Maritime

ESA COMMERCIALISATION GATEWAY

SPACE FOR BUSINESS
BUSINESS FOR SPACE

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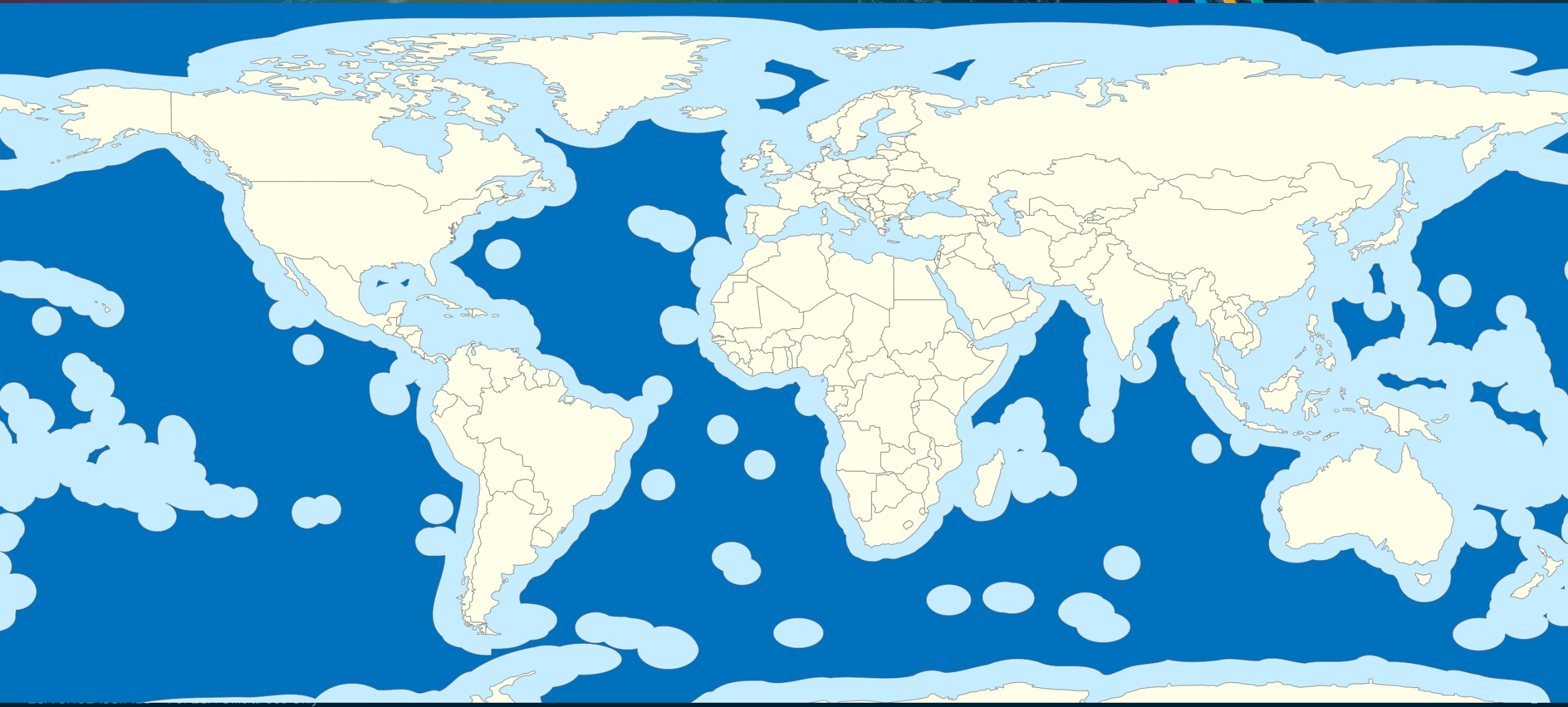
SPACE & MARITIME



→ THE EUROPEAN SPACE AGENCY

MARITIME CONTEXT

Economy: Maritime transport is the backbone of international trade and the global economy: around 90% of traded goods are transported by sea. As demand for global freight increases, maritime trade volumes are set to triple by 2050.

Emissions: Shipping is one of the most efficient transport modes, however it is still responsible for 2.9% of total greenhouse emissions. In 2018 IMO set the goal to halve GHG emissions by 2050.

Biodiversity: Maritime transport has an impact on marine ecosystems as it accounts for the largest source of introduction of non-indigenous species in Europe with ballast water (up to 25 %) and hull fouling (up to 21 %).

Pollution: Oil spills are one of the most concerning sources of marine pollution, oil spills can originate from deliberate operational discharges, from negligence, such as poor maintenance of equipment, or from the consequences of an accident or incident, such as a vessel collision or grounding or a pipeline rupture. Other forms of pollution from maritime transport, such as noise pollution, can also have serious consequences on the marine ecosystem.

Safety at sea: The sea remains a changing, challenging and perilous environment.
In 2021, 2854 ships were involved in casualties and accidents in EU waters, resulting in the loss of 14 ships, and 35 fatalities. With the digitalisation of ships, and increase in autonomy, cybersecurity is becoming a central element of safety at sea.

Illicit activities: freedom of navigation is a vital principle of international law. Society and economy can be affected by the impact of threats posed at sea such as piracy and armed robbery, terrorism, drug trafficking and trafficking in nuclear materials and firearms, human trafficking and migrant smuggling, waste trafficking and illegal activities in the fisheries sector.

