# EUROFLEETS+ FINAL CONFERENCE

## TAlPro2022 Cruise in the western Mediterranean Sea on R/V BELGICA

K. Schroeder[1], M. Álvarez[2], M. Castrillejo[3], L. Coppola[4], S. Jacquet[5], A. Pallavicini[6], S. Retelletti Brogi[7], T. Tanhua[8] and all other cruise participants

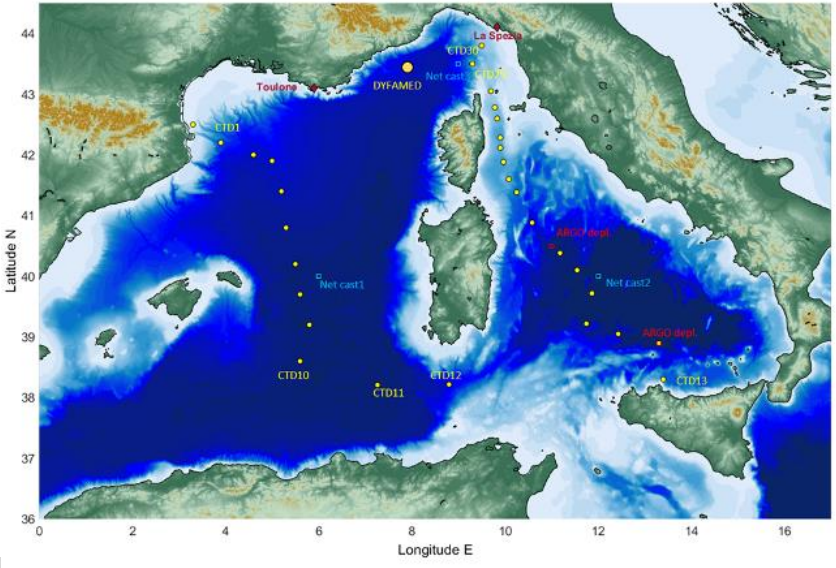
[1]CNR-ISMAR Venice (Italy), [2]CSIC-IEO Vigo (Spain) , [3]IC London (UK) , [4]IMEV-LOV Villefranche (France) , [5]MIO Marseille (France) , [6]University of Trieste (Italy), [7]CNR-IBF Pisa (Italy) , [8]GEOMAR Kiel (Germany)

# CRUISE DETAILS


TAlPro 2022 Cruise

Tyrrhenian Algero – Provençal Cruise 2022

24 full depth hydrographic stations




**17th May 2022**

**La Seyne sur Mer (France)**

**26th May 2022**

**La Spezia (Italy)**

# R/V BELGICA

**Silent Research Ship**
Diesel-Electric (AC) propulsion
(ABC – Rolls-Royce – Indar)
(twin screw – 5-blade – fixed pitch)
Research silent Class
–
Limited influence on environment &
Optimal acoustic platform

**Full Ocean Research Vessel**
71.4 m length, 16.8 m beam, 4.8 m draft
11 kn operational speed (max. 13+ kn)
North Sea, Atlantic Ocean, Mediterranean Sea
Instrumentation adapted to water depths of 5000 m
Ice Class for summer operations in Arctic areas

**Green Ship**
Waste-heat recovery
MARPOL TIER III
–
Energy efficient &
Low emission

**New Capabilities**
Dynamic Positioning Class 2 (DP-2)
(2 aft thrusters – 2 bow thrusters)
2 integrated drop keels
Hoppe roll stabilization System
12 crew – 28 scientists & marine technicians
(14 single & 13 double cabins)
30 day autonomy & 300 days at sea
–
Suitable for offshore research, survey & exploration

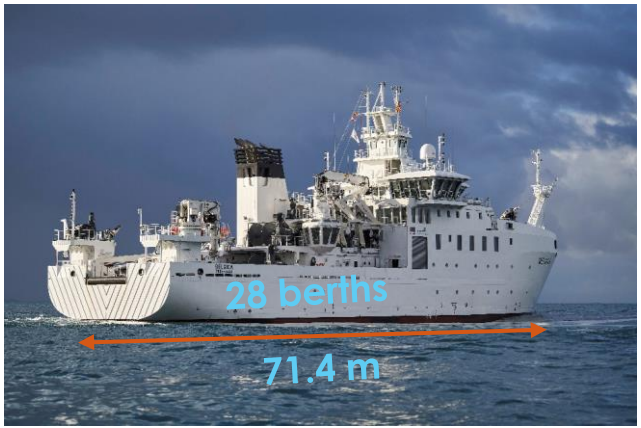
**Heavy Duty**
3 Cranes (fwd, mid, aft)
2 CTD Winches (stbd)
Multifunctional Winch (stbd)
Hydrographic Winch (aft/stbd)
2 Trawl Winches
Net Drum Winch
Split Net Drum Winch
Net Sonde Winch
2 Gilson Winches
CTD Gantry & LARS (stbd)
2 stbd T-frames
Aft A-frame
LARS incl. 15 m piston corer
7 m Work Boat
–
Able to deploy wide range of scientific gear up to 5000 m water depth

