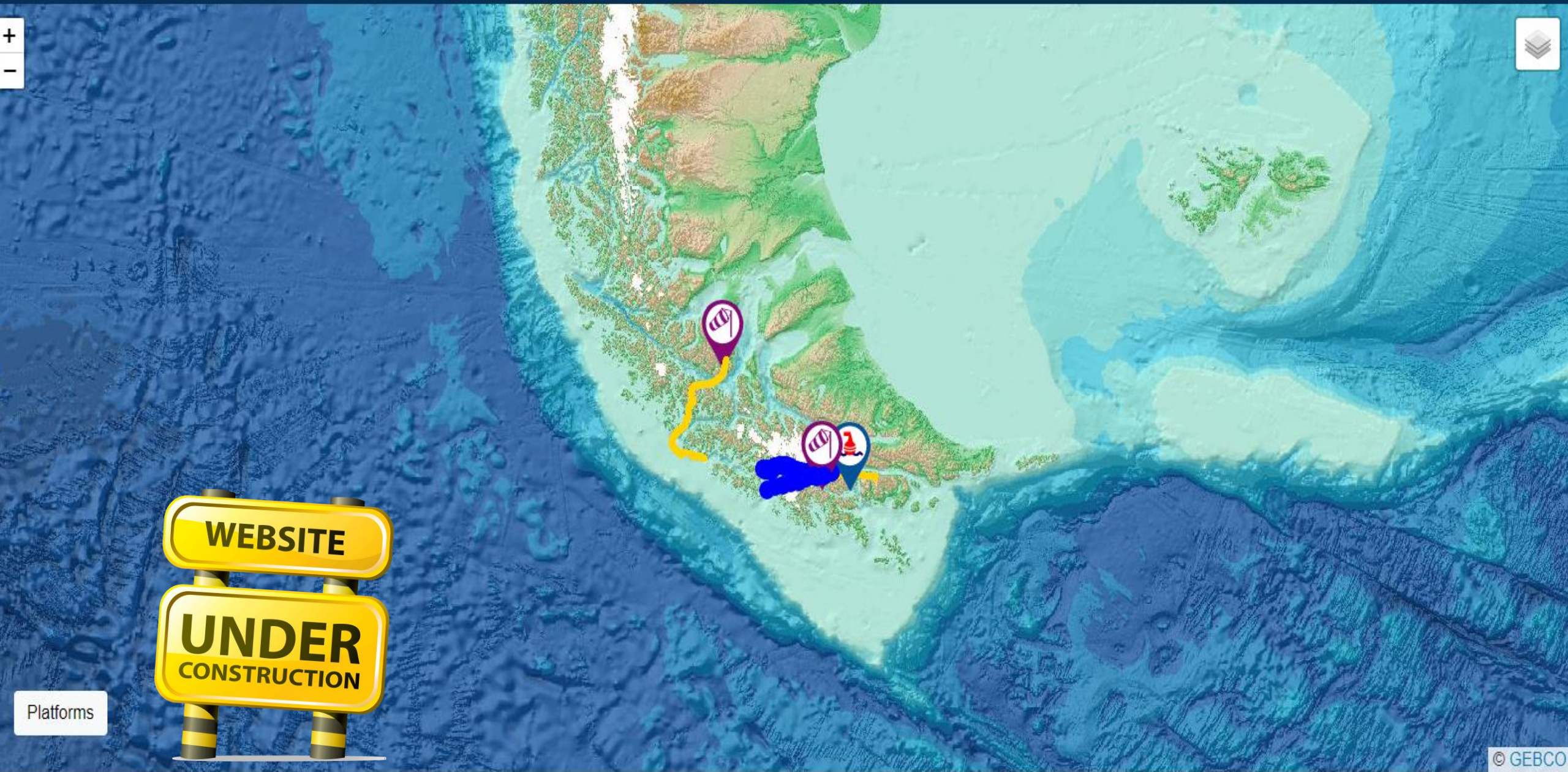


Prof. Dr. Oliver Zielinski,
ICBM, University of
Oldenburg

—

Data integration of
different platforms.
Magellan region
coastal observing
system





WEBSITE
UNDER CONSTRUCTION

Platforms

Feature

Crude oil

By:

Datetime

Filters

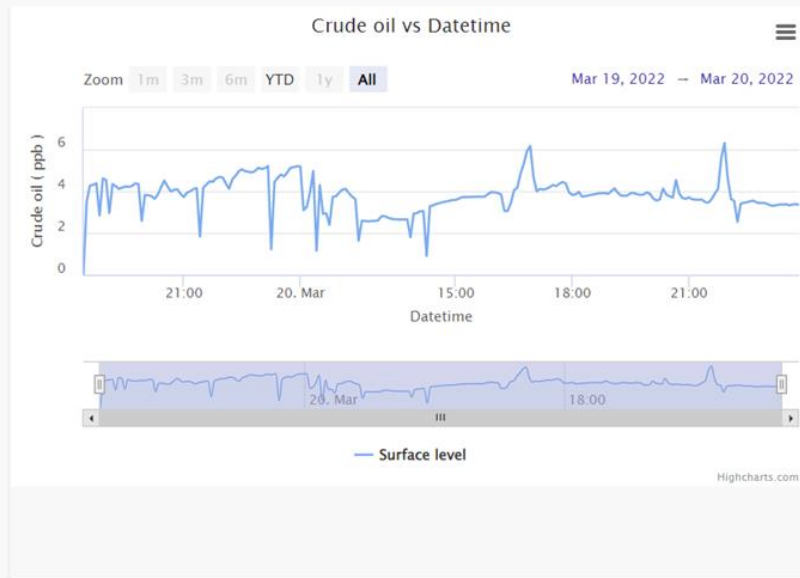
Depth Range

Surface level

Date Range

2022-03-19 2022-03-20

Render



Download

Sign In Create Account

Email

Password

Confirm Password

Entity

Entity

Create Account



Series de Tiempo de datos Ambientales de la Región de Magallanes y la Antártica Chilena <https://www.starm.cl/>

www.starm.cl

- Open access
- *Quasi* real time data (FerryBox)
- Visualization and data selection.
- Visualization using several map layers.

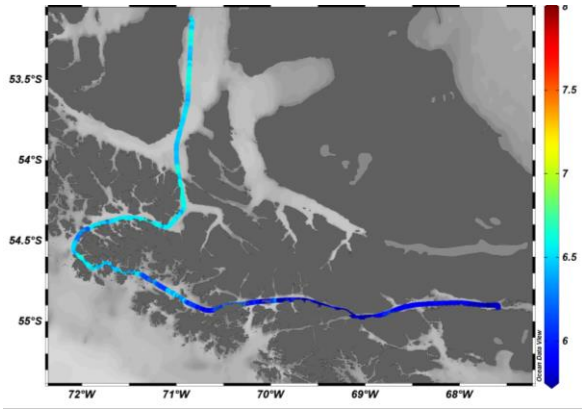
Web page and data management by



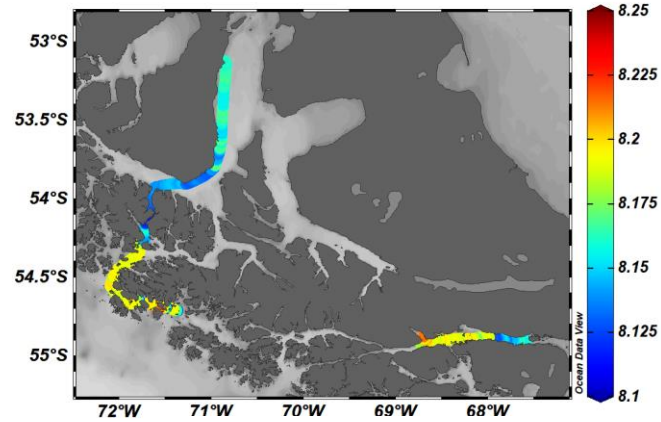
Supported by



Temperature (°C)