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FOCUS AREAS

Maritime Safety and Security

Maritime Sustainability

Ports

Blue Economy

MAIN TOPICS/ OPPORTUNITIES

Maritime Sustainability

- Digital Time of Arrival
- Wind Assisted Propulsion
- Predictive Maintenance
- Ballast water management and invasive species
- Underwater noise pollution
- Emissions monitoring and verification
- Biofouling and antifouling
- Alternative fuels (Green hydrogen, ammonia, electricity, LPG, LNG)

Maritime Safety and Security

- Search and rescue
- Enhanced situational awareness
- MASS/USV integration into non segregated traffic
- Smuggling of goods, drugs, weapons, waste, and people
- IUU fishing
- Marine crime and piracy
- Unauthorised entry
- Tax evasion

Blue Economy

- Fisheries
- Aquaculture
- Coastal Management
- Offshore Oil and Gas
- Offshore renewable energy
- Marine Spatial Planning
- Offshore green hydrogen production
- Marine mining

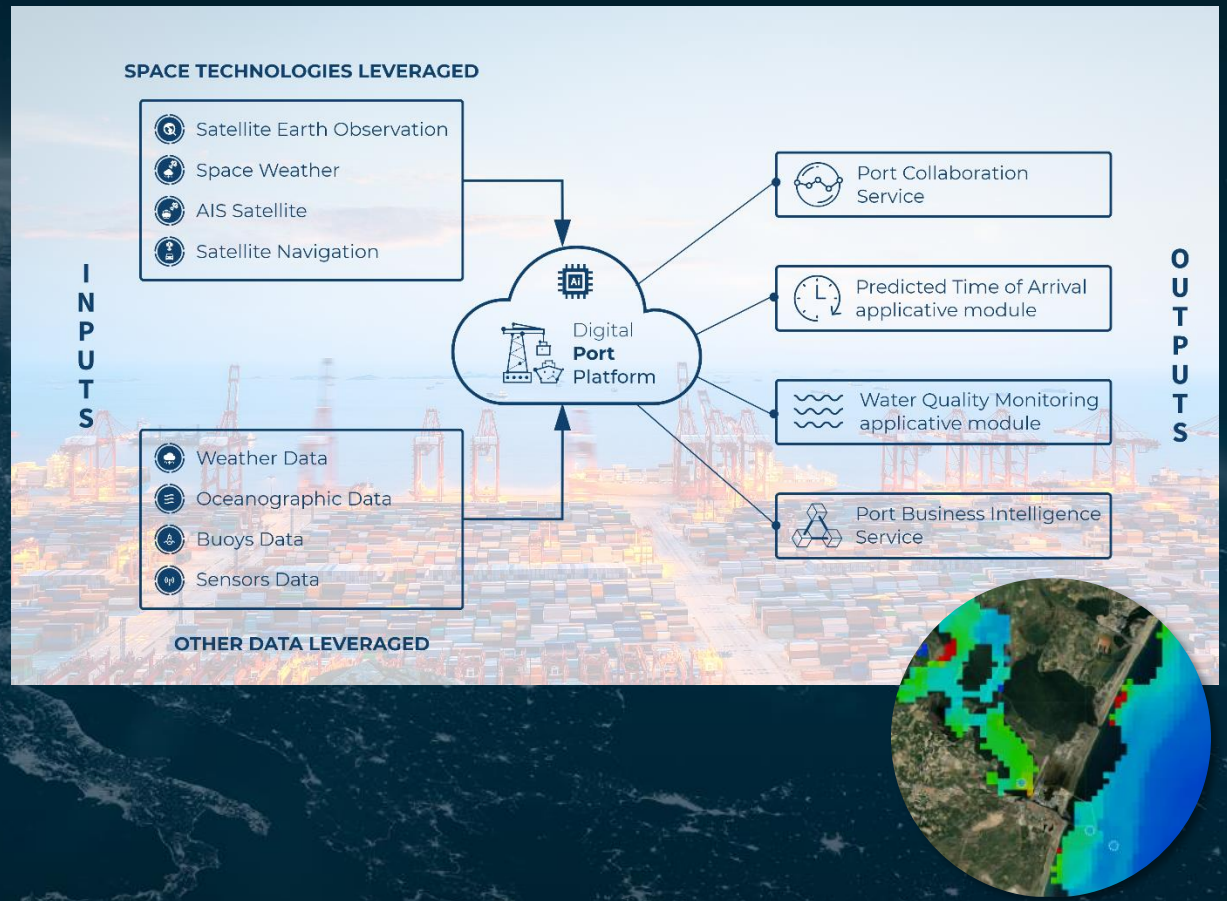
Ports

- Port Automation
- Digital and connected ports
- Sustainable dredging
- Port safety and security
- Enhanced intermodal logistics
- Port emissions monitoring
- Water quality prediction
- Optimised berthing

USE CASE – Digital Port Platform

The Digital Port Platform is built upon the SINAY-Hub and provides a set of modules to improve Port operations and reduce environmental footprint. The solution has 4 main axes:

- A Predicted Time of Arrival applicative module
- A Water Quality Assessment applicative module
- A Port Collaboration Service
- A Port Business Intelligence Service