**More Space**
More than 400 m² of lab space
Wet Lab
3 Dry Labs
Wet and Dry Fish Lab
AUMS Lab
Aerosol Lab
Diver Store
Seismic Room
Scientific Lab
Operational Center
CTD hangar
Hangar
Crow's Nest
Cold & Freeze Rooms
Large aft & stbd decks
–
Adapted to the scientific needs for the coming 30 years

**Class: DNV-GL** ✠ 1A; ICE(1C); SPS; E0; DYNPOS(AUTR); COMF-V(2); COMF-C(2); BWM-T; TMON; Silent-R; NAUT(AW)

**Full Acoustic Underwater Instrumentation Suite**
Shallow (EM2040) and deep-water (EM304) bathymetric multibeam echosounders (600 m & 8000 m)
Parametric subbottom profiler (Topas PS18) (11000 m)
Scientific multibeam (ME70) & split-beam wideband echosounder (EK80) (>5000 m)
Omnidirectional fish sonar (SU90) (4500 m)
Net- and catch monitoring system (PX & FX80)
Underwater position-reference system (USBL) (HiPAP 502) (5000 m)
Acoustic Doppler Current Profilers (Ocean Surveyor 75 kHz & Workhorse 600 kHz) (1000 m & 50 m)
–
Mapping and analyses of full water column (incl. fauna), sea floor and subsurface

**Adapted to existing large European Marine Research Infrastructure**
Autonomous Underway Vehicles (AUVs)
Remotely Operated Vehicles (ROVs)
Unmanned Aerial Vehicles (UAVs)
3D seismic systems
Scientific sediment coring and rock drill devices
Storage space of 7 ISO 20' containers
–
A platform for European cooperation through which Belgian researchers get (free) access to large (and expensive) European marine research infrastructure



# OBJECTIVES



- detecting trends and variability in the Mediterranean Sea
- Repetition of the western zonal transects of Med-SHIP, 6 years after its first occupation in 2016 (EUROFLEETS2 TNA)
- Observations will be used to

1) measure the changes in the thermohaline properties of Mediterranean water masses at the basin-scale;

2) quantify the inorganic and organic dissolved carbon and dissolved oxygen storage in the western Mediterranean;

3) quantify the uptake of anthropogenic carbon in the Western Mediterranean;

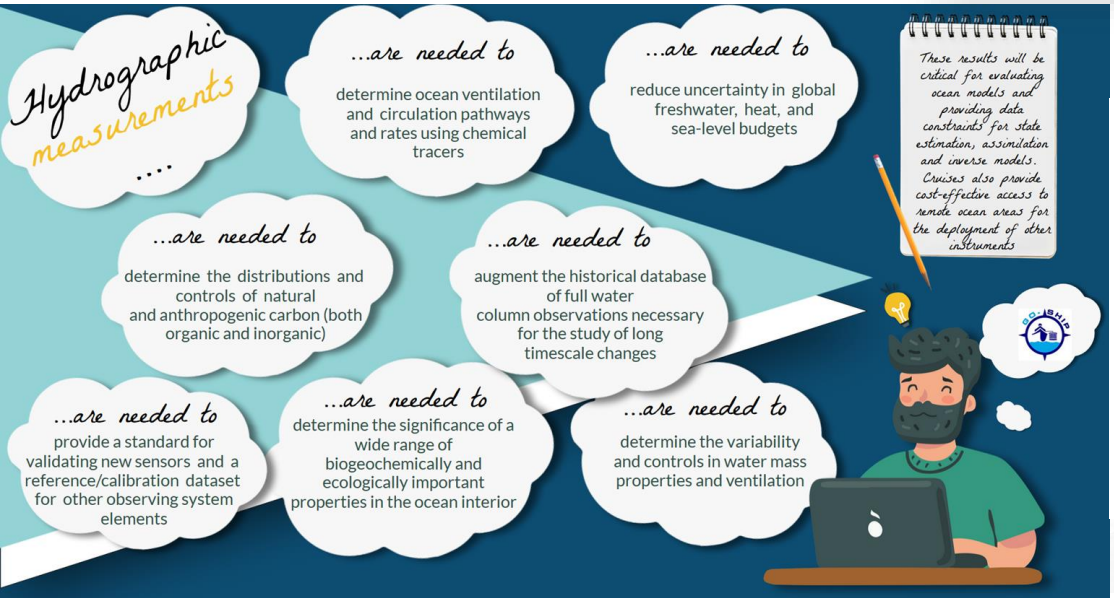
4) quantify changes in the ventilation of the deep and intermediate water masses thanks to the transient tracers (CFCs, $SF_6$, $^{14}C$, $^{129}I$, $^{236}U$);

