

Global Fishing Watch datasets available for the Open Ocean Research Grant Program

Table of contents

[Vessel identity data](#)

[Activity of all vessels \(fishing and non-fishing\) from AIS](#)

[Vessel presence and apparent fishing effort from AIS](#)

[Gear-specific fishing models: Longline sets](#)

[Gear-specific fishing models: Trawling activity](#)

[Events derived from AIS](#)

[Anchorages, port visits, voyages.](#)

[AIS disabling, “Gaps” in AIS reception](#)

[Encounters and loitering at sea](#)

[Forced labor dataset - forced labor model](#)

[Satellite imagery](#)

[Detections of vessels and offshore infrastructures from Sentinel-1](#)

[Detections of vessels from Sentinel-2](#)

[Detections of vessels from Planet](#)

[PlanetScope Dove](#)

[Skysat](#)

[Detections of vessels from RADARSAT2](#)

[Detections of vessels from VIIRS matched to AIS data](#)

[Ancillary datasets](#)

[Global shoreline](#)

[Distance from shore](#)

[Bathymetry](#)

[Ice regions](#)

Below are descriptions of each of the data products that we have developed and that will be available to fellows of the Open Ocean Research Grants Program. Some of these datasets are already publicly available in Global Fishing Watch’s [map](#) and [Data Download Portal](#), or via our [APIs](#) and the [R](#) and [Python](#) packages. Potential applicants are encouraged to explore these platforms to become familiar with the different datasets.

Other Global Fishing Watch datasets haven’t been released publicly and are at different stages of maturity. The selected fellows will have early access to them when necessary for their work plans.

Projects should apply any of these datasets to address challenges in the ocean, or suggest ways to improve the datasets to further enable Global Fishing Watch research. During the execution of the work plans, the selected fellows will receive further onboarding information on these datasets and guidance on their use.

Vessel identity data

Over the past decade, Global Fishing Watch has worked to organize information on vessel identity from different sources. AIS¹ messages transmit identity information that is then matched to the information present in more than 30 public registries. These registries carry other important vessel identity information, like vessel characteristics, registration history, authorizations for RFMOs, and ownership data. Over 35,000 vessels have matched AIS and registry information.

Our vessel classification model processes identity data from AIS and registries and predicts vessel characteristics for the entire AIS-transmitting fleet. The output from this model is then combined with our general fishing model to derive [apparent fishing effort](#). We are currently working on expanding the list of sources of identity data and improving our vessel classification algorithm.

Status: public

Publication: Park, J. et al., 2023. Tracking elusive and shifting identities of the global fishing fleet. *Science Advances* 9, eabp8200. <https://doi.org/10.1126/sciadv.abp8200>

Available data:

Public identity data is available on [Vessel Viewer](#), our [Vessels API](#) and the [R](#) and [Python](#) packages. This information is the endpoint of the whole identity pipeline and includes:

- Identity markers as transmitted by AIS messages (MMSI, IMO, call signs, vessel names).
- Identity as reported from external and public registry sources, ingested monthly.
- Segments of vessel identity histories, grouped under a variable named vessel ID. Vessel IDs are then grouped together to reconstruct the identity history of each vessel (reflagging, changing ownership, authorizations).
- Identity characteristics as predicted by our fishing model. This model uses registry, AIS information, and track behavior to estimate vessel class, as well as tonnage, length and other vessel characteristics.

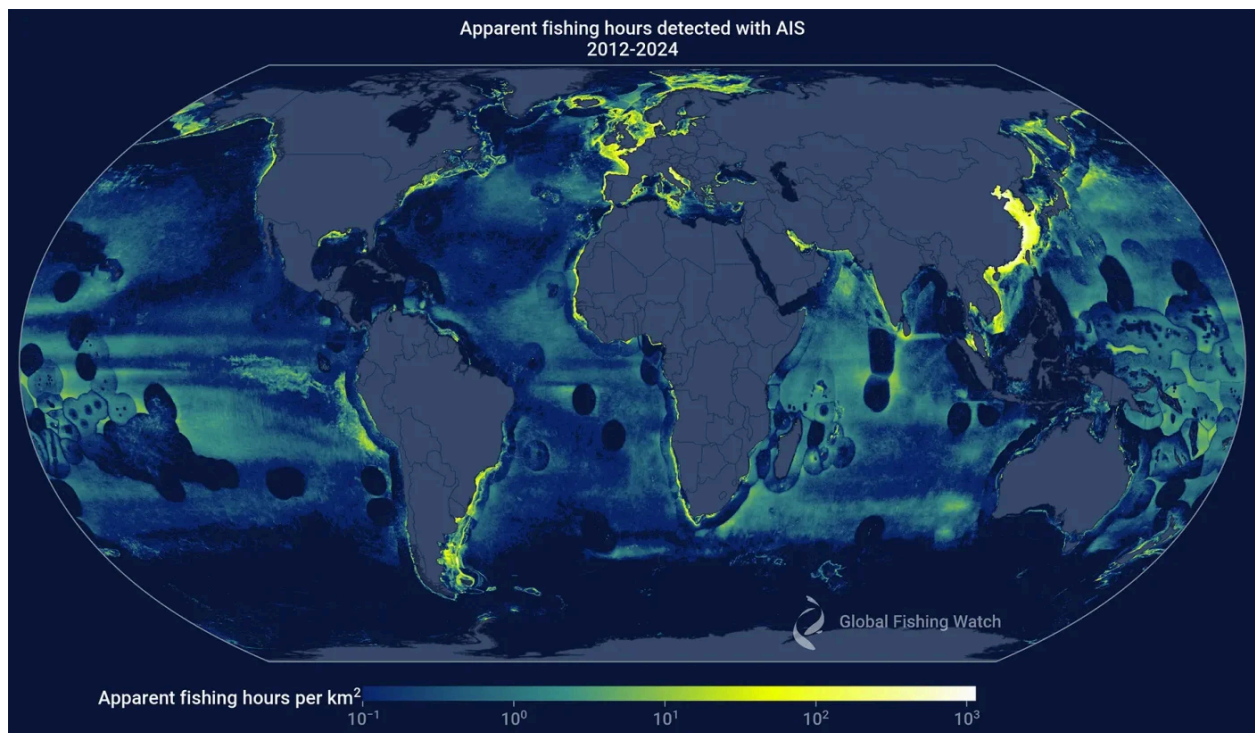
¹ The Automatic Identification System (AIS) is an automatic tracking system originally developed to help prevent collisions between vessels at sea. Vessels broadcast AIS to alert other vessels of their presence, but terrestrial and satellite receivers can also receive these messages and monitor vessel movements. AIS is at the core of Global Fishing Watch analysis pipelines, including the AIS-based fishing effort calculation displayed on our map.

