

# A brief introduction to Global Fishing Watch

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# Global Fishing Watch

## Our Mission

Advance ocean  
governance  
through increased  
transparency of  
human activity at  
sea

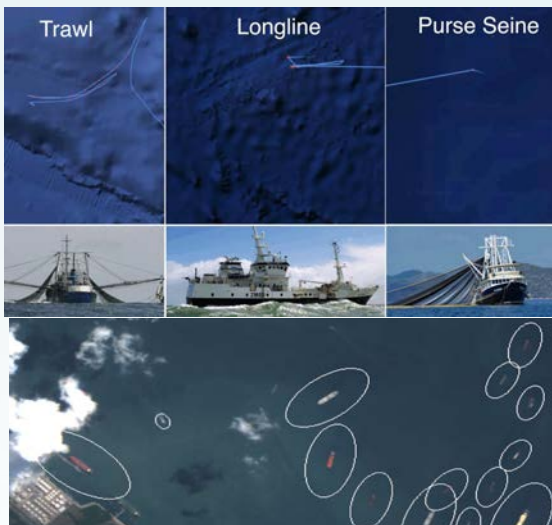
Use cutting-edge technology to turn  
big data about human activity at sea  
into actionable information

Create and publicly share model  
outputs, map visualizations, data  
and analysis tools

Accelerate science and drive fairer,  
smarter policies and practices that  
reward good behavior and protect  
biodiversity, fisheries and livelihoods



## Data, science, tools, technology



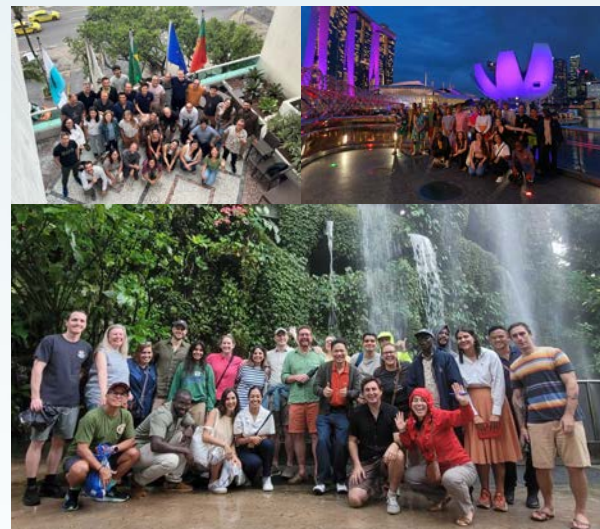
### Petabytes of data processed

Machine learning pipelines

Digital online tooling and maps

Data accessible via direct download, APIs, R  
and Python packages

## A global team of experts



International Policy officers, Biodiversity  
and IUU initiatives, in-country engagement  
and capacity development

**110+ GFW Staff in 30+ Countries**

# Global Fishing Watch Products - Platform



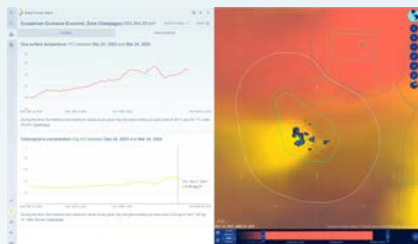
## Global Fishing Watch Map

Open-access online tool for visualization and analysis of vessel-based human activity at sea.

Direct download of dynamic data for pre-loaded or user-defined regions

Pre and post intervention activities

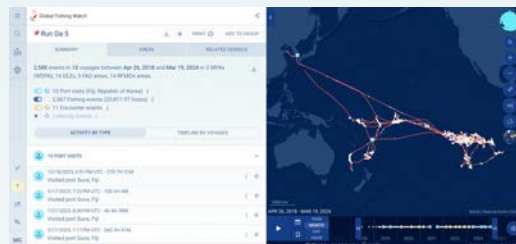
Shared individual workspaces



## Vessel viewer and Marine Manager

Vessel identity and history profiles, in collaboration with TMT.

Dynamic, and interactive data on ocean conditions, biology, and human-use activity to support MPA management.



