IMOS Integrated Marine Observing System

Australian Ocean Data Network (AODN)

Ships of Opportunity – Fishing Vessels as Ships of Opportunity WORKFLOW

Version 1.0

13th September 2024

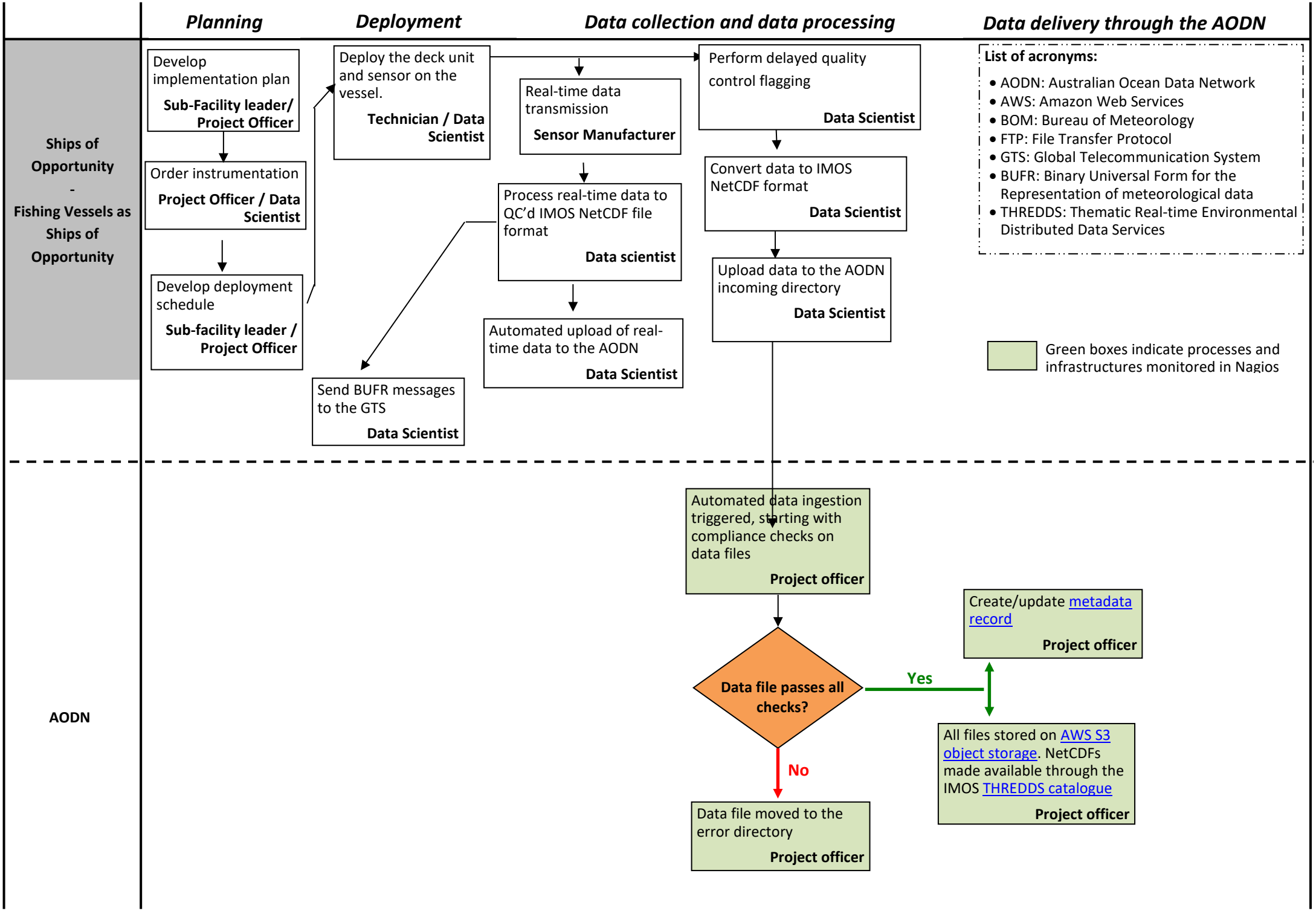
Data Workflows

The AODN, in managing the data for IMOS, has developed workflows for each IMOS sub-facility to describe the flow of IMOS data from planning through data collection to data delivery and public data access.

