Agenda

Purpose:

To help organisations who would like to apply for an AGO Labs project understand the drivers behind the program and the individual challenges.

Agenda:

1. Introduction to FrontierSI and AGO
2. AGO Analytics Labs vision
3. Challenge topics explained
4. Live Question and Answer

FrontierSI

FrontierSI is a social enterprise focused on anticipating and solving big problems using our space and spatial expertise.

SPECIALIST SPATIAL EXPERTISE

supported by a well-established multi-disciplinary team

EXTENSIVE COLLABORATIVE NETWORK

enabling us to rapidly build the best teams to maximise client outcomes

20-YEAR TRACK RECORD

delivering innovation and driving benefits across multiple industries

STRONG FOCUS ON DELIVERING IMPACT

through economic growth and improved environmental & social well-being

OUR VALUES

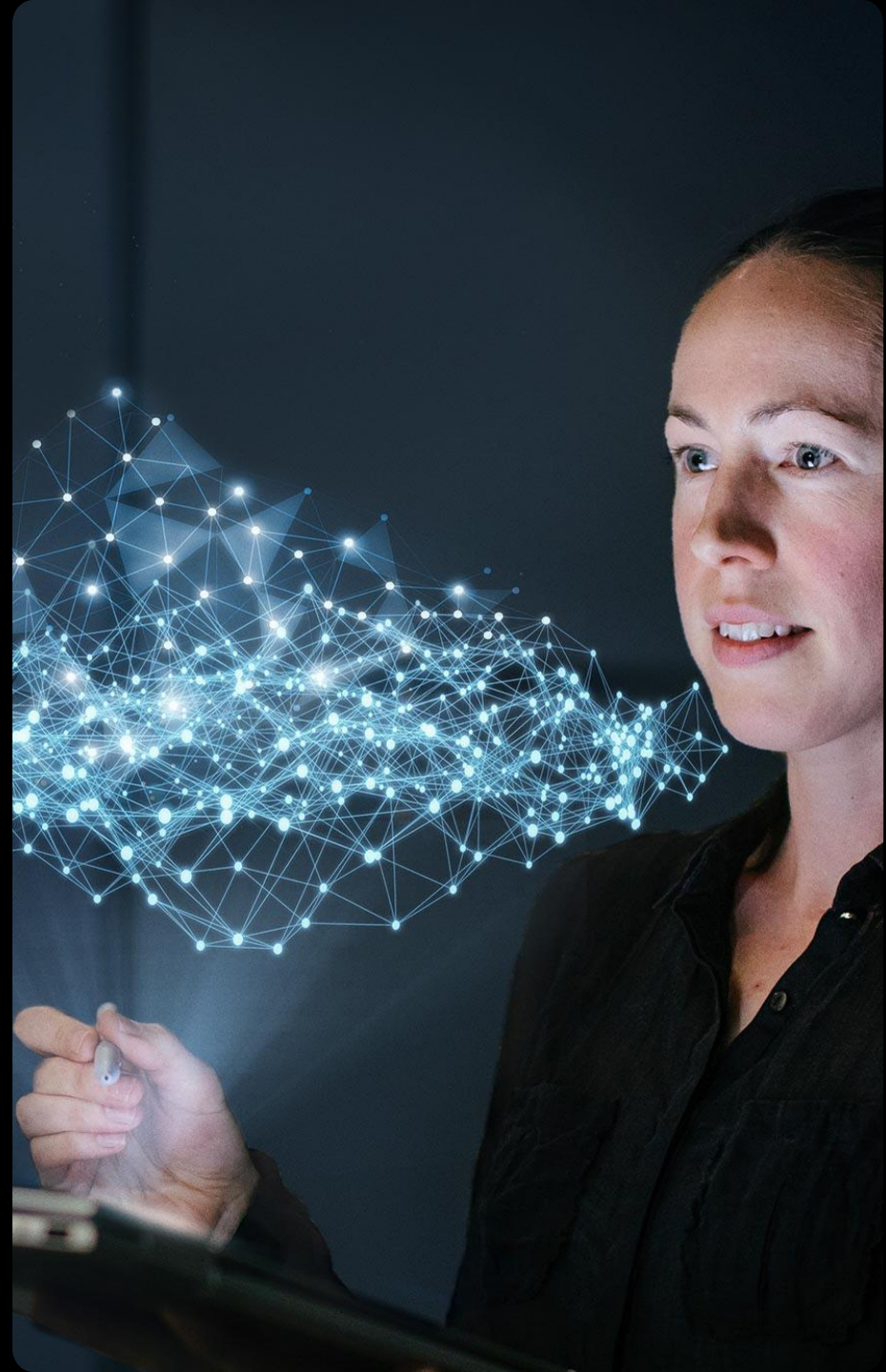
Communication