We expect that all projects use identity datasets to some extent, given that these form the basis for understanding vessel types, fishing and non-fishing vessel classification, and matching to other datasets. Identity information is also key to get [events](#) data from our databases.

Activity of all vessels (fishing and non-fishing) from AIS

Vessel presence and apparent fishing effort from AIS

The flagship datasets of Global Fishing Watch are vessel presence and [apparent fishing effort](#) based on AIS transmissions from vessel tracking datasets. Vessel presence represents the amount of time vessels are present in an area, and is available for all vessel types, fishing and non-fishing. Apparent fishing effort represents the amount of time that vessels classified as fishing vessels spend doing potential fishing-related activity.



A global map shows apparent fishing hours per square kilometer from the current release of our fishing effort dataset, covering 2012-2024. © 2025 Global Fishing Watch

Global Fishing Watch estimates fishing activity from AIS data. Built on [our landmark paper in 2018](#), this dataset now includes 12 years of fishing activity globally and more than 100,000 vessels as of 2024.

Status: public

Publication: Kroodsma *et al.*, 2018. Tracking the global footprint of fisheries. *Science* 359, 904–908. <https://doi.org/10.1126/science.aao5646>

Available data:

Vessel presence and apparent fishing effort data can be downloaded from Global Fishing Watch's [Map](#), [APIs](#), and [R](#) and [Python](#) packages. These platforms offer a dynamic, near-real-time dataset with a three-day delay.

Global Fishing Watch also curates a static, multi-year [public apparent fishing effort \(2012-2024\)](#) dataset, publicly available in our Data Download Portal. This dataset has gone through a series of filters and checks that make it slightly different from the dynamic dataset available on other platforms, and includes:

- Fishing hours by flag state and gear type at 100th degree resolution
- Monthly apparent fishing hours by flag state and gear type at 10th degree resolution
- Fishing hours by MMSI at 10th degree resolution

A provisional gridded dataset of all vessel presence (fishing and non-fishing vessels) will also be available. This dataset will include additional features such as distance travelled and average speed, and will group vessels by size class.

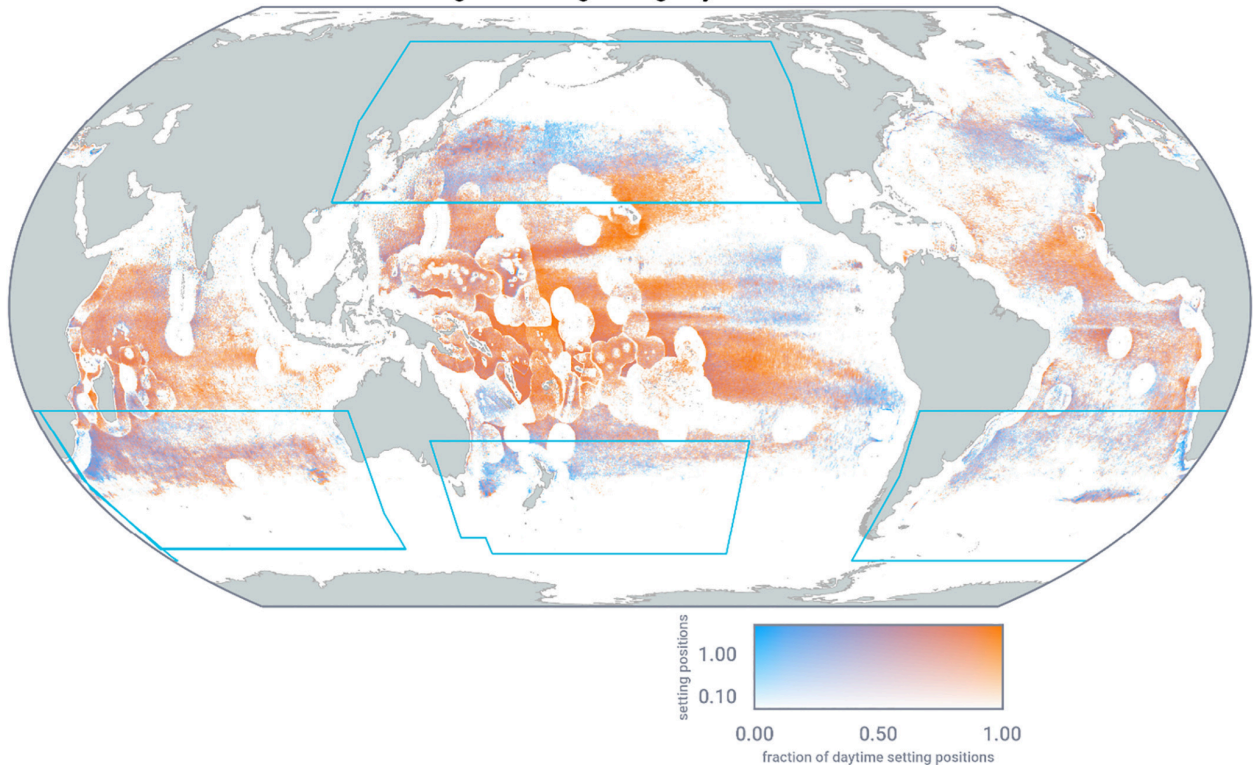
Useful links

- <https://globalfishingwatch.org/dataset-and-code-fishing-effort/>
- [2025 March – Global static dataset of AIS-based apparent fishing effort v3: difference with the map](#)

Gear-specific fishing models: Longline sets

A global dataset of the location and time of setting for the global drifting longline fleet, trained on four years of GPS data.

