



New Mediterranean Sea Climatologies

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OUTLINE

- Introduction
- Input Dataset
- Methodology
- Results
- Consistency Analysis
- Dissemination
- Work in progress
- Conclusions and Future Work

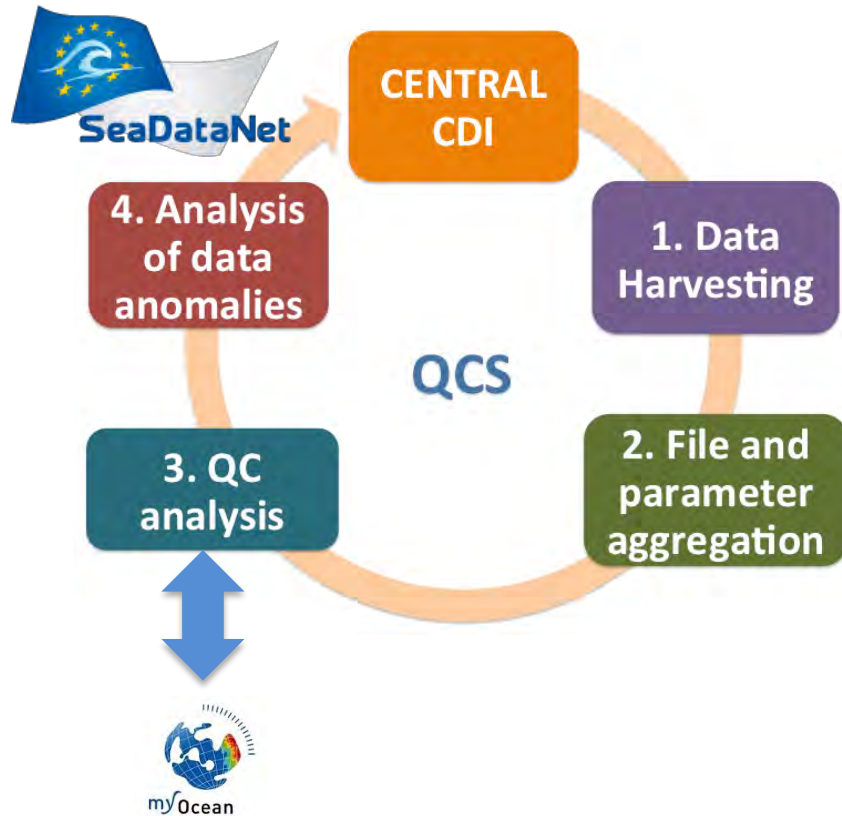
INTRODUCTION

New temperature and salinity monthly climatologies have been produced for the Mediterranean Sea within the framework of SeaDataNet2 EU project.

OBJECTIVES:

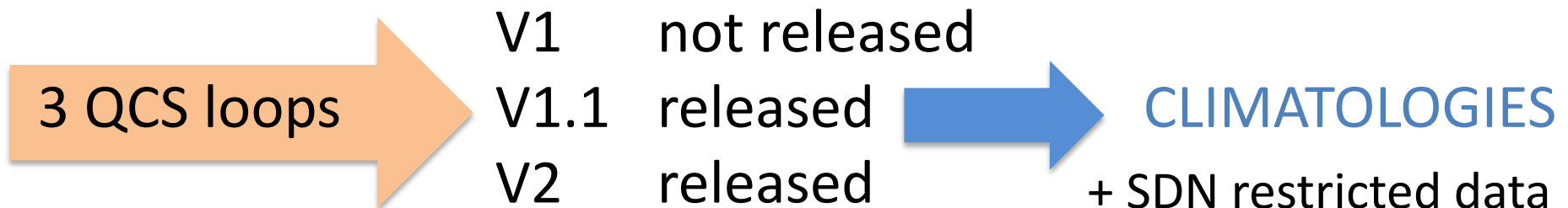
- To present/provide new temperature and salinity climatologies for the Mediterranean Sea and develop/implement standard validation/consistency analysis procedure considering reference datasets.
- To provide climatologies for model (analysis and reanalysis) validation and initialization and serve the operational oceanography community.
- To implement a standard validation procedure to be included in quality information documents (like CMEMS QUIDs) and increase SDN products uptake.

SeaDataNet2 → WP10 dedicated to data products, regional aggregated datasets and climatologies



Quality Control Strategy

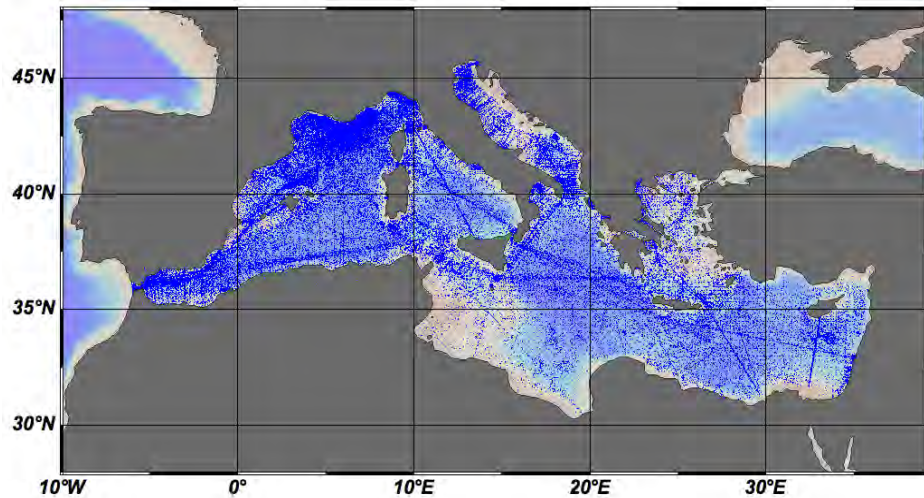
Iterative approach to facilitate the upgrade of the database and the versioning of data products through the release of new data collections at the end of each QCS loop and the generation of the derived climatologies after a certain time lag



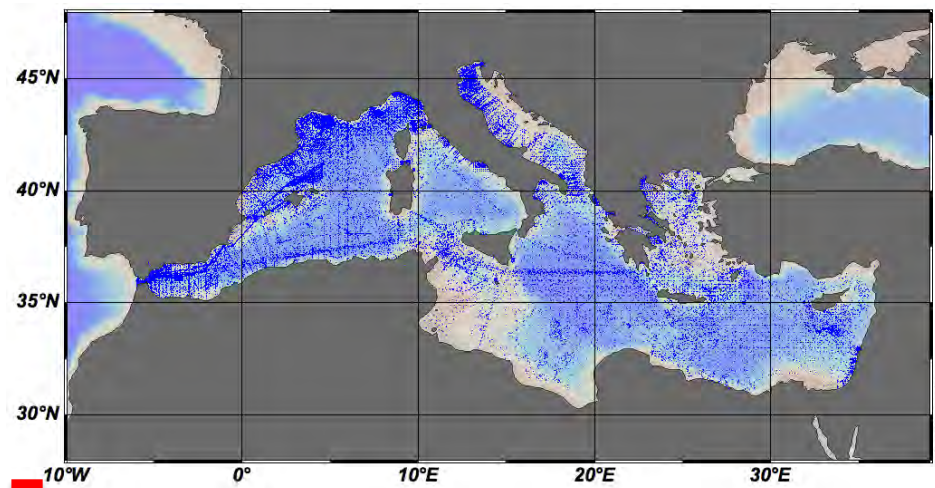
INPUT DATASET

SDN2 V1.1 Climatologies are based on the V1.1 historical data collection of all available temperature and salinity in situ profiles spanning the time period 1900-2013