Agility

Integrity

Future-Focused

Collaboration



OUR CORE EXPERTISE

Positioning & Geodesy

To improve positioning technologies accuracy, reliability, and resilience.

Data Analytics

Turning rich data sets, and the location information linking them, into useable knowledge and actionable decisions.

Spatial Data Management

To improve the integration and maintenance of spatial data to make it discoverable, accessible and usable.

AGO is Defence's lead Geospatial Agency

AGO provides geospatial data, information and intelligence (GEOINT) for Defence and the National Intelligence Community, and strategic leadership for the Defence GEOINT Community.

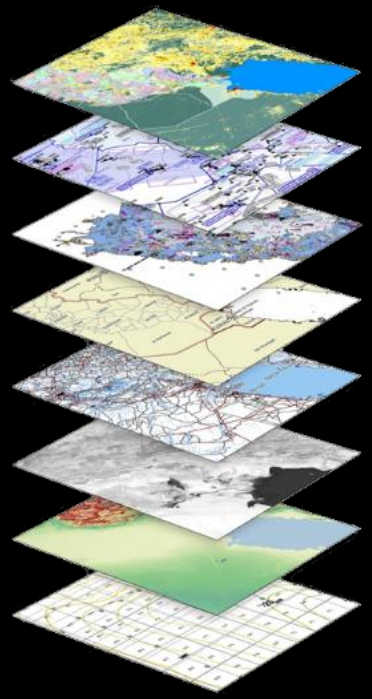
AGO also contains the **Australian Hydrographic Office**.

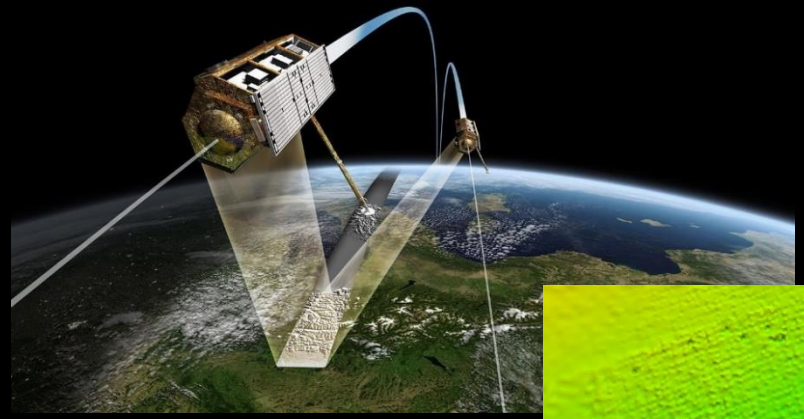
The AHO is Australia's maritime charting authority under the *Navigation Act 2012 (Cth)*.