Fraction of longline setting during daytime hours: 2017-2020



A global map of the fraction of daytime longline setting from the longline model, covering 2017-2020. © 2025 Global Fishing Watch

Status: public

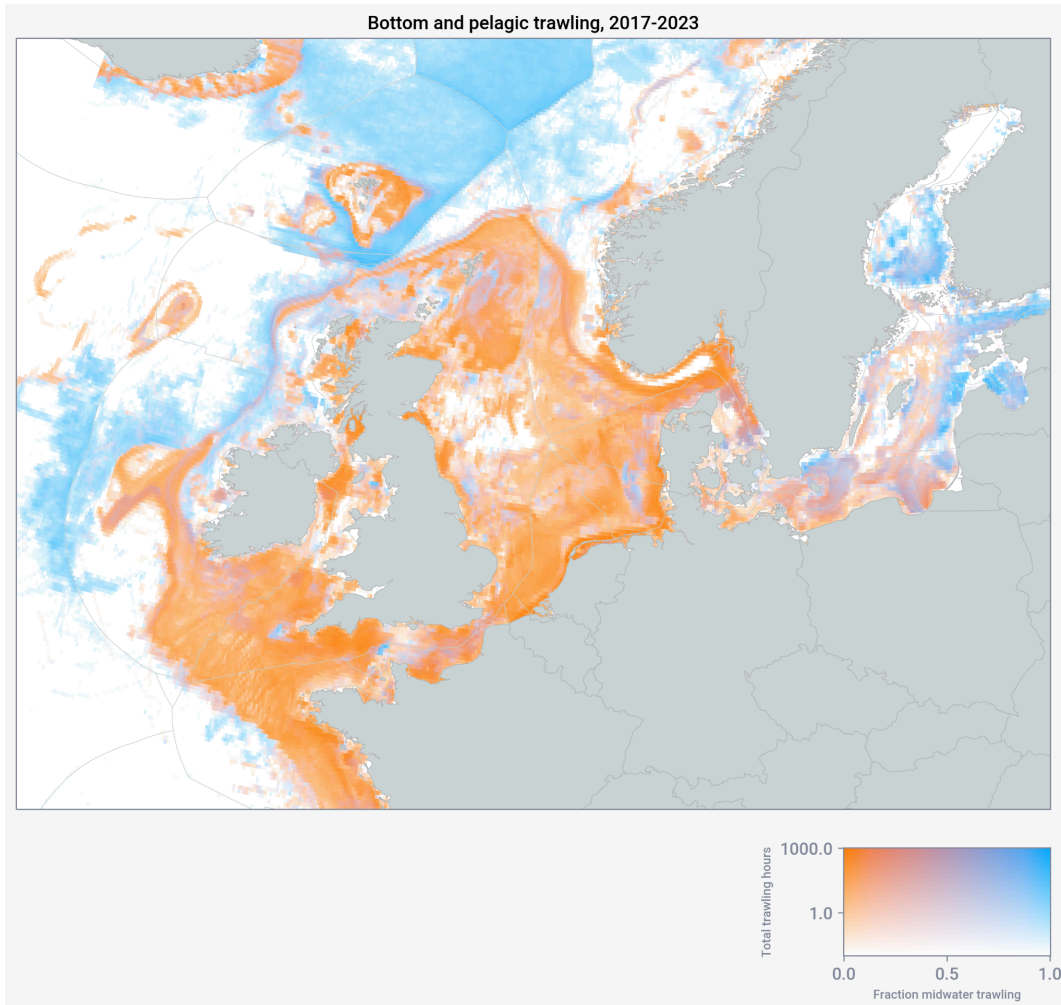
Publication: Kroodsmma *et al.*, 2023. Global prevalence of setting longlines at dawn highlights bycatch risk for threatened albatross. *Biological Conservation* 283, 110026. <https://doi.org/10.1016/j.biocon.2023.110026>

Available data:

- The data associated with the publication is available on our [Data Download Portal](#). It contains predicted setting and hauling events by drifting longliners broadcasting AIS between the years 2017 and 2021.
- The longline model is improving continuously, so accepted proposals may be granted early view access to datasets updated up to 2025.

Gear-specific fishing models: Trawling activity

A global dataset of the location of trawling activity that distinguishes between bottom trawling, midwater trawling, and other fishing (e.g. in the case of multigear vessels). This dataset is produced using a new AIS-based fishing model specific for trawling vessels that detects and classifies fishing activity at the level of the individual trawl.



Status: early view

Available data:

The trawling model datasets are not publicly available in our [Data Download Portal](#), but access can be granted when necessary. These datasets include:

- Gridded trawling activity (fishing hours, distance trawled, swept area) by fleet and MMSI.
- Trawling vessel information, including detailed trawler type (e.g. otter trawl, beam trawl) when available from registries, as well as vessel size, flag state, and estimated gear width.
- Start and end times of trawling activity by vessel with start and end locations, and classified as bottom, midwater, other fishing (not yet available, but could be made available).

