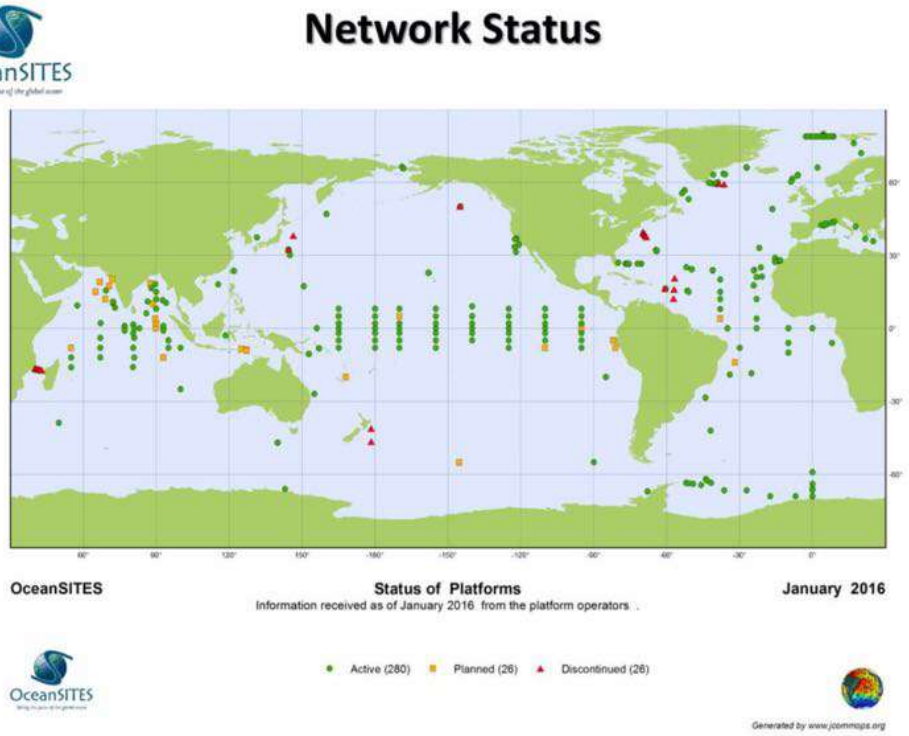
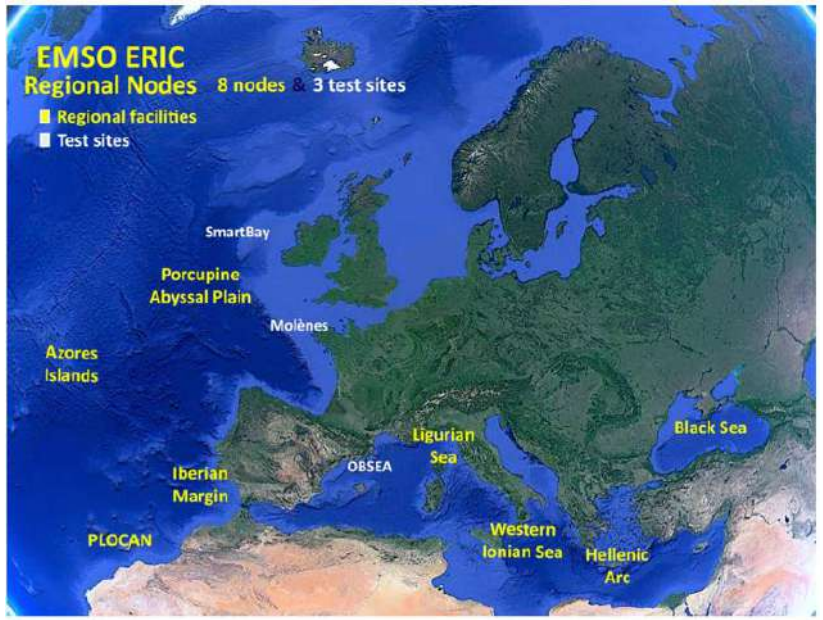
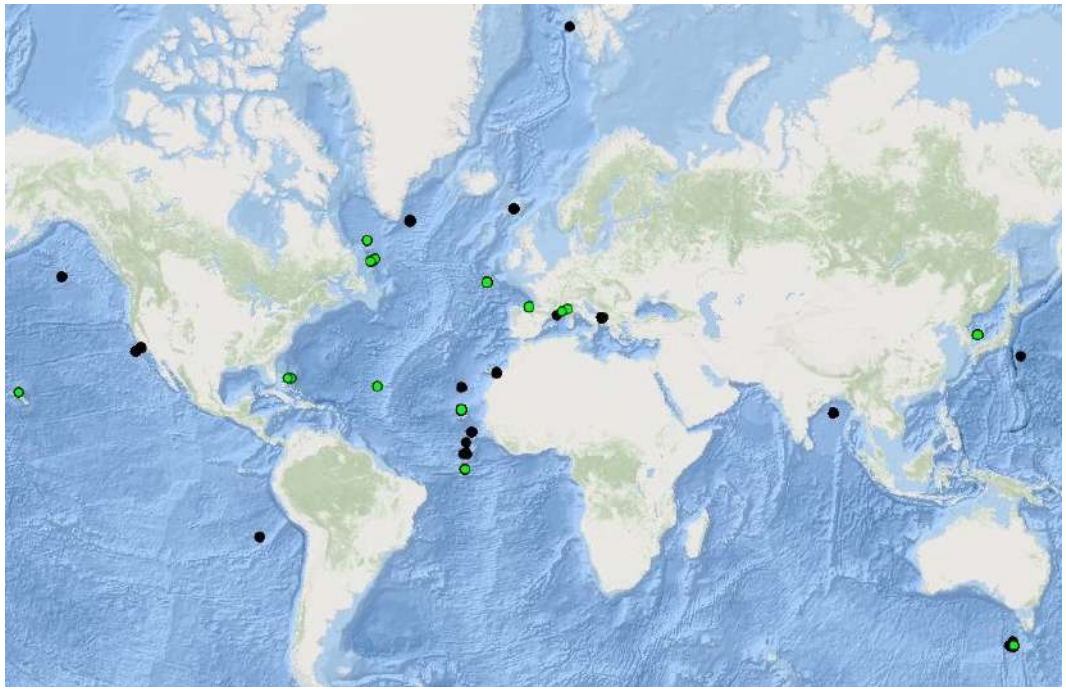
Eulerian observatories in the NW MedSea