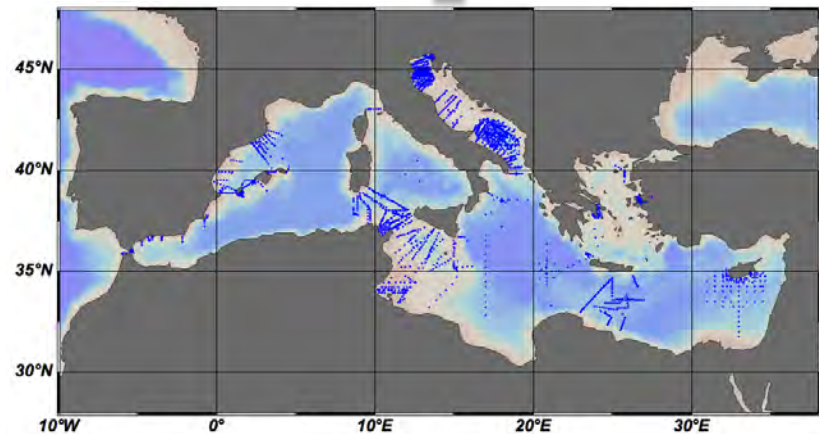
V1.1 Data distribution maps



TEMPERATURE



SALINITY

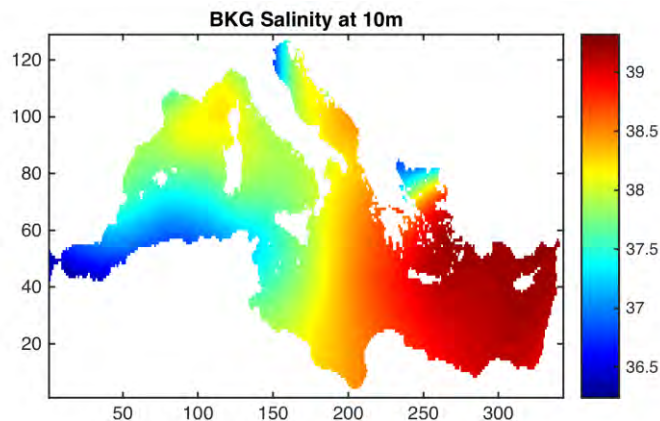


SDN2
RESTRICTED
data

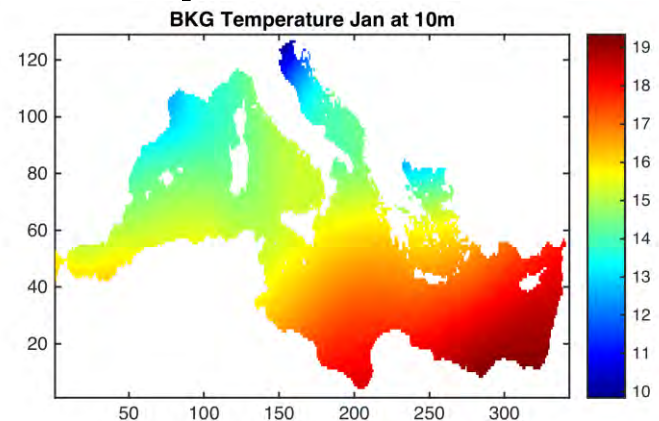
ANALYSIS METHODOLOGY

- DIVA (4.6.9 version)
- Resolution: $1/8^\circ$ on 33 IODE standard levels
- Monthly fields
- Error field: “clever poor men’s error field” (ispec=111)
- Correlation Length: 2 degrees (Lc)
- Signal to noise ratio: 0.5 (snr)
- Variance of the background field 0.6: (varbak)
- Background fields semi-normed analysis:

Annual SALINITY BKG



3-monthly TEMPERATURE BKG



VALIDATION METHODOLOGY

Reference dataset → WOA 2013 V2 monthly temperature and salinity

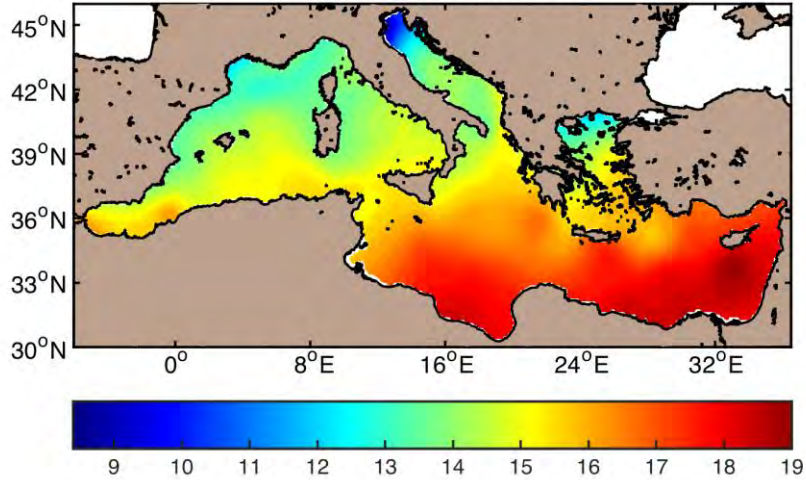
	WOA2013V2	SDN2 V1.1
Horizontal extent	global	Med Sea [-9.25°E]
Horizontal resolution	1/4°	1/8°
Vertical extent	0-1500m	0-5500m
Vertical resolution	57 levels	33 levels
Temporal data coverage	Averaged decades 1955-2012	1900-2013

The consistency analysis has been performed over 24 coincident data layers.

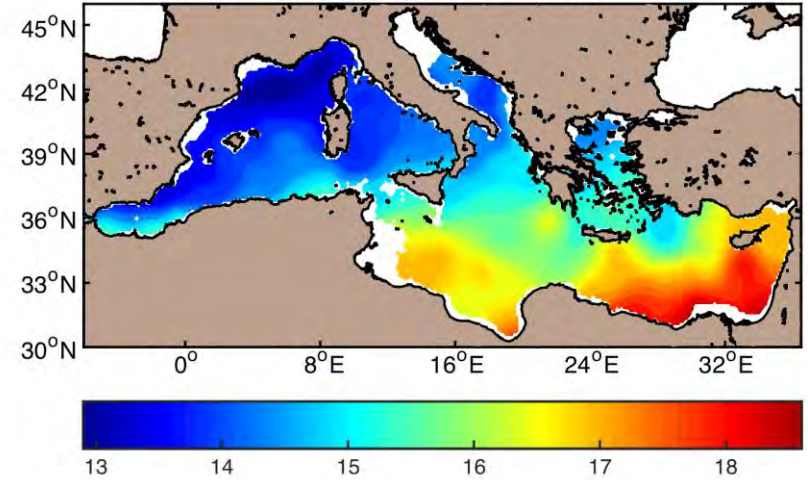
1. Computation of simple statistics, RMSD and BIAS;
2. Visual consistency analysis to check the climatological patterns and verify possible big discrepancies.