Events derived from AIS

In addition to the fishing models, Global Fishing Watch analyzes vessel AIS tracks to derive other datasets related to their behavior. Track portions that may indicate certain activities based

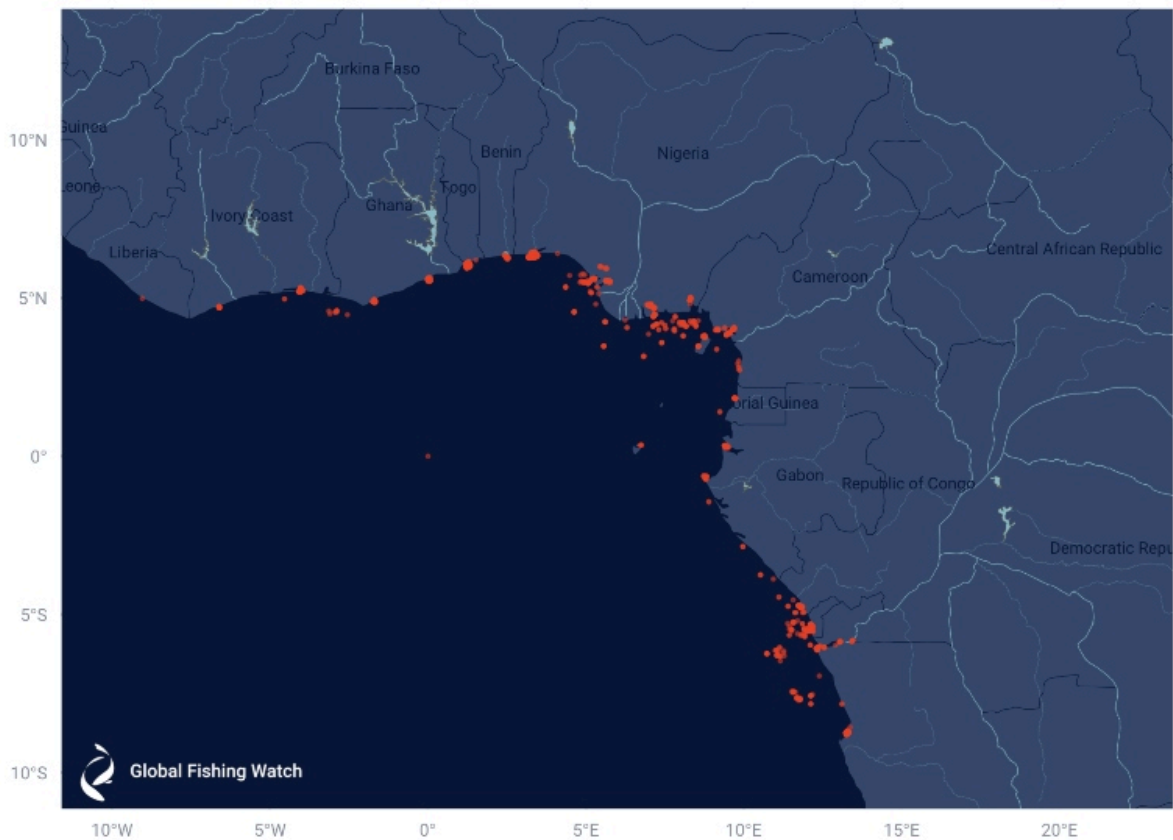
on behavior patterns are called events, and these include fishing events, port visits, AIS-disabling events (“gaps”), encounters, and loitering at sea.

Anchorage, port visits, voyages.

Global Fishing Watch maintains a global database of more than 160,000 anchorages derived from AIS tracks. These anchorages are grouped into ~32,000 ports. Vessel tracks are then analyzed with respect to these ports to generate port events (port entry, port stop, port gap and port exit).

Global Fishing Watch Anchorages Dataset

Western Africa (Gulf of Guinea)



Anchorage along the West African coast (Gulf of Guinea)

Port events are grouped into port visits. Port visits have different confidence levels depending on which port events are available (a full confidence port visit must have a port entry and a port exit, but not all of them do).

Voyages represent the period between two port visits, and are referred to as ‘trips’ in the data schema. A voyage starts when a vessel exits a port and ends when the vessel enters a port following the previous port exit.

Status: public

Available data:

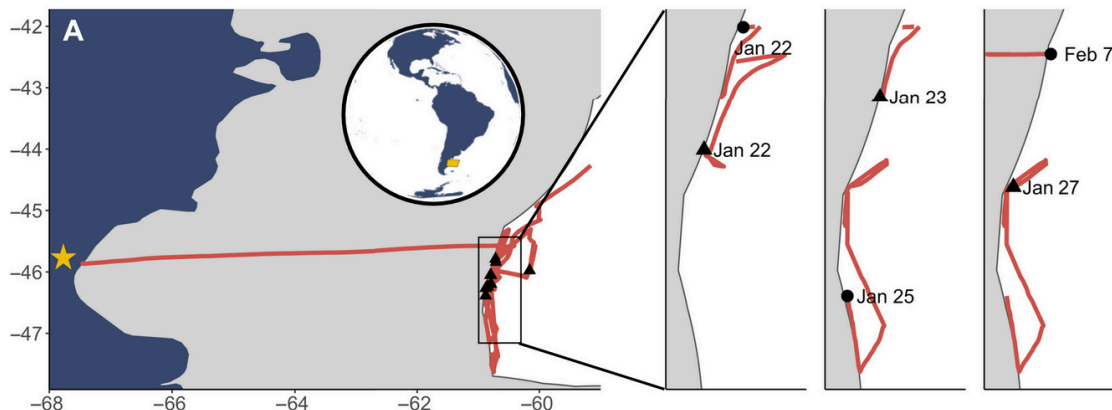
The anchorages and port visits datasets can be explored on our carrier vessel portal. The complete anchorages dataset is available via our data download portal.

- Anchorages
<https://globalfishingwatch.org/data-download/datasets/public-anchorages:v20200316>
- Public voyages
<https://globalfishingwatch.org/data-download/datasets/public-voyages-confidence-4:v2020922>
- Port visits are publicly available in our [Events API](#), and the [R](#) and [Python](#) packages, and can be visualized on the map.

Useful links: <https://globalfishingwatch.org/datasets-and-code-anchorages/>

AIS disabling. “Gaps” in AIS reception

Interruptions in AIS reception (known as “gaps” or gap events) are not uncommon and can happen due to problems in AIS reception by satellites and terrestrial AIS receivers, or by the intentional disabling of the AIS transponders. Global Fishing Watch records all gaps that last over six hours and uses a set of filters to identify gaps that may have been caused by intentional AIS disabling.