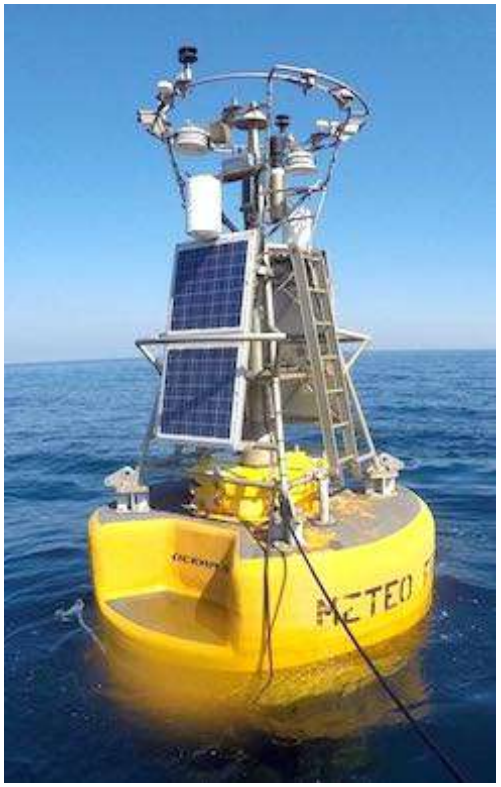
Oxygen data status (OceanSites/EMSO)

L.Coppola, D.Lefevre et al.