RESULTS: Temperature

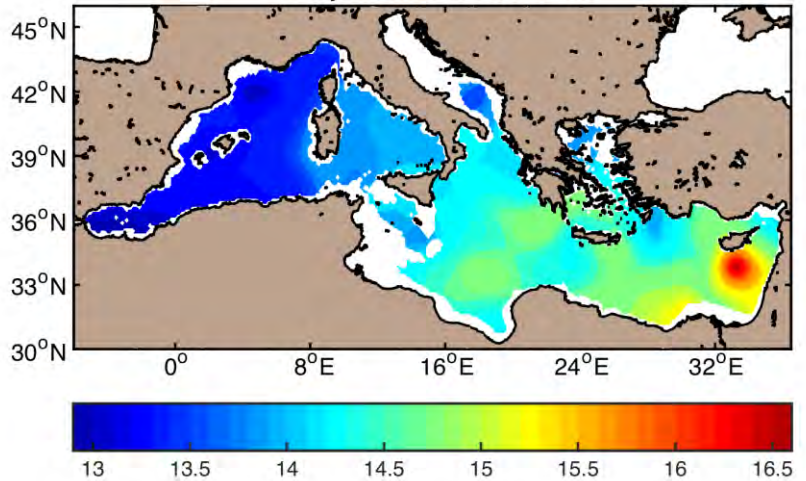
Temperature Jan at 10m



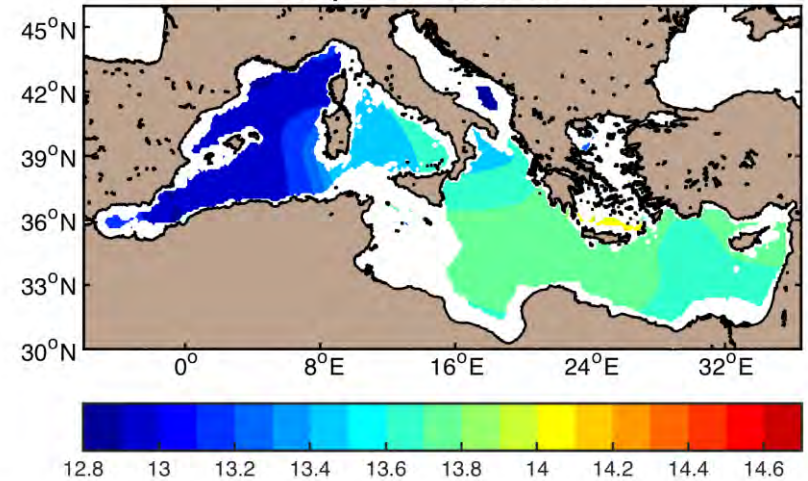
Temperature Jan at 100m



Temperature Jan at 300m

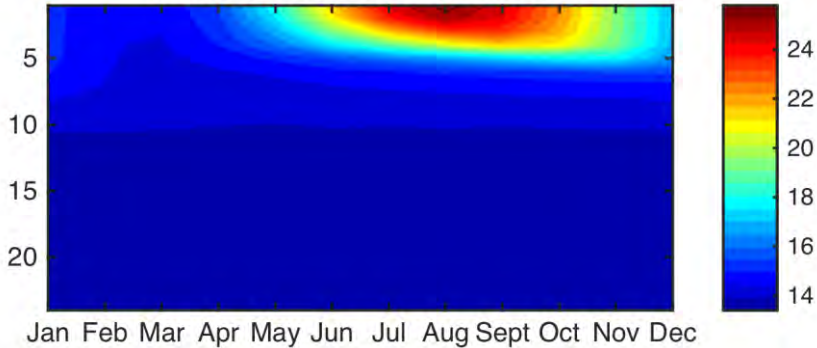


Temperature Jan at 1000m

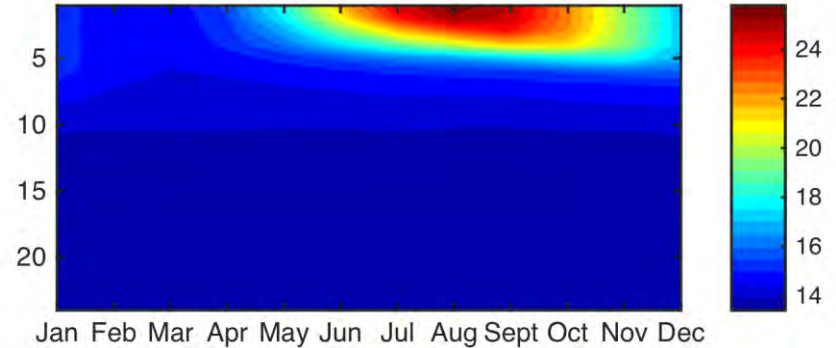


CONSISTENCY ANALYSIS: Temperature

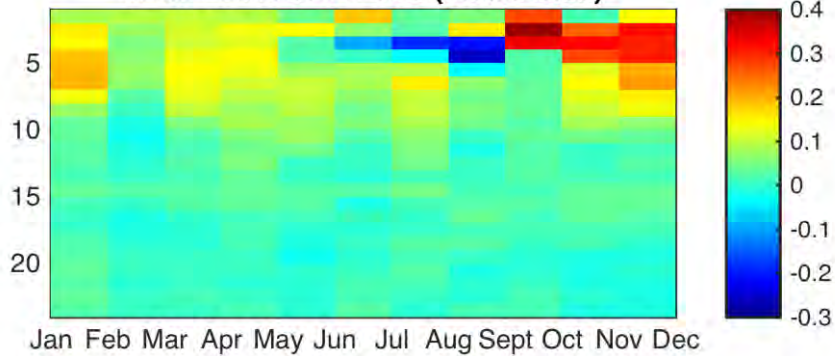
WOA13 V2 TEMPERATURE



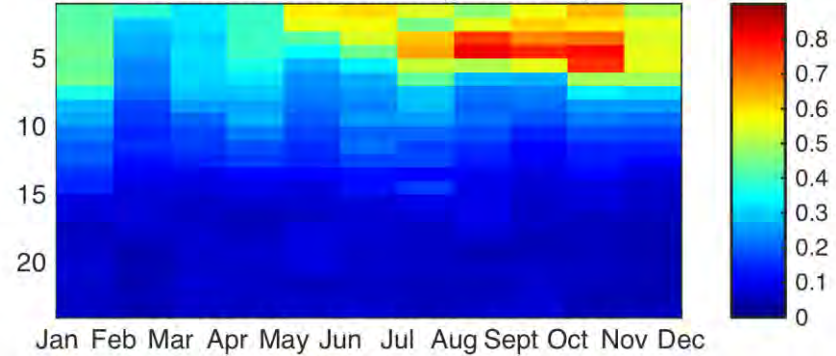
SDN V1.1 TEMPERATURE



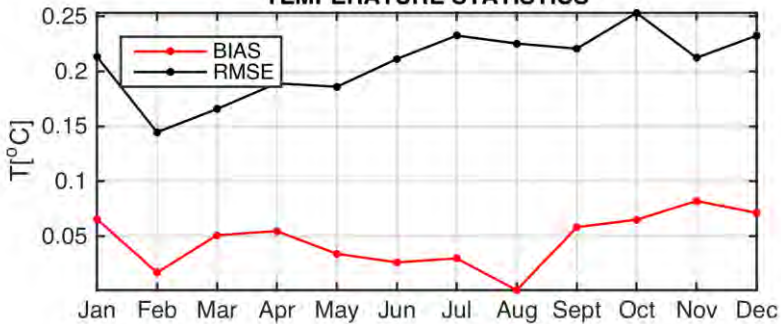
TEMPERATURE BIAS (mean=0.05)