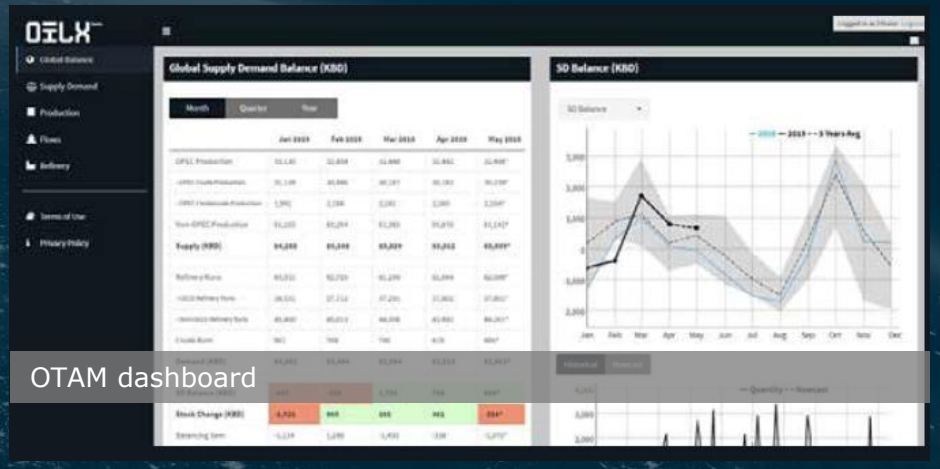


USE CASE - OTAM

Oil Trading Analytics Monitor is the first platform to deliver real time, independent, unbiased, and validated insights on the oil production chain including oil field productions, tanker shipment and refinery phases.

- Innovative fusion of SAR, AIS, VIIRS, and national statistics.
- 19 countries monitored covering 57 million barrels of oil daily.
- Media coverage by the Washington Post, Forbes, Financial Times, Bloomberg, Reuters, Business Insider, TheBanker, Anadolu, Petroleum Economist, OilPrice.com, Euronews.

Tank level derived from SAR data



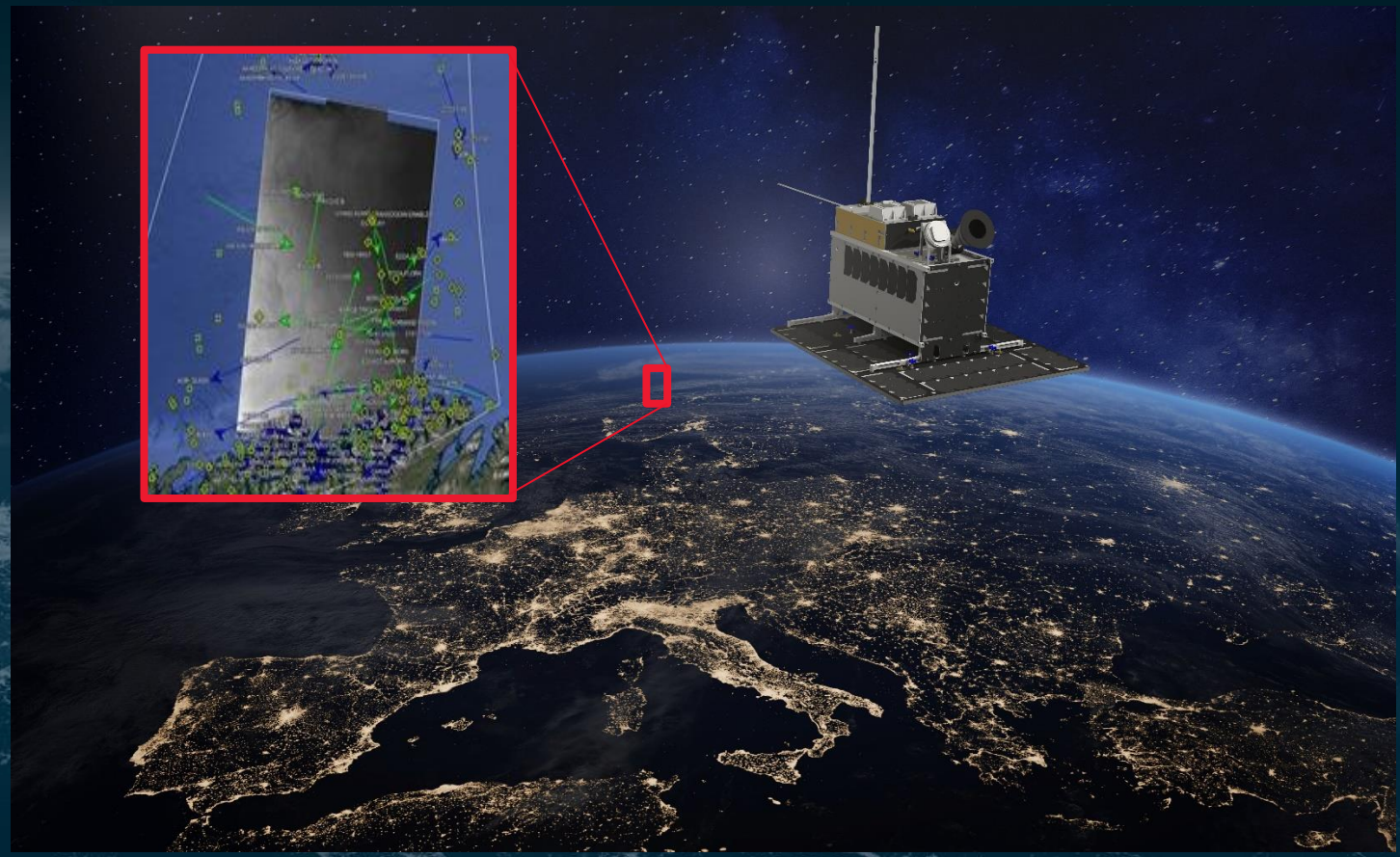
OTAM dashboard

- Sentinel 1 data is used to derive tank levels.
- VIIRS data is used to detect flaring in refineries
- AIS data is used to track global oil movement