The primary goals of this workflow are to:

- Improve data flow and data handoff, making tracking of data status easy and preventing data loss
- Identify and delimit precisely the responsibilities of each person involved
- Improve communication at the interface between IMOS facilities and the AODN
- Improve transparency for end users by providing more details to populate metadata records (*i.e.* limitations and processing methods applied to datasets)
- Assist in reporting planned deployments against actual deployments and data delivery

The workflow is available on the next page of this document. Additional information (*i.e.* timeline, input, output, step description) for each operation step is available in the 'Supporting Information' section. The role and contact details of people involved in the workflow are summarised in a table and suggested potential improvements are listed at the end of the document.


Planning
Deployment
Data collection and data processing
Data delivery through the AODN
Ships of Opportunity - Fishing Vessels as Ships of Opportunity
AODN
Develop implementation plan
Sub-Facility leader/ Project Officer
Order instrumentation
Project Officer / Data Scientist
Develop deployment schedule
Sub-facility leader / Project Officer
Deploy the deck unit and sensor on the vessel.
Technician / Data Scientist
Real-time data transmission
Sensor Manufacturer
Process real-time data to QC'd IMOS NetCDF file format
Data scientist
Automated upload of real-time data to the AODN
Data Scientist
Send BUFR messages to the GTS
Data Scientist
Perform delayed quality control flagging
Data Scientist
Convert data to IMOS NetCDF format
Data Scientist
Upload data to the AODN incoming directory
Data Scientist
List of acronyms:
AODN: Australian Ocean Data Network
AWS: Amazon Web Services
BOM: Bureau of Meteorology
FTP: File Transfer Protocol
GTS: Global Telecommunication System
BUFR: Binary Universal Form for the Representation of meteorological data
THREDDS: Thematic Real-time Environmental Distributed Data Services
Green boxes indicate processes and infrastructures monitored in Nagios
Automated data ingestion triggered, starting with compliance checks on data files
Project officer
Data file passes all checks?
Yes
No
Create/update metadata record
Project officer
All files stored on AWS S3 object storage. NetCDFs made available through the IMOS THREDDS catalogue
Project officer
Data file moved to the error directory
Project officer

Supporting information

Phase	Operation step	Timeline	Input	Output	Step description	Step operator
Planning	**Develop implementation plan**		IMOS funding	Implementation plan	• Annual plan for instrumentation (deck units and sensors) deployments. • Evaluate required resources.	**Sub-Facility leader/ Project Officer**
	Order instrumentation (deck units, sensors and attachments)		Implementation plan	Instrument order	Identify which vessels to instrument, then vessel-specific gear can be purchased (dependent on fishing gear type).	**Project Officer / Data Scientist**
	Develop deployment schedule		• Implementation plan • Instrument order	Deployment schedule and plan	Activate deck unit SIM card, test deck unit communication and sensors.	**Sub-facility leader/ Project Officer**
Deployment	**Deploy the deck unit and sensor on the vessel**		• Deployment plan • Signed Vessel Agreement • Deck unit, sensors and attachments	• Metadata recorded • Sensor(s) deployed	Get vessel operator to fill in metadata information, sign legal agreement and install gear. Gear can change vessel, and vessels fishing location can vary. One vessel can have one or more sensors, but only one deck unit.	**Technician and Data Scientist**
	Real-time data transmission	**Automatic**	Sensor deployed	Raw real-time CSV raw data files automatically transmitted to Zebratech and then to our private AWS S3 object storage	Automatically transmitted by cellular network or vessel Wi-Fi from the deck unit to Zebratech, then to FishSOOP cloud server.	**Sensor Manufacturer**