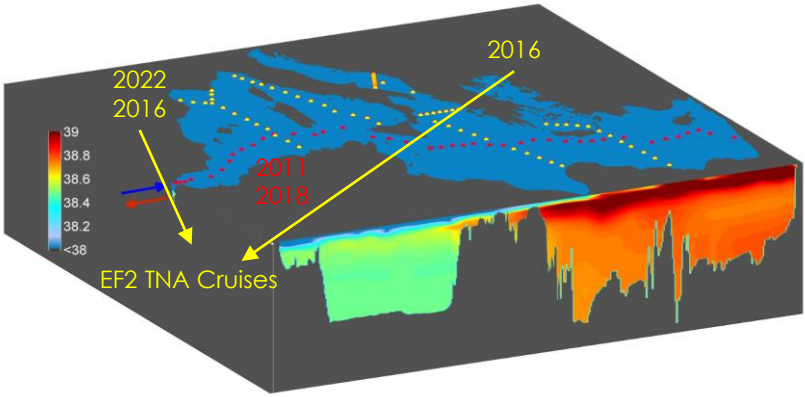
5) measure concentrations of nutrients (nitrate, phosphate, silicate) in the water column, their ratio and assess changes;

# Med-SHIP: Mediterranean contribution to GO-SHIP

Med-SHIP includes a low-frequency zonal transect (GO-SHIP line MED01), and a number of high-frequency meridional transects

| Level 1 | Level 2 | Level 3 (examples) |
|---|---|---|
| DIC, TA, pH (any two) | pCo2 | Chl, PP |
| CTD/LADCP | 14C | HPLC pigments |
| CTD oxygen | CCl4 | Experimental continuous analyzers (such as pH, DIC, and TAlk, and O2/Ar) |
| Bottle salinity | ∂13C of DIC | ∂15N |
| Nutrients by standard auto analyzer | DOC, DON | ∂18O of H2O |
| Dissolved oxygen | Fe/trace metals | NH4 |
| CFC-11, -12, -113, SF6 | CTD transmissometer | TOP |
| Surface underway (T, S) | Surface underway (pCO2, nutrients, O2, Chl, skin T) | Upper ocean optical properties |
| ADCP shipboard | ADCP shipboard | Isotopes of O2 |
| Underway nav and bathy | Underway nav and bathy | N2, Ar, O2 |
| Meteorological data | Meteorological data | |



# CRUISE PREPARATION

We issued two calls, partially with the support of CIESM, the Mediterranean Science Commission:

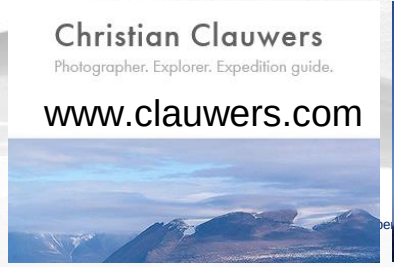
**«Scientist of opportunity»** offering a couple of berths for additional scientists, that were not part of the original proposal
- eDNA sampling (Univ. Trieste)
- particulate Barium (CSIC)

**«Call for students»** from Mediterranean southern shore countries to participate to the cruise
- due to COVID-19 and VISA issues none of them came on board

TAlPro2022 was selected by a successful **Co-PI** proponent, so our team also performed 2 net casts to collect zooplankton in certain areas

We brought a **professional photographer** on board

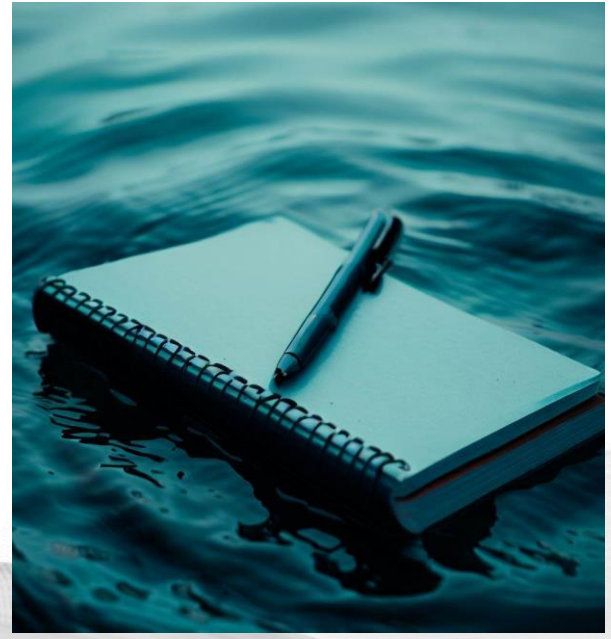





# DATA MANAGEMENT PLAN

**'FAIR', Open Data and CC0-licensed data** (default Horizon 2020 )

DMP of our cruise details the steps we took to get the data ready before ingestion into the Eurofleets infrastructure, and after the project ends (preliminary and final DMP)



Timeline for delivering raw data and metadata

- Metadata of the cruise (SeaDataNet Cruise Summary Report): within 2 weeks after the cruise
- Metadata of the datasets of the cruise: within 2 months after the cruise
- CTD data and data of deployed devices: within 2 months after the results are obtained
- "manual" data, e.g. observations on samples: within 2 months after the result is obtained (to allow lab analyses, does not include QC), together with operations metadata generated by the EARS software
- embargo: up to 2 years after the cruise, justified in the DMP

