

EMSO ERIC: Advancing Deep-Sea Science with Long-Term Ocean Observations

One Ocean Science Congress
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EMSO ERIC Data Officer

EMSO ERIC – Introduction

Distributed European RI

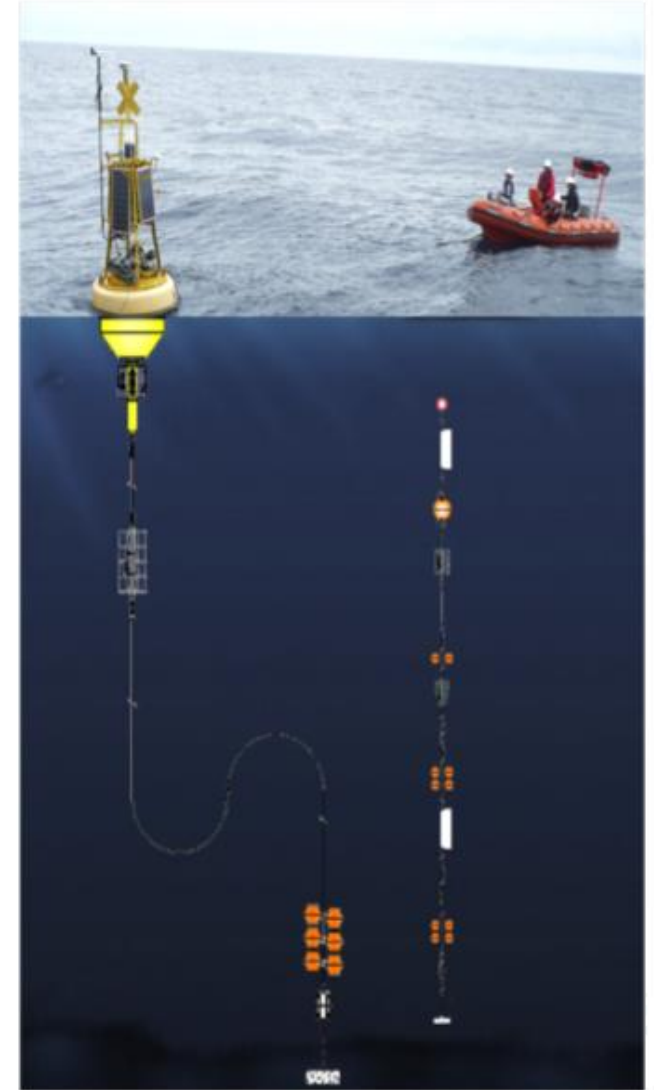
14 regional facilities and **27** European

Institutions

~ **130** physical & biogeochemical parameters

Goal: Offering **FAIR** data & services to scientific community

Poster: EMSO ERIC a pan European RI ...(DG Ingrid Puillat et al.)



EMSO Data Infrastructure

Initial Approach: Centralized data infrastructure complemented by a harmonization system.

Problem: Heterogeneous data would require significant investment of time and effort from RF to achieve harmonization.

Actual Approach: Federated data infrastructure utilizing **ERDDAP** for enhanced data distribution and retrieval.

EMSO ERIC Data Infrastructure: ERDDAP

ERDDAP: EMSO's data backbone

Open-source software developed by **NOAA**

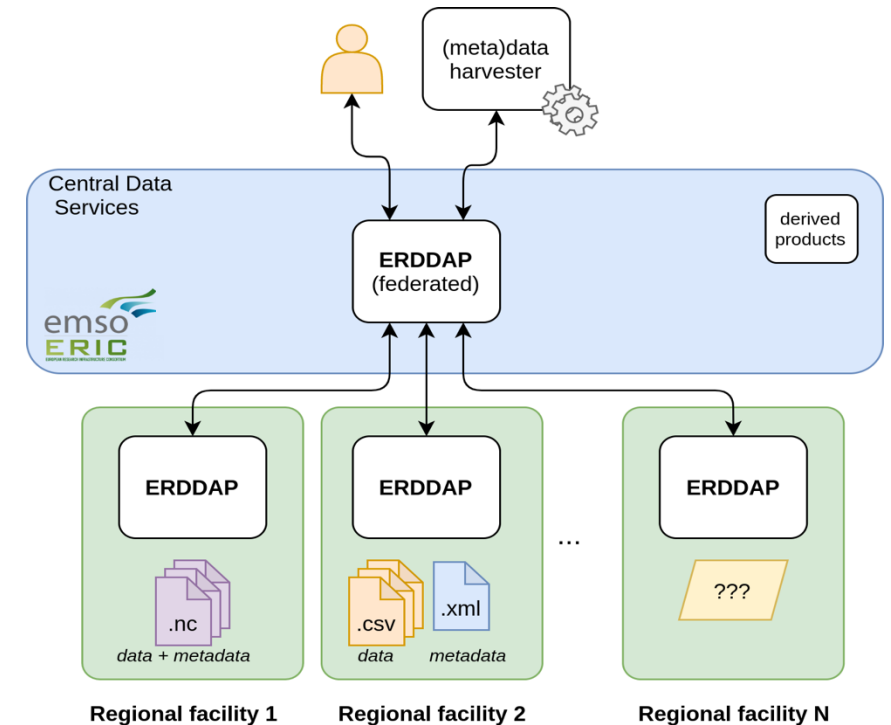
ERDDAP servers deployed at regional facilities

Data Managed at RF level

Central ERDDAP links regional facilities

Data needs to be fully **harmonized** at each RF

BlueCloud2026: Harmonization and integration of marine data



EMSO Metadata Standard

Custom EMSO Metadata Specification Document

Based on the OceanSITES Data Format but adapted to the needs of EMSO. Version control, human-readable, machine-actionable, defines a set of compliance tests

Available in **GitHub** and **Zenodo**



EMSO ERIC Metadata Service

EMSO Metadata Harmonizer tool:

Checks compliance with EMSO specs.