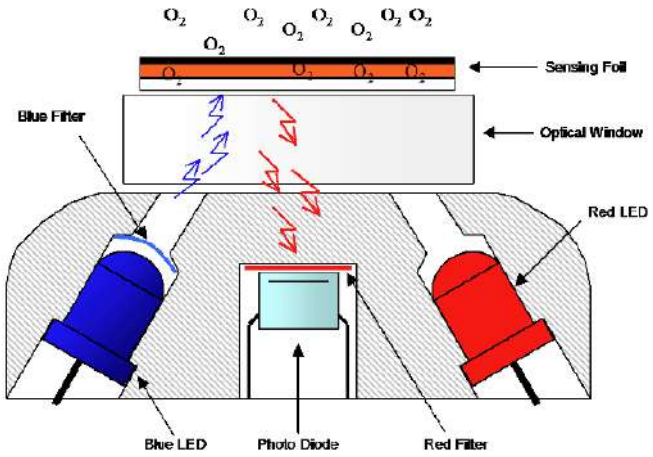
DO data from 2010-2019 (not complete ?)

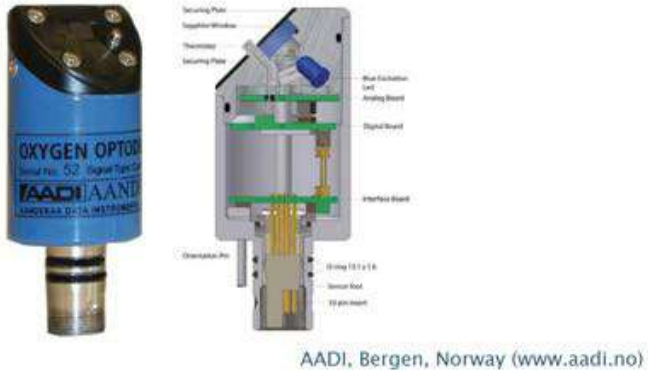
Oxygen is not measured everywhere (RT & DM)

Distributed from surface (pCO2) to intermediate and deep waters (mixing, ventilation, biological activity)

Optical sensors for moorings/buoys

- The sensor is based on the dynamic luminescence quenching of an oxygen-sensitive fluorochrome embedded in the tip
- Long time stability, no pressure hysteresis, fast response, compact, better accuracy (< 5 µmol/kg; Bittig et al., 2018)
- Adapted for Argo floats, gliders, ferry boxes, moorings, plankton incubators





SBE63 seems to be the best sensor so far (pumping system)

Best practices applications for mooring

- Perform inter-comparison onboard after the mooring collection:
  - ✓ Mount the DO sensors on CTD-rosette and perform vertical cast with Winkler sampling
  - ✓ Recommend to sample at 2-3 depth levels (avoiding TSO2 gradients) with 2 min long stops: 300-400m and 2000m depth
  - ✓ Estimation of the DO **sensor offset**
- If it is possible compare DO sensor values over the time with monthly repeated cruises (eg. Dyfamed, Antares): best standard to correct the **sensor drift and offset**
- Send DO sensor for calibration every two years for post-calibration
  - ✓ Recommend **multi-points calibrations** : perform at least five temperature and seven O2 levels (35 points) to well characterize the O2-T-response of the sensor and the coefficients calibrations of the optode (manufacturer or lab facility)

OSMO plaform: status

DO sensors calibration facility (EMSO)

Setup uncomplete (Covid effect) → January 21

Calculation cost under process

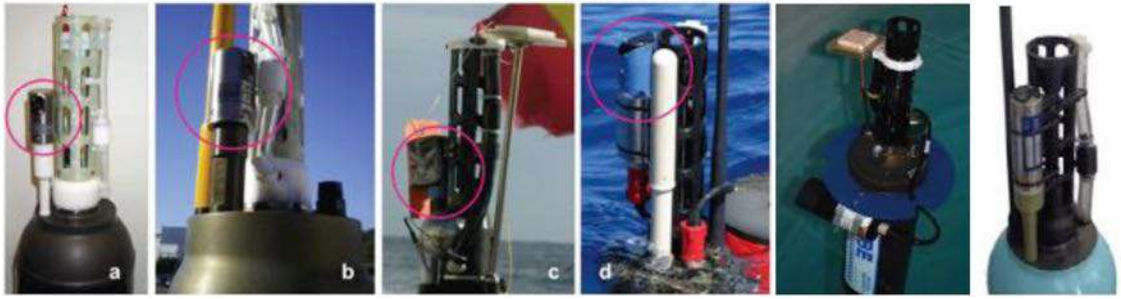
Potential of yearly accessibity under assesment (sensors, running time…)