# ON BOARD ACTIVITIES

+ Co-PI activities (2 net casts)
+ deployment of 2 ARGO floats

CTD/LADCP/salinity/ARGO/underway

DOC/CDOM/FDOM

DIC/TA/pH

CFC/SF6

C-14/I-129/U-236

Oxygen, nutrients, UVP5

Barium

eDNA

photographer

| | | | |
|---|---|---|---|
| 1 | Katrin | Schroeder | Italy |
| 2 | Mireno | Borghini | Italy |
| 3 | Francesco | Falcieri | Italy |
| 4 | Mirco | Guerrazzi | Italy |
| 5 | Simona | Retelletti Brogi | Italy |
| 6 | Valtere | Evangelista | Italy |
| 7 | Marta | Álvarez Rodríguez | Spain |
| 8 | Rubén | Acerbi Amigo | Spain |
| 9 | Maribel | García Ibáñez | Spain |
| 10 | Beatriz | Manzanares Obispo | Spain |
| 11 | Toste | Tanhua | Germany |
| 12 | Boie | Bogner | Germany |
| 13 | Abed El Rahman | Hassoun | Germany |
| 14 | Maxi | Castrillejo Iridoy | UK |
| 15 | Lorenza | Raimondi | Switzerland |
| 16 | Anthony | Bosse | France |
| 17 | Laurent | Coppola | France |
| 18 | Fourrier | Marine | France |
| 19 | Stephanie | Jacquet | France |
| 20 | Christian | Clauwers | Belgium |
| 21 | Alberto | Pallavicini | Italy |
| 24 | Francisca | Martínez Ruiz | Spain |

**Water Budget and sampling order**

CTD 025

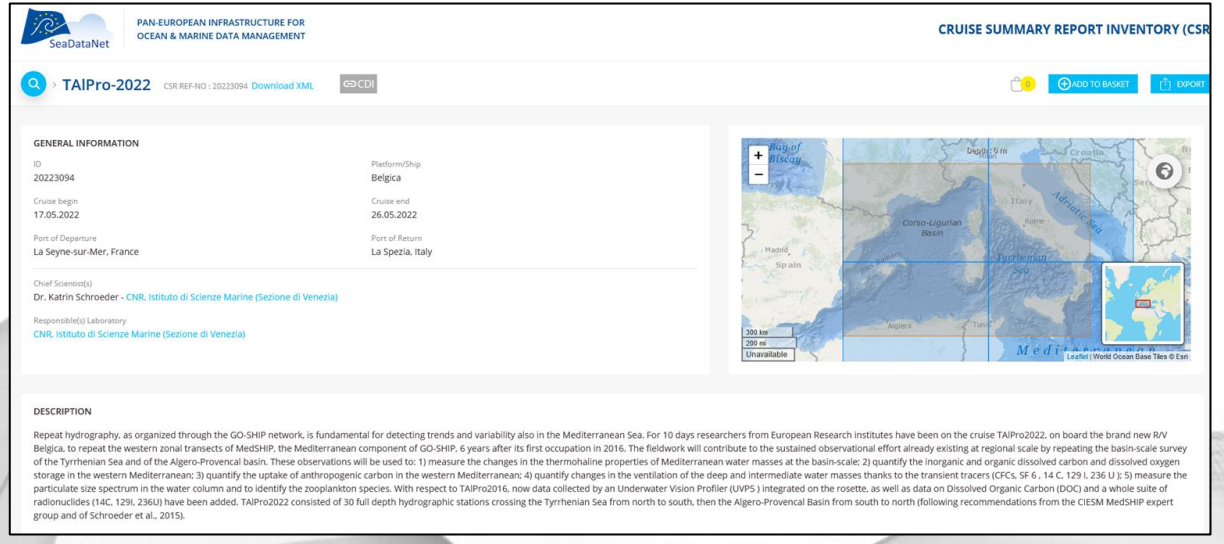
| B# | DPTM | Sampling order | | | | | | | | | | | | ml | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bot | CFC | DO | C14 | pH | DIC | TA | DOC | Nu | I129 | DOC | | | 4700 | |
| 2 | Bot | D.Ba | P.Ba | DNA | | | | | | | | | | 8400 | |
| 3 | 2500 | CFC | DO | C14 | pH | TA | DOC | Nu | I129 | DOC | | | | 4050 | |
| 4 | 2500 | D.Ba | P.Ba | | | | | | | | | | | 6200 | |
| 5 | 2250 | CFC | DO | C14 | pH | DIC | TA | DOC | Nu | DOC | I129 | D.Ba | P.Ba | 10900 | |
| 6 | 2000 | CFC | DO | C14 | pH | TA | DOC | Nu | DOC | I129 | | | | 4050 | |
| 7 | 2000 | D.Ba | P.Ba | | | | | | | | | | | 6200 | |

# REPORTING

Full Cruise Report submitted 2 months after the cruise to the ship operator and the EF+ Coordinator

