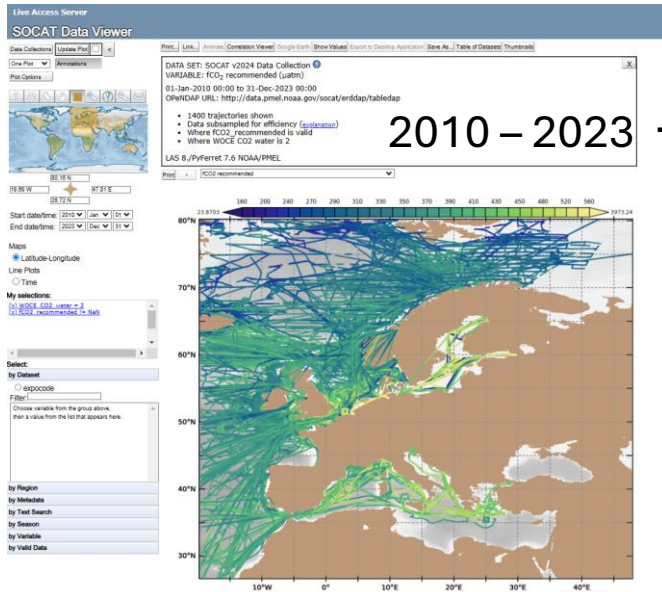


Enhancing pCO₂ Measurement on Research Vessels

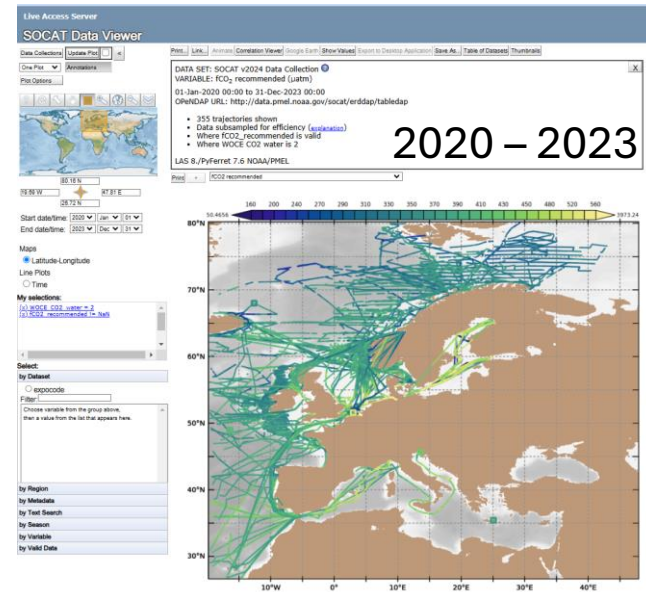
JPI Oceans Knowledge Hub - Ocean Carbon Capacities