## Data download portal

Direct dataset download from our publications and consolidated (static) datasets

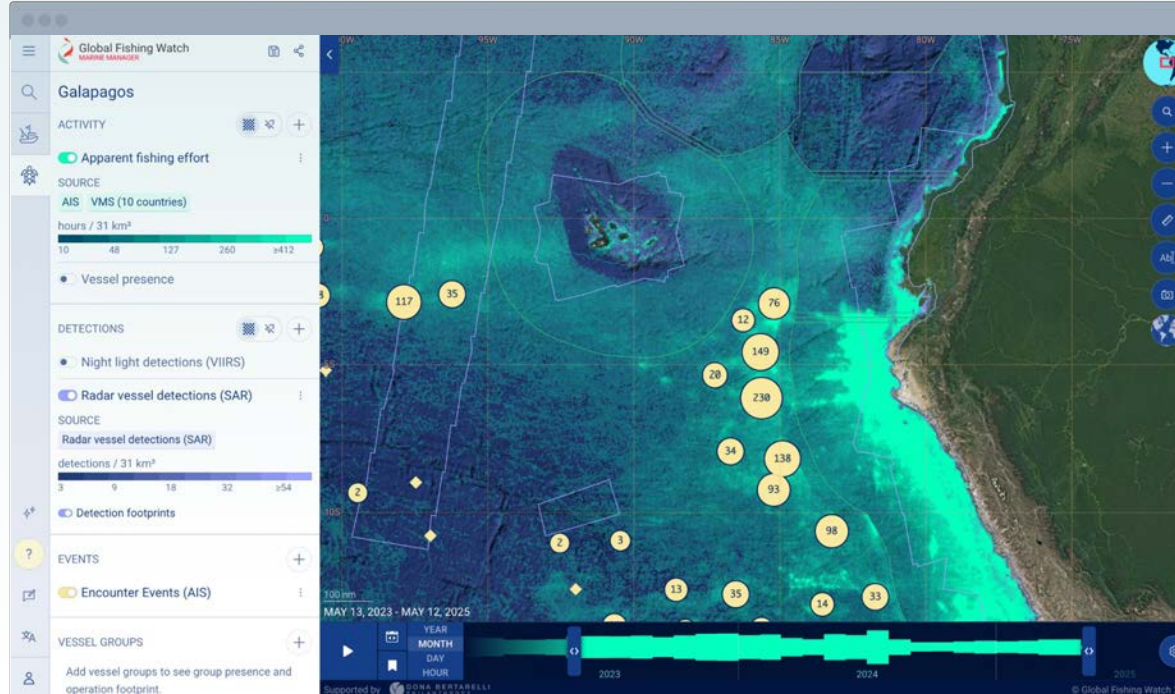


## APIs and R and Python packages

Provide a programmatic access to data in the platforms via command line

# GFW data is used globally for MCS, policy, and research

## Open data and tooling



53K data and platform users from 200+ Countries & Territories

## Publications and research partnerships



73+ publications and 6,500+ citations

# GFW transparency tools: map, reports, and vessel information

Custom regions  
& time periods

Trends over  
time

Summary of  
fishing effort by  
flag state

Top Vessels  
Active

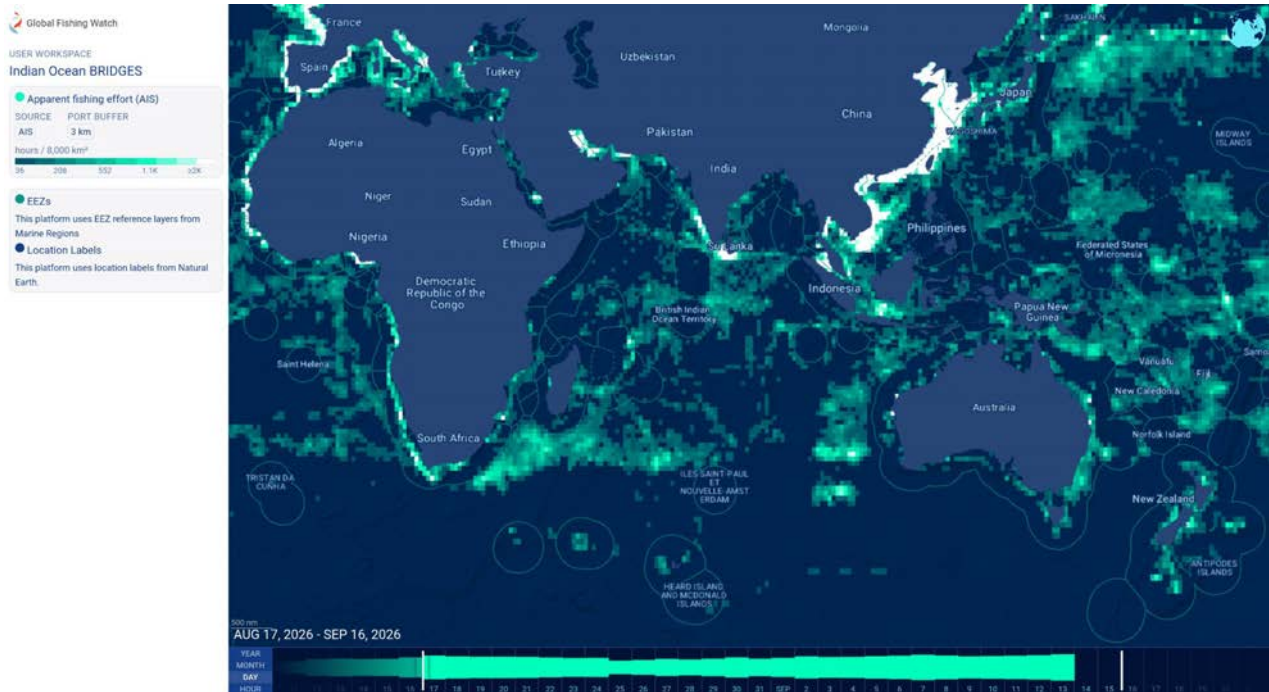
Compare across data  
sources

Click a vessel to see  
tracks and vessel  
insights



# Global Fishing Watch fishing activities in the Indian Ocean

## Workspace



Download



Visualization



Customization



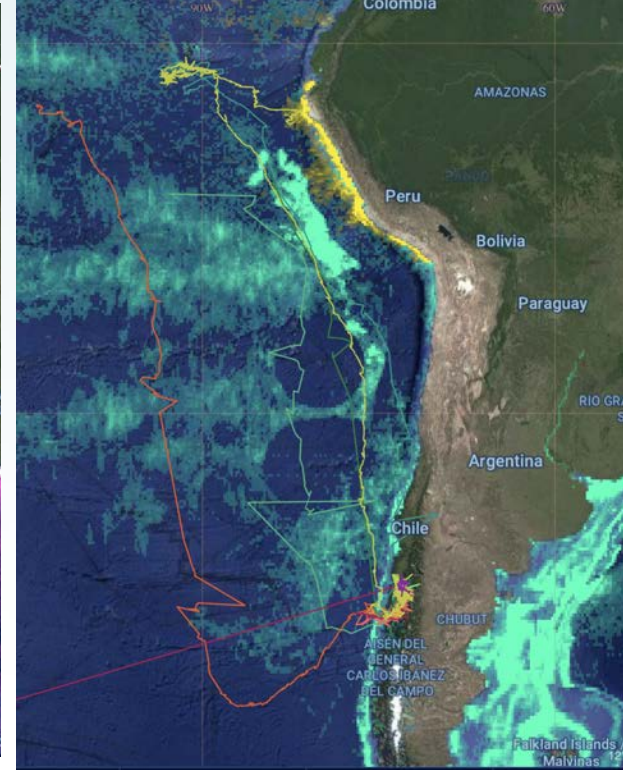
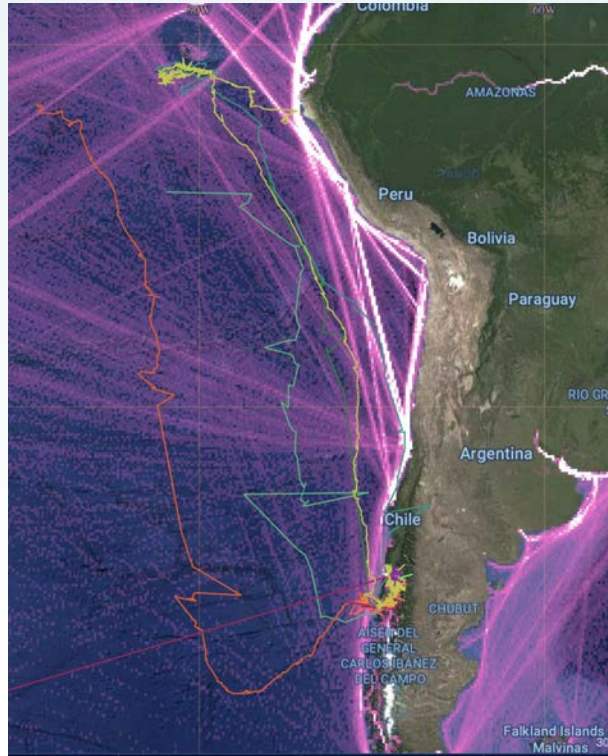
Analysis

# Workspaces: Researchers can load data into the GFW platform to quickly visualize overlaps, and save/share workspaces

Tracks

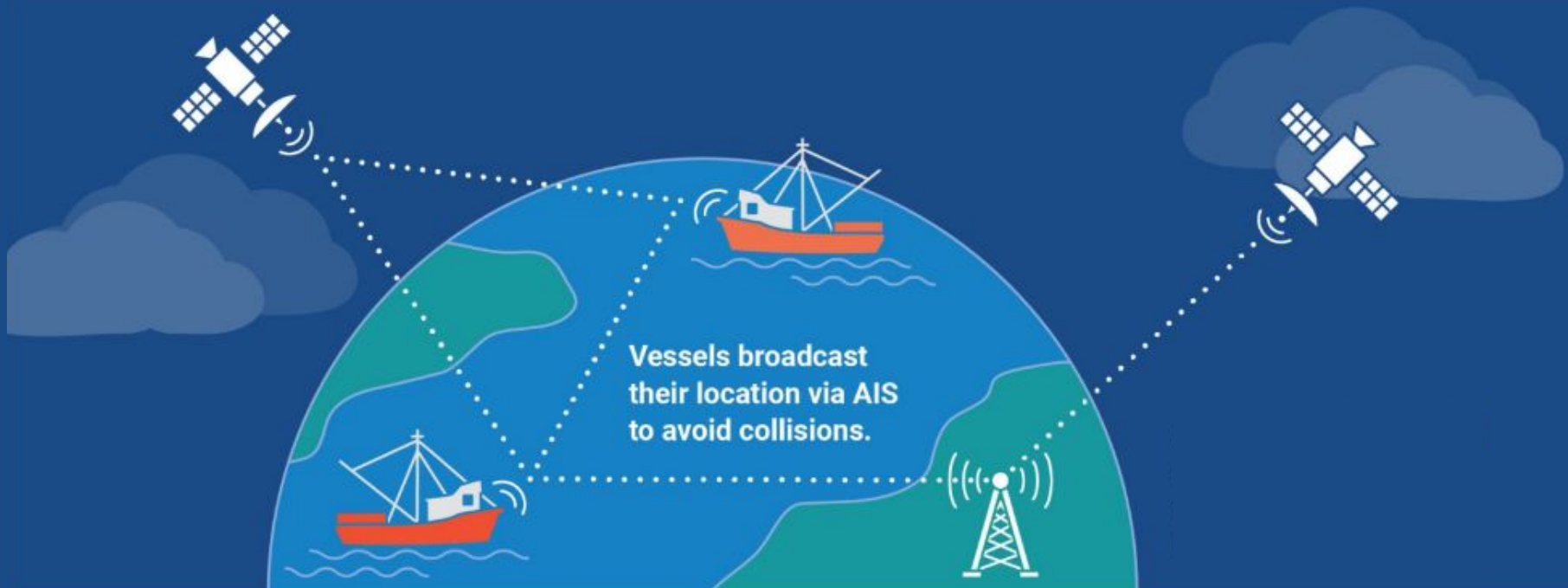
Cargo vessels >15 kn

Apparent fishing  
AIS and VMS

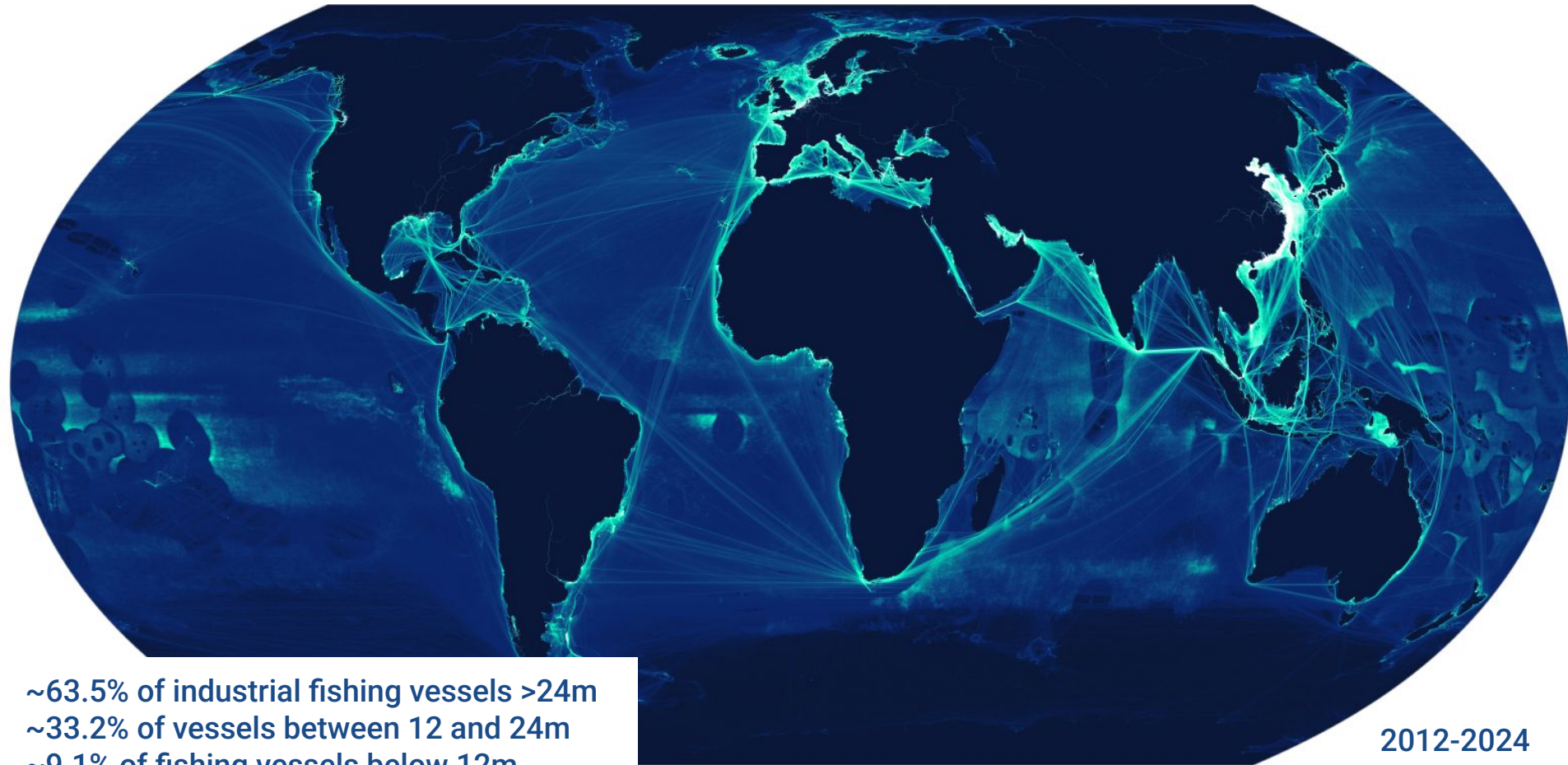


# AIS: Our main source of data

A collision avoidance system that allows understanding the movement of vessels



Vessel tracking data allows to map vessel activity for ~100k vessels of all classes