Available on Zenodo:
https://doi.org/10.5281/zenodo.6918731

**CSR submitted 2 weeks after the cruise**
(https://csr.seadatanet.org/report/20223094)



SeaDataNet
PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

CRUISE SUMMARY REPORT INVENTORY (CSR

TAIPro-2022 CSR REF-NO : 20223094 Download XML CDI

ADD TO BASKET EXPORT

GENERAL INFORMATION

ID
20223094

Platform/Ship
Belgica

Cruise begin
17.05.2022

Cruise end
26.05.2022

Port of Departure
La Seyne-sur-Mer, France

Port of Return
La Spezia, Italy

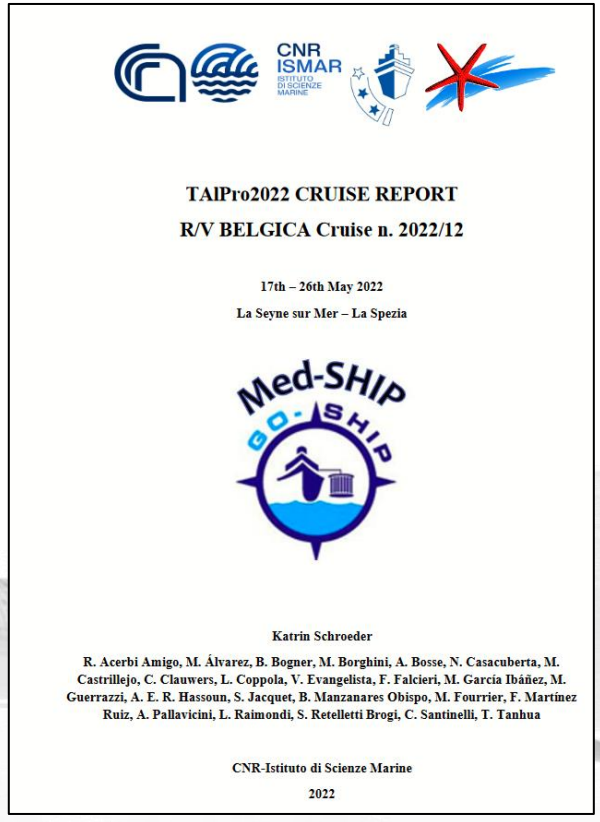
Chief Scientist(s)
Dr. Katrin Schroeder - CNR, Istituto di Scienze Marine (Sezione di Venezia)

Responsible(s) Laboratory
CNR, Istituto di Scienze Marine (Sezione di Venezia)



DESCRIPTION

Repeat hydrography, as organized through the GO-SHIP network, is fundamental for detecting trends and variability also in the Mediterranean Sea. For 10 days researchers from European Research institutes have been on the cruise TAIPro2022, on board the brand new R/V Belgica, to repeat the western zonal transects of MedSHIP, the Mediterranean component of GO-SHIP, 6 years after its first occupation in 2016. The fieldwork will contribute to the sustained observational effort already existing at regional scale by repeating the basin-scale survey of the Tyrrhenian Sea and of the Algero-Provencal basin. These observations will be used to: 1) measure the changes in the thermohaline properties of Mediterranean water masses at the basin-scale; 2) quantify the inorganic and organic dissolved carbon and dissolved oxygen storage in the western Mediterranean; 3) quantify the uptake of anthropogenic carbon in the western Mediterranean; 4) quantify changes in the ventilation of the deep and intermediate water masses thanks to the transient tracers (CFCs, SF 6 , 14 C, 129 I, 236 U ); 5) measure the particulate size spectrum in the water column and to identify the zooplankton species. With respect to TAIPro2016, now data collected by an Underwater Vision Profiler (UVP5 ) integrated on the rosette, as well as data on Dissolved Organic Carbon (DOC) and a whole suite of radionuclides (14C, 129I, 236U) have been added. TAIPro2022 consisted of 30 full depth hydrographic stations crossing the Tyrrhenian Sea from north to south, then the Algero-Provencal Basin from south to north (following recommendations from the CIESM MedSHIP expert group and of Schroeder et al., 2015).