MINKE IFRAIA project (2021- 2025)

Task D9.7 Report on improved procedures from O_2 sensor purchase to data dissemination

Task : D9.13 Improving dissolved oxygen measurement: sensors calibration report

DOXY correction methods



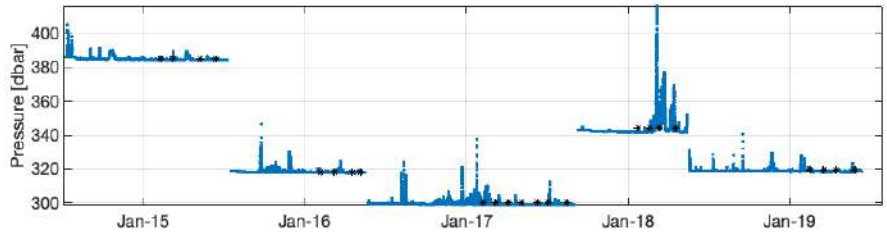
- **Strong 'storage' O_2 sensitivity** (loss 5 % / year): not recently calibrated optodes should be regarded as uncalibrated!
- Any deployment needs some way of **referencing** (pO2): adjusted CTD or WOA
- Adjust with a ***slope only*** (or very small offset).
- Necessary to adapt **O_2-T calibration** (lab multi-points with 35-40 points)
- Don't change foils unless mechanically damaged.
- **In situ drift,** order of O(0.5 % / year) : long-term deployments need long-term way of referencing: **apply in-air correction** (SAGE-O2, LOCODOX) and surface mooring or adjusted CTD casts is possible

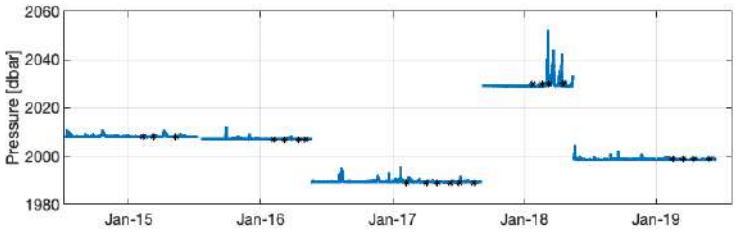
SLOPE = mean ratio PPOX_WOA/PPOX_FLOTTEUR, OFFSET = 0, DRIFT in % PPOX per year

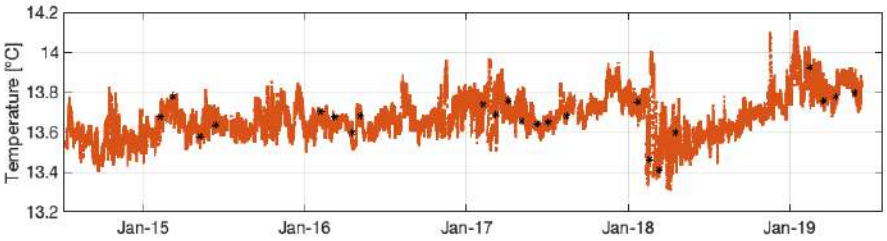
Correction WOA = error +/- 10 µmol/kg
Correction adjusted CTD casts = error +/- 2 µmol/kg

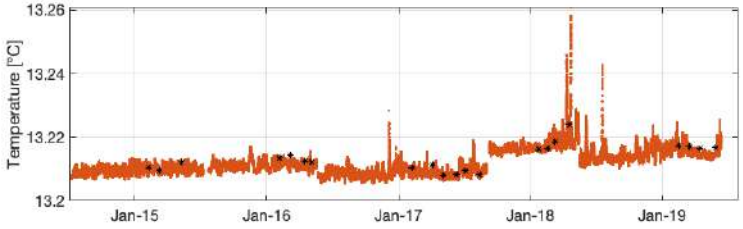
Details in Bittig et al., 2018 (Frontiers)