18/19 Feb 2025

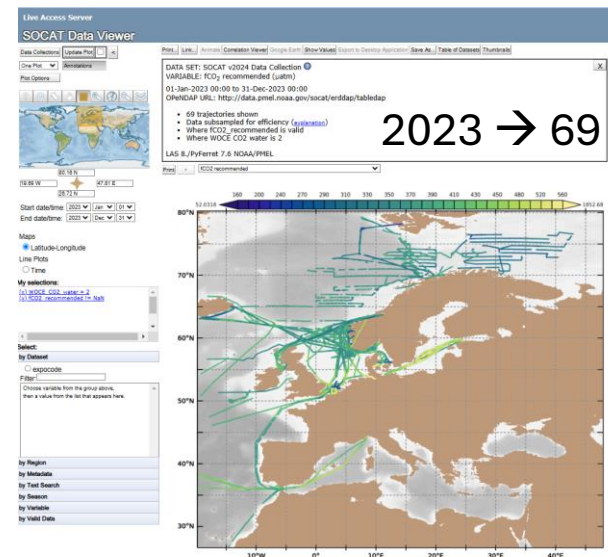
SOCAT Coverage of European Seas



2010 – 2023 → 100/year

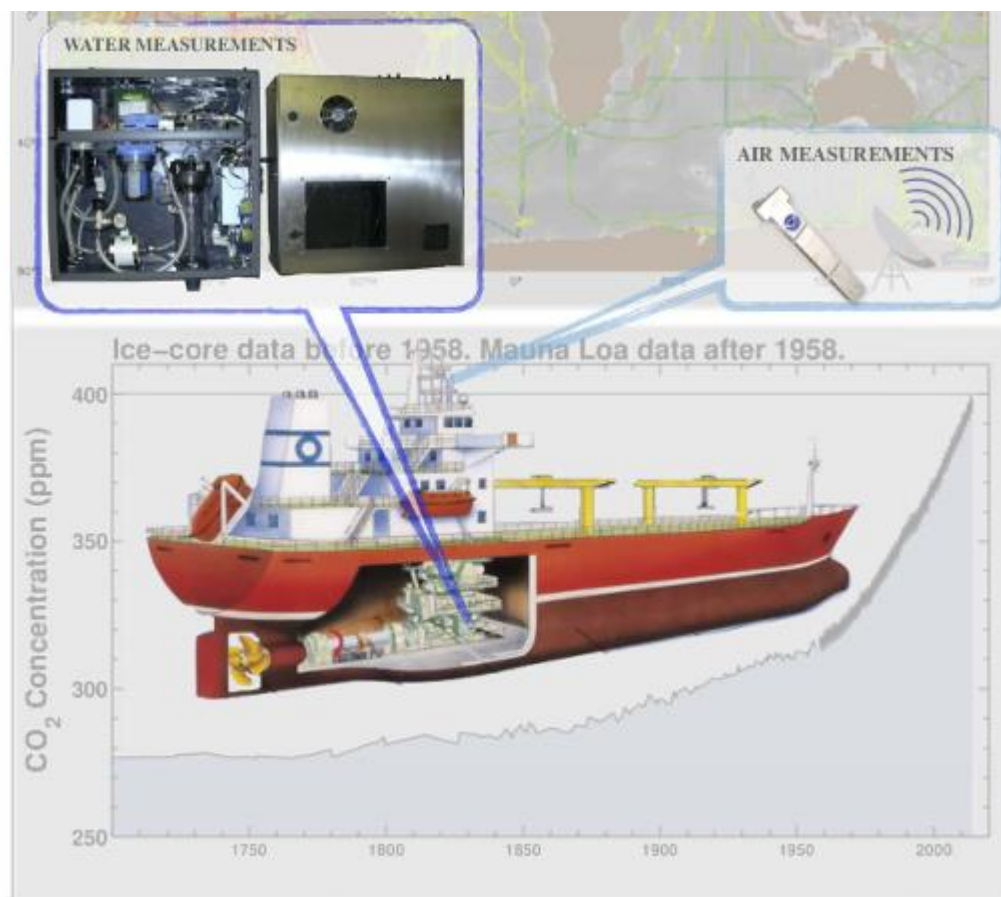


2020 – 2023 → 89/year



2023 → 69

2024 → 87 but only 1 fixed station in MED



- 1/8" stainless steel gas tubing
 - 1/2" Dekabon (Synflex) tubing
 - Data cable
 - Power cable (AC or DC)
 - Pressurized air
- 1 Water inlet
 - 2 Manual valve
 - 3 Safety valve
 - 4 Temperature sensor for intake temperature
 - 5 Anti fouling device
 - 6 Pump
 - 7 Thermosalinograph and/or manifold
 - 8 $p\text{CO}_2$ system – wet box
 - 9 $p\text{CO}_2$ system – dry box
 - 10 Main switch for pump
 - 11 Drain tank
 - 12 Outlet
 - 13 Inlet for outside air
 - 14 Deck box
 - 15 GPS antenna
 - 16 Iridium antenna
 - 17 Pressure inlet