CNR ISMAR ISTITUTO DI SCIENZE MARINE

**TAIPro2022 CRUISE REPORT**

**R/V BELGICA Cruise n. 2022/12**

**17th – 26th May 2022**

**La Seyne sur Mer – La Spezia**

Med-SHIP GO-SHIP

**Katrin Schroeder**

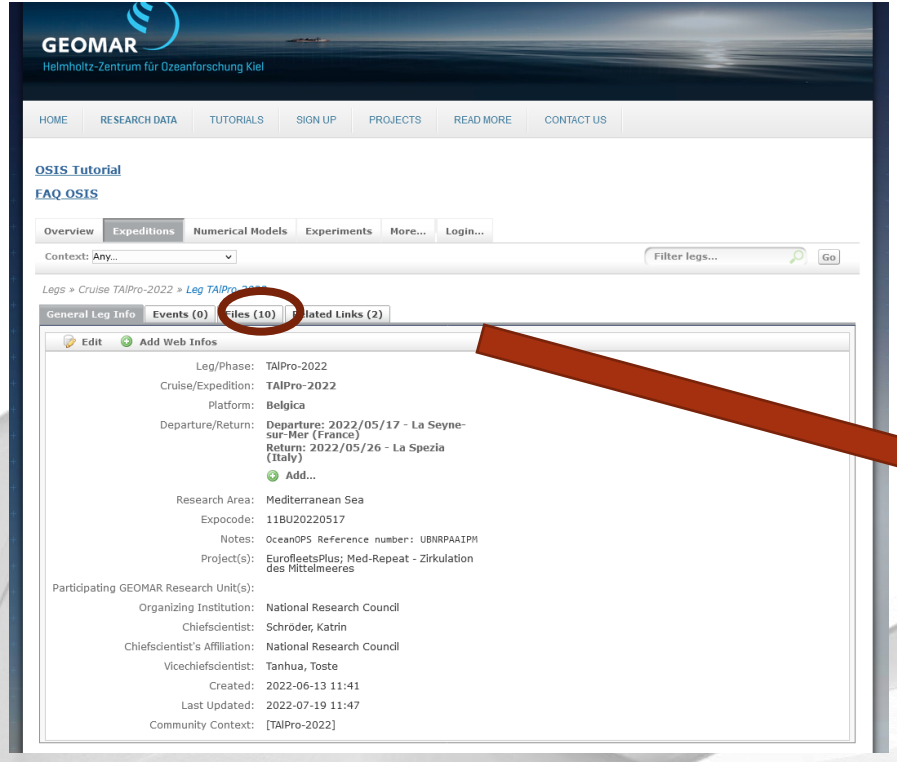
**R. Acerbi Amigo, M. Álvarez, B. Bogner, M. Borghini, A. Bosse, N. Casacuberta, M. Castrillejo, C. Clauwers, L. Coppola, V. Evangelista, F. Falcieri, M. García Ibáñez, M. Guerrazzi, A. E. R. Hassoun, S. Jacquet, B. Manzanares Obispo, M. Fourrier, F. Martínez Ruiz, A. Pallavicini, L. Raimondi, S. Retelletti Brogi, C. Santinelli, T. Tanhua**

**CNR-Istituto di Scienze Marine**

**2022**

# DATA SHARING

## Data submitted (GEOMAR OSIS Portal)




# DATA SHARING

**Data repositories used by GO-SHIP**

# DATA SHARING

## Submitter's Data Submission List

ADD

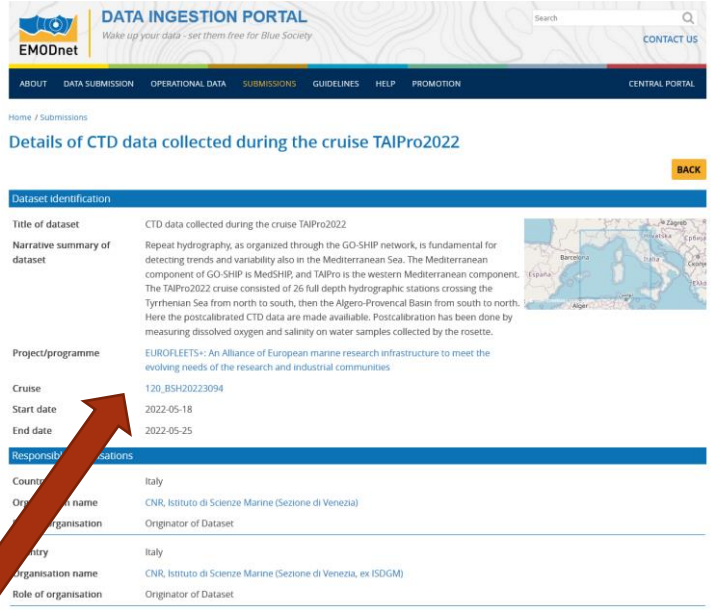
Show 10 entries

| Submission identifier (UUID) | Title of dataset | Status | Last Update | Controls |
|---|---|---|---|---|
| Search Submission identifier | TAIPro | All selected | | |
| 0b3b0cdf-460c-49f7-bf15-c48587f8c956 | Weather station data collected during Med-SHIP cruise TAIPro2022 | Published at Discovery and Access Service | 2023-05-12 17:10:24.681003 | VIEW |
| ed83e921-e669-4752-9ebb-e511b7ca6a54 | LADCP current profiles collected during Med-SHIP cruise TAIPro2022 | Published at Discovery and Access Service | 2023-05-12 13:35:36.107308 | VIEW |
| bbe3fe2b-8508-45b5-87a7-299012dc4570 | CTD data collected during the cruise TAIPro2022 | Published at Discovery and Access Service | 2023-05-12 13:35:14.827115 | VIEW |
| 524d7edb-38b8-4a3a-9b2a-dc6f593d98ff | Bottle data collected during the cruise TAIPro2022 (only from CTD sensors) | Published at Discovery and Access Service | 2023-05-12 13:34:45.339999 | VIEW |
| 163e6607-010b-4b35-a10e-02e84a8b310e | Ferrybox data collected during Med-SHIP cruise TAIPro2022 | Published at Discovery and Access Service | 2023-05-12 13:34:26.509254 | VIEW |
| a63c0b6d-36b4-4f4e-9a47-267328b6fb05 | Continuous thermosalinograph data collected during Med-SHIP cruise TAIPro2022 | Published at Discovery and Access Service | 2023-05-12 13:34:06.435368 | VIEW |
| 3b3b1466-89cb-4091-9bb3-468a6b74f008 | Vessel-mounted ADCP data (current profiles) collected during Med-SHIP cruise TAIPro2022 | Published at Discovery and Access Service | 2022-10-19 14:19:53.433417 | VIEW |