USE CASE – RAMAR

RAMAR - KSAT, together with Norwegian Defence Research Institute (FFI), and the company Kongsberg Norcontrol (KNC): Fusion of space based AIS, SAR and RF data into the existing KSAT vessel detection service chain using SAR and AIS/LRIT data.

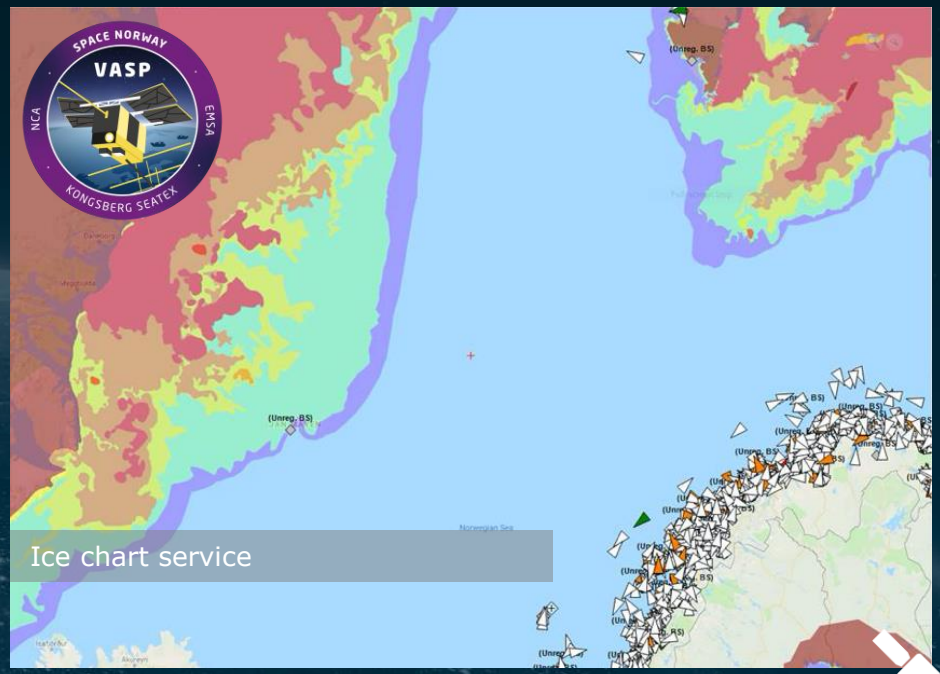
KSAT
KONGSBERG SATELLITE SERVICES



USE CASE - VASP

VDE-SAT Applications and Services Platform is a VDES platform targeting the services that the International Maritime Organization (IMO) has defined in the Maritime Service Portfolio (MSP).

- VDES is an affordable satellite communication system that evolves from the AIS standard.
- VDES facilitates digital information exchange in small, simple user terminals.
- VASP has demonstrated three services with NorSat-2:
  - ➢Search and Rescue coordination service
  - ➢Ice chart distribution service
  - ➢Mandatory reporting System (MRS).