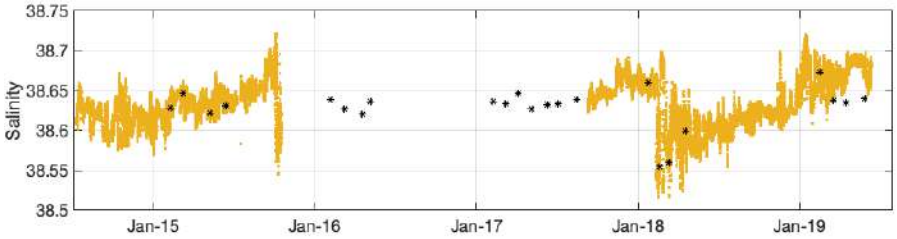
DOXY data for DYFAMED since 2014 (SBE63: adjusted data @350m & 2000m)

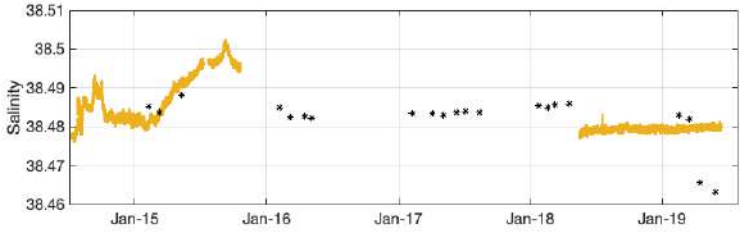


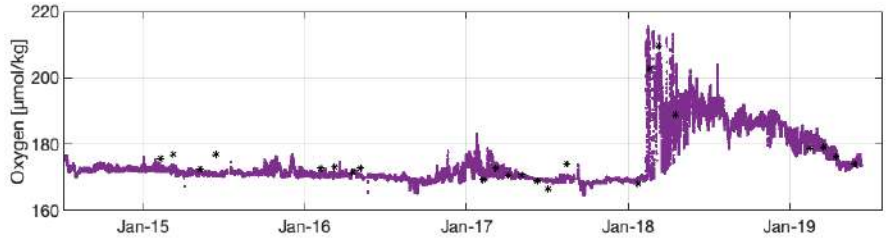


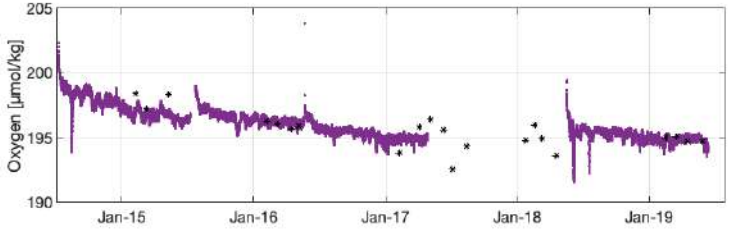






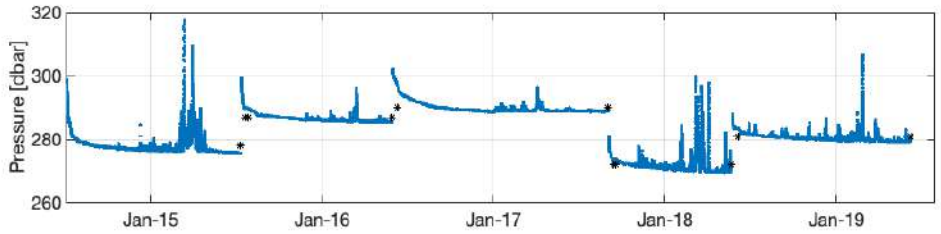