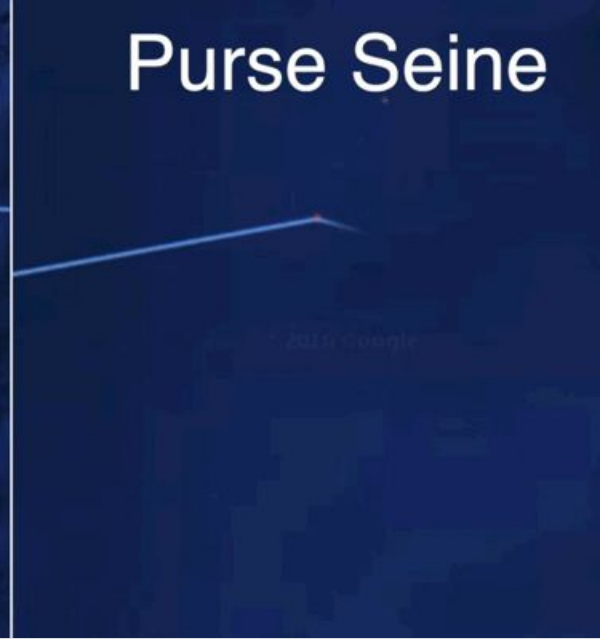
Trawl



Longline



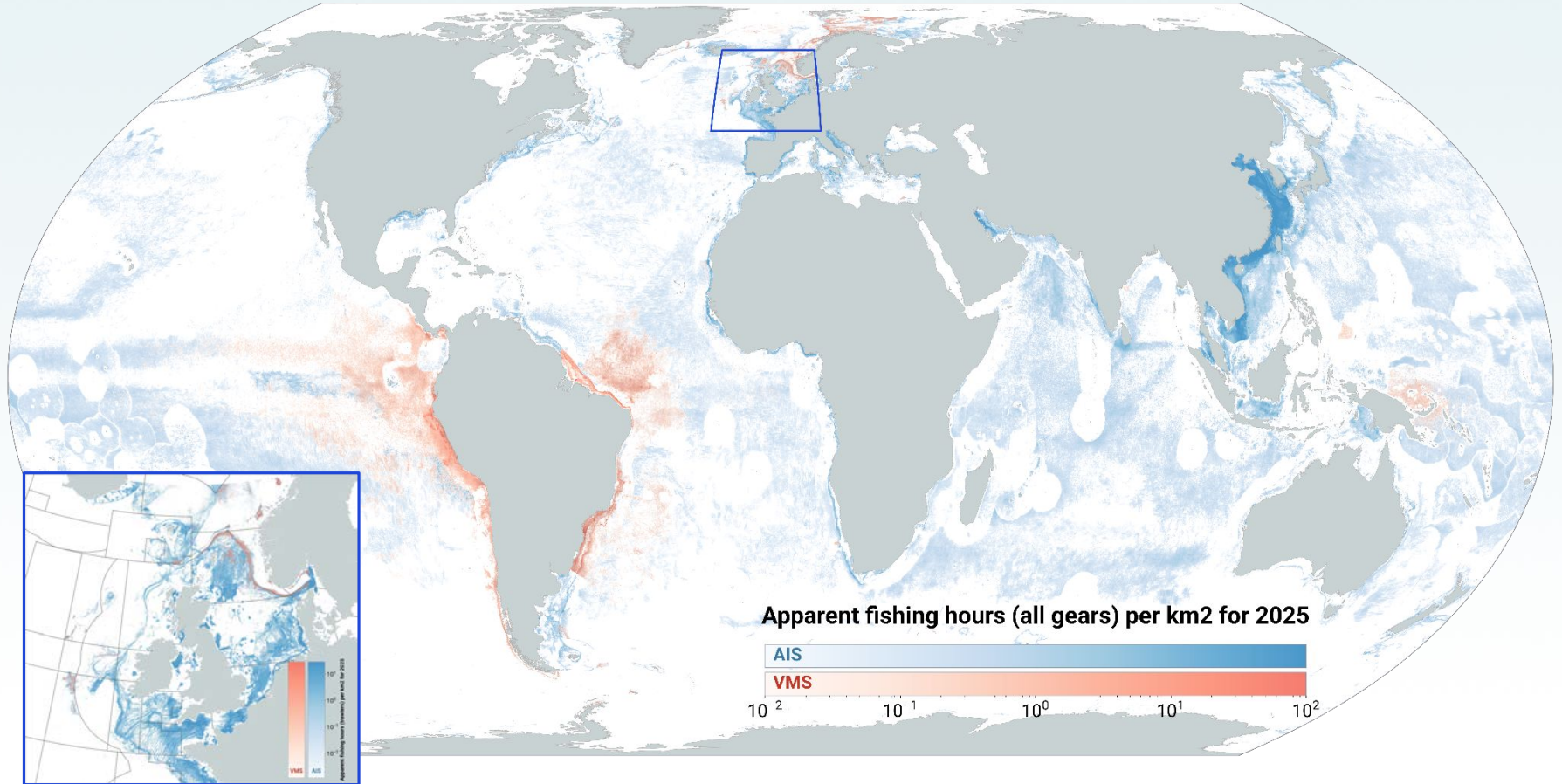
Purse Seine



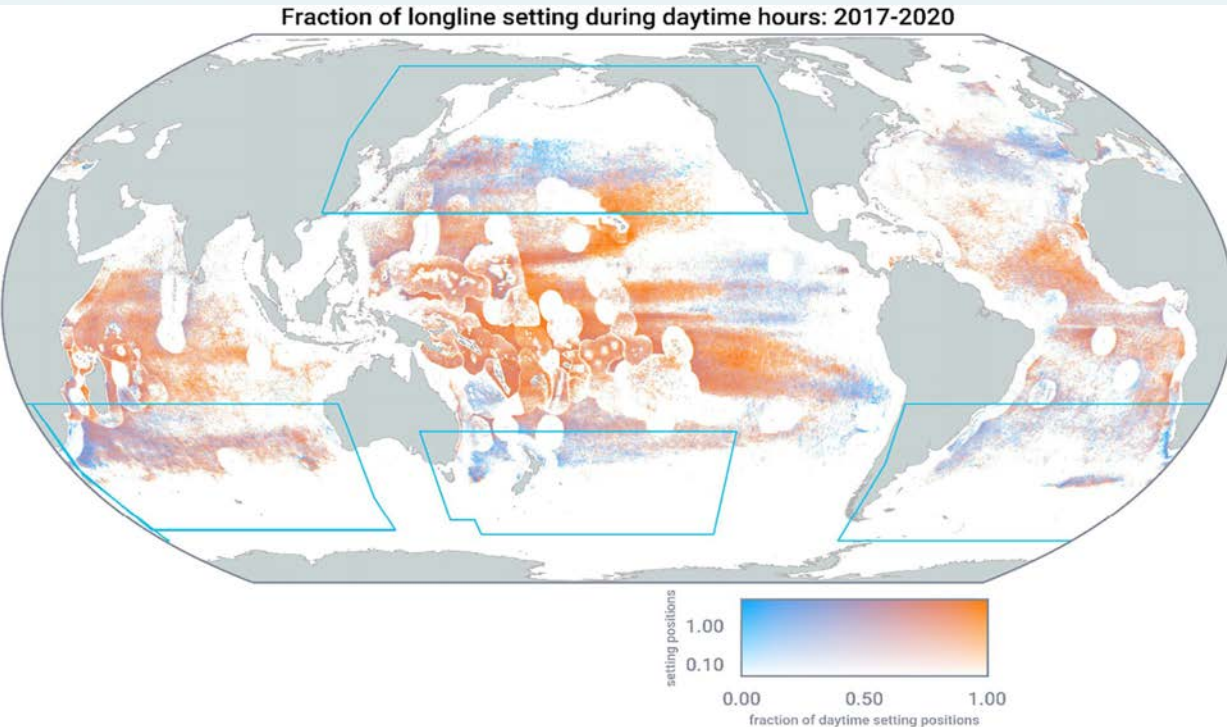
Apparent fishing effort and vessel classification models (AIS/VMS)



## A year of apparent fishing activity



## A longline model to monitor bycatch mitigation measures



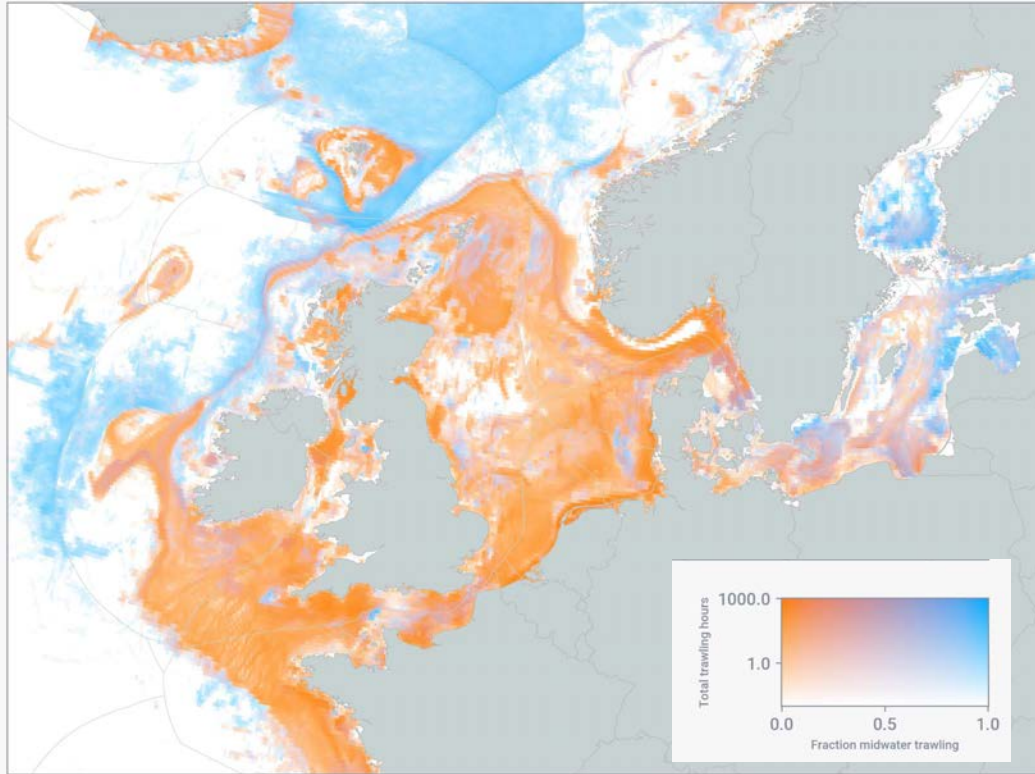
Longline fishing has high levels of seabird bycatch