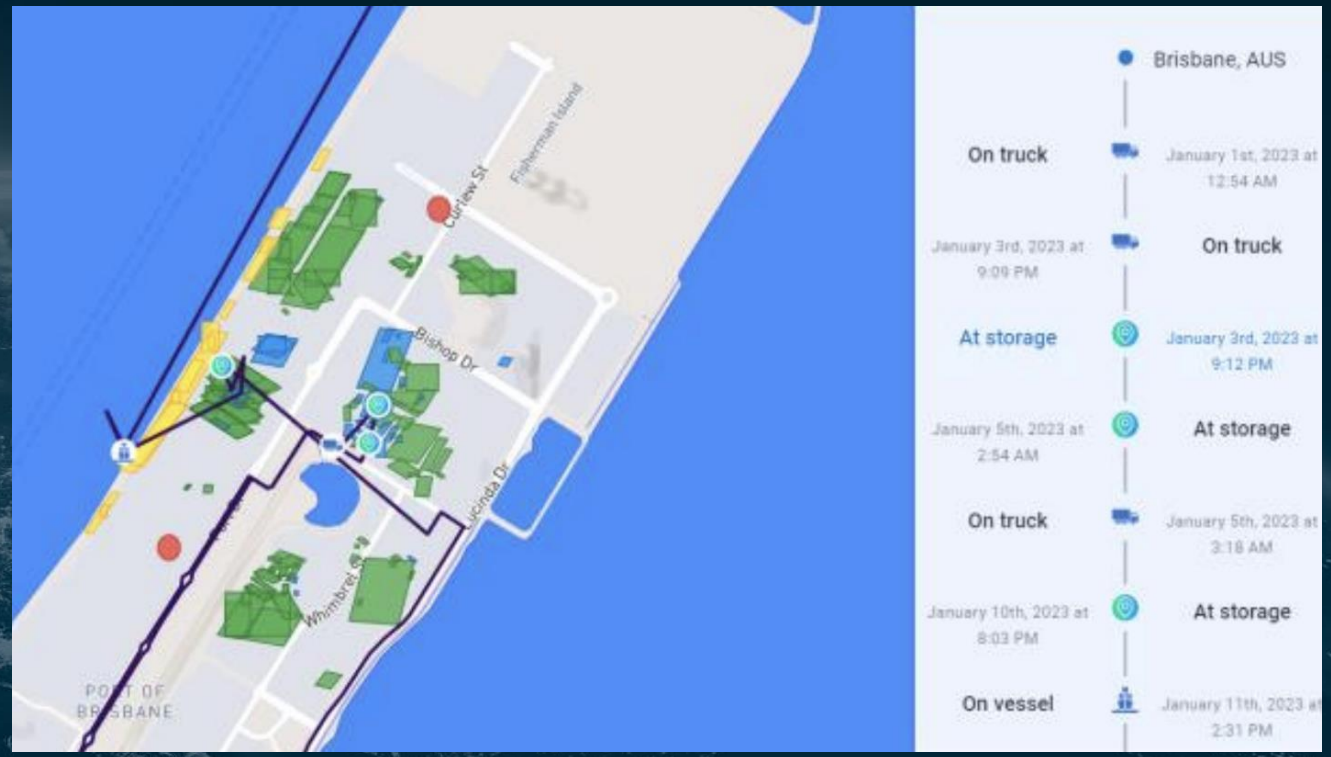


- NorSat-2 is used for the reception and emission of VDES messages.

USE CASE – REEFERPULSE

REEFER PULSE – Leverages AI to enhance supply chain operations and reduce risk by quantifying real-time events based on their locations within the supply chain.

- Over 1000 maritime terminals geofenced.
- Catalogue of over 100.000 polygons
- Locate container mishandling
- Pinpoint unauthorised door events



SATCOM APPLICATIONS

UTAS

User segments

TASK

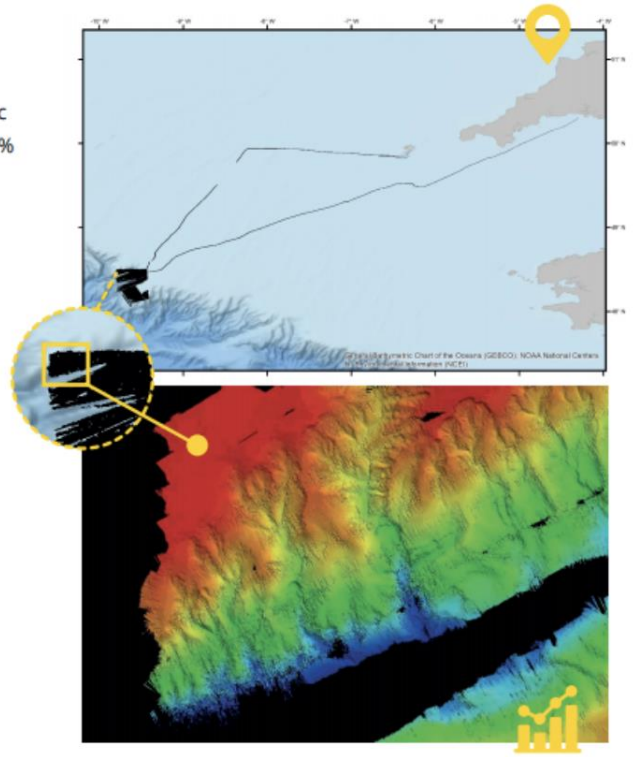
Ensure collection of high-quality multibeam data, using a Kongsberg MBES mounted on a USV, for an uncrewed Atlantic survey mission contributing to the goals of Seabed2030 - 100% of the ocean floor mapped by 2030.

LOCATION

Europe's continental margin in water depths ranging from 4.9-1362.5 metres.

KEY STATS

- **22** days offshore
- **24/7** remote operation from UK control centre
- **1200** 1200+nm travelled
- **1.5** billion data points gathered
- **1000** 1000+km2 ocean floor mapped
- **391** hours of survey data collection