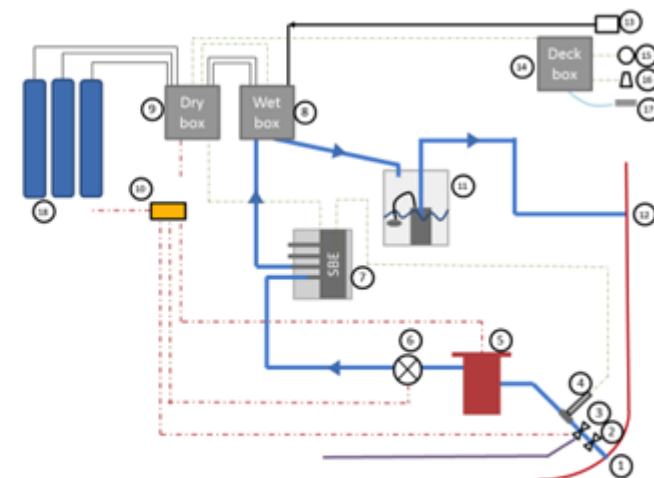


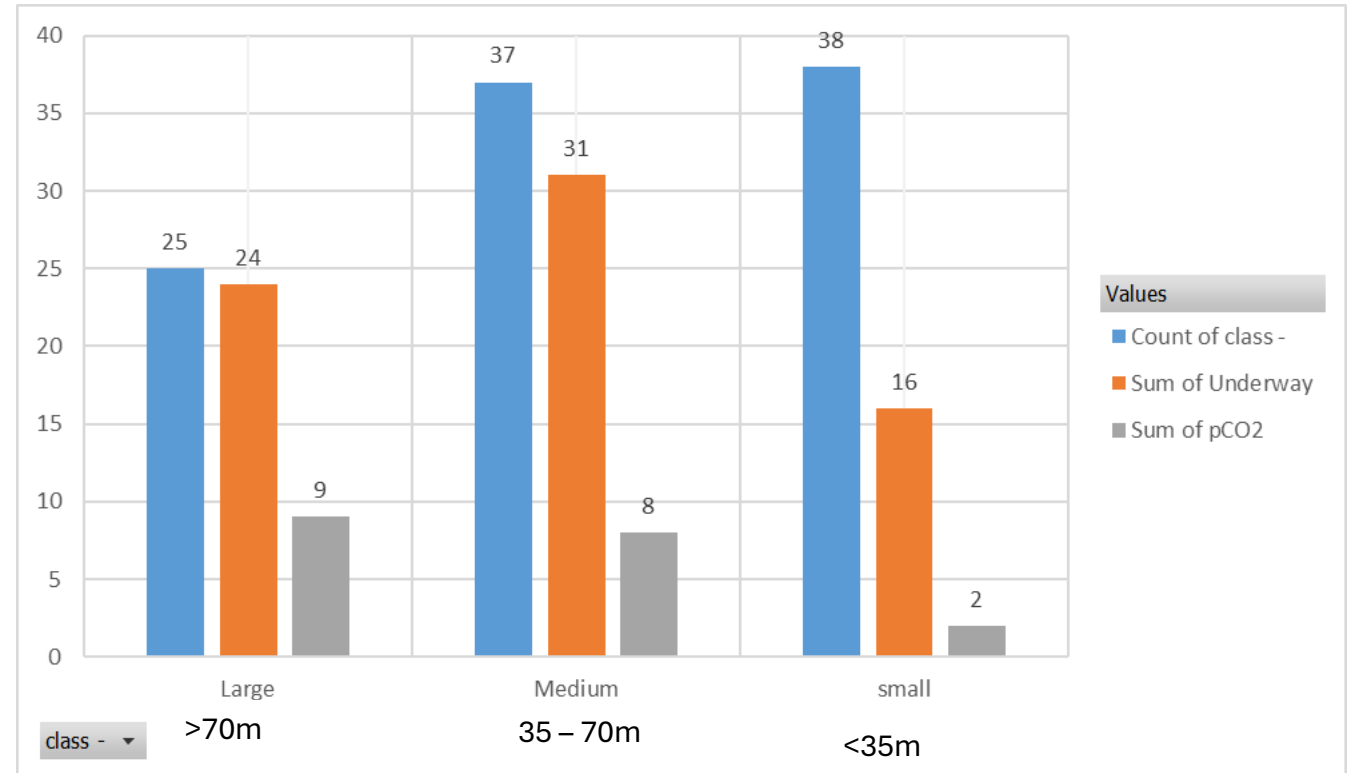
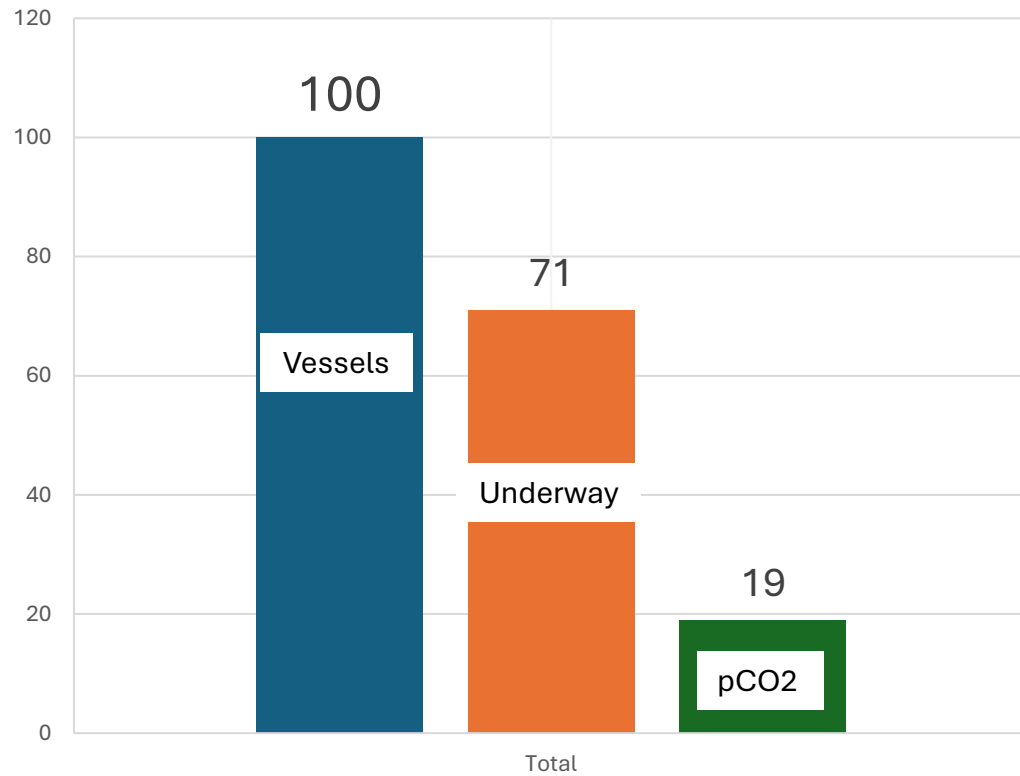
Figure 1. Schematic overview of the full installation of an autonomous underway $p\text{CO}_2$ system.