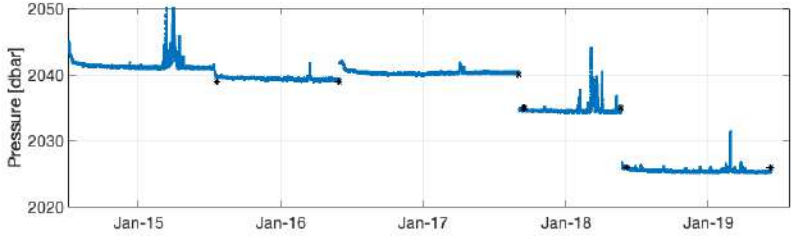


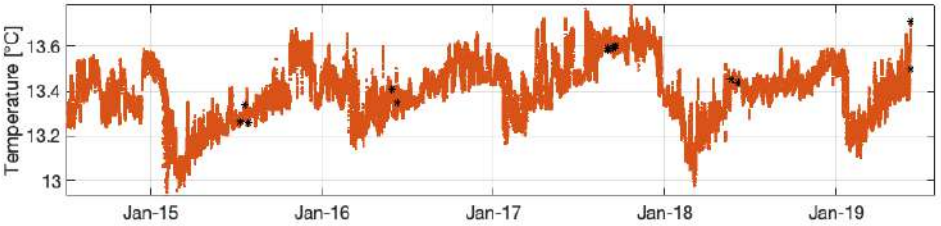


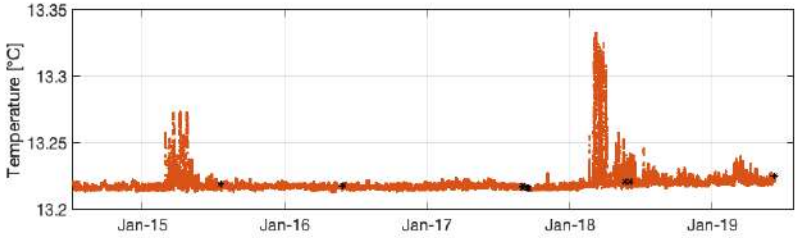
Adjusted with monthly in situ sampling (offset)

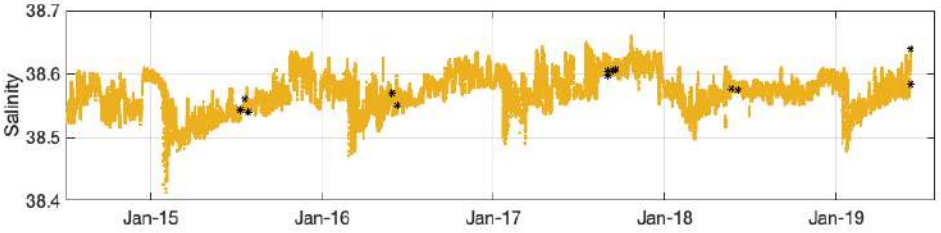
DOXY data for LION since 2014
(SBE63: adjusted data @300m & 2000m)