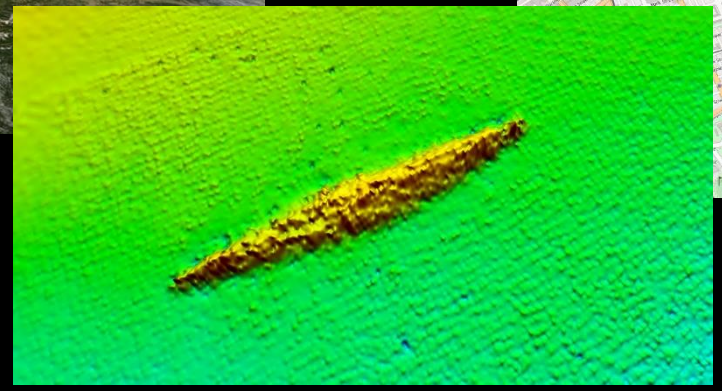
It provides official and authorised navigational charts, publications, and maritime data and services to the public, mariners and Defence.

What is GEOINT?

The term ‘geospatial intelligence’ (GEOINT) means the collection, analysis, and dissemination of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities in the air, land, maritime, and space domains.







GEOINT STRATEGY

MISSION

TO ASSURE AND DELIVER GEOINT CAPABILITY FOR THE DEFENCE OF AUSTRALIA AND ITS NATIONAL INTERESTS

VISION