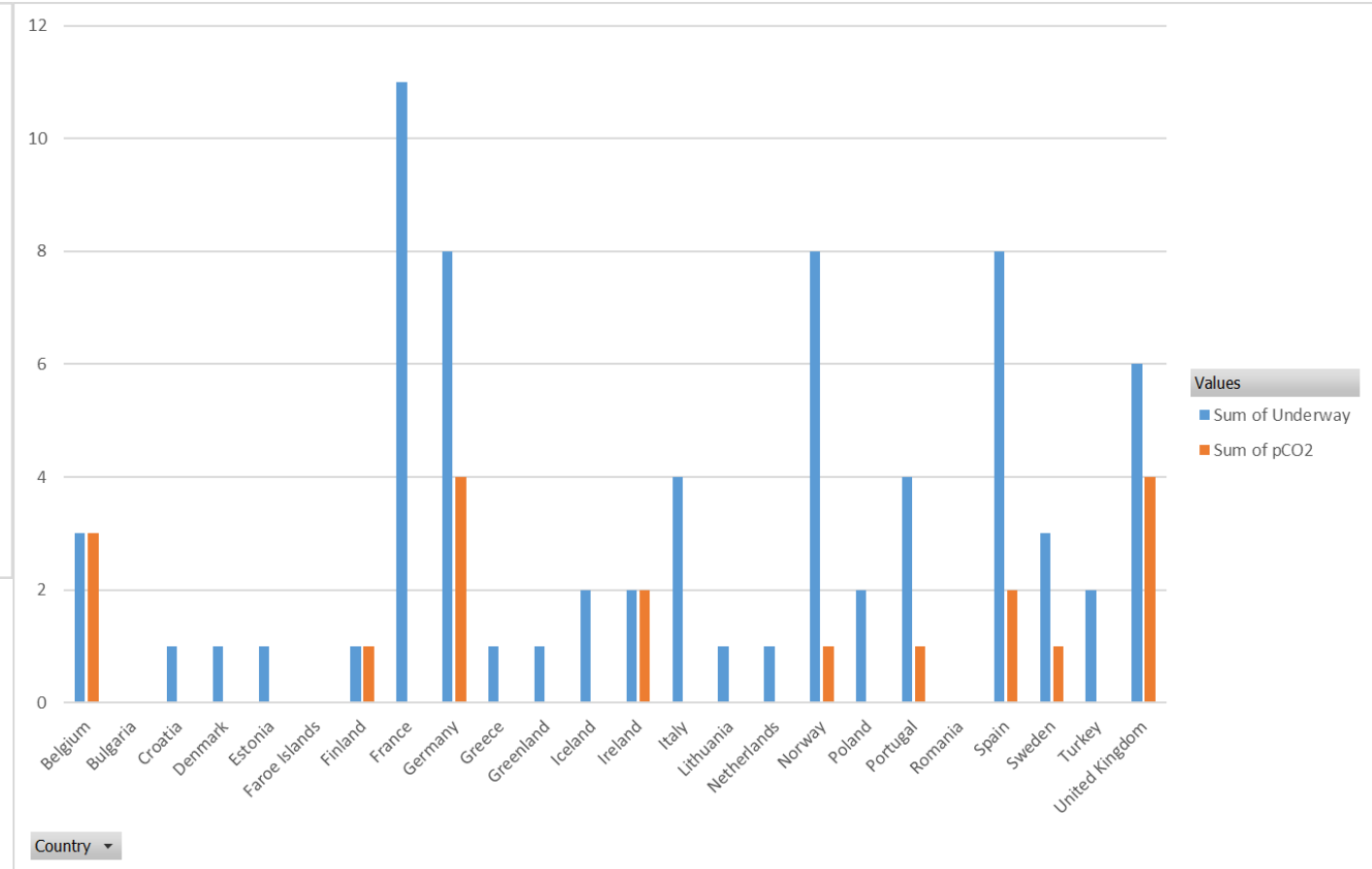
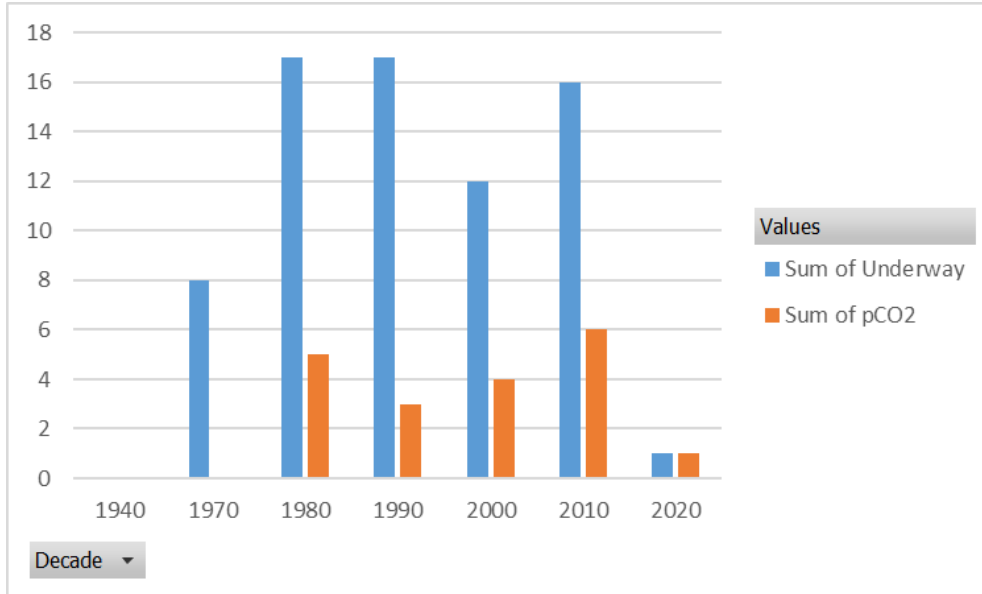
List of RVs