TEMPERATURE RMSE (mean=0.21)



TEMPERATURE STATISTICS



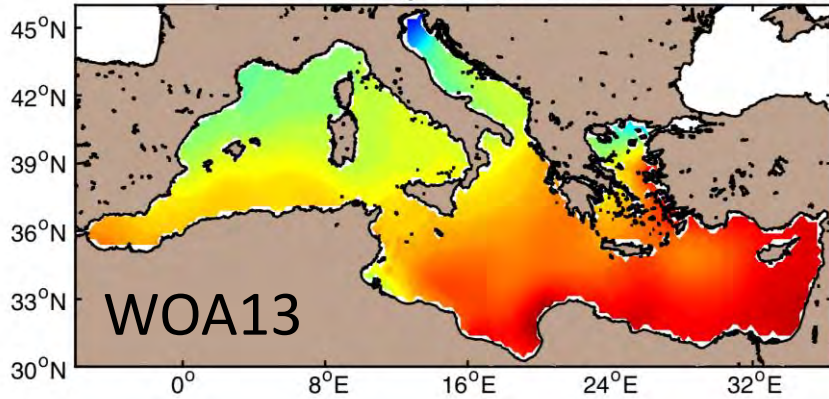
SDN-WOA13V2
monthly basin
average BIAS and RMSE

CONSISTENCY ANALYSIS: Temperature

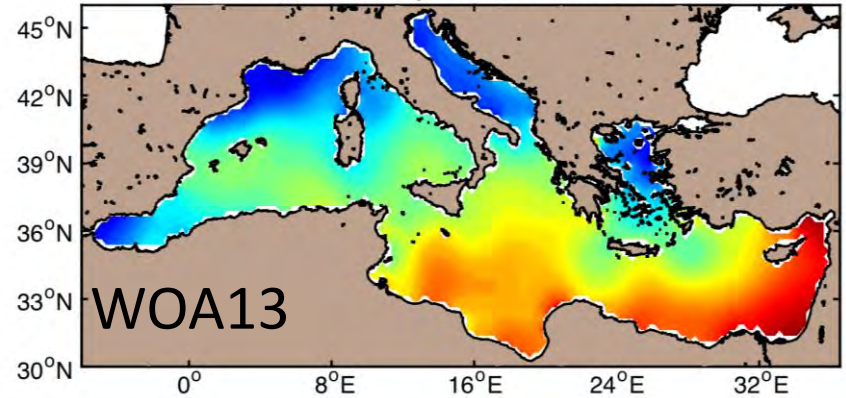
February

October

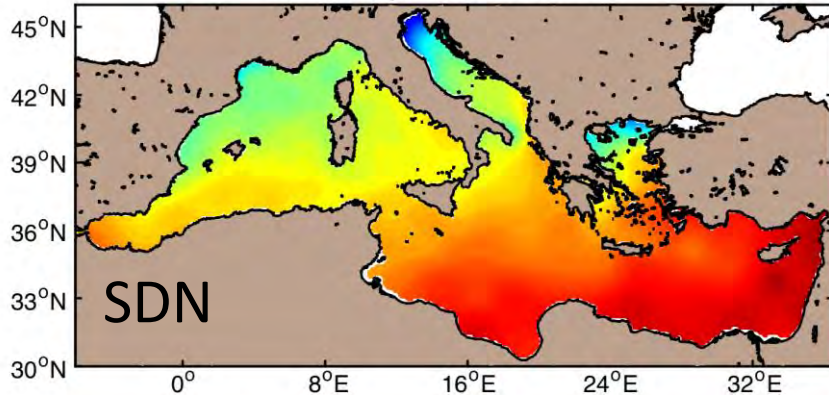
WOA13 Temperature Feb at 10m



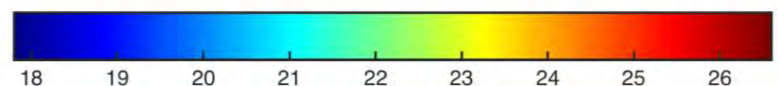
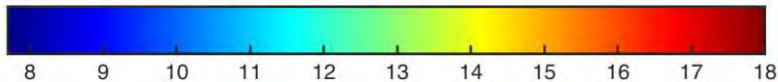
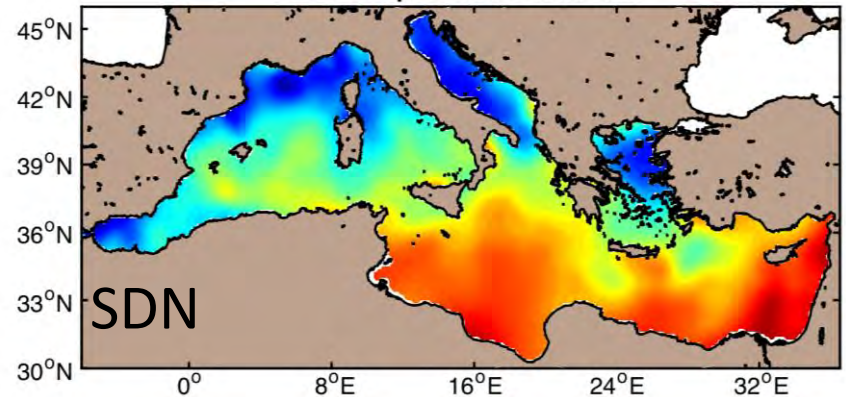
WOA13 Temperature Oct at 10m