Three mitigation measures: weighted lines, bird-scaring devices and nightsetting

Our longline model allows to monitor if the setting happens at night ✓ or during the day ✕

## A trawling model to understand the impact on the sea bottom

Bottom and pelagic trawling, 2017-2023



Trawling model is one of the most important fisheries in the planet

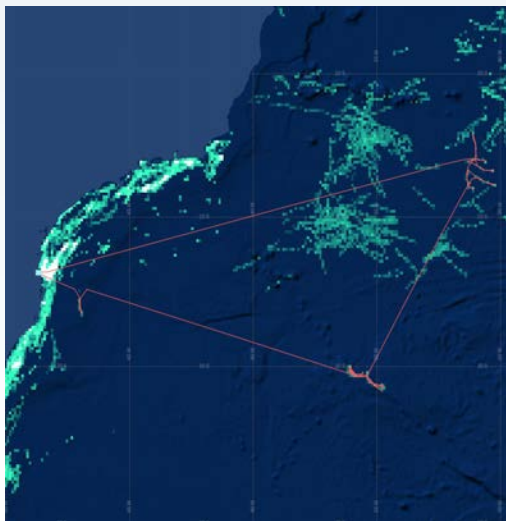
Distinguishing between midwater and bottom trawling is essential to understand its impacts

The response variable is not fishing-not fishing, but midwater, bottom, and other (not fishing)

BETTER LABELS AROUND THE WORLD ARE NECESSARY

# We derive other insights from AIS data

## AIS disabling ("gaps")



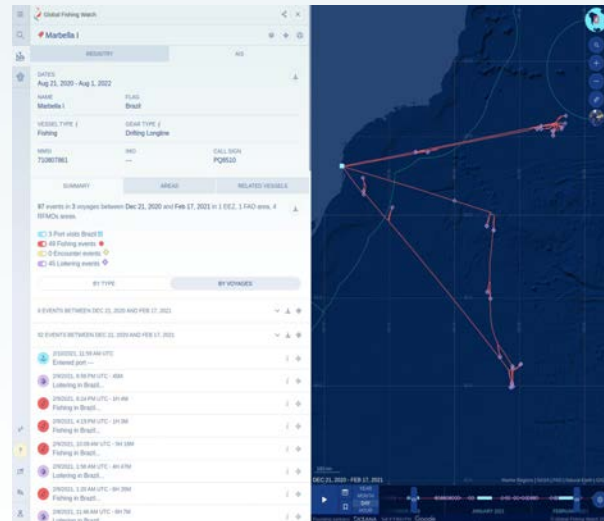
([Kroodsmma et al. 2018](#))

## Vessel encounters and loitering



([Miller et al. 2018](#))

## Port visits

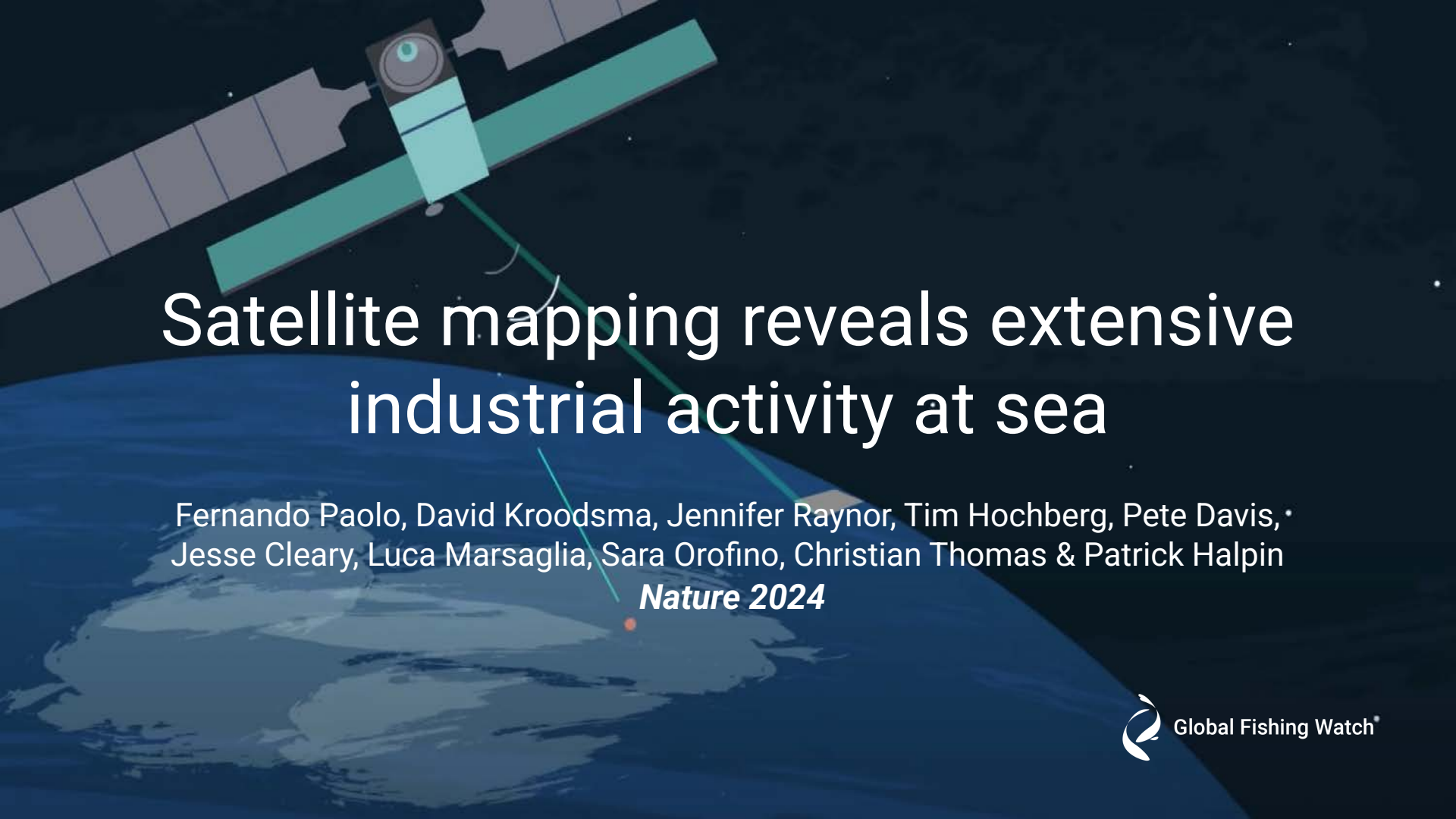


## Vessel tracking systems have limitations

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- Not mandatory
- Not universal
- Can be disabled
- Can be altered ("spoofing")

**To have a proper view of fishing human activity at sea, we need alternative methods**

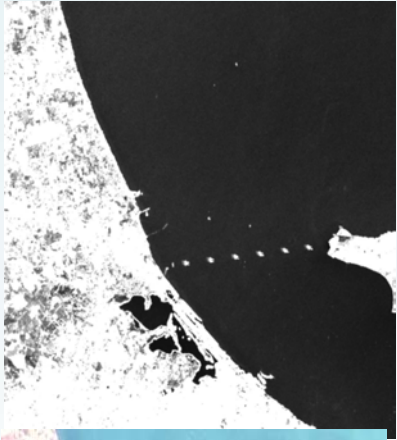


# Satellite mapping reveals extensive industrial activity at sea

Fernando Paolo, David Kroodsma, Jennifer Raynor, Tim Hochberg, Pete Davis, Jesse Cleary, Luca Marsaglia, Sara Orofino, Christian Thomas & Patrick Halpin