Data collection and processing	**Process real-time data to QC'd IMOS NetCDF file format**	**Automatic**	Raw real-time data files	• QC'd datafiles in IMOS NetCDF format. • QC status file	• Automatically check the data for QC for each variable (temperature, depth, location and time). N.B. the location QC is dependent on the vessel fishing gear type.	**Data Scientist**
	Automated upload of real-time data to the AODN	**Automatic**	Processed real-time QC'd IMOS NetCDF data files	Processed real-time QC'd IMOS NetCDF files on the AODN incoming directory	• Upload data on the AODN incoming directory.	**Data Scientist**
	Send BUFR messages to the GTS	**Automatic**	BUFR messages delivered to the BOM FTP site	BUFR messages sent to the GTS by BOM	Send BUFR messages to the GTS.	**Data Scientist**
Data collection and processing	**Perform delayed quality control flagging [This step is still to be implemented]**	**Manual**	Sensor data	Delayed expert Quality controlled data files	• Manual quality flags are applied to the data according to the QC Best Practice. • Expert review of the failed QC status file.	**Data Scientist**
	Convert data to IMOS format NetCDF		Quality controlled data files in NetCDF format	Quality controlled delayed-mode data files in IMOS NetCDF compliant format	Run a Python script to create IMOS NetCDF compliant files.	**Data Scientist**
	Upload data to the AODN incoming directory		Quality controlled data files in IMOS NetCDF compliant format	Quality controlled data files in IMOS NetCDF compliant format uploaded to the AODN incoming directory		**Data Scientist**

	Automated data ingestion triggered, starting with compliance checks on data files	**Automatic**	Processed data files (NetCDF) IMOS and CF compliant	• Checks performed on content of NetCDF files	A python script is automatically triggered once a processed NetCDF file is in the AODN incoming directory. The script performs the following checks: • Check if the file is not corrupted. • Check if the NetCDF file is a valid Fishing Vessesls as Ships of Opportunity file If any of the above checks fail, the NetCDF file is moved to the error directory. If it passes all checks, the tasks below are performed.	**AODN Project officer**
	All files stored on AWS S3 object storage. NetCDFs made available through the IMOS THREDDS catalogue	**Automatic**	• Processed data files (NetCDF) IMOS and CF compliant	All NetCDF files stored on AWS S3 object storage and made available through the IMOS THREDDS catalogue and publicly available.	If NetCDF files are valid, they are then copied to the AWS S3 object storage. All files are then publicly available. NetCDFs are also made available on the IMOS THREDDS catalogue.	**AODN Project officer**
Data delivery through the AODN	**Create/update metadata record**	**Manual update**	NetCDF files	GeoNetwork record created and configured to support data discovery via the AODN metadata catalogue	• Create a metadata record with a new UUID. • Configure the newly created record (*e.g.* abstract, point of contact, parameters, timeframe).	**AODN Project officer**

Contact details (as at September 2024)

	Role	Name	Email address	Phone number
Ships of Opportunity - Fishing Vessels as Ships of Opportunity	**Facility leader**			
	Sub-facility	Moninya Roughan	mroughan@unsw.edu.au	+64 (0) 22046 6020
	Data officers	Veronique Lago	v.lago@unsw.edu.au	
	Project Officer	Matthew Irwin	matt.irwin1@unsw.edu.au	
	Technician	TBC		
AODN	**Project officer**	Laurent Besnard	Laurent.Besnard@utas.edu.au	(03) 6226 8570
	Project officer	Eva Coughan	Eva.Coughan@utas.edu.au	
	Data services team leader	Benedicte Pasquer	Benedicte.Pasquer@utas.edu.au	(03) 6226 1927

Supporting links

AODN portal: http://portal.aodn.org.au

AODN portal help page: https://help.aodn.org.au/
Data upload instructions: https://help.aodn.org.au/aodn-ftp-upload/ (contact AODN for access)

Fishing Vessels as Ships of Opportunity data on S3 server: https://data.aodn.org.au/?prefix=IMOS/SOOP/SOOP-FishSOOP/
Fishing Vessels as Ships of Opportunity THREDDS server: https://thredds.aodn.org.au/thredds/catalog/IMOS/SOOP/SOOP-FishSOOP/catalog.html
Fishing Vessels as Ships of Opportunity (real-time) metadata record: https://catalogue-imos.aodn.org.au/geonetwork/srv/eng/metadata.show?uuid=bdb84466-dc53-49ad-a60f-83d9fa0baed5

IMOS user code library: https://github.com/aodn/imos-user-code-library
Fishing Vessels as Ships of Opportunity script to process real time mode data on GitHub: https://github.com/metocean/moana-qc

IMOS website: http://www.imos.org.au/

Fishing Vessels as Ships of Opportunity sub-facility web page: https://imos.org.au/facility/ships-of-opportunity/fishing-vessels-as-ships-of-opportunity