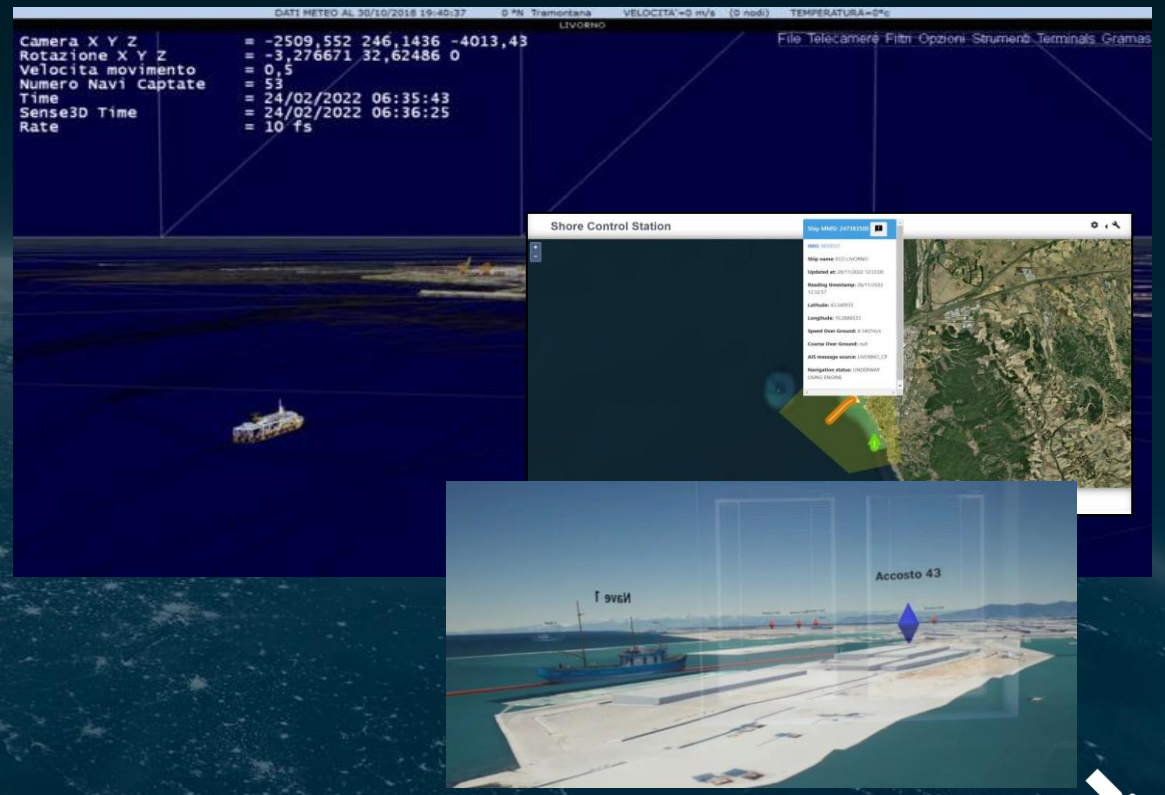


SEA-KIT

- SEA-KIT uses satcom connectivity to extend the USV range beyond radio contact.

USE CASE – 5G MASS

5G MASS is digital platform shared between ship and the port to enable an assisted and autonomous navigation in port waters, predicting the manoeuvring path of a ship approaching the port and docking, and adopting mitigation actions against eventual malfunctions and failures occurring onboard and ashore.

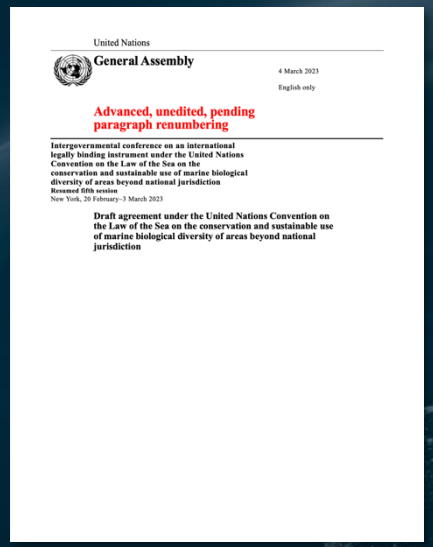


- 5G MASS uses terrestrial and satellite 5G networks to guarantee connectivity during autonoumous operations in ports.

Regulatory Framework

Regulatory tailwinds

- 2023 – IMO MEPC 80
- 2023 – UN High Seas Treaty
- 2024 – IMO Non-Mandatory MASS Code



United Nations

General Assembly

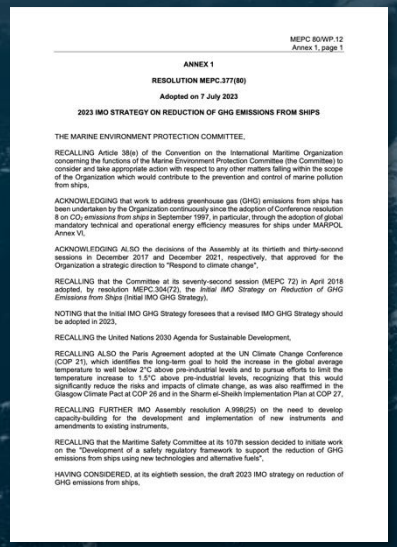
4 March 2023

English only

Advanced, unedited, pending paragraph renumbering

Intergovernmental conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction
Resumed fifth session
New York, 20 February–3 March 2023

Draft agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction



MEPC 80/WP.12
Annex 1, page 1

ANNEX 1

RESOLUTION MEPC.377(80)

Adopted on 7 July 2023

2023 IMO STRATEGY ON REDUCTION OF GHG EMISSIONS FROM SHIPS

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) to consider and take appropriate action with respect to any other matters falling within the scope of the Organization which would contribute to the prevention and control of marine pollution from ships,

ACKNOWLEDGING that work to address greenhouse gas (GHG) emissions from ships has been undertaken by the Organization continuously since the adoption of Conference resolution 8 on CO_2 emissions from ships in September 1997, in particular, through the adoption of global mandatory technical and operational energy efficiency measures for ships under MARPOL Annex VI,

ACKNOWLEDGING ALSO the decisions of the Assembly at its thirtieth and thirty-second sessions in December 2017 and December 2021, respectively, that approved for the Organization a strategic direction to "Respond to climate change",