Crawls through ERDDAP's datasets

Tips to improve harmonization

Provides harmonization **score**

Available in GitHub

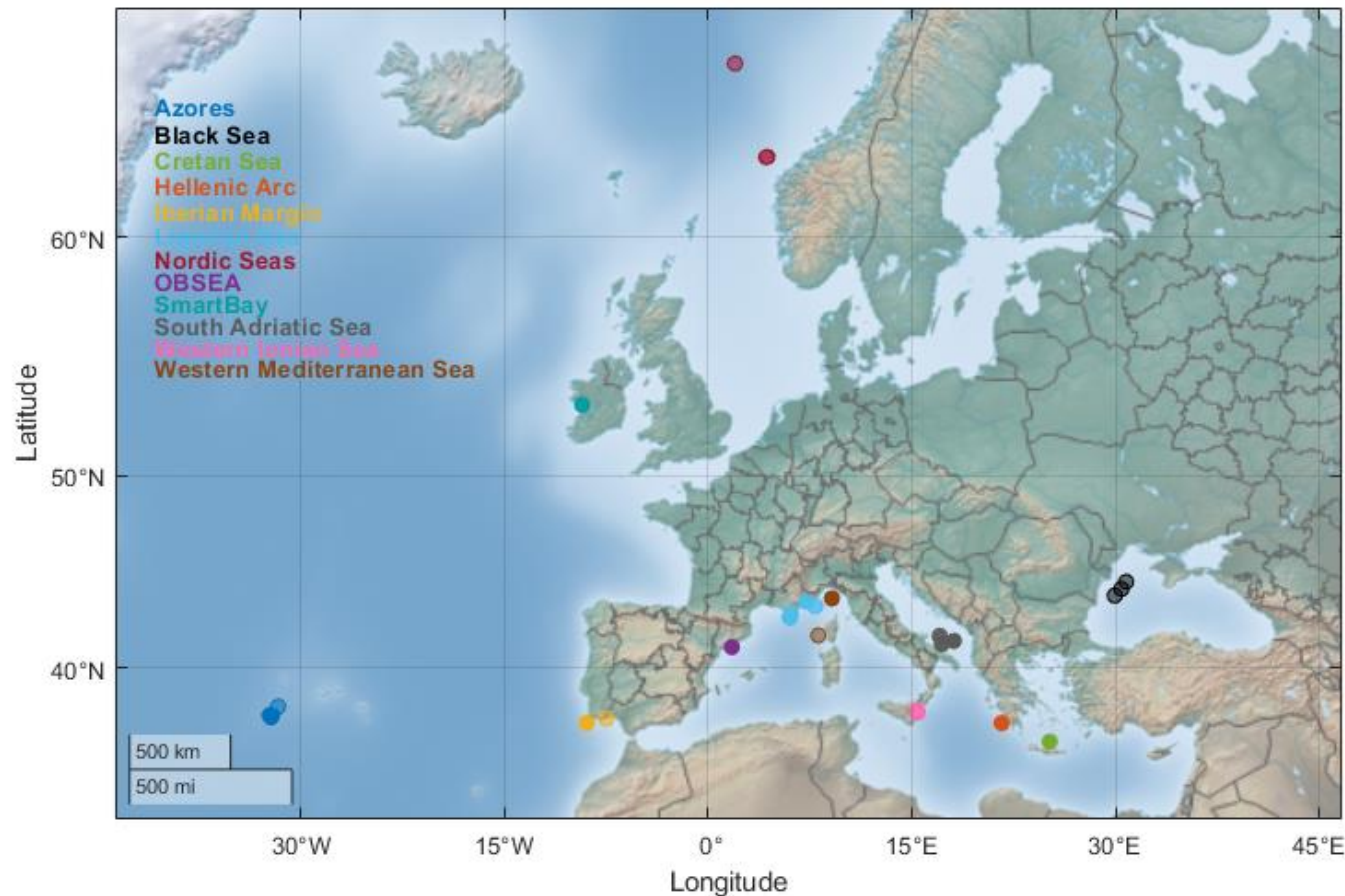
ERDDAP test report					
variable	attribute	required	passed	message	value
global	date_created	True	False	not found	
global	Conventions	False	True		COARDS, CF-1.6, ACDD-1.3
global	institution_edmo_code	True	True		2150
global	geospatial_lat_min	True	True		41.18212
global	geospatial_lat_max	True	True		41.18212
global	geospatial_lon_min	True	True		1.75257
global	geospatial_lon_max	True	True		1.75257
global	geospatial_vertical_min	True	False	not found	
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global	time_coverage_start	True	True		2010-03-12T09:30:00Z
global	time_coverage_end	True	True		2023-03-23T09:30:00Z
global	site_code	True	True		OBSEA
global	emso_facility	False	False	not found	
global	source	False	False	not found	
global	title	True	True		CTD data from a SBE16 at OBSEA (30min average)
global	summary	True	True		CTD data collected by a SBE16 deployed at OBSEA, 30min average
global	principal_investigator	True	False	not found	
global	principal_investigator_email	True	False	not found	
global	license	True	True		Creative Commons Attribution 4.0 International (CC-BY-4.0)

Required tests passed:	39 of 120	
Required tests passed:	1 of 15	
Total tests passed:	40 of 135	
Required tests...	<div></div>	32%
Optional tests...	<div></div>	7%
Total tests...	<div></div>	30%