Showing 1 to 7 of 7 entries

Previous 1 Next



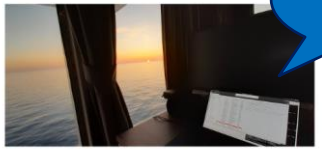



**All data submitted to Emodnet Ingestion Portal**

# DISSEMINATION

Social media profiles
Blog





19 May 2022 –The best desk ever!

The science meeting room is maybe the thing that surprised me the most on this vessel. Every research vessel I have been on has a room dedicated to meetings and were scientists can hold short seminars. This one is different, not only the meeting room is very big (all of us can easily fit in it) but it has whole corner of windows right over the sea. In the last few days I have spent most of my time away from the CTD working on a desk near one of those windows. This breathtaking view on a blue Mediterranean sea with no other ship on the horizon has a surprisingly calming effect. I will definitely miss it once I will be back in my office in the Venice Arsenal!

Blog
https://mediterraneanmonitoring.wordpress.com/

GOOS Report Card


Story on UNESCO homepage


GOOS News and SM

The Global Ocean Observing System
News

**Under the surface: When a cruise through the Mediterranean Sea is not exactly a holiday**

Details
Published: 07 November 2022

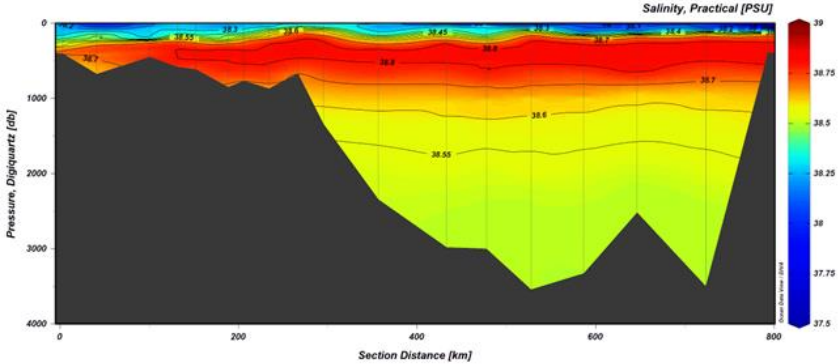
Day and night, a group of scientists are gliding through a special route across the Mediterranean Sea, stopping every 25 nautical miles to measure important parameters, from the surface to the 3 km deep bottom. They undertake this journey every 5 to 8 years - not only to document the effects of climate change today, but also to witness what awaits in the near future.


## Arctic World Archive

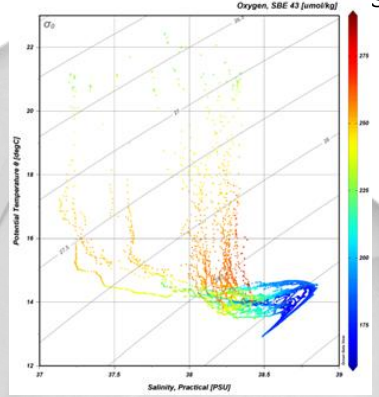
AWA is a facility for data preservation, located in the Svalbard. It contains data of historical and cultural interest from several countries, as well as all of GitHub's open source code, in a deeply buried steel vault, with the data storage medium expected to last 500-1000 years

Pictures and footages taken by C. Clauwers during the TAIPro2022 cruise have been deposited there

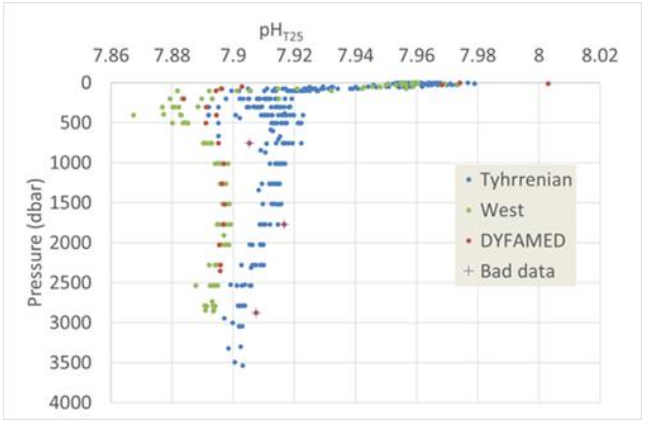
# PRELIMINARY RESULTS



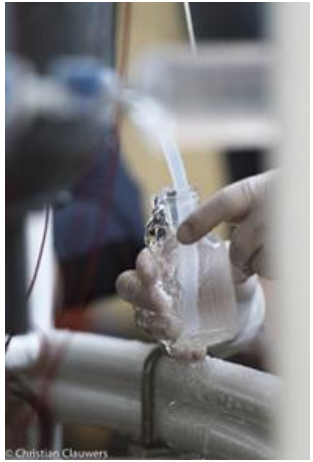

Salinity section in the Tyrrhenian Sea (north is left), using post-calibrated CTD data.