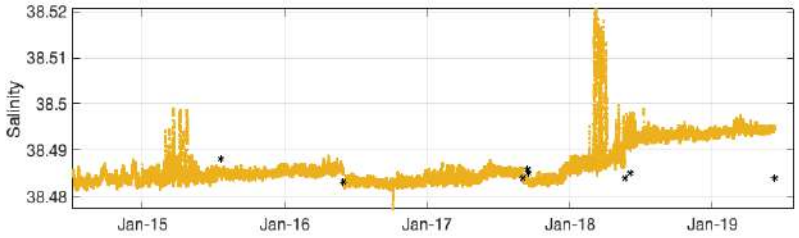


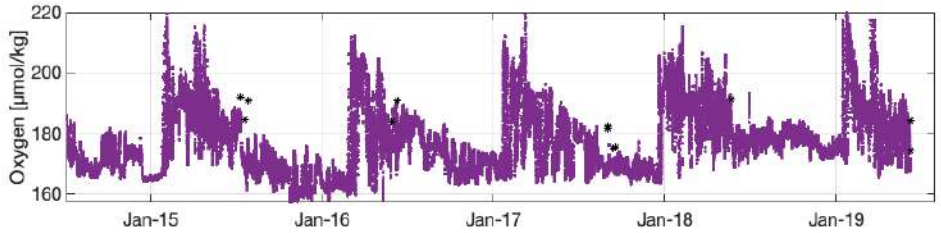


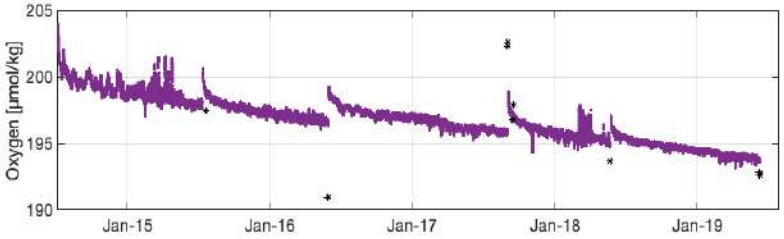












Adjusted with annual in situ sampling (offset)

Example of databases

Dyfamed observatory data

Publication date	2016-04
Author(s)	Coppola Laurent[1, 2], Diamond Riquier Emilie[1, 2], Carval Thierry[3]
Affiliation(s)	1 : Sorbonne Universités, UPMC Univ. Paris 06, UMR 7093, Laboratoire d'Océanographie de Villefranche, 06230 Villefranche-sur-Mer, France 2 : CNRS, UMR 7093, Laboratoire d'Océanographie de Villefranche, 06230 Villefranche-sur-Mer, France 3 : Ifremer, Service Ingénierie des Systèmes d'Information, France
DOI	10.17882/43749
Publisher	SEANOE
Keyword(s)	Ligurian Sea, marine biogeochemistry, sediment traps, dissolved oxygen, nutrients, carbon export
Abstract	In the framework of the French MOOSE project (Mediterranean Ocean Observing System for the Environment), an eulerian time series so-called DYFAMED (Ligurian Sea) performs since 1991 a monthly multidisciplinary monitoring to observe: 1) the evolution of the water mass properties (LIW and WMDW), 2) the carbon export change and 3) the variability of the biological species relative to climate forcing (temperature, acidification).In addition to monthly CTD profiles, a standalone mooring is located in the DYFAMED site with CTD and currents sensors (since 2009) and two sediment traps (Technicap PPS5) for collecting large particles and zooplankton every 15 days (48 samples per year).
Licence	CC BY

Data

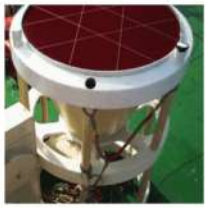
File	Size	Format	Processing	Access	Key
1988-2015 deployments	20 MB	NetCDF, Excel	Quality controlled data	Open access	43298
2010-2014 deployments	14 MB	NC, NetCDF	Quality controlled data	Restricted access	43276
2010-2013 deployments	2 MB	XLS, XLSX	Quality controlled data	Restricted access	43283

Top of the page

How to cite

Coppola Laurent, Diamond Riquier Emilie, Carval Thierry (2016). **Dyfamed observatory data**. SEANOE. http://doi.org/10.17882/43749

Click to download the data — DATA



Download metadata
TXT, RIS, XLS

Oceanographic cruises
MOOSE (DYFAMED), MOOSE (DYFAMED) 2008, MOOSE (DYFAMED) 2009, MOOSE (DYFAMED) 2010, MOOSE (DYFAMED) 2011, MOOSE (DYFAMED) 2012, MOOSE (DYFAMED) 2012, MOOSE (DYFAMED) 2012, MOOSE (DYFAMED) 2012, MOOSE (DYFAMED) 2013, MOOSE (DYFAMED) 2014, MOOSE (DYFAMED) 2015, MOOSE (DYFAMED) 2016

Project(s) FP7/H2020
FIXO3

MOOSE (DYFAMED)