Harmonization Status

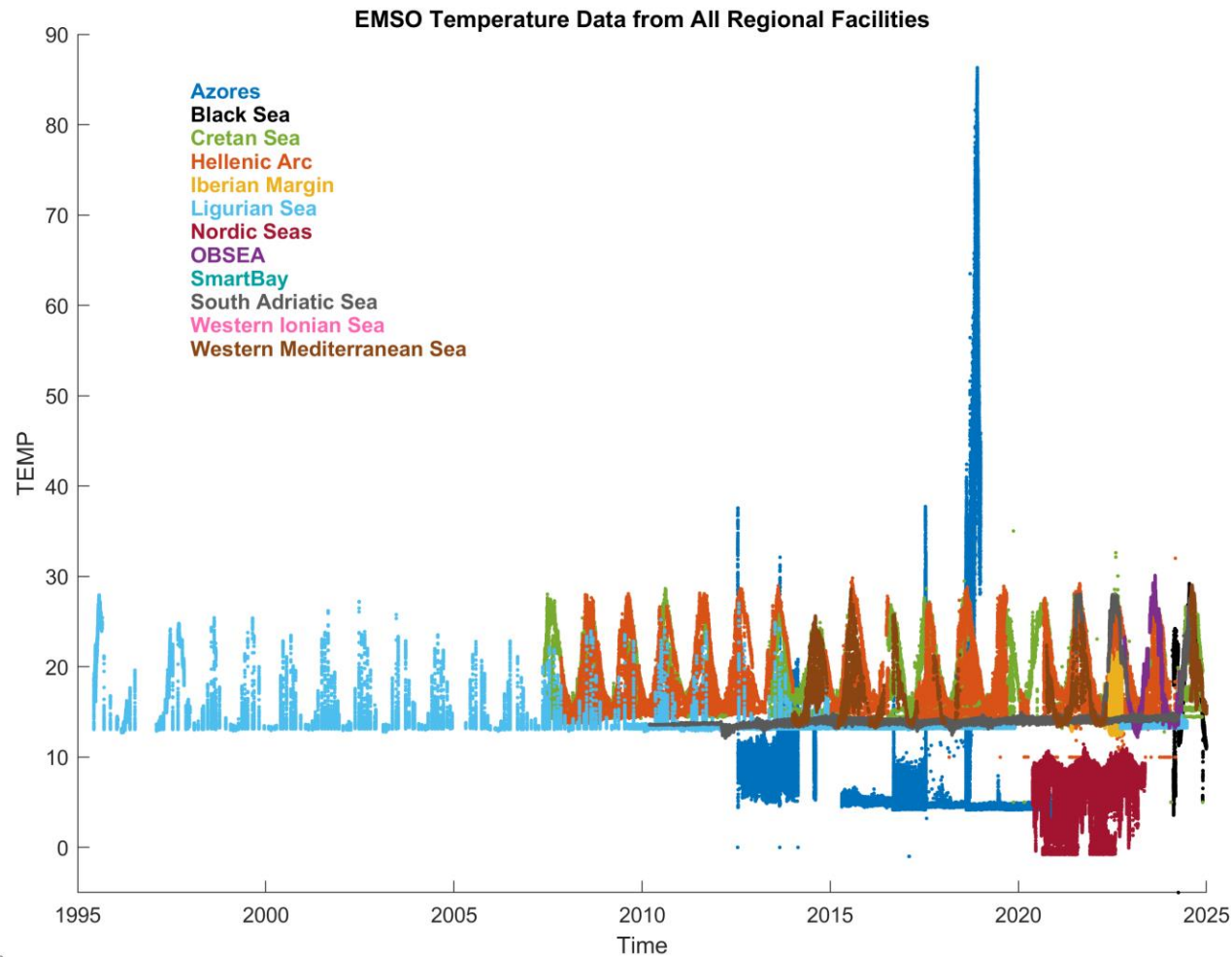
RF harmonization status				
	Regional Facility	15th Dec 2023	5th Nov 2024	19th May 2025
1	SmartBay	54%	78%	83%
2	OBSEA	88%	89%	90%
3	Cretan Sea	86%	87%	87
4	Ligurian Sea	73%	78%	78
5	Hellenic Arc	84%	84%	84
6	Azores	87%	87%	88
7	Iberian Margin	96%	In progress	96
8	Western Ionian Sea	100%	100%	100
9	South Adriatic Sea	87%	89%	98
10	Western Mediterranean Sea	100%	100%	100
11	Nordic Seas	98%	99%	99
12	Black Sea	In progress	In progress	94
13	Canary Islands	In progress	In progress	In progress
	total average	85%	89%	91%