- RVs with CO2 capacity → system already in place
- RVs that can host CO2 sensors (i.e. UW system able to host a CO2 system)
 - Identify costs
 - Investment → (200 K)
 - Personnel → (1/2 – 1 FTE)
 - Operations → 10-15 K/year
- RVs that need a significant investment to be able to host a CO2 system
 - Same as above with added cost of UW system modifications

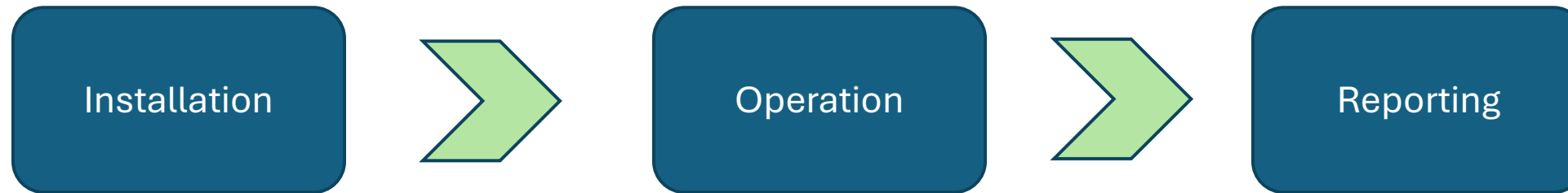
RV fleet pCO2: 2019



By decade and by country



Barriers



- **Political and Priorities –**
 - ☐ e.g lack of a clear legal requirement
 - ☐ Short term benefit
- **Funding:**
 - ☐ cost, capital vs operational
 - ☐ structural/access to funds
- **Technical Challenges**
 - ☐ Perception
- **Lack of Expertise**
- **Country specific –**
- ++



What can JPI Knowledge Hub do....?

- **Vision and advocacy** – Path to National funding
 - ☐ articulate the need – engage policy makers
 - ☐ Business case
 - ☐ Mapping infrastructure
- **Support?**
 - ☐ Expertise/Technical know-how
 - ☐ training (JPI funding?)
 - ☐ Cross-county collaboration
- **Leveraging Infrastructures and Collaboration:**
 - ☐ ERVO, ICOS, Aquarius, EuroGOSHIP.....

QUESTIONS

- What systems exist, and who holds the relevant expertise?
- What are the barriers to measurement? Beyond funding, are there other issues?
- How can these barriers be closed, particularly for countries outside specific research infrastructures?
- What are alternative approaches if barriers cannot be overcome?
- Which ministries and external expertise need to be involved?
- Which role could the JPI Oceans Knowledge Hub on OCC play (long-term perspective)?