SDN Temperature Feb at 10m

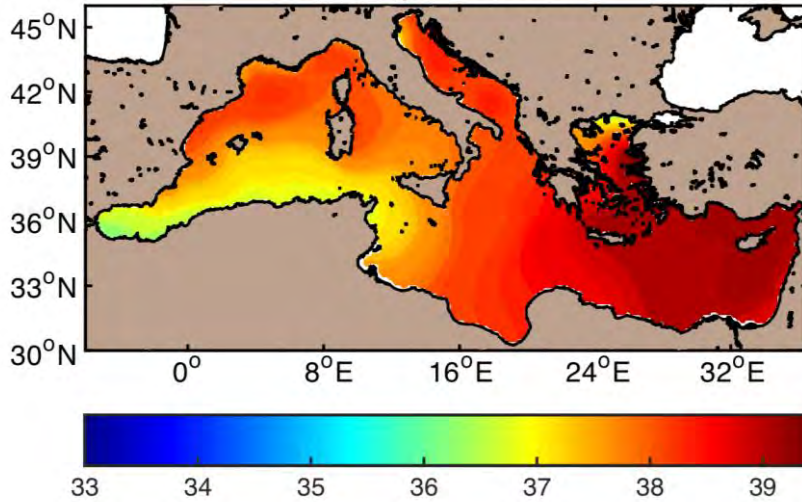


SDN Temperature Oct at 10m

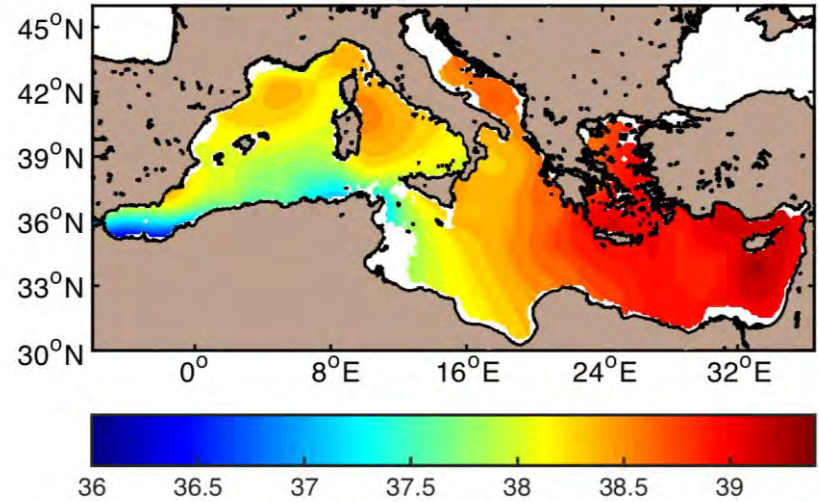


RESULTS: Salinity

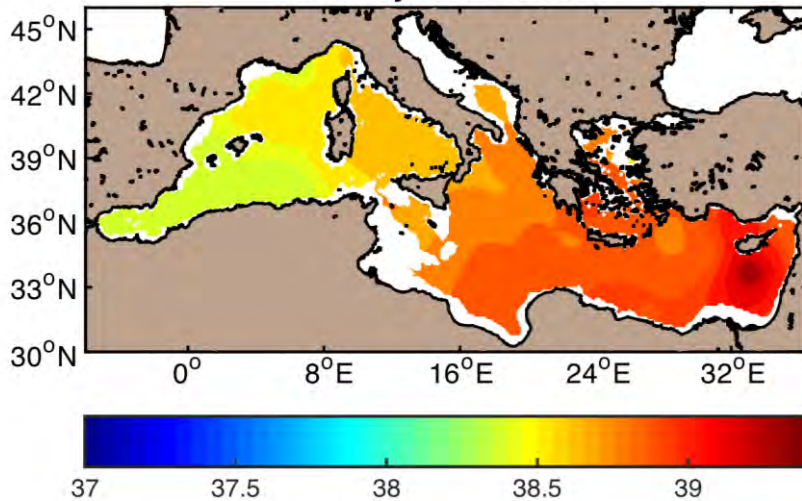
Salinity Jan at 10m



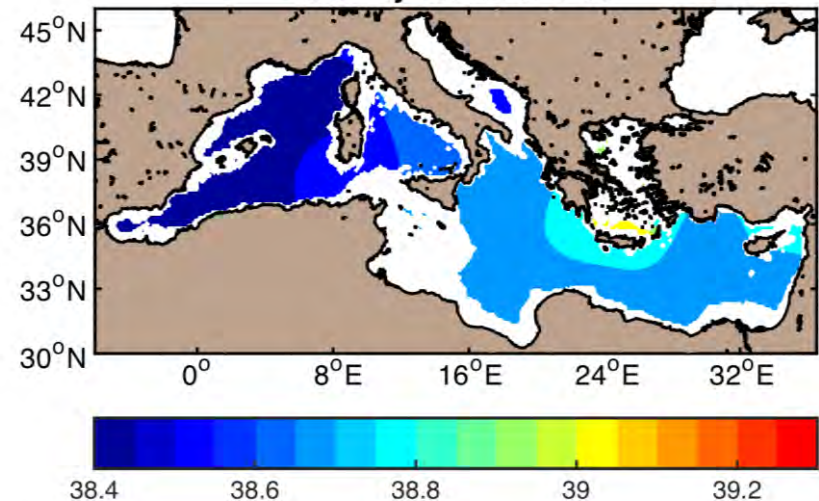
Salinity Jan at 100m



Salinity Jan at 300m

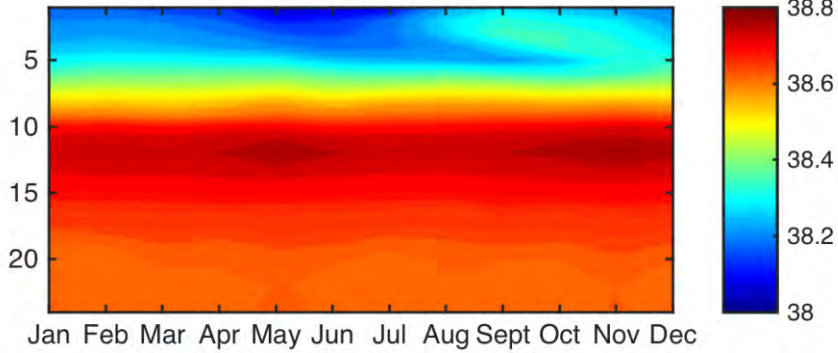


Salinity Jan at 1000m

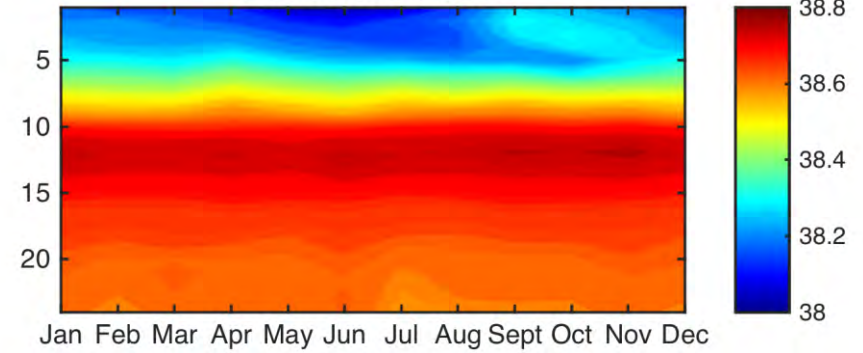


CONSISTENCY ANALYSIS: Salinity

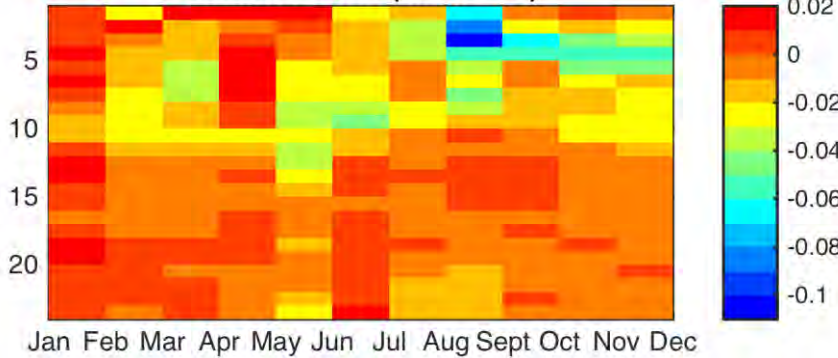
WOA13 V2 SALINITY