Status: public

Publication: Welch, H.*et al.* 2022. Hot spots of unseen fishing vessels. Science Advances 8, eabq2109. <https://doi.org/10.1126/sciadv.abq2109>

Available data:

- Gap events are publicly available in our [Events API](#), and the [R](#) and [Python](#) packages, and can be visualized on the map.
- The dataset for Welch et al 2022 is available in the [Data Download Portal](#)

Encounters and loitering at sea

An encounter occurs when two vessels (a carrier or support vessel and a fishing vessel) are observed in close proximity for an extended period of time and at low velocity. Encounters can be indicative of transshipment events.

Loitering events happen when a single vessel exhibits the same behavior and may indicate transshipment events in which only one of the vessels is broadcasting AIS.



Status: public

Publication: Miller *et al.*, 2018. Identifying global patterns of transshipment behavior. Frontiers in Marine Science 5, 240. <https://doi.org/10.3389/fmars.2018.00240>

Available data:

- Port visits, AIS gaps, encounters and loitering events are available via the [Events API](#), which has the same information as [Vessel Viewer](#) in the map and feeds our R and Python packages.
- The data for Miller et al. 2018 is available in the [Data Download Portal](#).

Useful links:

- <https://globalfishingwatch.org/datasets-and-code-transshipment/>

Forced labor dataset - forced labor model

The forced labor model is a positive-unlabeled machine learning algorithm that identifies fishing vessels (based on vessel characteristics and behaviors) that behave similarly to vessels reported as forced labor offenders. The model dataset includes a prediction of positive (the model deems that the vessel is similar to forced labor offenders) or negative (the model deems that the vessel is not similar to forced labor offenders) for all squid jiggers, drifting longliners and trawlers in our AIS dataset from 2012 to 2024. The dataset also includes outputs for the model features per vessel per year (for example average daily fishing hours, average voyage duration, number of AIS gaps > 12 hours, number of encounters).

Status: early view

Publication: Joo, R. et al., 2023. Towards a responsible machine learning approach to identify forced labor in fisheries. <https://doi.org/10.48550/arXiv.2302.10987>

Satellite imagery

Detections of vessels and offshore infrastructures from Sentinel-1

The vessel detection dataset contains vessels from 2017 to 5 days ago detected with Sentinel-1 satellite imagery and classified with deep learning. Besides the location and the time of the vessel detections, this dataset also includes the inferred size of every detected vessel, as well as whether it was broadcasting AIS (and which vessels it was broadcasting). For more information check the paper [Paolo et al. \(2024\)](#).

The offshore infrastructure detection dataset is based on 6-month composites of Sentinel-1 satellite imagery and updated monthly. The dataset includes the location, presence window, and inferred types of the infrastructures.

Status: public

Publication: Paolo *et al.* 2024. Satellite mapping reveals extensive industrial activity at sea. Nature 625, 85–91. <https://doi.org/10.1038/s41586-023-06825-8>

Available data:

- Detections of vessels from 2016 to the present in global coastal waters with the prediction of fishing and non-fishing vessel classes
<https://globalfishingwatch.org/data-download/datasets/public-sar-vessel-detections:v20231026>
- Detections of offshore infrastructures from 2017 to the present in global coastal waters with the prediction of structure types
- Imagery metadata including the polygons of image footprints and 0.005-degree-resolution rasters of satellite overpasses.

- 0.005-degree-resolution yearly overpasses raster summarized from the data above.

Detections of vessels from Sentinel-2

By July of this year, we will be sharing a new dataset, detections of vessels from Sentinel-2 data from 2019 through the end of 2024. This dataset includes the size, orientation, and speed of every detected vessel, as well as whether it was broadcasting AIS (and which vessels it was broadcasting).

Sentinel-2 detections are derived from electro-optical imagery at 10-m resolution from the European Space Agency's Sentinel-2 mission using a deep-learning model Global Fishing Watch developed. The detections are matched with AIS data using the same method for our published Sentinel-1 dataset described above. Compared with our published Sentinel-1 detections based on SAR imagery at 20-m resolution, Sentinel-2 allows detecting smaller vessels with all types of vessel materials, in contrast with the limitations of SAR imagery to reveal vessels made of wood and fiberglass. Sentinel-2 also images the wakes of moving vessels, which further increase the detectability of small vessels and allow us to infer the vessels' speed and orientation. Sentinel-2 also covers more area of the ocean than Sentinel-1, and the neural-net detection approach does not require the exclusion of near-shore regions (as opposed to the CFAR approach used in Sentinel-1), allowing detection of vessels in highly-packed areas all the way to the shoreline where most human activity is concentrated. Overall, with Sentinel-2 imagery we are able to detect about 3 times more vessels and "see" a broader range of vessel lengths and types. The major caveats include the cloudy images, bad sun angle, and dark lightning conditions.

For every detection (about 100 million), we saved a thumbnail image centered on the detection. We developed a secondary-stage model to distinguish fishing and non-fishing vessels and identify false positives originating from offshore infrastructure, rocks, clouds, white caps, sea ice, image artifacts, among others. As a result, each detection is assigned with scores for being a fishing vessel, a non-fishing vessel, and non-vessel. We can also make subsets of thumbnails of these vessels available for researchers. See some examples below.

