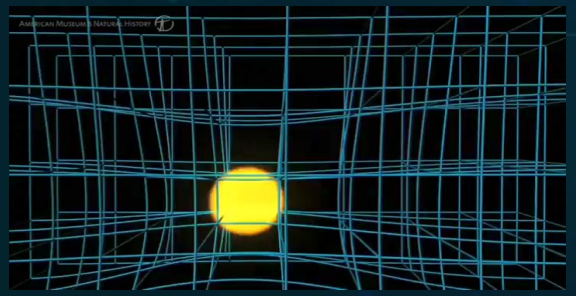
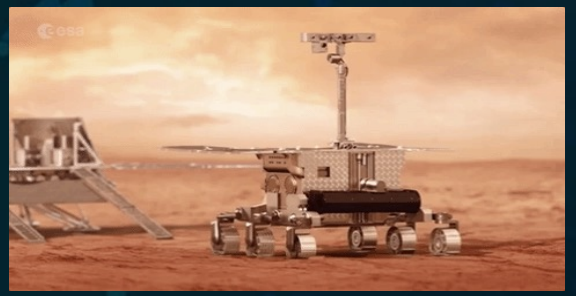
Space for Maritime Sustainability

→ THE EUROPEAN SPACE AGENCY

ESA Pillars

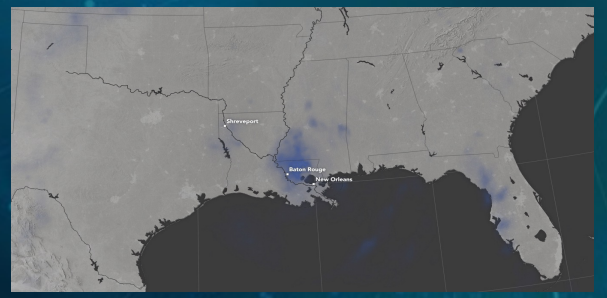
Science and Exploration



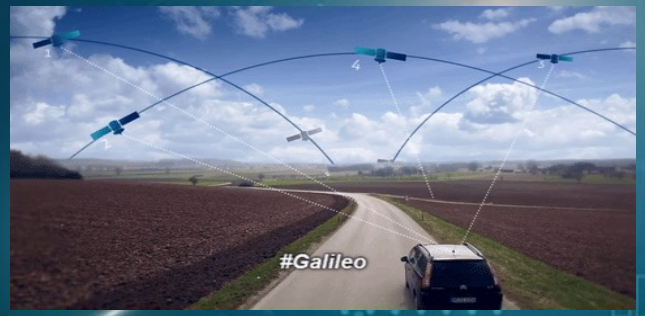


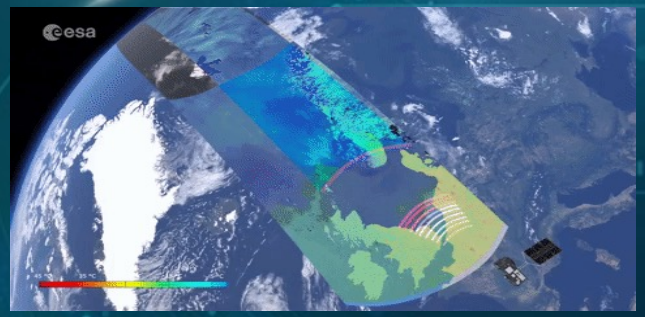
Enabling and Support

Safety and Security



Applications





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.

BASS Maritime Portfolio

100+

Projects over the last 10 years

16

Projects currently running

5

Projects in preparation

Focus of interest

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

Maritime sustainability

- Alternative fuels (Green hydrogen, ammonia, electricity, LPG, LNG)
- 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

Ports

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

Blue Economy

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

Maritime Sustainability Task Force

Maritime Sustainability Task Force

The focus of the Task Force is on enhancing the environmental sustainability of the maritime sector. This includes, but it is not limited to, measures that alleviate the impact of greenhouse gas emissions, air pollution, water pollution, noise pollution, and the spread of non-indigenous species.

- Promote developments
- Facilitate adoption and scale up.
- Establish partnerships
- Reach out to non-space communities
- Support pre-operational demonstrations

Maritime Decarbonisation Call

Fixed Call – Maritime Decarbonisation

Maritime is the most efficient form of cargo transport, yet the large volumes transported result in significant emissions of CO2.

Significant social, economic, and regulatory pressure to decarbonise.

- EU ETS
- IMO GHG Strategy (MEPC80)

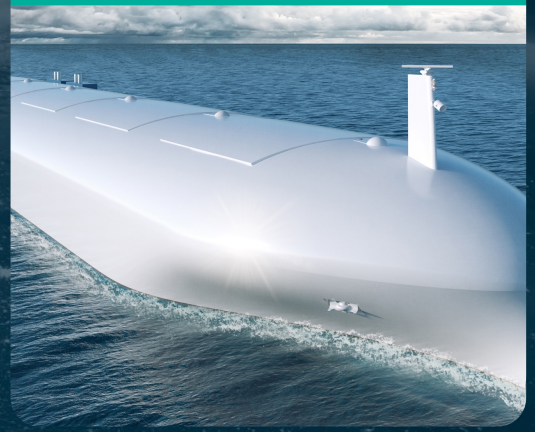
Complex and multifaceted challenge with No silver bullet.

Maritime Decarbonisation Call

Digitalisation and operations optimisation

Port decarbonisation

Decarbonisation through maritime autonomy



Green Fuels (well to wake)

COMMERCIAL APPLICATIONS OF SPACE-ENABLED ROBOTICS

Seeking innovative ideas at the intersection of robotic systems and space-based services…

- To exploit capabilities enabled by parallel advancements in robotics and space sectors (in terms of new technology, business models, and operational environments).
- ‘Robotics’ is here defined to include physical robots, autonomous drones, machines and vehicles, and precursory solutions or those that enable these (e.g. perception and navigation systems for autonomous vehicle services, connectivity solutions to enable tele-operated robotics, etc).
- Satellite technology/data can be integrated at the system or service level, or both.
- Open to feasibility studies and demonstration projects.

Kickstart: Blue Capital

Topics of relevance

- Coastal and Marine Ecosystem Monitoring
- Sustainable Aquaculture and Fisheries
- Blue Finance

Value of space and Potential applications

- **Satellite Navigation:** e.g. to track fishing boats to avoid activities like illegal fishing and encroachment on marine protected areas, demarcation of vulnerable ecosystems, geotagging of fish captures to provide proof of compliance to local and international regulations and enforcements, traceability for reliable certification and accreditation of fisheries and aquaculture produces.
- **Satellite Communications:** connectivity to remote locations not served by terrestrial connections, offshore aquaculture farms, marine protected areas etc., a tool for continuous, cost-effective monitoring and data gathering or real-time high-resolution video streaming of restoration efforts in combination with IoT sensors, drones and hybrid satellite and terrestrial communication systems.
- **Earth Observation:** e.g. to map changes in the marine ecosystems and protected areas relevant for investment and governing decisions, knowledge share and awareness raising, to explore and identify new marine activity hotspots, integration with AI to support monitoring and analysis of blue carbon, GHG emissions, effect of human activities on the local environment and so on

Thank you for your attention!

Nil Angli – Nil.Angli@esa.int

Business Applications and Partnerships Officer

European Space Agency