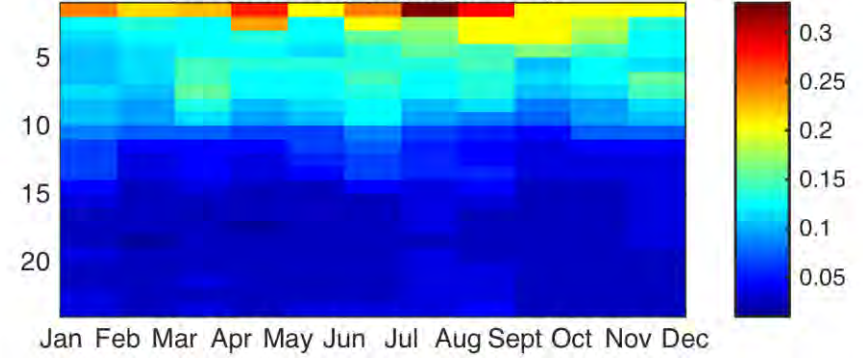
SDN V1.1 SALINITY



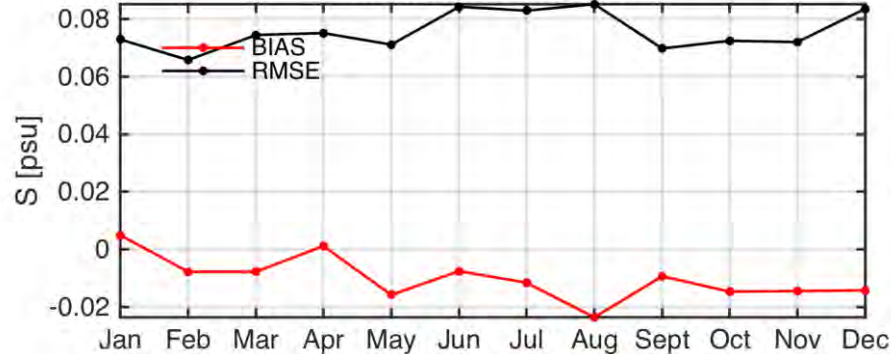
SALINITY BIAS (mean=0.01)



SALINITY RMSE (mean=0.08)

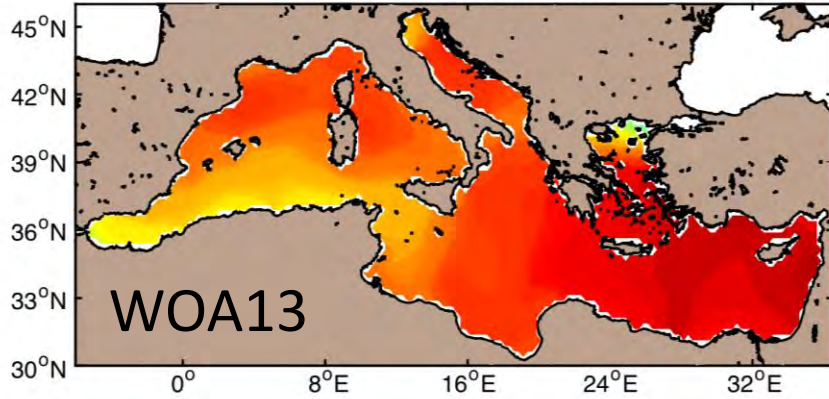


SALINITY STATISTICS

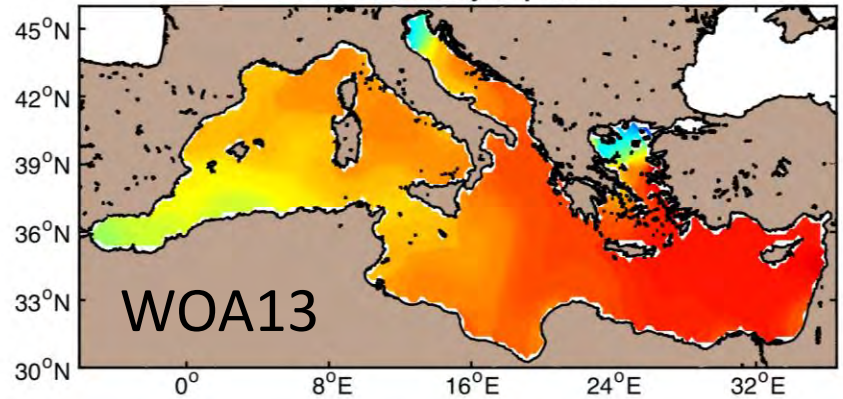


CONSISTENCY ANALYSIS: Salinity

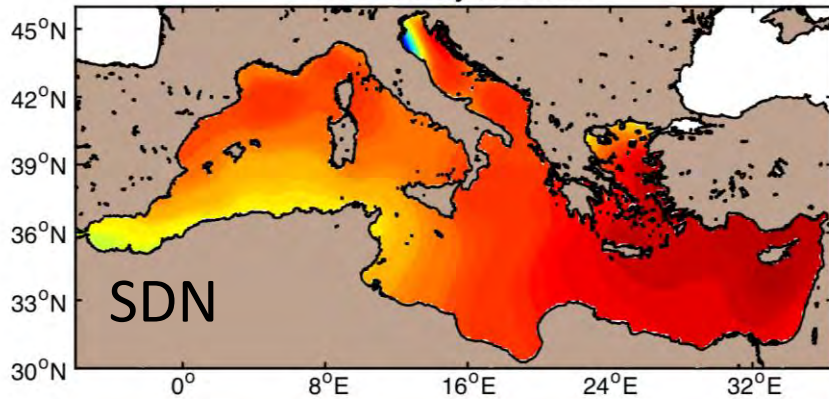
WOA13 Salinity Jan at 0m



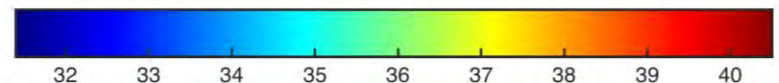
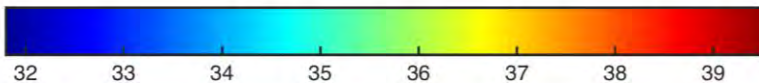
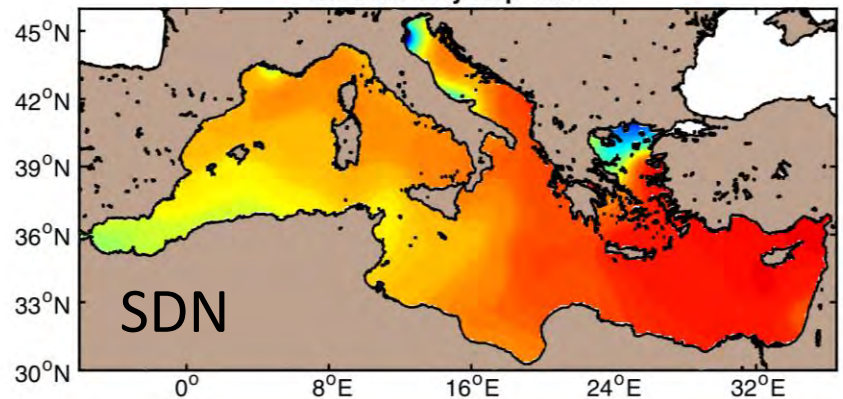
WOA13 Salinity Sept at 0m