EMSO ERDDAP data overview

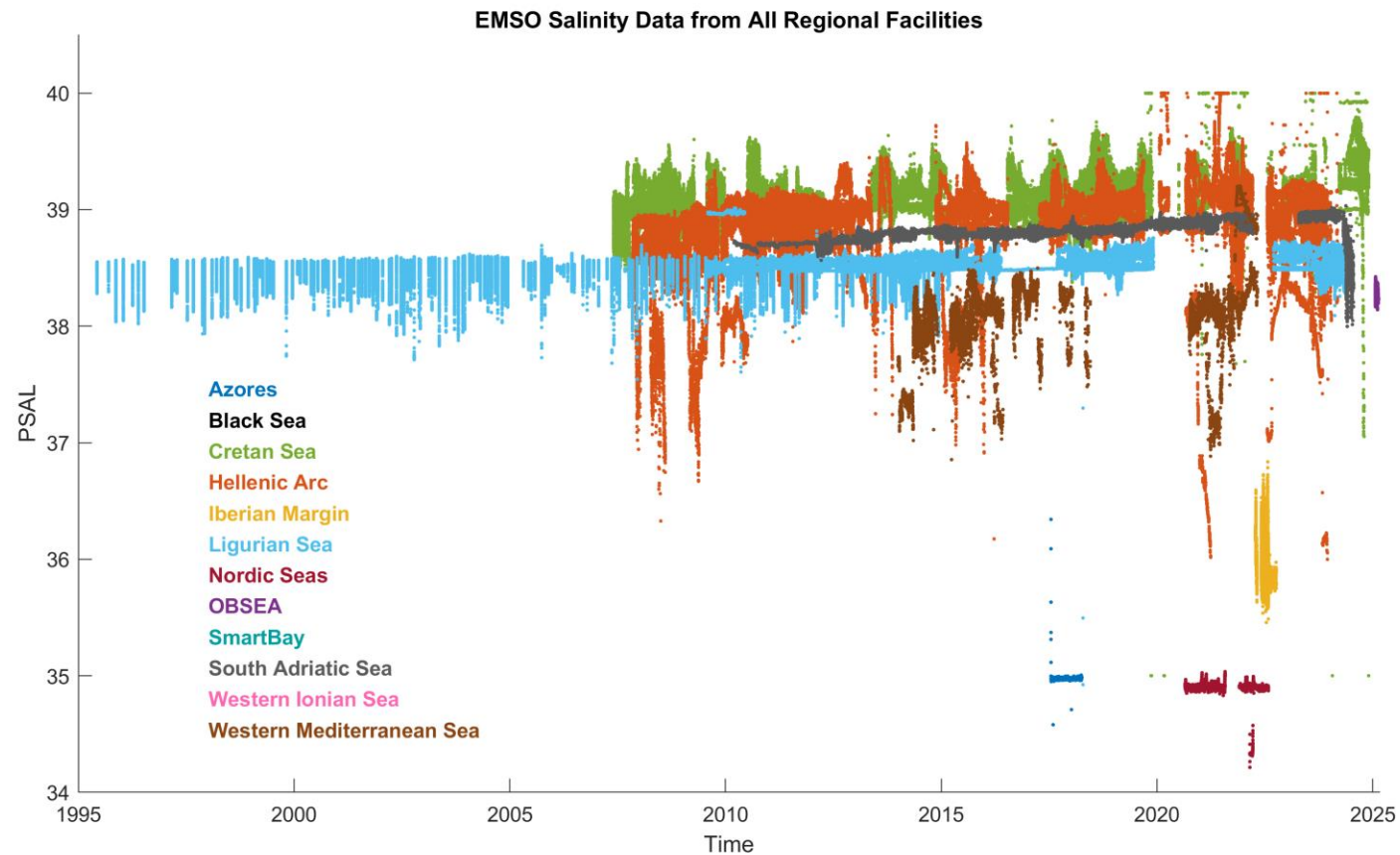


Poster: Multi parametric
**Time series ... (Dominique
Lefèvre et al.)**

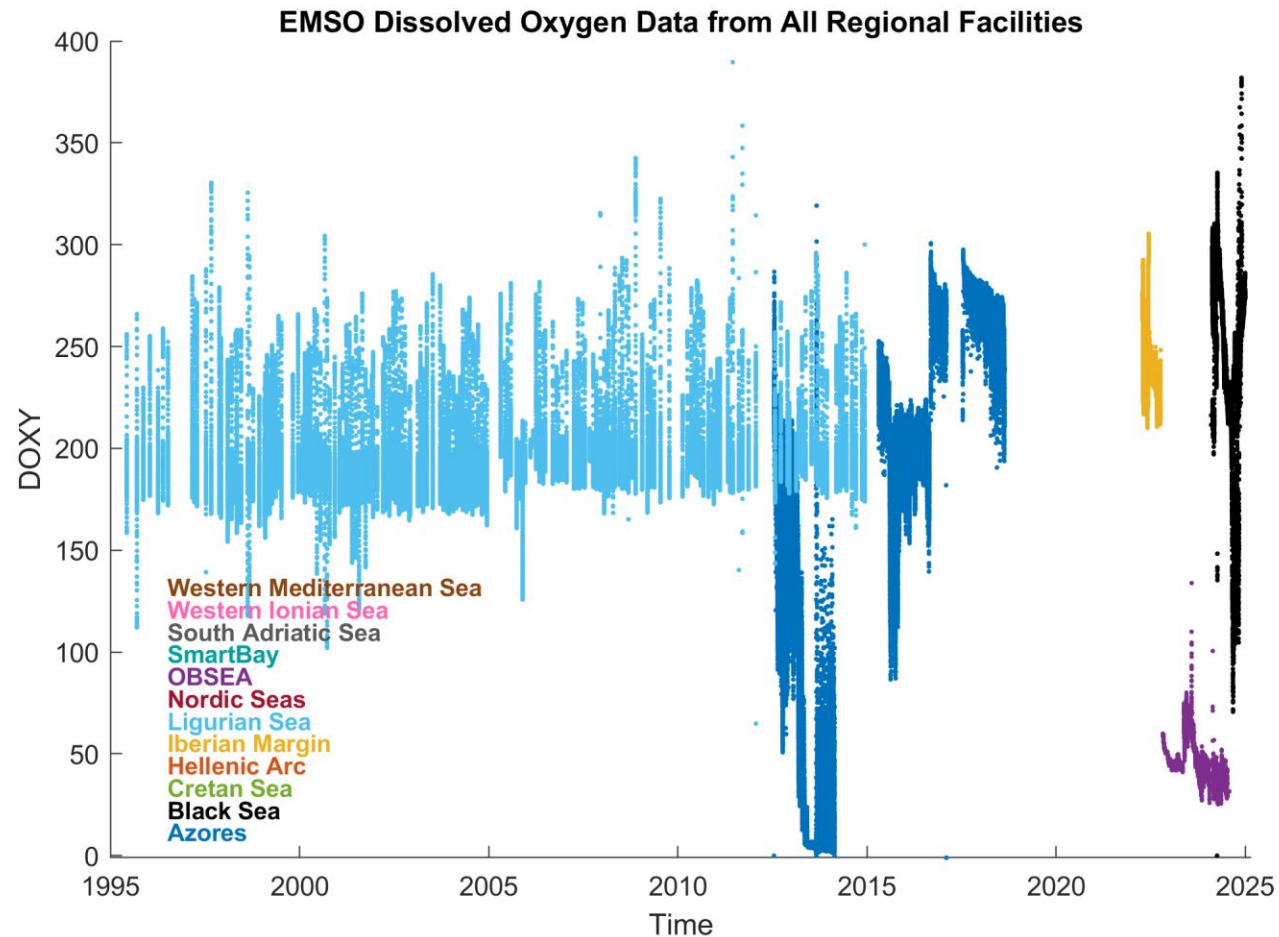