Example #1



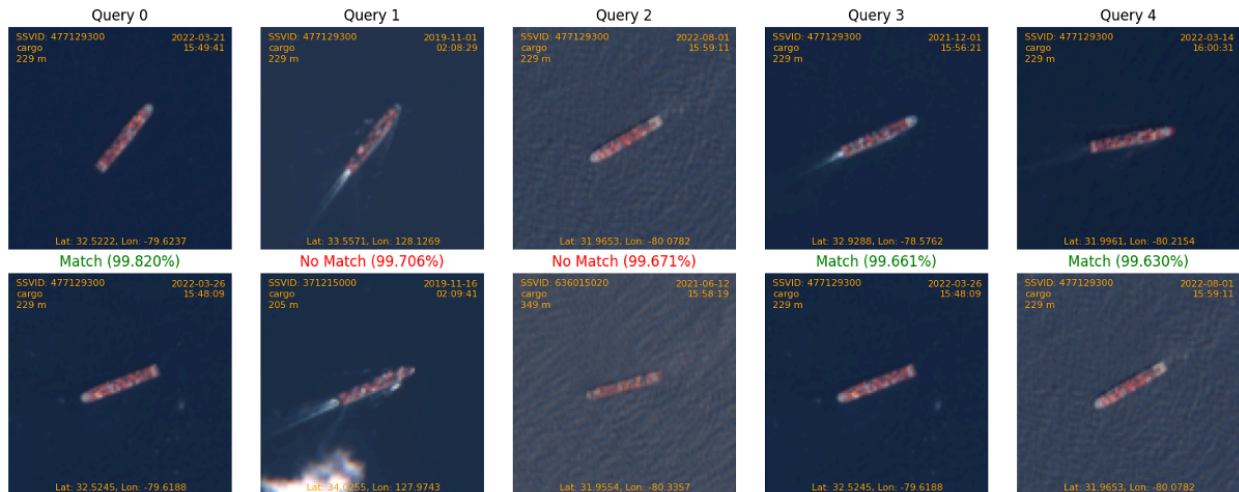
Encounters between vessels captured in satellite imagery

Example #2



Plumes from sand dredgers detected in imagery

Example #3



We have developed an algorithm to detect “similar vessels,” which can help identify when specific large vessels are operating with their AIS off.

Example #4



What large, medium-sized, and small vessels may look like in Sentinel-2 images

Status: early view

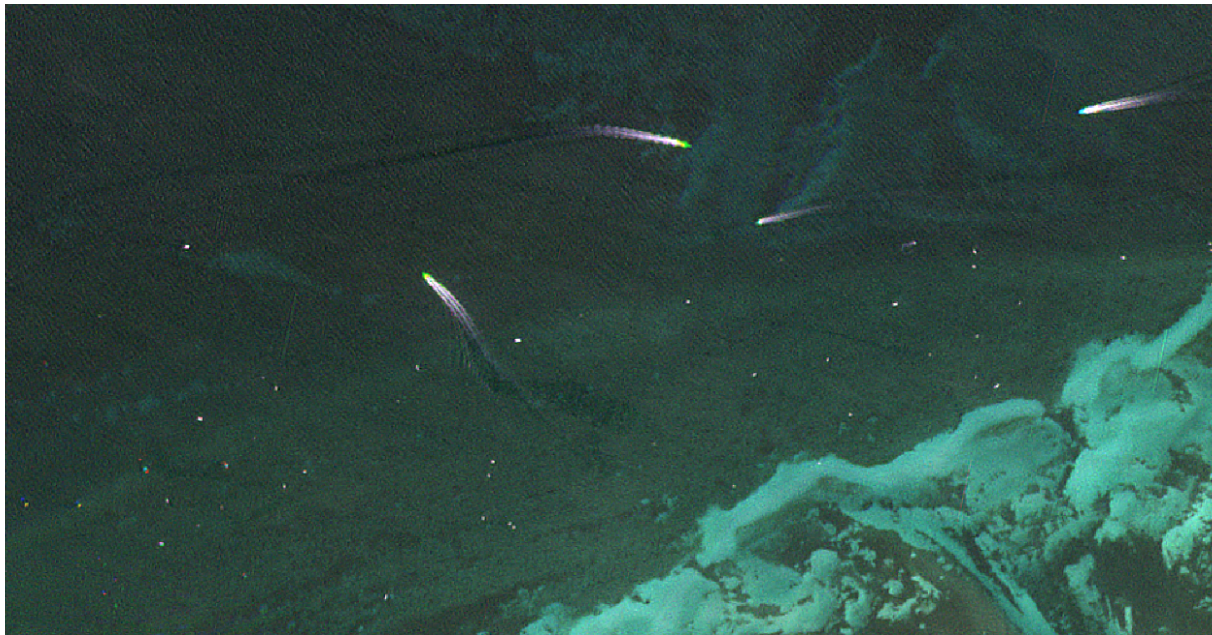
Available data:

- Detections of vessels in 2019-2024 in global coastal waters with the prediction of fishing and non-fishing vessel classes.
- Imagery metadata including the polygons of image footprints and cloud mask rasters (summarized at [level-7 h3 cells](#)).
- Yearly overpasses raster summarized at [level-7 h3 cells](#).
- Subsets of detection thumbnails.

Detections of vessels from Planet

PlanetScope Dove

We are continuously processing a subset of 2025 PlanetScope Dove images (3-m resolution) for the global coastlines (≥ 15 km from shore) at a weekly to biweekly temporal coverage. Similar to Sentinel-2, the data includes vessel detections with inferred vessel size, orientation, and speed, as well as the results of matching detections with AIS. We may also make available subsets of detection thumbnails.



Planet image of 15-foot boats engaging in recreational fishing off the coast of Florida