RECALLING that the Committee at its seventy-second session (MEPC 72) in April 2018 adopted, by resolution MEPC.304(72), the *Initial IMO Strategy on Reduction of GHG Emissions from Ships* (Initial IMO GHG Strategy),

NOTING that the Initial IMO GHG Strategy foresees that a revised IMO GHG Strategy should be adopted in 2023,

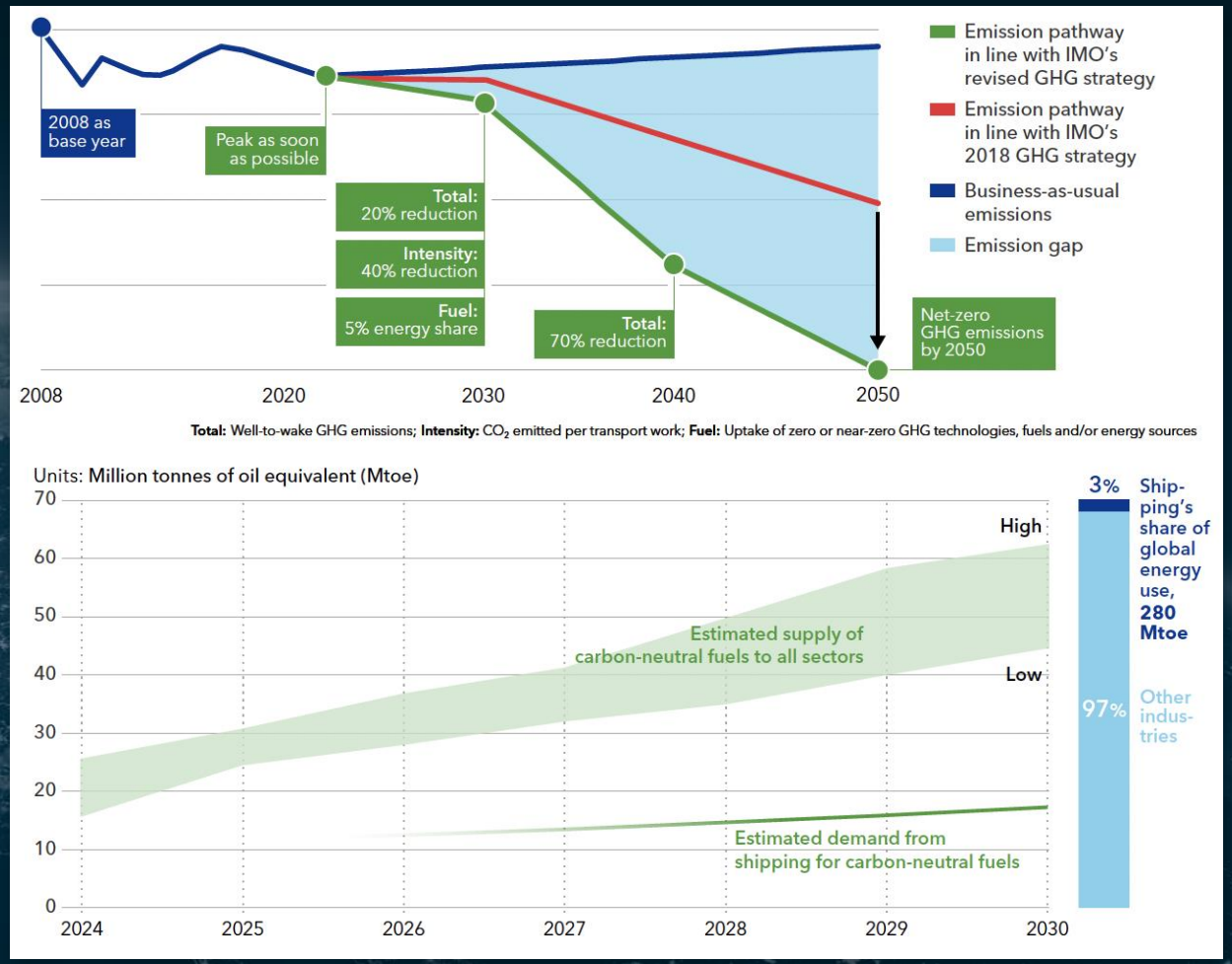
RECALLING the United Nations 2030 Agenda for Sustainable Development,

RECALLING ALSO the Paris Agreement adopted at the UN Climate Change Conference (COP 21), which identifies the long-term goal to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change, as was also reaffirmed in the Glasgow Climate Pact at COP 26 and in the Sharm el-Sheikh Implementation Plan at COP 27,

RECALLING FURTHER IMO Assembly resolution A.998(25) on the need to develop capacity-building for the development and implementation of new instruments and amendments to existing instruments,

RECALLING that the Maritime Safety Committee at its 107th session decided to initiate work on the "Development of a safety regulatory framework to support the reduction of GHG emissions from ships using new technologies and alternative fuels",

HAVING CONSIDERED, at its eighteith session, the draft 2023 IMO strategy on reduction of GHG emissions from ships,



Source: Maritime Forecast to 2050 DNV

Maritime Sustainability Task Force

Scope

Maritime sustainability is a complex, multidisciplinary and cross-sectorial domain, and as such the Task Force is open to all stakeholders that contribute to maritime sustainability. While there is a deliberate attempt to retain a wide scope, the sustainability mindset will act as common denominator and underpin the group's efforts.