EMSO Temperature Data from all RF



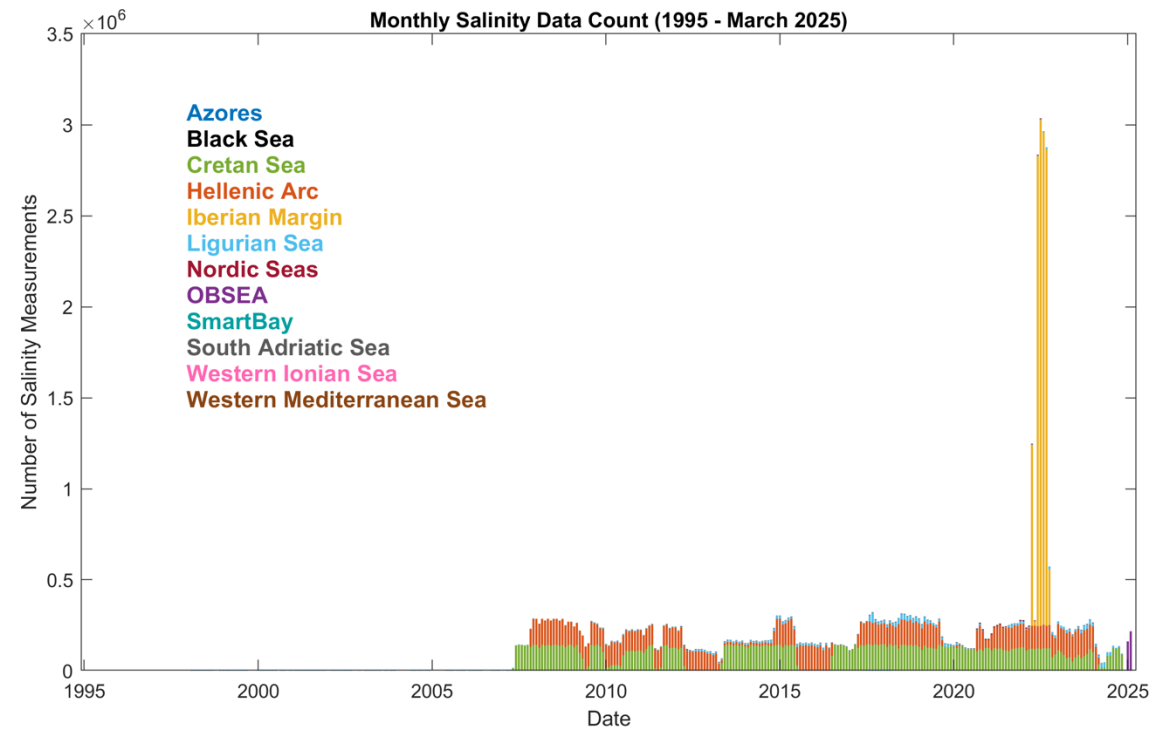
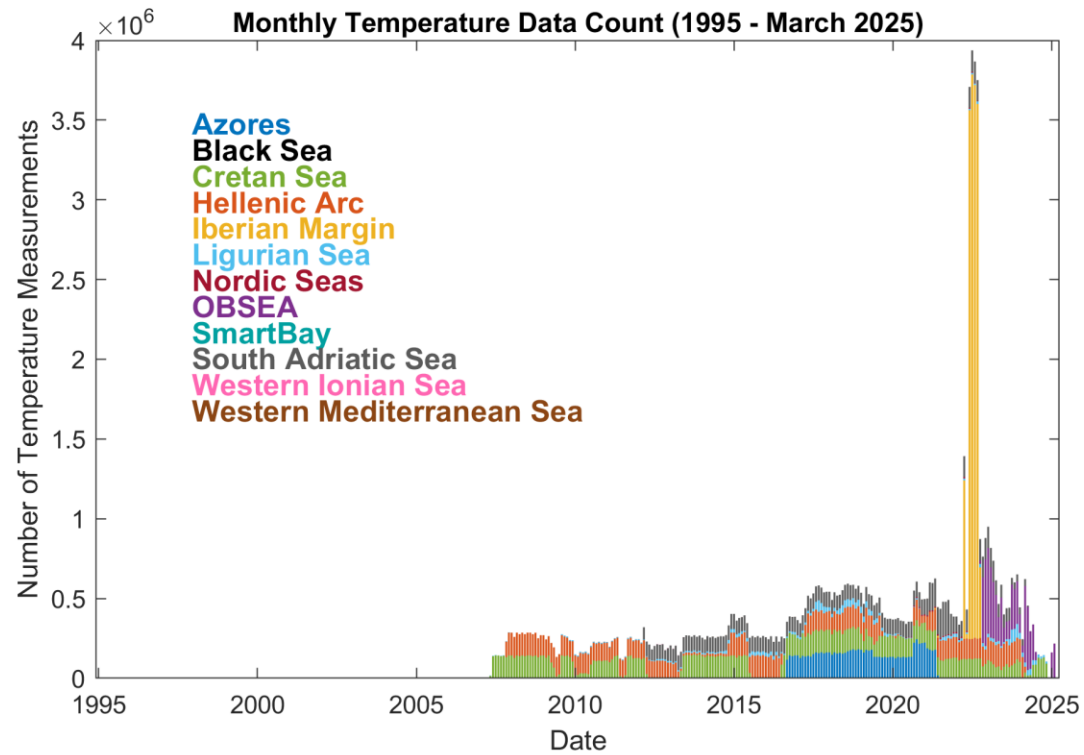
EMSO Salinity Data from all RF