***Nature 2024***

## Two types of satellite to detect vessels and infrastructure

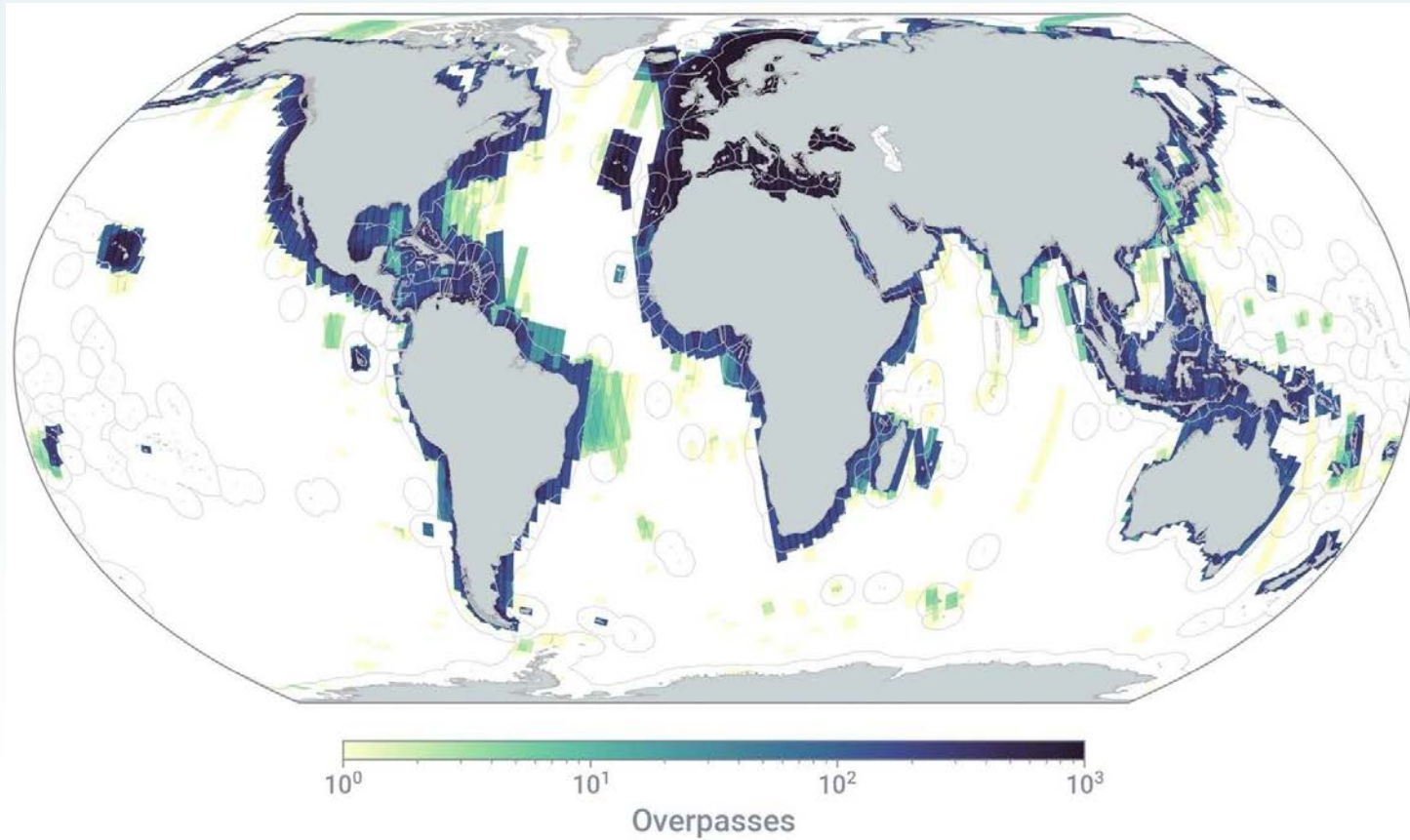


- Sentinel-1 (SAR)
  - Radar imagery, can see through cloud cover
  - 20-m resolution
  - Better for metallic objects

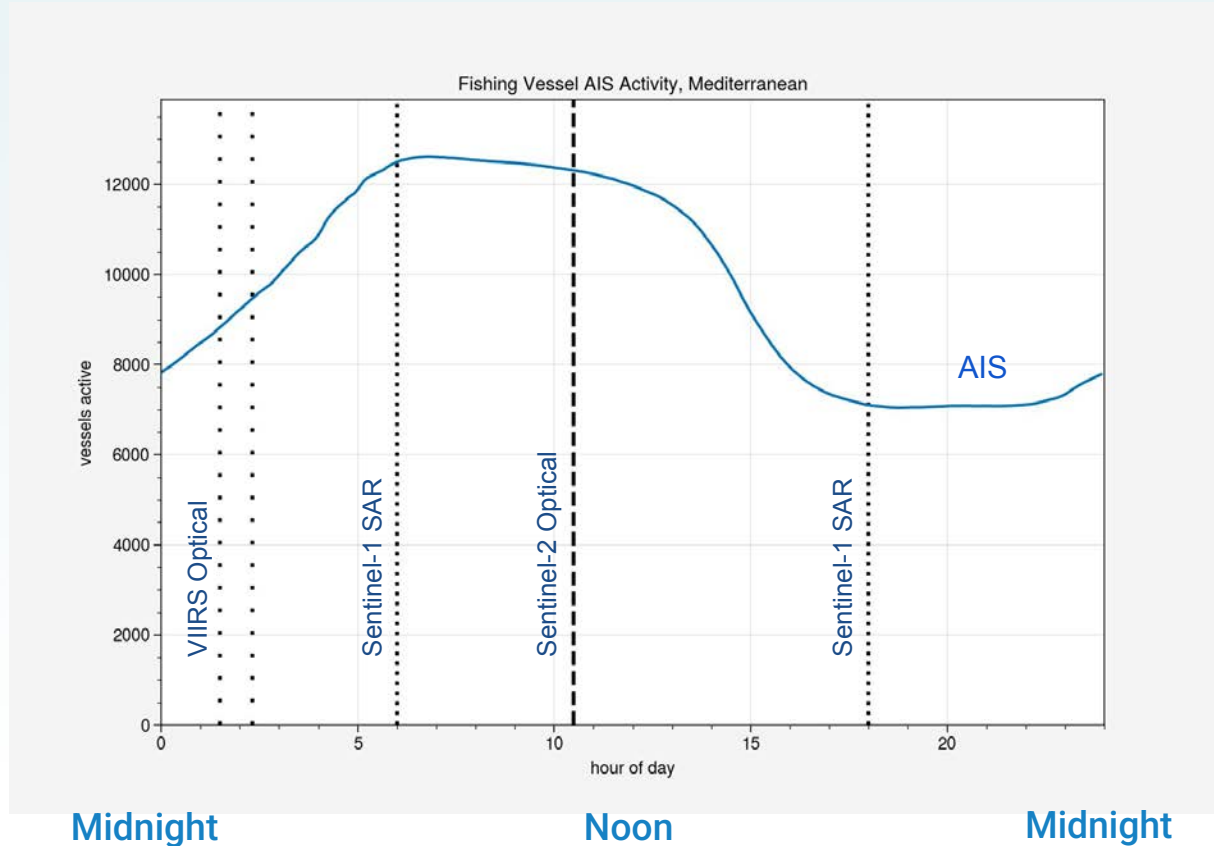


- Sentinel-2 (optical)
  - Optical imagery, depends on low cloud cover
  - 10-m resolution
  - Any material