TRANSFORMING DEFENCE GEOINT INTO AN INTEGRATED AND FUTURE-FOCUSED CAPABILITY

AGO Analytics Labs supports the key goals of the Defence GEOINT Community by:

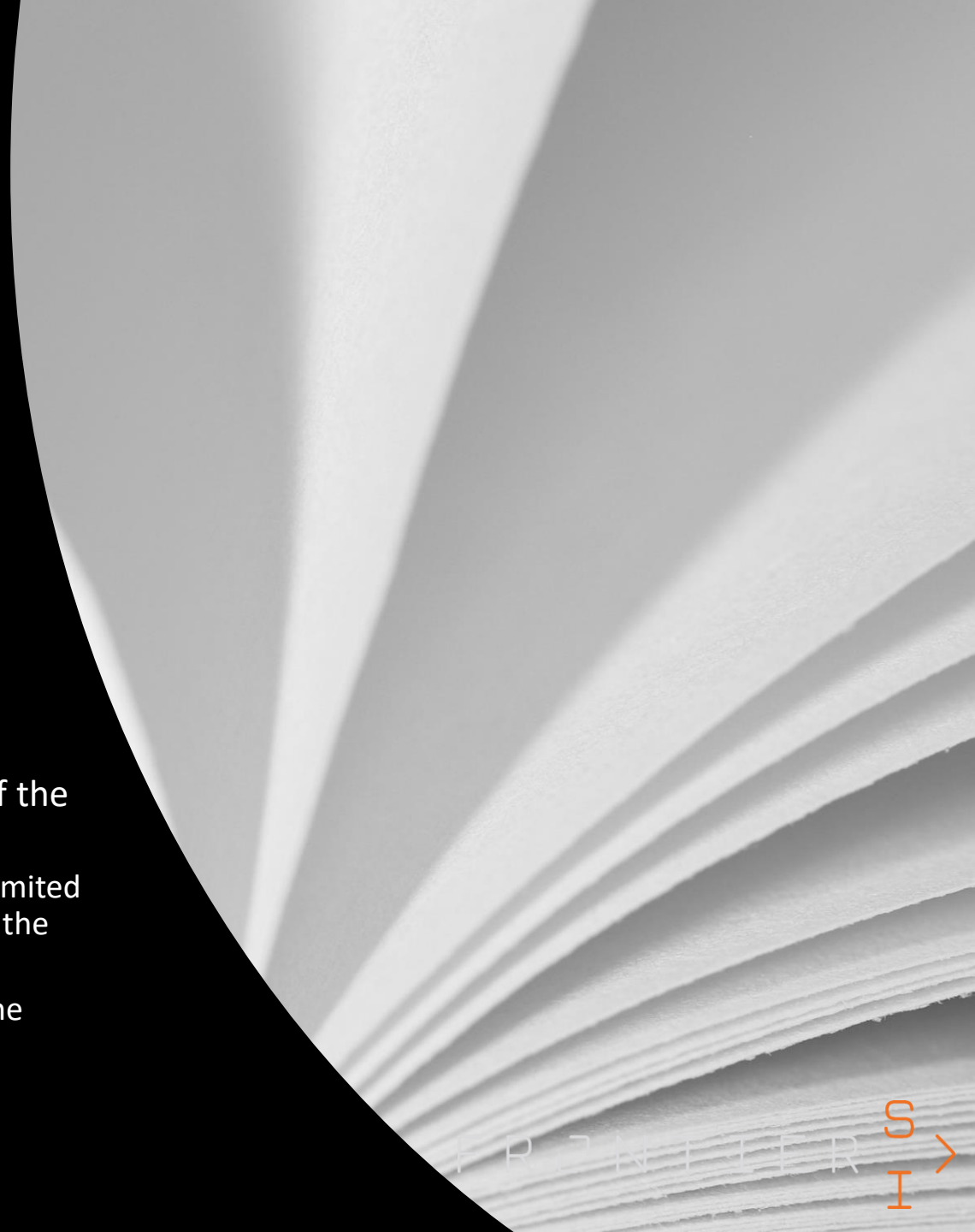
- Drive continuous GEOINT innovation. Evolve capability acquisition, science and technology that increase the rate of adoption of automation, AI and computer vision technologies.
- Strengthen GEOINT partnerships. Coordinated approach to developing purposeful, structured and outcome-oriented partnerships with industry and academia. Enhancement of existing Defence industry and innovation programs.