Type	Set of cruises
Chief scientist(s)	DIAMOND-RIQUIER Emilie
Project manager	DIAMOND-RIQUIER Emilie
DOI	10.18142/131
Objective	The DYFAMED series started in 1991 under JGOFS program. It has been integrated into the SNO MOOSE since 2010 (SNO having integrated the IR ILICO in 2016). This series is largely based on the monthly cruises performed by the CNRS-INSU vessel TETHYS II. These observations are complemented by "high-frequency" measurements of the submerged mooring integrated into the ERIC EMSO, surface measurements acquired by the ODAS Cote d'Azur buoy (Meteo France) and bio-optical measurements of the BOUSSOLE buoy. In SNO MOOSE, fixed-point observations of the DYFAMED site are improved by glider measurements along the NICE-CALVI endurance line (MOOSE T00), which provides a better understanding of the mesoscale variability of hydrological and biogeochemical processes in the Ligurian Sea. The objective of this unique time series in the Mediterranean (in the open sea) is to observe over the long term the impact of climate and anthropogenic forcing on: 1) the evolution of water masses in relation to deep water formation and watervmass propagation from the eastern basin, 2) biological production and export of associated material (nutrients, major elements C, N, Si), 3) acidification and sequestration of anthropogenic carbon, 4) biodiversity and 5) variability of atmospheric inputs to the CO2 biological pump. In this context, the long-term observation strategy makes it possible to detect seasonal and interannual anomalies as well as decennial variations affecting this open sea area. Monthly observations in the water column at the DYFAMED site include a CTDO2 profile (surface-bottom), seawater samples and zooplankton collections. Seawater samples are used to measure essential biogeochemical variables (EOV) using standard and best practices (identical to those of SOMLIT, GO-SHIP): nutrients and oxygen (Villefranche), pigments (SAPIGH service), DIC-AT (SNAPCO), zooplankton identification (Villefranche).

SCIENTIFIC CONTEXT

The Mediterranean Sea is a semi-enclosed sea that responds rapidly to climatic and anthropogenic forcings compared to the global ocean. This is due, in part, to its small size, its geographical characteristics and growing demographics and the circulation of water masses 10 times faster than the global ocean. As a result, climate

How to cite ?

DIAMOND-RIQUIER Emilie (2008) MOOSE (DYFAMED), https://doi.org/10.18142/131

List of cruises
MOOSE (DYFAMED) 2019
MOOSE (DYFAMED) 2018
MOOSE (DYFAMED) 2017
MOOSE (DYFAMED) 2016
MOOSE (DYFAMED) 2015
MOOSE (DYFAMED) 2014
MOOSE (DYFAMED) 2013
MOOSE (DYFAMED) 2012 - EU-2
MOOSE (DYFAMED) 2012 - TE
MOOSE (DYFAMED) 2012 - EU-1
MOOSE (DYFAMED) 2012 - AN
MOOSE (DYFAMED) 2011
MOOSE (DYFAMED) 2010
MOOSE (DYFAMED-PIEGES)
MOOSE (DYFAMED) 2009
MOOSE (DYFAMED) 2008

SEANOE for the mooring/buoy data
(OceanSites format, QC, DOI)
+ references papers

SISMER for TS monthly ship visits
(MedAtlas, ODV format, QC, DOI)
+ references papers

Best practices for data analysis O_2 : where are we now ?

- White book in JERICO (2011-2015)
- Argo-O2 cookbook v.2.0 Oct 2018
- Reports Gallian Marine, Thierry Virginie (2018): Argo-O2 + LOCODOX
- OceanObs2019 paper “Evolving and Sustaining Ocean Best Practices and Standards for the Next Decade” Pearlman et al., 2019
- EMSO-Link D2.2 : first release of handbook of best practices in April 2019
- “Fixed Observatories and Long-time-Series of Dissolved Oxygen Measurements: Good Quality Data is a Challenge” S. Van Ganse IEEE DOI: 10.1109/OCEANSE.2019.8867385
- In progress: update with EMSO Science Service Group (D.Lefevre)
- Plan next meeting OceanSites/EMSO in April 2021 to update and harmonize practices (EUROSEA WP3.4)