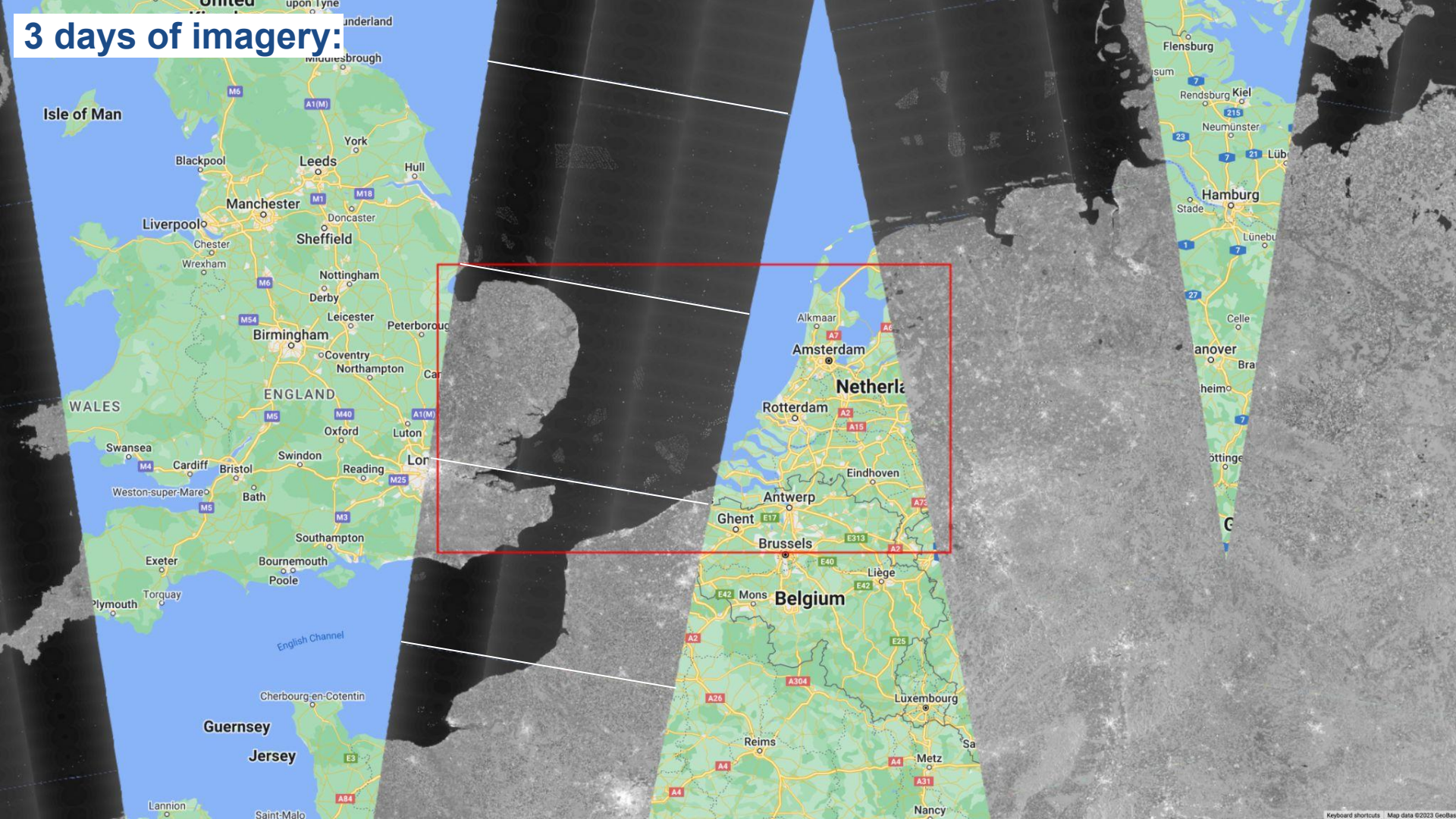
Satellite footprint is mostly coastal



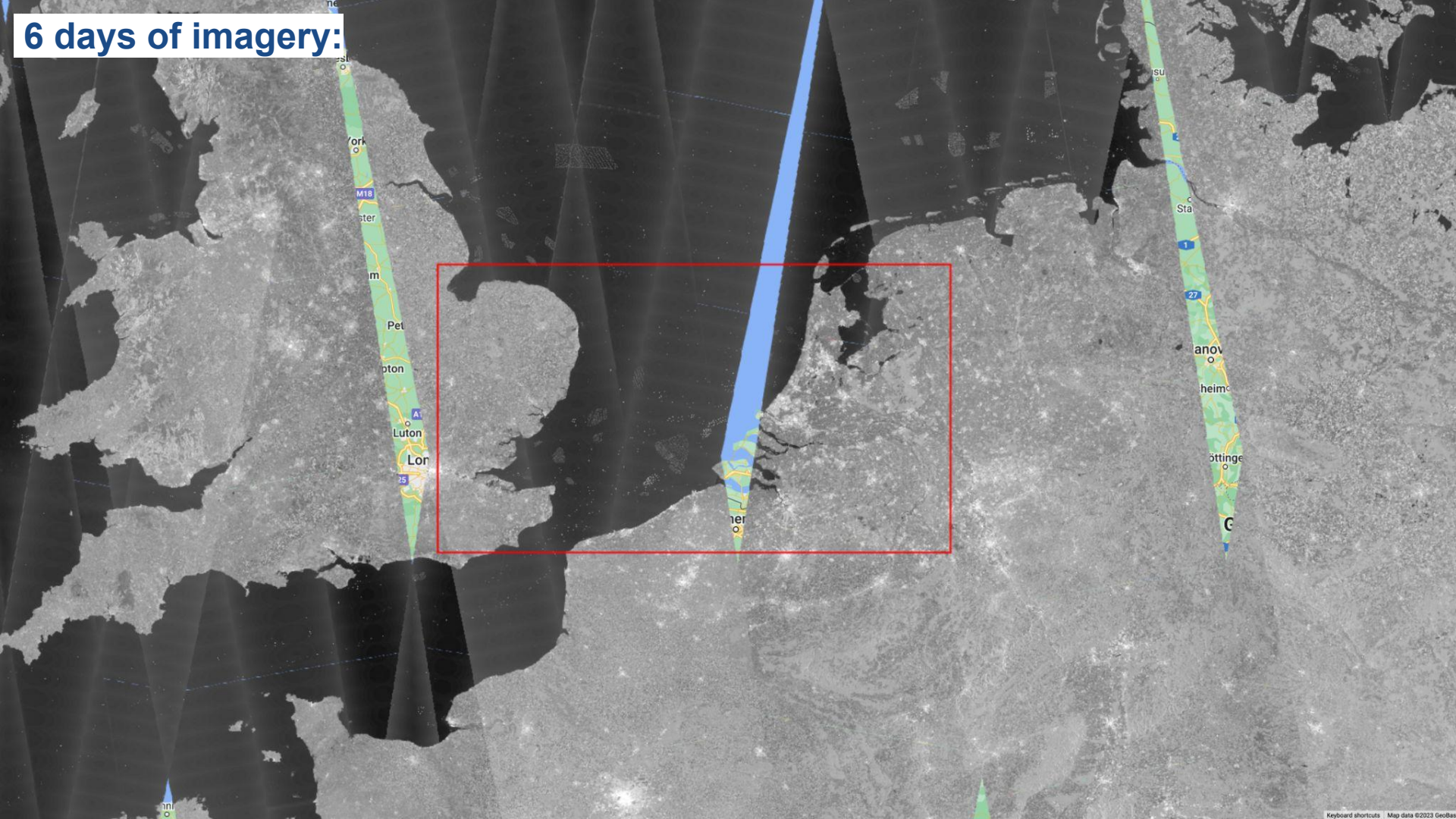
# Satellite provide snapshots of activity at specific times of day



# 3 days of imagery:



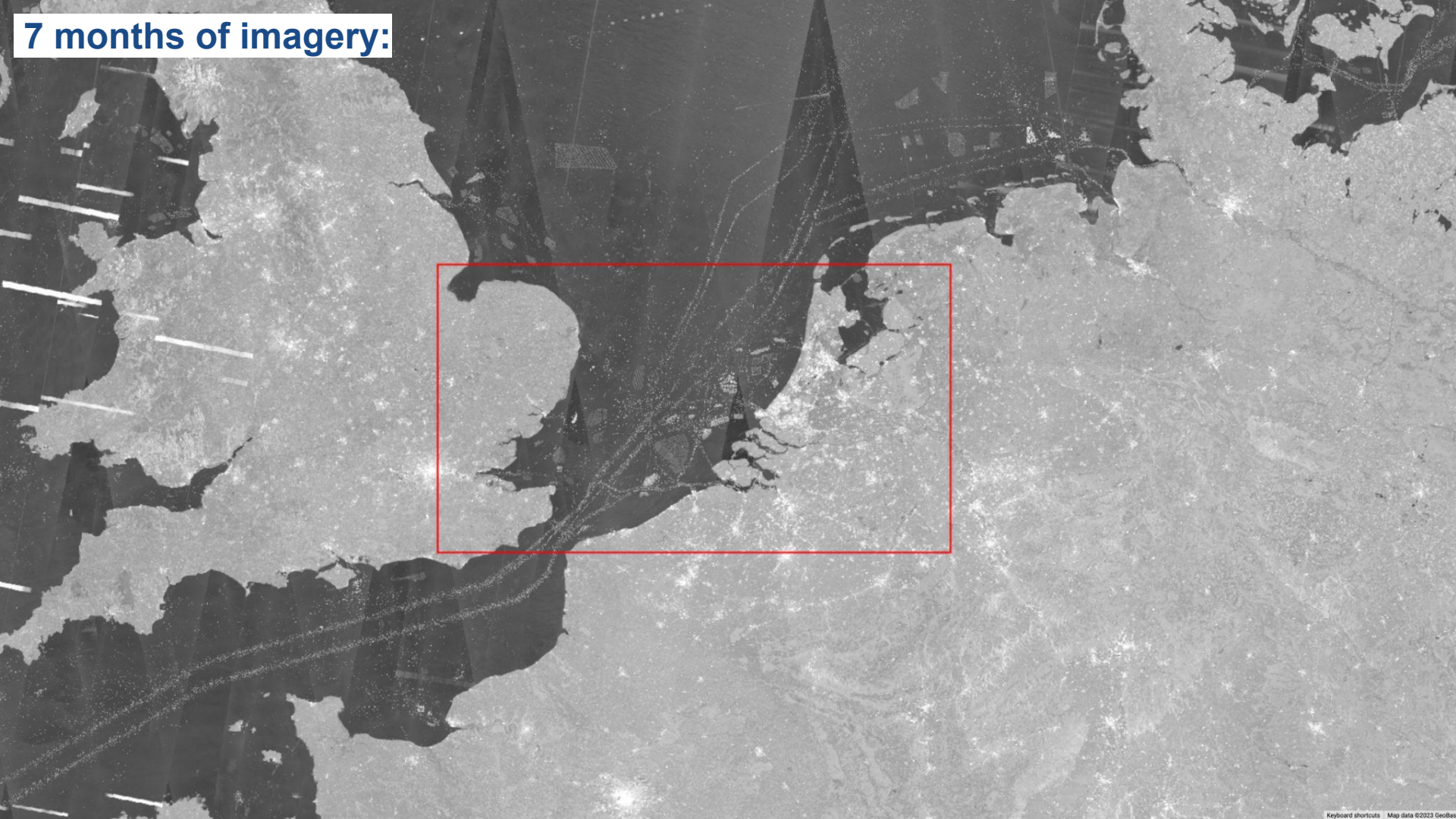
6 days of imagery:



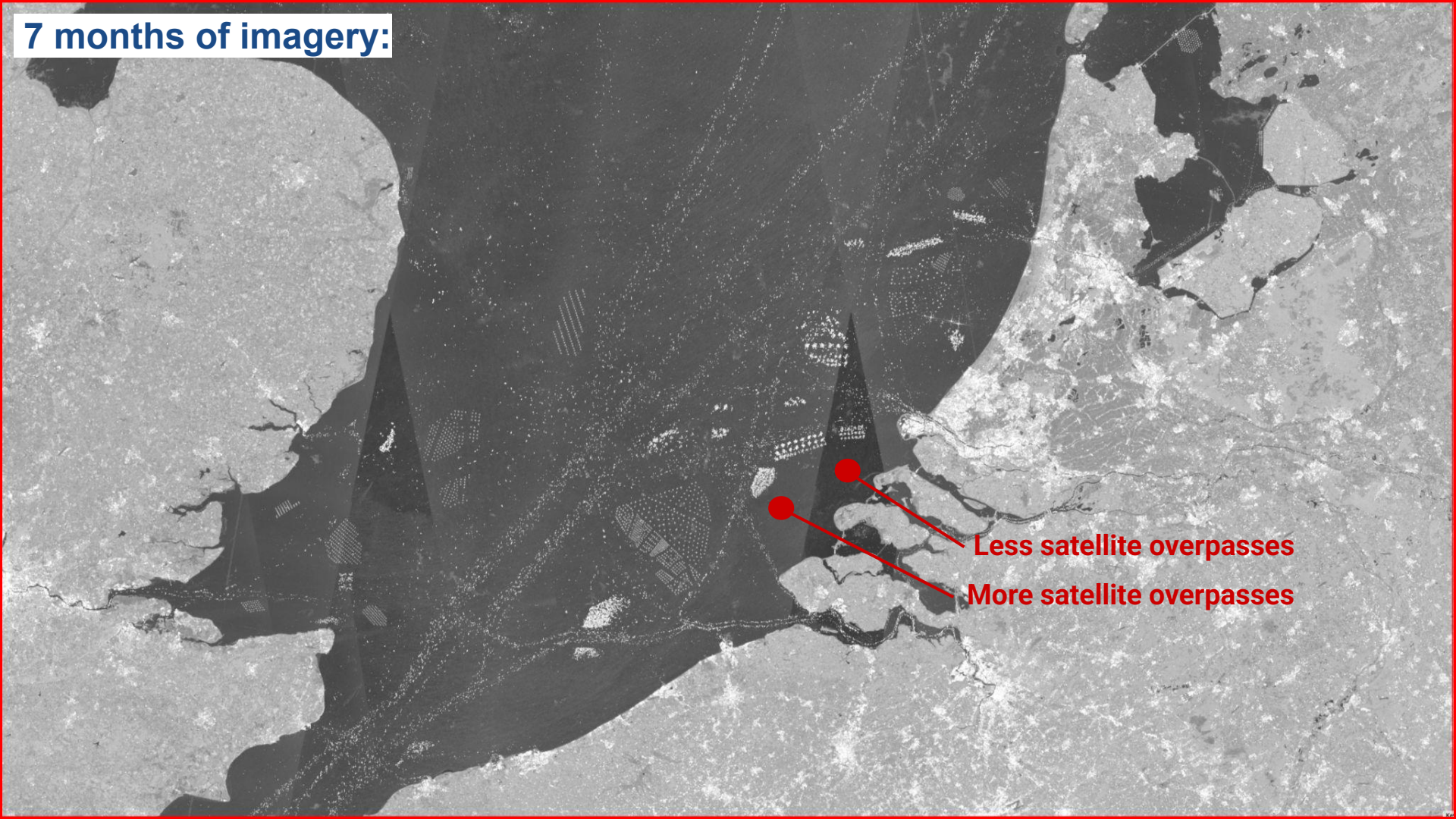
12 days of imagery:



7 months of imagery:



**7 months of imagery:**



**Less satellite overpasses**

**More satellite overpasses**

We match  
detections to  
AIS broadcast



Likely fishing vessels with AIS

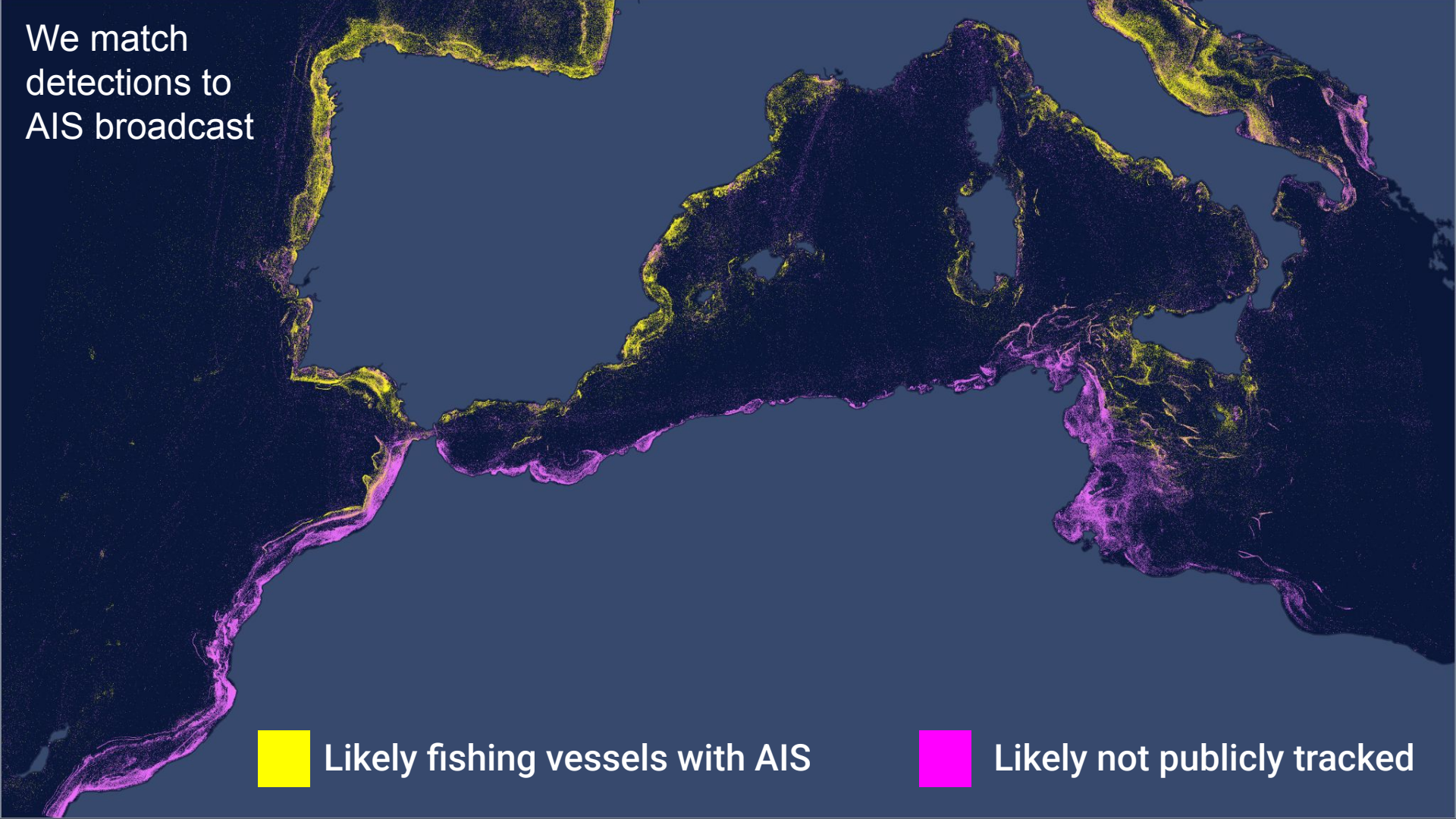
We match  
detections to  
AIS broadcast



Likely fishing vessels with AIS



Likely not publicly tracked



# Global offshore infrastructure



## OFFSHORE INFRASTRUCTURE

- Oil platforms
- Wind turbines

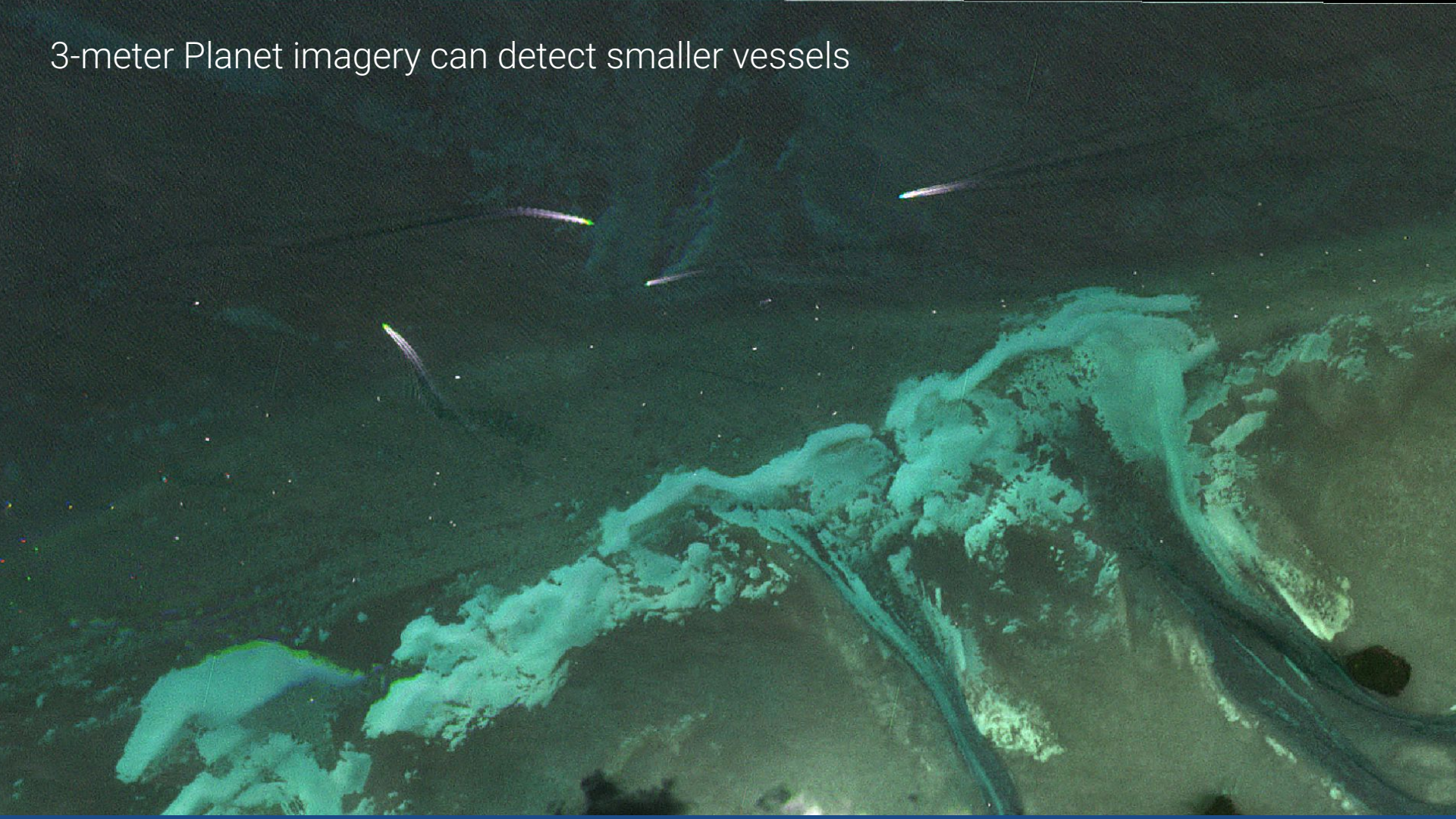
## VESSEL ACTIVITY

- Oil vessels
- Wind vessels
- Fishing vessels
- Non-fishing vessels

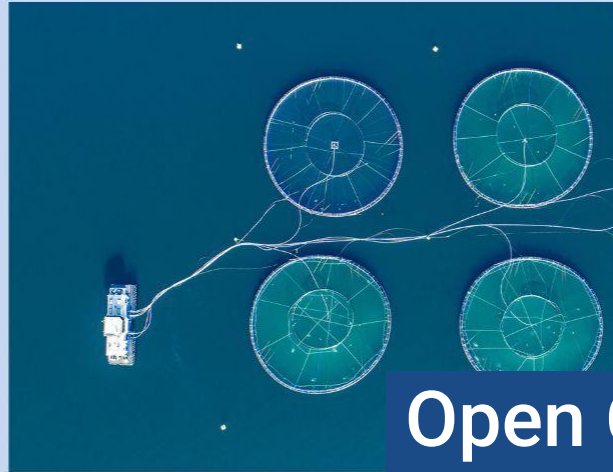
Next: GFW is releasing Planet imagery for coastal waters globally