pH

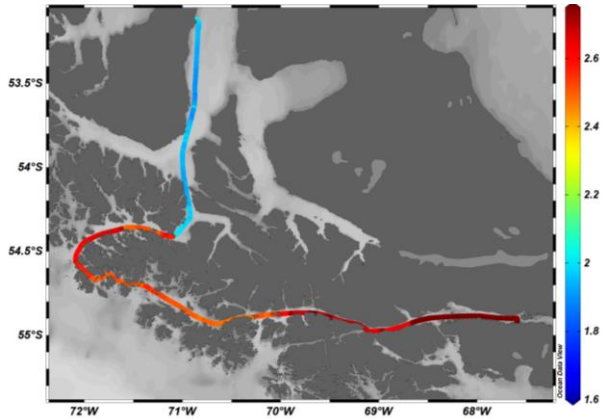


First track from Punta Arenas to Puerto Williams
19 sept 2022

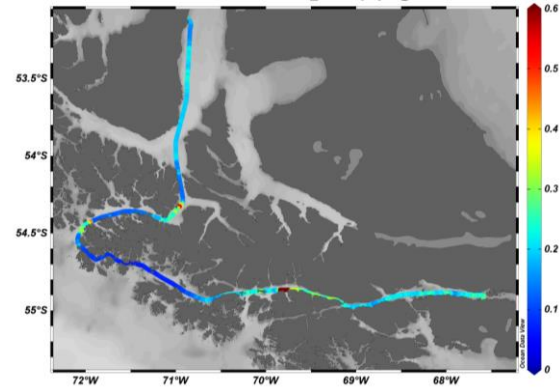


www.starm.cl

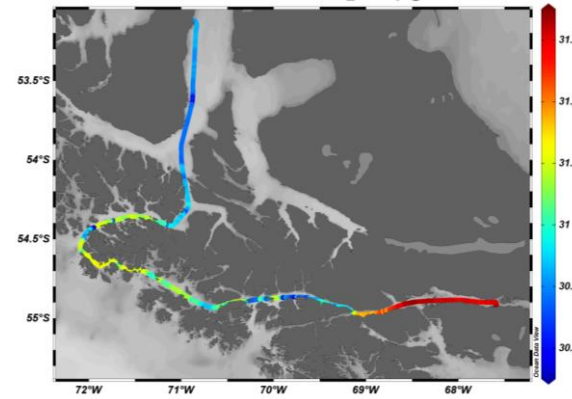
Turbidity (NTU)



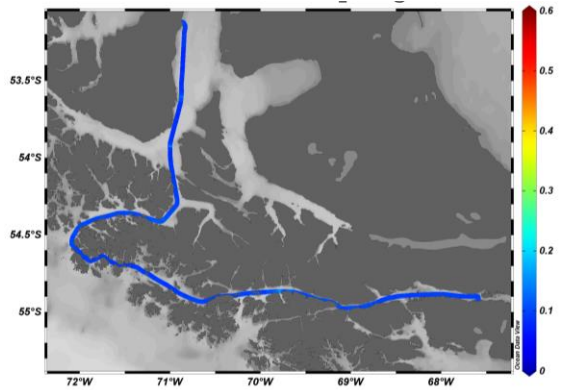
Chlorophyll-a (ug L⁻¹)



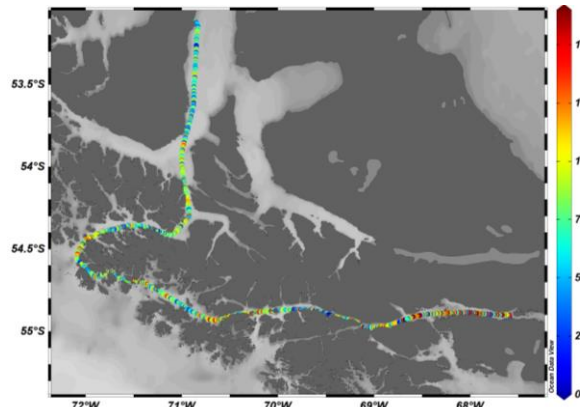
Salinity (PSU)



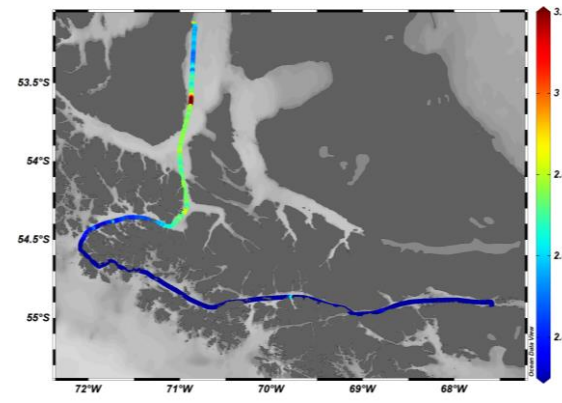
C-DOM



Nitrate (uM)



Crude Oil (ppb)



Next steps

- Launch the new website
- Apply quality control to the data generated by the FerryBox
- Expand for collaboration with national and international partners.

Thank you
any questions?



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TRANSBORDADORA
AUSTRAL BROOM



DO DATA OBSERVATORY



ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG



**Helmholtz-Zentrum
Geesthacht**
Centre for Materials and Coastal Research



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Centro de Investigación
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