SDN Salinity Jan at 0m



SDN Salinity Sept at 0m



CONSISTENCY ANALYSIS with CMEMS Reanalysis

Extracted from CMEMS Mediterranean Sea Physical Reanalysis 1997-2014

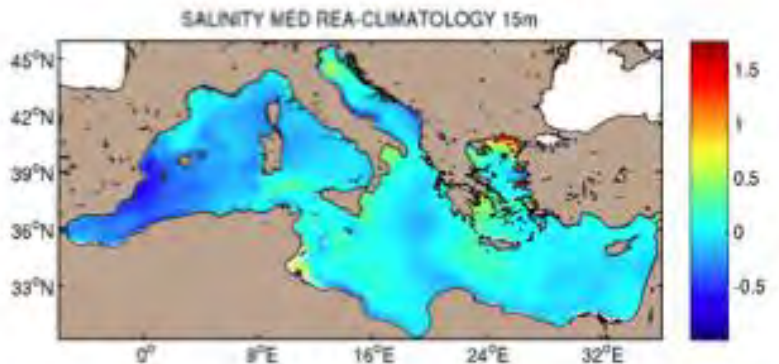
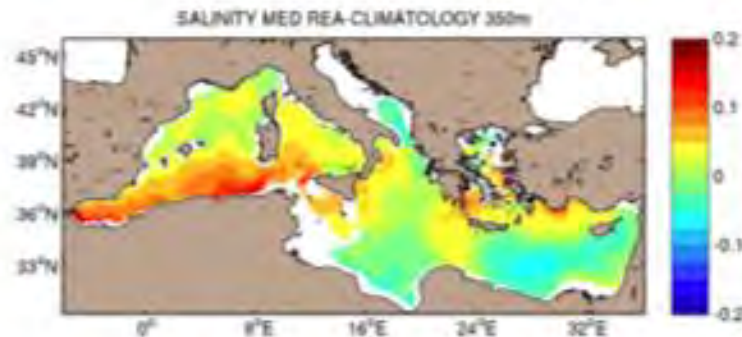
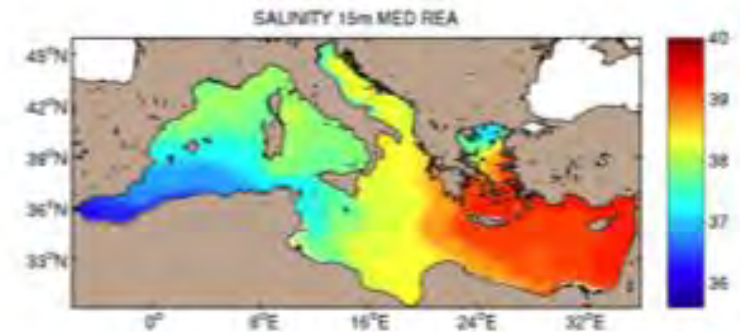
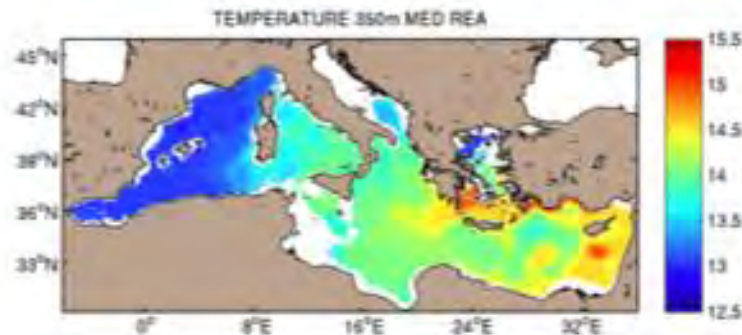
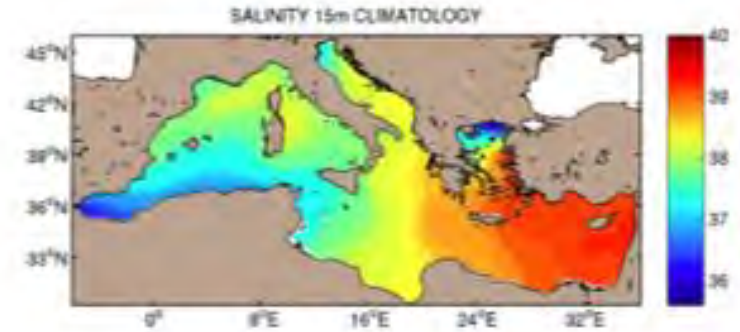
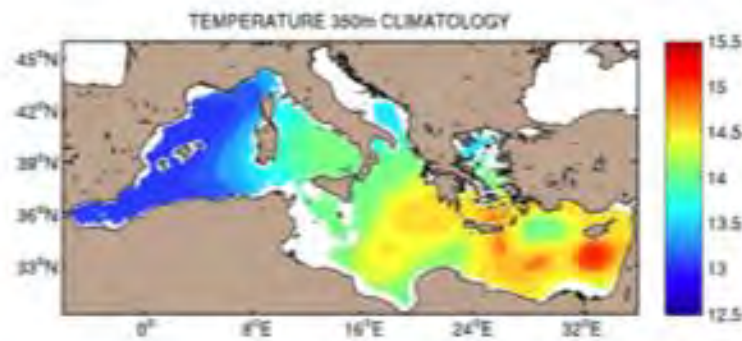
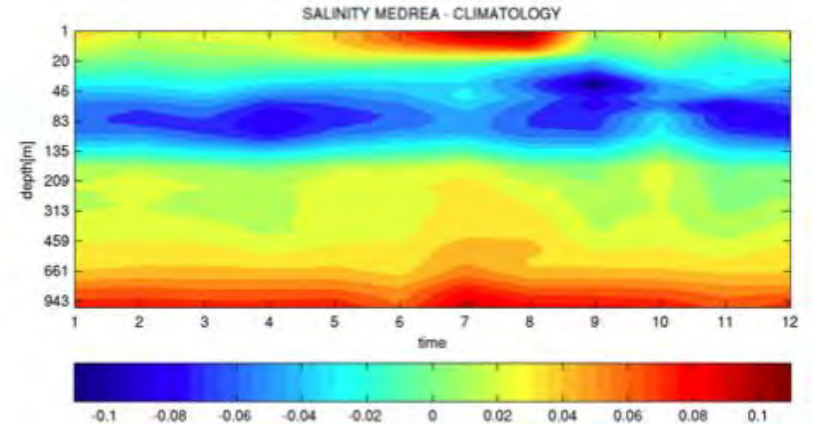
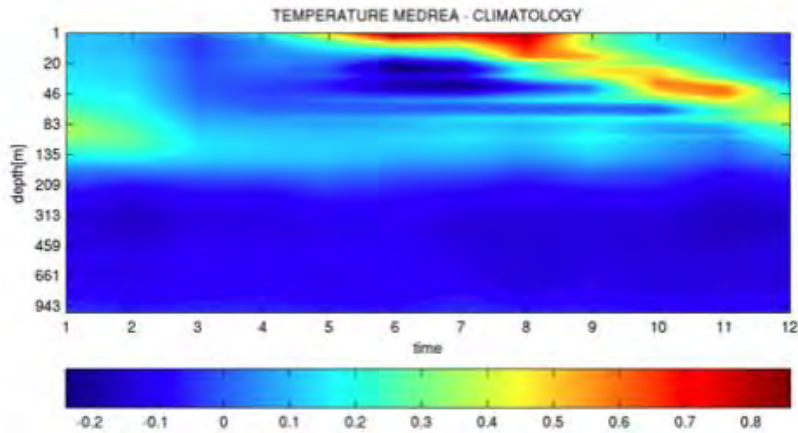