Status: early view

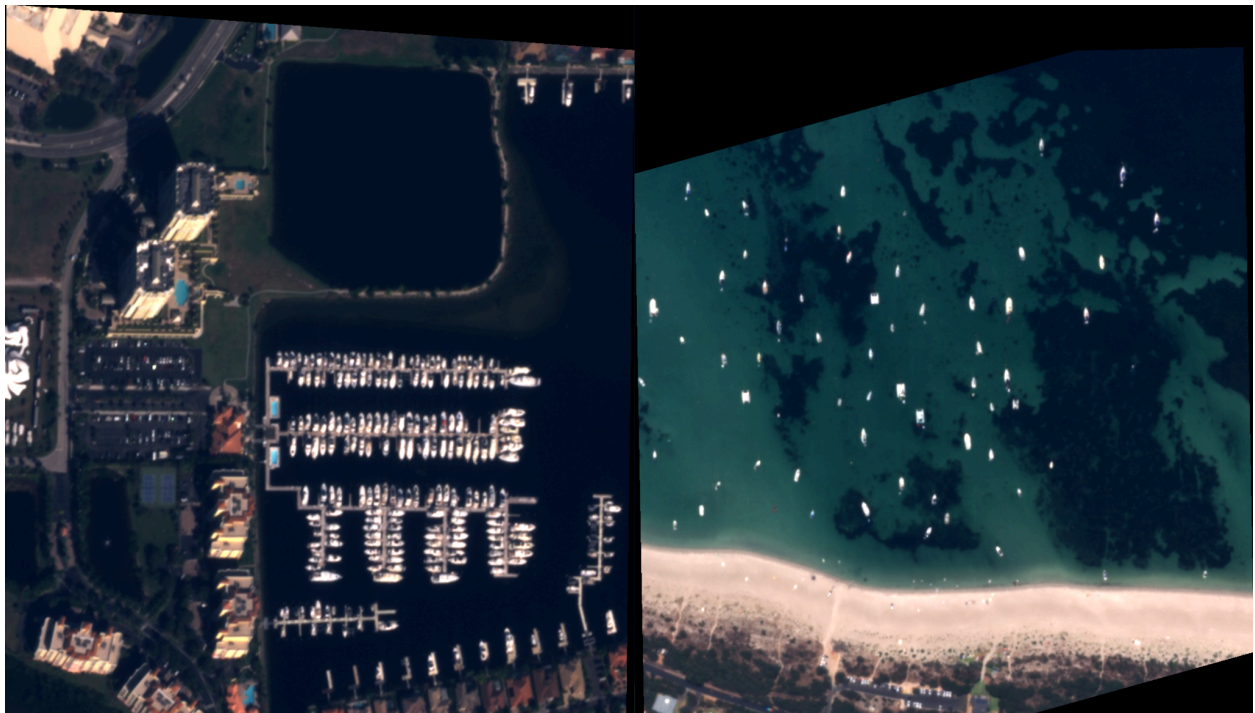
Data available: Static dataset of vessel detections, matched to AIS and including inferred vessel location, size and orientation. Thumbnails of vessel detections may also be available.

Skysat

We have processed 10,000 km² of Planet Skysat imagery (0.5-m resolution) over major global anchorages, based on the locations derived from AIS tracks in the Global Fishing Watch anchorage dataset. The Skysat imagery covers 23% of the anchorages in our global dataset with a single-pass image acquired per spatial grid between 2020 and 2023.

Status: early view

Data available: Static dataset of vessel detections, matched to AIS and including inferred vessel location, size and orientation. Thumbnails of vessel detections may also be available.



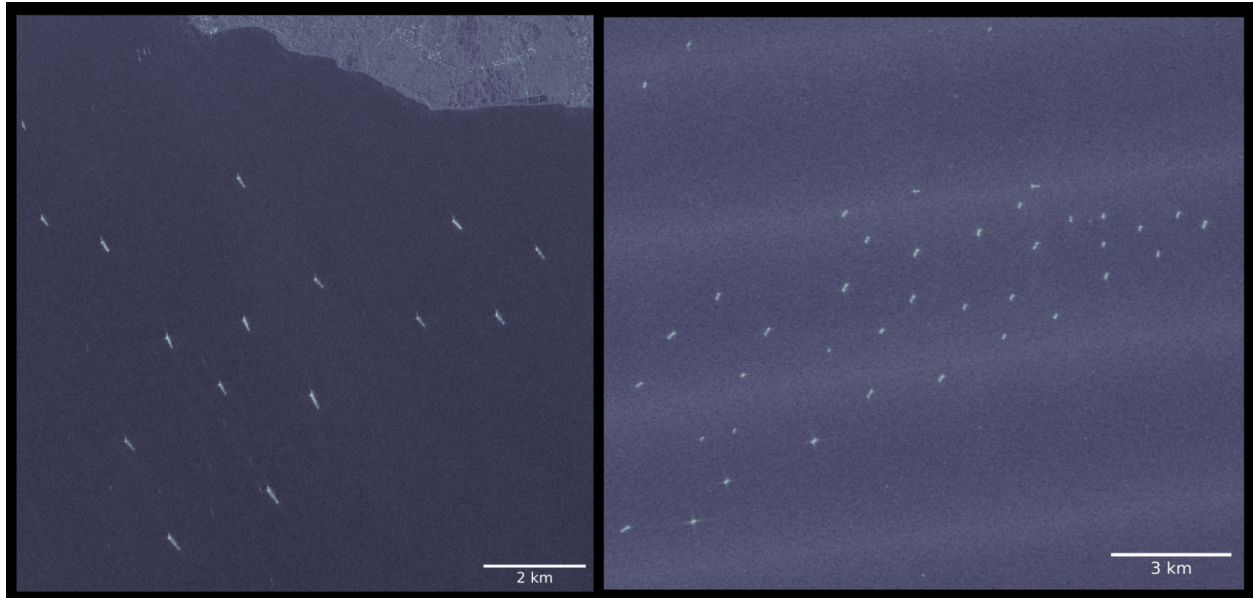
Planet Skysat imagery showing two different types of anchorages. Left: A densely packed marina with vessels moored in a structured dock layout. Right: An open-water anchorage with boats anchored individually in a shallow coastal bay.

Detections of vessels from RADARSAT2

We partnered with MDA to identify a collection of 50,000 images from Radarsat2 spanning 2013-2023, covering approximately 25% of the open ocean. Radarsat-2 provides valuable imagery over high-seas areas that are not covered by Sentinel-1 or Sentinel-2. The Radarsat2 dataset includes spatial coverage of key areas such as the Yellow Sea and the Sea of Japan that were previously outside the scope of our mapping efforts.

Status: early view

Data available: Static dataset of vessel detections, matched to AIS and including inferred vessel location, size and orientation. Thumbnails of vessel detections may also be available.



Imagery showing vessels captured by two types of Radarsat2 images. Left: Vessels captured in 6.25-m resolution ExtraFine mode imagery. Right: Vessels captured in 20-m resolution ShipDetection mode imagery.