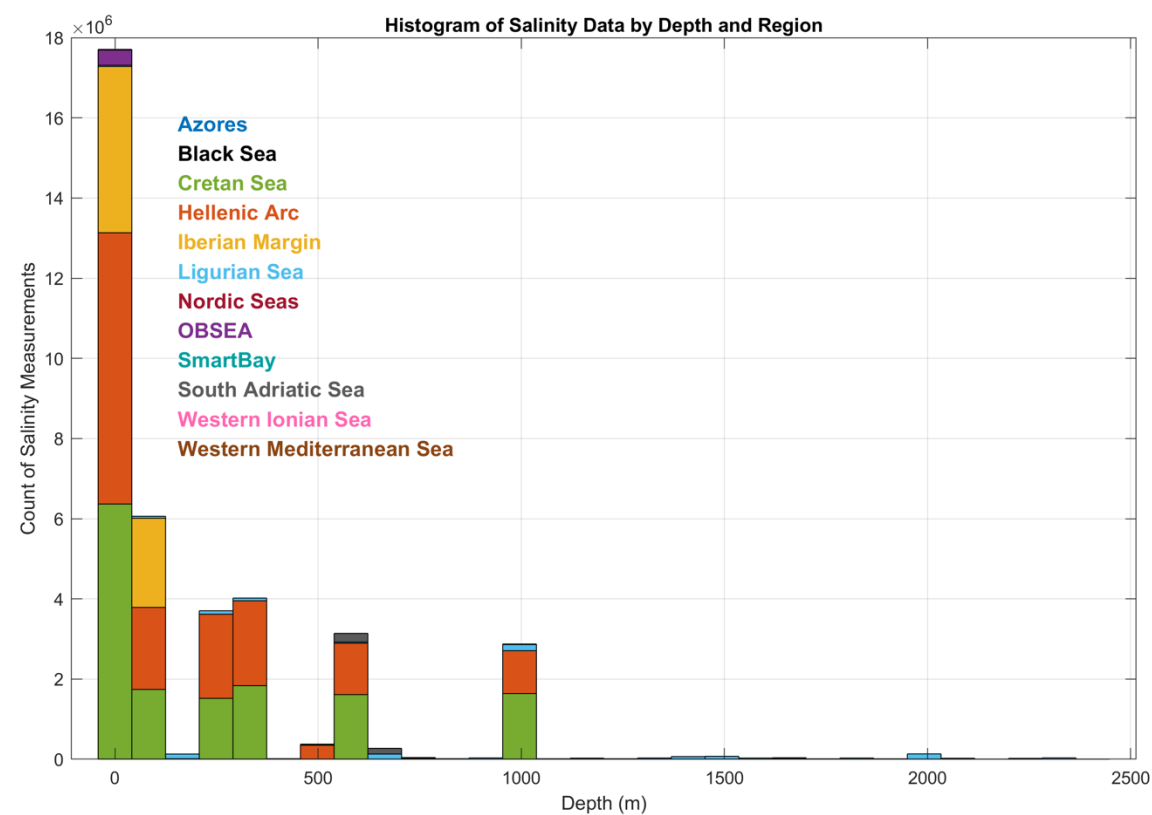
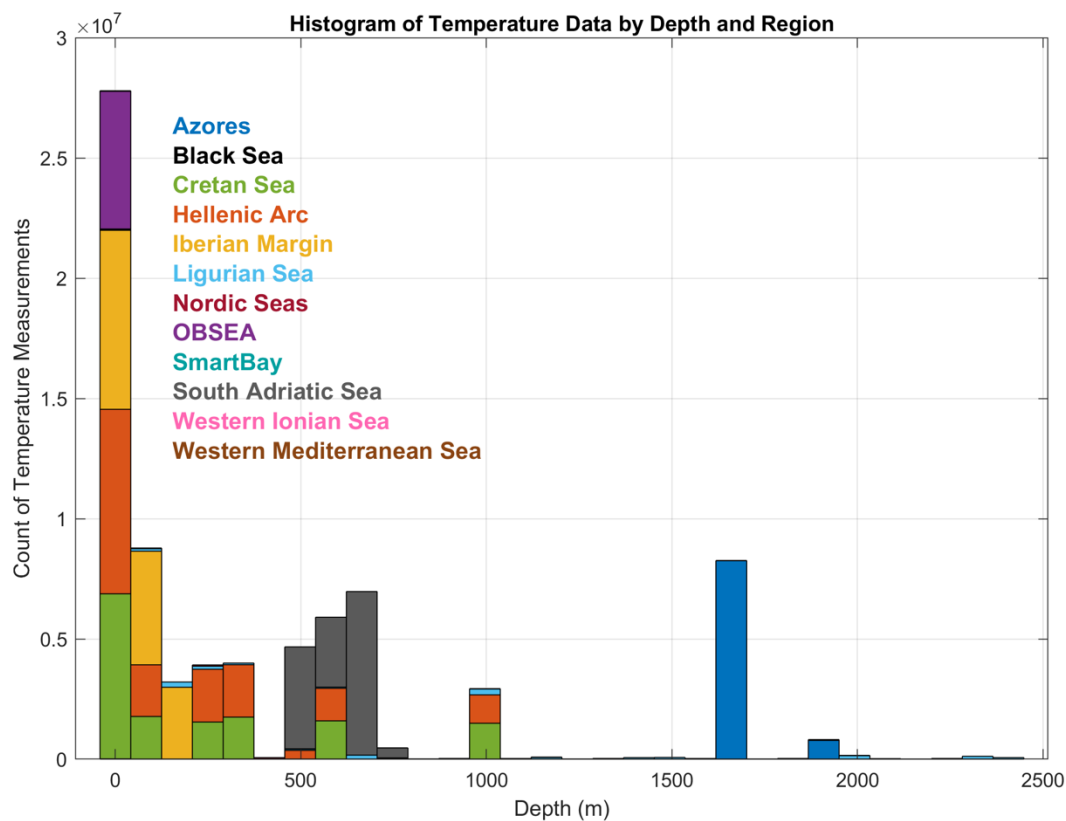
EMSO Dissolved Oxygen Data from all RF