CALLS ROADMAP

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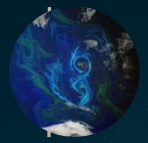
Services enabled by High Altitude Pseudo Satellites (HAPS) complemented by satellites



Atlantic Area KS

Ports of the future

Cyber security and space-based services

Decommissioning of Energy Assets

Unmanned Maritime Systems

RF Analytics

Plastic-Less Society

Space for smart and unmanned shipping

Marine Energy

Assessing the potential of Future Maritime Applications in the context of VDES

Space for decarbonisation of maritime transport

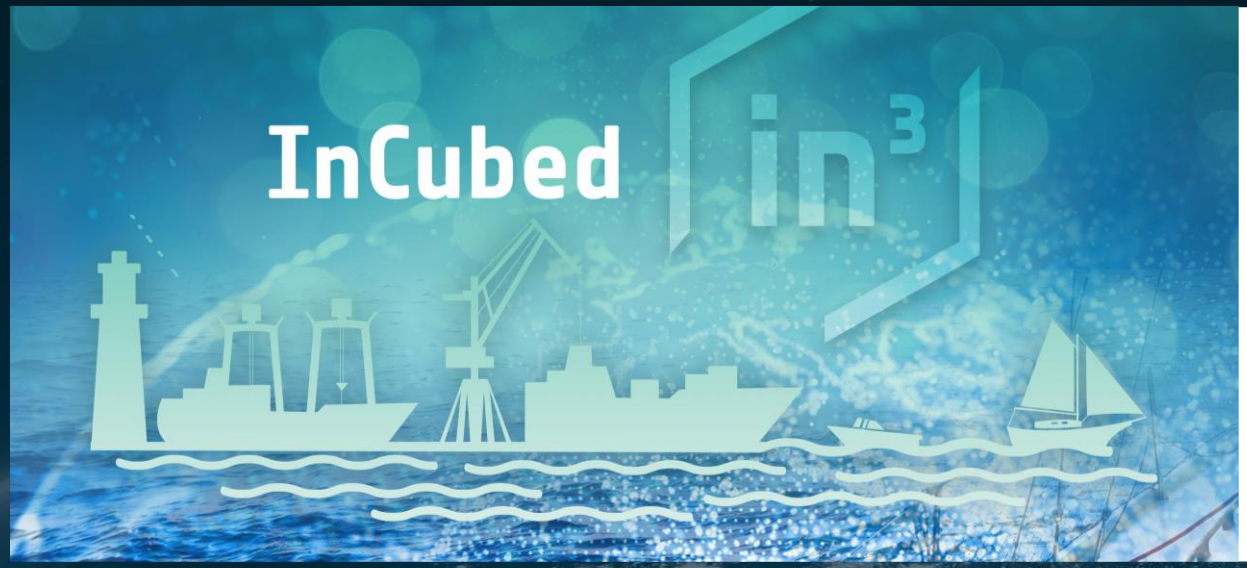
Satellite Connectivity for Maritime Autonomous Surface Ships (MASS)

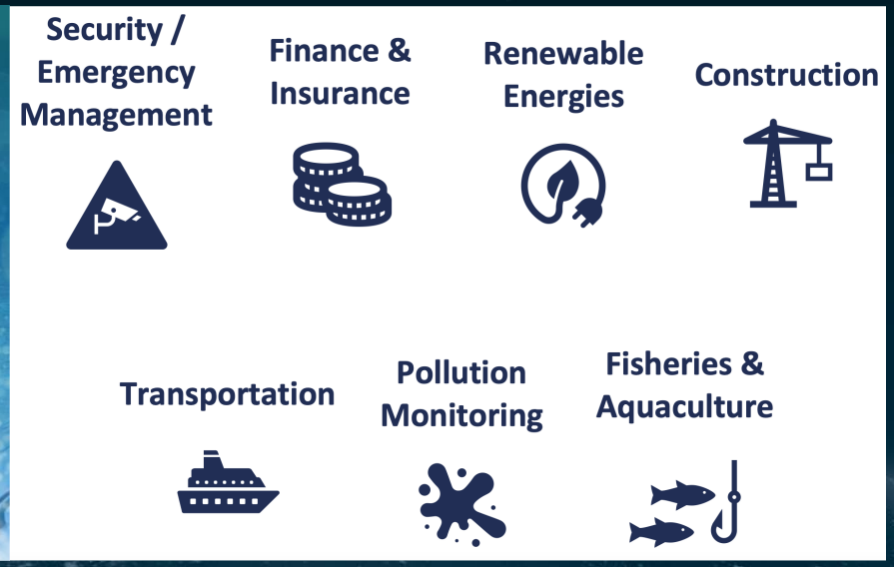
The Dark Side of the Earth

More to come...

2017 2018 2019 2020 2021 2022 2023 2024 2025

ESA Φ-lab – Incubed Maritime Thematic Call





Cycle	Main activities	Objectives
De-risking	Technical study, technical riskmitigation excluding any qualification or industralization	for all segments: system analysis, Business analysis, EM, breadboard of prototype of full to partial end-to-end integrated system
Product development	Development, qualification, verification, indusrialization and validation	Space: (E)QM or similar Ground/Data: verified product in a (pre)operational environment OPTIONAL: Validation of all segments in a (pre)operational environment

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Thank you for your attention!

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