3-meter Planet imagery can detect smaller vessels



# Global Fishing Watch is moving towards mapping all activity at sea



Open Ocean Project

# Impacts and partnership beyond fishing to understand human activity at sea and reduce impacts on the ocean

Non-Exhaustive

## Conservation



**Designate** protected areas based the latest data and community engagement

**Manage** the protected areas using real-time tooling and local capacity development

**Monitor** the effectiveness of protected areas in the long term

## Fishing



**Neutral, detailed, global fact base** for fisheries and fleet capacity

## Energy Production



**Mapping energy infrastructure;** marine spatial planning

## Seafloor Resources



**Deep Sea Mining Watch 2.0** launched with UCSB; Mapping sand mining underway

## Commerce/Geopolitics



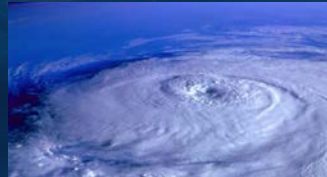
**Tracking dark fleets** and supporting transparent media efforts

## Pollution



**SkyTruth-** Cerulean Platform for creates transparency on oil spills

## Climate



**Climate TRACE-** mapping marine emissions with EmLab / UCSB

## Wildlife Strikes



**WhaleSafe** - report cards for shipping fleets in whale speed reduction zones

## Bycatch



**Birdlife International/Agreement on the Conservation of Albatross and Petrels -** Watch  
longline set data for creation of best practices

# Resources and Trainings

## Help resources on our map

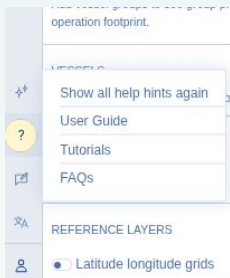
<https://globalfishingwatch.org/user-guide/>

<https://globalfishingwatch.org/tutorials/>

<https://globalfishingwatch.org/help-faqs/>

## YouTube channel

<https://www.youtube.com/@GlobalFishingWatch>



### User Guide

Introduction  
Accessing the map  
Registering and accessibility  
Profile  
Support  
Main areas of the map  
Activity - Fishing  
Activity - Vessel Presence  
Vessels  
Detections  
Encounters  
Reference layers  
Uploading data  
Analysis and dynamic reports  
Sharing information  
Additional Global Fishing Watch tools  
Marine manager portal  
Center vessel portal  
Disclaimer

#### Introduction

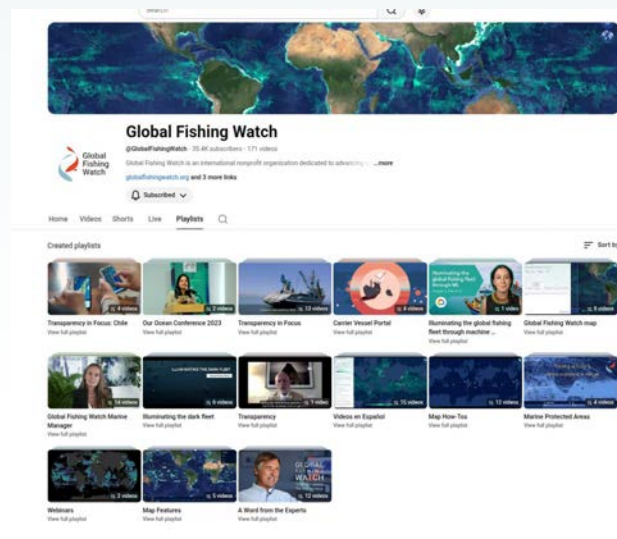
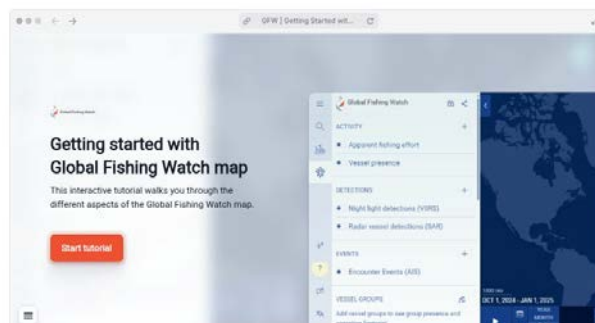
The Global Fishing Watch map is the first open-access online platform for visualization and analysis of vessel-based human activity at sea. Powered by satellite technology and machine learning, the map merges multiple types of vessel tracking data to provide a view of global human activity at sea, including fishing activity, encounters between vessels, night light vessel detection and vessel presence.

Anyone with an internet connection can access the map to monitor global fishing activity from 2012 to the present for more than 65,000 commercial fishing vessels that are responsible for a significant part of global seafood catch. The map analyzes **automatic identification systems** and **vessel monitoring system** data collected from vessels and transmitted through satellite and terrestrial receivers and applies a **fishing detection algorithm** to determine "apparent fishing activity" based on changes in vessel speed and direction.

Users can search for vessels, filter activity by flag or time period, identify port visits and view encounters between vessels. The map also allows anyone to upload and overlay their own data, download reports of activity from custom areas, and save and share workspaces. Free and easy-to-use features offer unprecedented opportunities to increase transparency across the world's ocean and support the fair and sustainable use of marine

### Tutorials

Our video tutorials are designed to help you navigate our **interactive online platform** and monitor global fishing activity. Don't find what you need in the videos? Try searching our FAQs or reading our downloadable how-to guides.



# Resources and Trainings

## API and gfwr R package documentation

<https://globalfishingwatch.github.io/gfwr>

gfwr 3.0 Reference Articles ▾ Changelog

### gfwr: Access data from Global Fishing Watch APIs



#### Important

This is a major release of the package, with several breaking changes in function names and two new endpoints: AIS vessel presence and SAR vessel detections. Please take a look at the [changelog](#). Several improvements are on the way in subsequent minor releases, please log any feedback in the issues.

For latest API releases, please check our [API release notes](#)

A **Python package** to communicate with Global Fishing Watch APIs was released in April 2025. Check the [gfw-api-python-client](#) repository.

The **gfwr** R package is a simple wrapper for the Global Fishing Watch (GFW) [APIs](#). It provides convenient functions to freely pull GFW data directly into R in tidy formats.

The package currently works with the following APIs:

- [Vessels API](#): vessel search and identity based on AIS self reported data and public registry information
- [Events API](#): encounters, loitering, port visits, AIS-disabling events and fishing events based on AIS data
- [Vessel presence based on AIS](#) for all vessel types
- [Apparent fishing effort in hours, based on AIS](#) for all vessels classified as fishing vessels
- [SAR vessel detections](#), indicating which vessels were matched or unmatched with AIS

#### Links

[Browse source code](#)  
[Report a bug](#)

#### License

[Full license](#)

Apache License (>= 2)

#### Community

[Contributing guide](#)

#### Citation

[Citing gfwr](#)

#### Developers

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Rocío Joo

Author

Nate Miller

Author

Jorge Cornejo-Donoso

Author

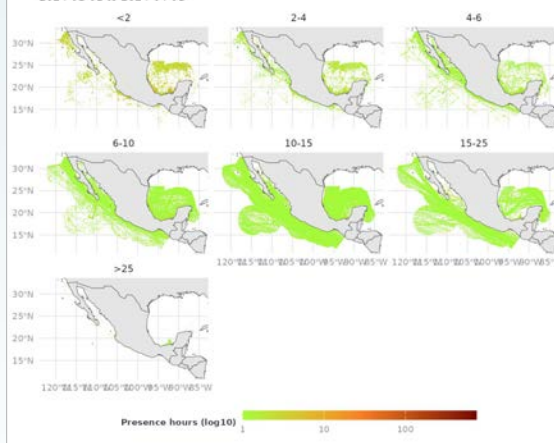
gfwr 3.0 Reference Articles ▾ Changelog

### Exploring the vessel presence layer in `gfwr`



Source: [vignettes/articles/gfw\\_vessel\\_presence.Rmd](#)

#### Vessel Presence hours by speed categories 2024-01-01 to 2024-04-01

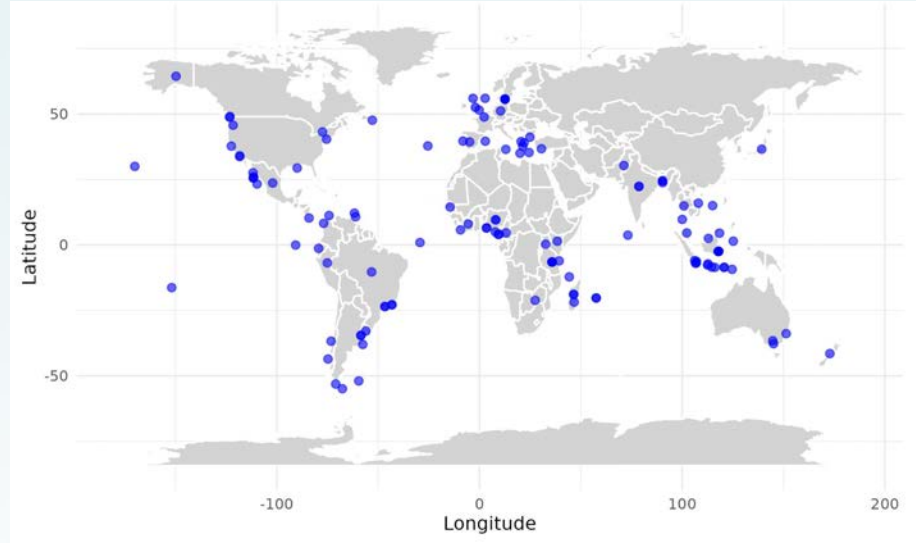


## Webinars and gfwr trainings

- Workshops in Spanish and Portuguese on YouTube
- In 2027: Webinars in English and French with the new datasets: [Vessel Presence](#) and SAR vessel detections

# Open Ocean Research Grants Program

*Now in 2nd year!*



Hundreds of  
Geographically  
Diverse Applicants



- \$10-20k USD for single/group projects
- Onboarding series with GFW research experts
- Office Hours
- Slack channel/community cohort
- Media promotion through GFW of their project

# Research collaborations at GFW

- Co-develop key algorithms & datasets
- Support research to inform policy



*+55 peer-reviewed  
papers published*

6.1K Research Paper Citations

[research@globalfishingwatch.org](mailto:research@globalfishingwatch.org)



DALHOUSIE  
UNIVERSITY



Marine  
Geospatial  
Ecology  
Lab



msi  
Marine Science Institute



Stanford



FRA  
Fisheries Research Agency



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