Monthly Temperature/Salinity Data count



Histogram of Temperature/Salinity Data by Depth



Ligurian Sea Temperature trend

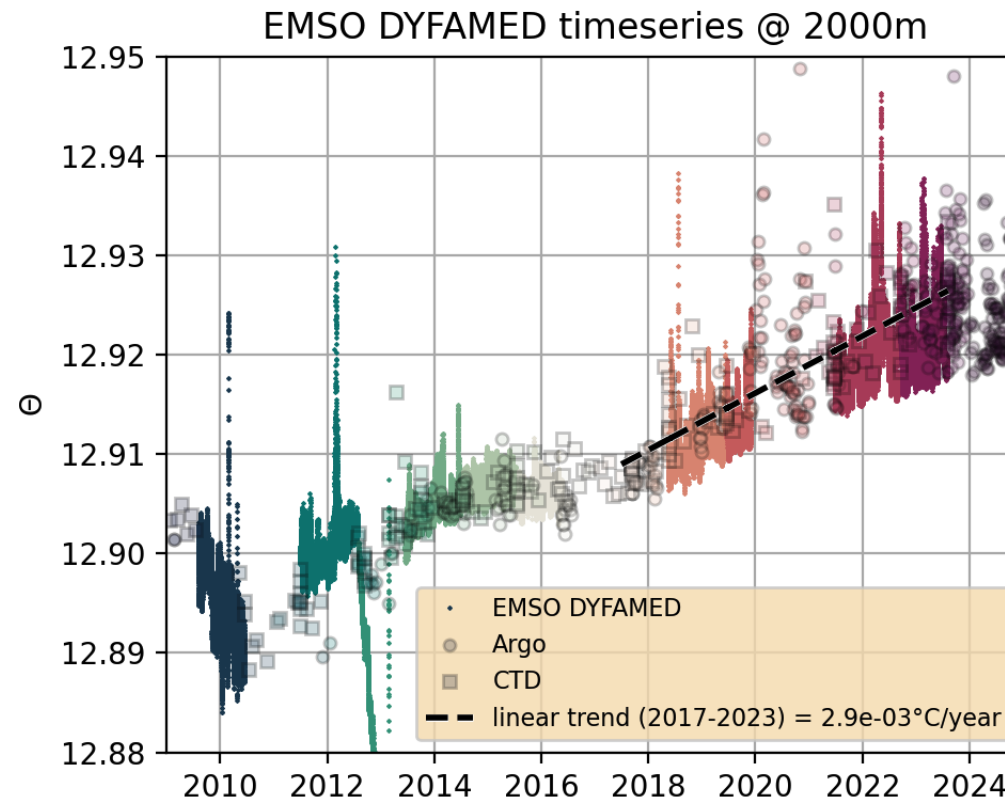
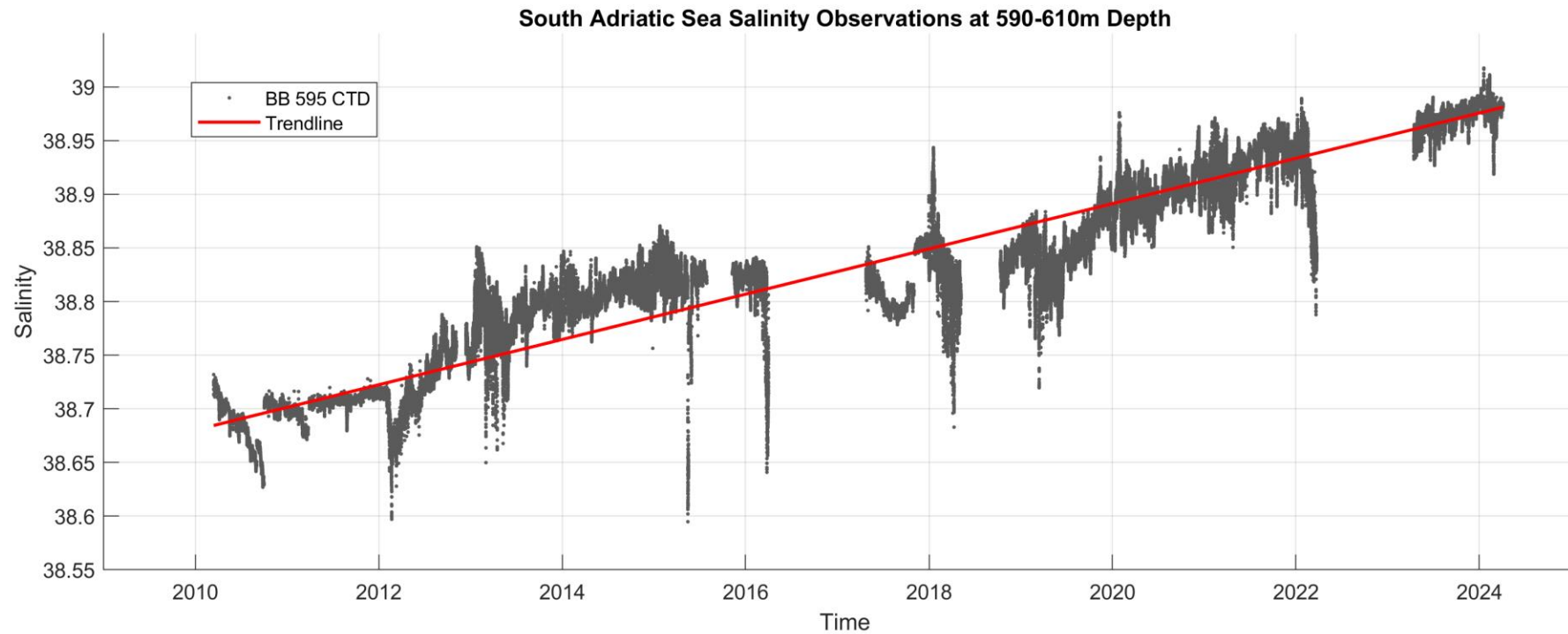