Detections of vessels from VIIRS matched to AIS data

VIIRS, or Visible Infrared Imaging Radiometer Suite, is a sensor onboard the Suomi National Polar-orbiting Partnership and NOAA-20 weather satellites. VIIRS collects imagery and radiometric measurements that, among other applications, are used to detect bright lights at night. VIIRS can be used to detect vessels at night and [NOAA's Earth Observation Group](#) produces a nightly VIIRS Boat Detection (VBD) dataset. The VBD reports the locations of boats detected based on lights and is directly used by Global Fishing Watch.

Publications: Elvidge, C.D., Zhizhin, M., Baugh, K., Hsu, F.-C., 2015. Automatic Boat Identification System for VIIRS Low Light Imaging Data. *Remote Sensing* 7, 3020–3036.

<https://doi.org/10.3390/rs70303020>

Elvidge, C.D., Ghosh, T., Baugh, K., Zhizhin, M., Hsu, F.-C., Katada, N.S., Penalosa, W., Hung, B.Q., 2018. Rating the Effectiveness of Fishery Closures With Visible Infrared Imaging Radiometer Suite Boat Detection Data. *Front. Mar. Sci.* 5.

<https://doi.org/10.3389/fmars.2018.00132>

Hsu, F.-C., Elvidge, C.D., Baugh, K., Zhizhin, M., Ghosh, T., Kroodsma, D.A., Susanto, A., Budy, W., Riyanto, M., Nurzaha, R., Sudarja, Y., 2019. Cross-matching VIIRS boat detections with vessel monitoring system tracks in Indonesia. *Remote Sensing* 11, 995.

<https://doi.org/10.3390/rs11090995>

Data availability: VIIRS detections can be seen on the map, and can be downloaded from the original source at the Colorado School of Mines Earth Observation Group [VIIRS Boat Detection](#) page.

Ancillary datasets

Global Fishing Watch creates and maintains geospatial datasets to support workflows and analyses. A shared common ground helps share and exchange results internally and with our research partners. These datasets are available as support for the research proposals, but similar datasets can be used from other sources. To be eligible, proposals should not use only these datasets, but propose workflows with any of the datasets above.

Global shoreline

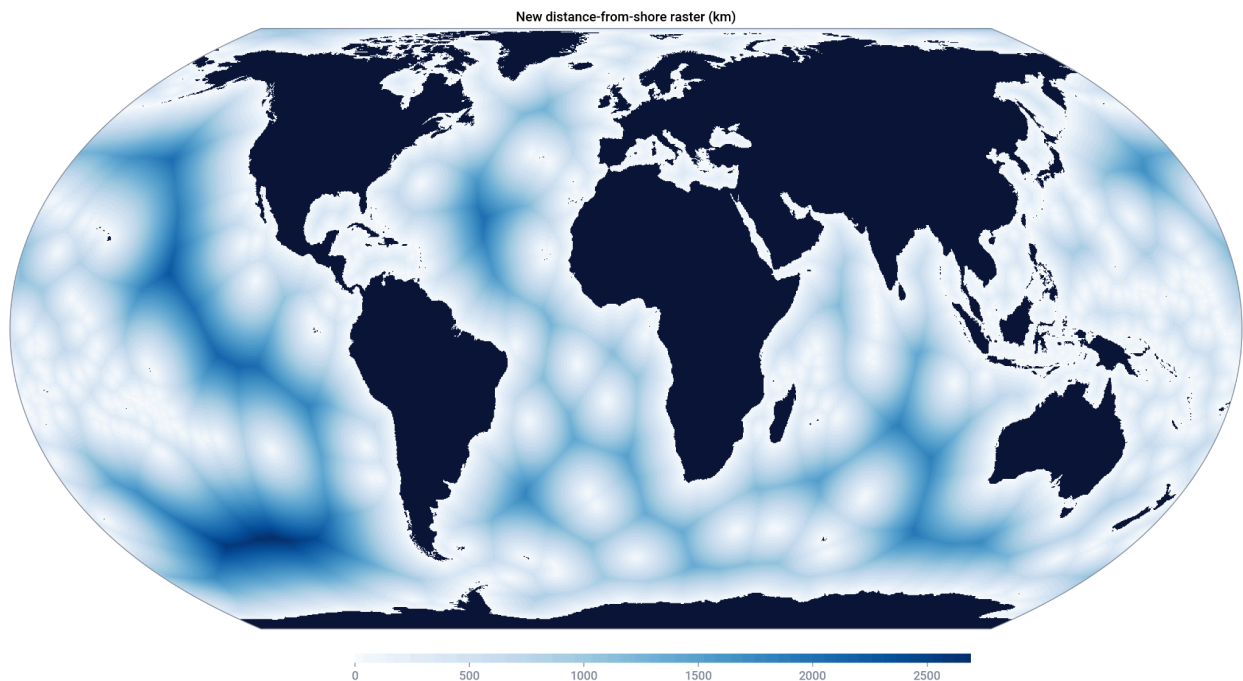
Based on the [Copernicus DEM GLO-30: Global 30m Digital Elevation Model data available through Google Earth Engine](#)

Status: early view

Available data:

- Global (~100-m resolution) land and ocean masks in shapefiles
- Global land masks in 0.01-degree-resolution raster

Distance from shore



Status: early view

Available data:

- 0.001-degree-resolution distance-from-shore raster: for +/- 5km from shore developed based on the land mask mentioned above

- 0.01-degree-resolution global distance-from-shore raster: created by combining the raster published on [Pacific Islands Ocean Observing System](#) with the 0.01-degree-resolution land mask above. The inland cells have a distance of -1000, based on the land mask. Cells containing ocean waters have distances ≥ 0 .

Bathymetry

Status: published

Available data: 0.01-degree-resolution global bathymetry raster sourced from the General Bathymetric Chart of the Oceans ([GEBCO 2014 grid](#)).

Ice regions

Status: early view

Available data: monthly mask of icy regions in the ocean summarized by combining sea ice coverage data ([U.S. National Ice Center Daily Sea Ice](#)), iceberg tracking data ([U.S. National Ice Center \(USNIC\) weekly location data for Antarctic icebergs](#)), and ice sheet location data ([ICESat/GLAS Surface-Type Mask](#)).