AGO Analytics Labs

- Challenge based approach to industry innovation and capability
- Utilise FrontierSI as engagement and management mechanism
- Focus on Machine Learning and analytics
- AGO Labs program tested in 2019 – 2020
- AGO Labs program extended 2021-2024

What AGO is looking for in a proposal

- Clear statement of proposal objectives
- Description of the timeframes, phases and deliverables
- Demonstration of innovative approaches to challenge topics
- Demonstration of modern methodologies
- Communication strategy of how AGO will be engaged
- Provision of a future vision of “next steps” after the completion of the challenge to further advance the technology
  - Additional funding may be provided to some projects to undertake limited operational testing – will be considered as a stage gate at the end of the Proof-of-Concept
  - Proposals should focus on the Proof-of-Concept stage, rather than the operational testing stage



What’s in it for you?

- Funding to demonstrate your technology
- Opportunity to demonstrate and present capability
- Quick turn around times dealing directly with FrontierSI
- Access to Defence Subject Matter Experts (SMEs)
- Marketing opportunities
- Access to advice and program management from FrontierSI

AGO Capability Challenges: June 2024

Hidden Waves

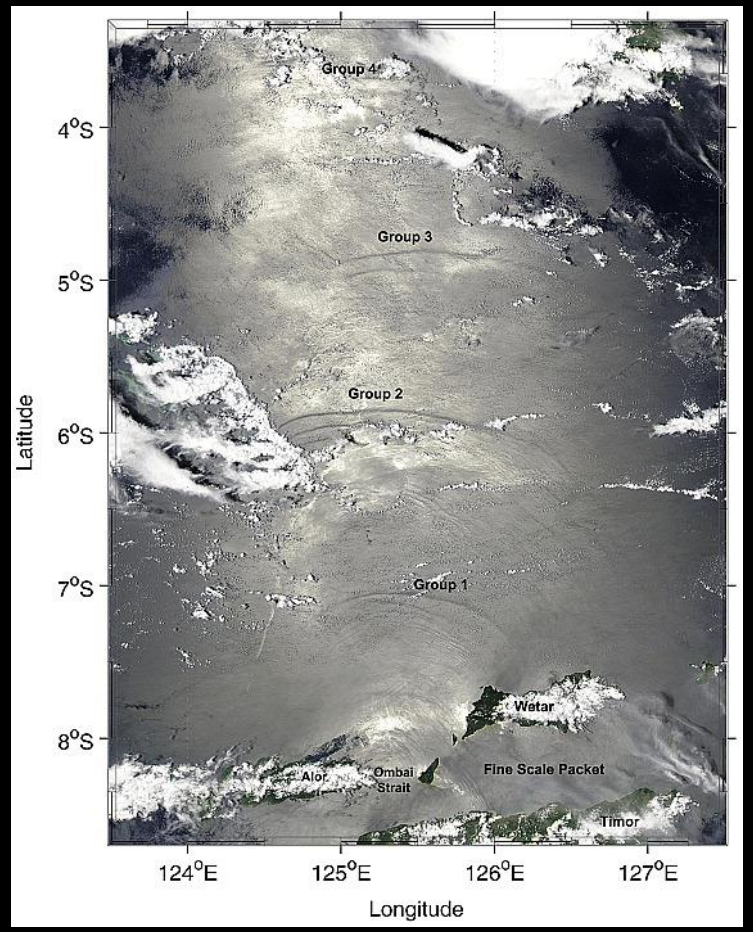
Depths of the deep blue sea

FRONTIER SI

Hidden waves

- This challenge aims to find the location of internal waves in the ocean – where they occur over time and in near-real time. The aim is to create a process that automatically identifies internal waves.
- Internal waves occur deep in the water column, and pose hazard areas for subsurface navigation. Developing more data on this phenomena will allow for validating modelling on how and where these waves occur, and being able to find them rapidly in the future.
- AGO is looking for innovative solutions that:
  - Identify potential data sources and techniques to identify internal waves. This could include the use artificial intelligence and machine learning (or other) techniques applied to earth observation data to automate detection of internal waves.

Hidden waves
Handy Hints



Open Source Research

- Internal wave detection using the Moderate Resolution Imaging Spectroradiometer (MODIS) - Jackson - 2007 - Journal of Geophysical Research: Oceans - Wiley Online Library
- Satellite altimeters for detection of oceanic internal waves (spie.org)
- Detection of solitary ocean internal waves from SAR images by using U-Net and KDV solver technique – ScienceDirect
- Remote Sensing | Free Full-Text | SAR Mode Altimetry Observations of Internal Solitary Waves in the Tropical Ocean Part 1: Case Studies (mdpi.com)

- Focus on **identification**, not numerical modelling.

Left side image: True-color MODIS image of the Banda Sea acquired on 24 February 2004 at 5:05 UTC. Four groups of internal waves are visible in the central sea radiating from a generation point in the Ombai Strait. Imaged area is approximately 450 km × 600 km