Figure source: Dominique Lefèvre

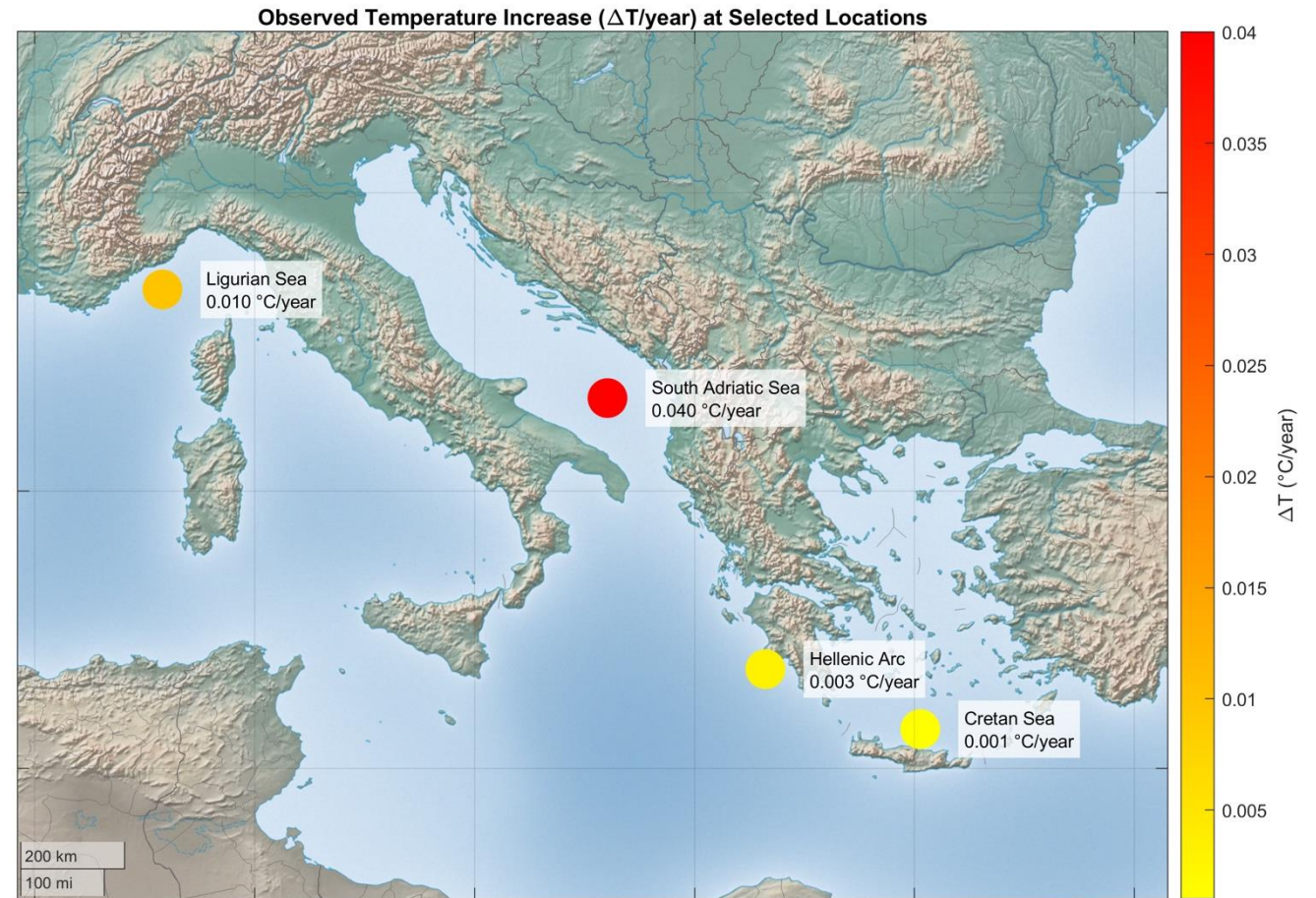
South Adriatic Sea Salinity trend



Observed Temperature Increase at 1000 m depth

Approx. last 15 years of deep-ocean temperature data

Supports **informed decision-making** for **policymakers** and stakeholders.



Summary

ERDDAP is the backbone

Harmonization is **improving (90 %)** due to EMSO Metadata

Specification Document & Metadata Harmonizer tool.

Overview of EMSO Data (trends)

Please **Check Out Our 6 Posters**

Thank you for your time and attention!

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