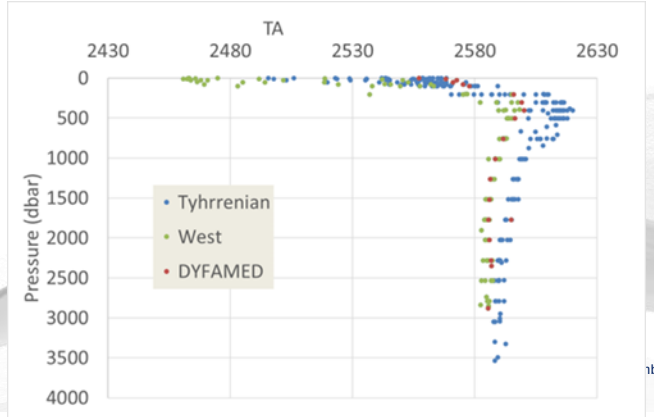



TS-diagram with dissolved oxygen values in the Algero-Provencal basin



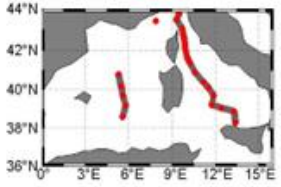

Credits: C. Clauwers



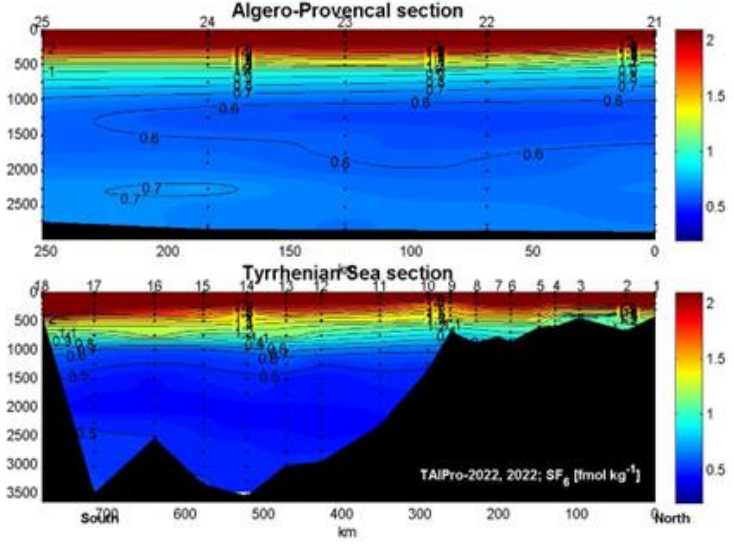




Vertical distribution of pH$_{T25}$ and TA values for different areas: the Tyrrhenian Sea, the Western Basin, and the DYFAMED stations.

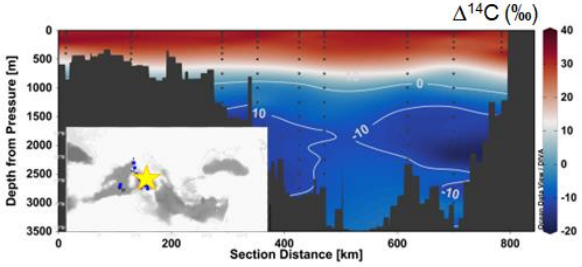
# PRELIMINARY RESULTS



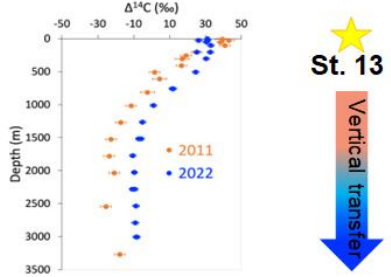

preliminary sections of $SF_6$ concentration along the two transect




By tracking changes in nuclear bomb contamination we can learn about shallow to deep water movement


Distribution of the radiocarbon in the Tyrrhenian
→ most radioactive contamination remains in the upper layers




Comparison of radiocarbon distributions in 2011 and 2022 in the central Tyrrhenian
→ water circulation has transported a substantial amount of radiocarbon from shallow to deep between 2011 and 2022

# FUTURE STEPS

Organize the 2nd post-cruise meeting

Topics of interest (conferences or potential papers)
- post-WMT situation
- Warming and Salinification of IW
- Ventilation rates estimates of the deep basins
- Carbon, Isotopes, Nutrients, eDNA, Barium ….

Data Repositories:

- conclude the submission of data to public repositories
- Prepare a data paper

Future of Med-SHIP:
- east-west transect (GO-SHIP Med01 line, 2024-2026), eastern Med north-south transects?
- Ocean Decade Call for Actions submitted