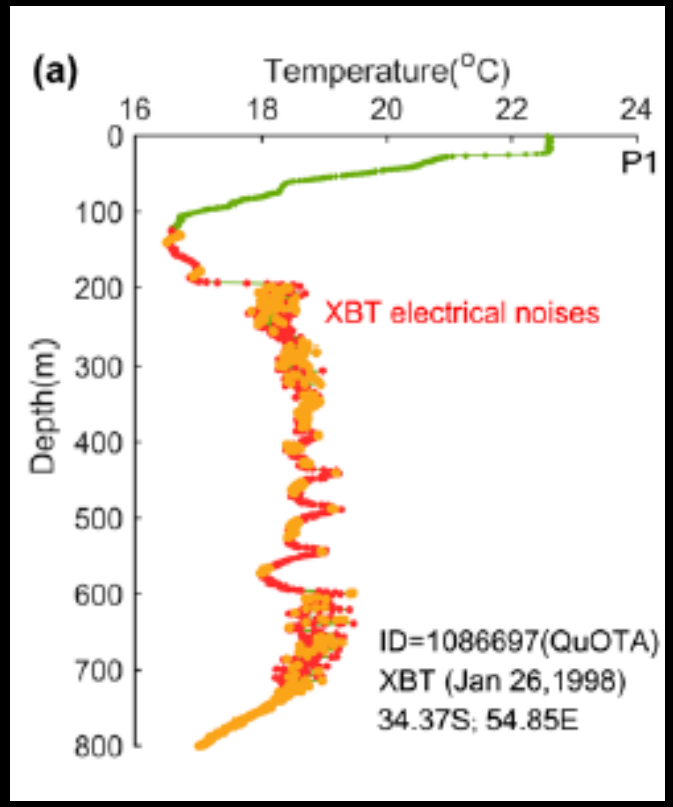
Hidden waves
Available datasets

- Data for this challenge is Open Source to allow for maximum scoping in answering the question.
- One data source is the Sentinel satellite constellation available from the ESA and various commercial cloud providers through their "Open Data" initiatives:
- Copernicus Data Space Ecosystem | Europe's eyes on Earth
- Sentinel-1 - Registry of Open Data on AWS
- Sentinel-2 - Registry of Open Data on AWS
- Sentinel Collections in Earth Engine | Earth Engine Data Catalog | Google for Developers
- Sentinel-1 Synthetic Aperture Radar (SAR) | Planetary Computer (microsoft.com)
- Sentinel-2 Level-2A | Planetary Computer (microsoft.com)

Depths of the deep blue sea

- This challenge aims to modernise the process and enrich observational data used to understand the water column.
- AGO is interested in ways to automate currently manual processes, and bring in new methods and/or new datasets to support better understanding of the water column
- AGO is looking for innovative solutions that:
  - Automate quality control of ocean profiles (such as from eXpendable Bathy Thermography or ARGO Profiles) in real time, leveraging existing manual processes and training datasets, to facilitate near-real time observations to be used within ocean modelling.

Depths of the deep blue sea
Handy Hints



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- Common XBT Faults
  - Hit Bottom
  - Wire Break
  - Wire Stretch
  - Temperature inversions
  - Unusual regional profile

- Looking for tools to combine real-time and delayed-mode QC.

Depths of the deep blue sea
Available datasets

- Data for this challenge will primarily be Open Source and is available from the Australian Ocean Data Portal or NCEP:
- Australian Ocean Data Portal: Open Access to Ocean Data (aodn.org.au)
- NCEP-GTS Marine Observations in BUFR format (noaa.gov)
- Data formats are NetCDF (delayed mode and real time) and BUFR (real time).
- BUFR Codes | World Meteorological Organization (wmo.int)
- Details on current QC methodology can be found at this links:
- The Argo Online School — Argo Online School (euroargodev.github.io)
- Australian XBT Quality Control Cookbook Version 2.1
- IQuOD Community Practices References (oceanbestpractices.org)
- ARGO: an international programme using autonomous floats ... (oceanbestpractices.org)
- A selection of non-QC'd data can be made available towards the end of the challenge to showcase the utility of the solution.

What do we need from you?

- Demonstrations of potential capabilities / techniques / approaches
- Insight into the challenges and opportunities of working with AGO
  - Technology related
  - Project related
  - Relationship related
- Flexibility and openness to help AGO try new things
- Technology that has a potential path to operational use
- Lessons learned to improve the program in the future

So what next?

CALL FOR PROPOSALS

- M 17 June : Call for proposals opens
- W 26 June : Q&A webinar
- M 8 July 10am: Closing date for applications

ASSESSMENT OF PROPOSALS

- F 26 July: Successful projects notified

CAPABILITY DEMONSTRATOR PROJECTS

- F 9 Aug: Contracting and project kick-offs completed
- F 29 Nov 2024: Final Presentations and Report submitted, project closure
- Projects delivered by F 29 Nov (4 months)

Questions and Answers

Please raise your questions in the zoom Q&A window

More information:

w: https://frontiersi.com.au/news-events/ago-analytics-labs-challenge-2024/

e: agolabs@frontiersi.com.au