Figure 8T-CLASS1-T3D_MEAN Annual mean maps of Temperature at 350m of depth: **(top)** from SDN climatology; **(middle)** from MED REA climatology; **(bottom)** differences between MED REA and SDN climatology (1900-2009).

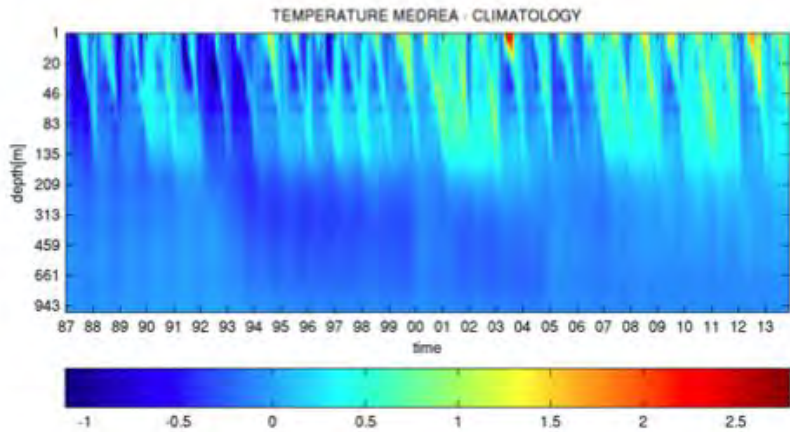
Figure 25S-CLASS1-S3D_MEAN Annual mean maps of Salinity at 15m of depth: **(top)** from SDN climatology; **(middle)** from MED REA climatology; **(bottom)** differences between MED REA and SDN climatology (1900-2009).

CONSISTENCY ANALYSIS with CMEMS Reanalysis

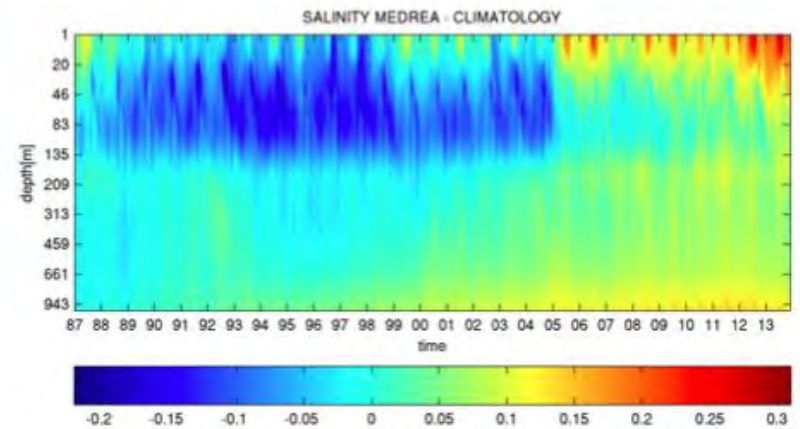
Extracted from CMEMS Mediterranean Sea Physical Reanalysis QUID



(a)



(a)



(b)

Figure 11 Temperature difference between (a) MED REA monthly Climatology and monthly basin SDN Climatology; (b) MED REA monthly basin averaged profile (time period 1987-2013) and SDN monthly Climatology within the first 1000m of water column.

(b)

Figure 22 Salinity difference between: (a)MED REA monthly basin climatology and monthly SDN Climatology (b) MED REA monthly basin averaged profile (time period 1987-2013) and SDN monthly Climatology within the first 1000m of water column.

DISSEMINATION

Overview Metadata Data Access Standards & Software **Products** Events Publications

Aggregated datasets
Climatologies

SeaDataNet2 > Products

DATA PRODUCTS

SeaDataNet provides the following products for all the European sea basins :

- **aggregated datasets** : ODV collections of all SeaDataNet measurements of temperature and salinity by sea basins
- **climatologies** : regional gridded field products based on the aggregated datasets

Arctic Sea

Baltic Sea

North Sea

Access to the SeaDataNet Products Catalogue

Mediterranean Sea

Black Sea

Atlantic Ocean

News

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DISSEMINATION



SeaDataNet products

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1-17 result(s) / 17

Mediterranean Sea - Temperature and Salinity Climatology V1.1

Mediterranean Sea Climatology computed from the SeaDataNet V1.1 aggregated dataset . The version used for the DIVA software is the 4.6.9. The period covers 1900-2013. For data access please register at <http://www.marine-id.org>

Sources : Seadatanet

Download View

Baltic Sea - Temperature and Salinity Climatology V1.1

Seadatanet temperature and salinity monthly climatologies 1900-2012 by DIVA software v4.6.10. Based on Seadatanet V1.1 dataset v1.1. For data access please register at <http://www.marine-id.org> DIVA settings: Seasonal background fields, months 12-02, 03-05, 06-08, 09-11. Weighting have been applied with length of weighting 0.5° and time of...

Sources : Seadatanet

Download View

Arctic Ocean - Temperature and salinity observation collection V1.1

SeaDataNet Temperature and Salinity historical data collection, including revised quality flags after quality control with ODV. For data access please register at <http://www.marine-id.org> The dataset format is ODV binary collections. You can read, analyse and export from the ODV application provided by Alfred Wegener institute at <http://odv.awi.de/>

Sources : Seadatanet

Download View

<http://sextant.ifremer.fr/en/web/seadatanet/>

DISSEMINATION



SeaDataNet products

Viewing and Downloading service

Horizontal Section

Vertical Section

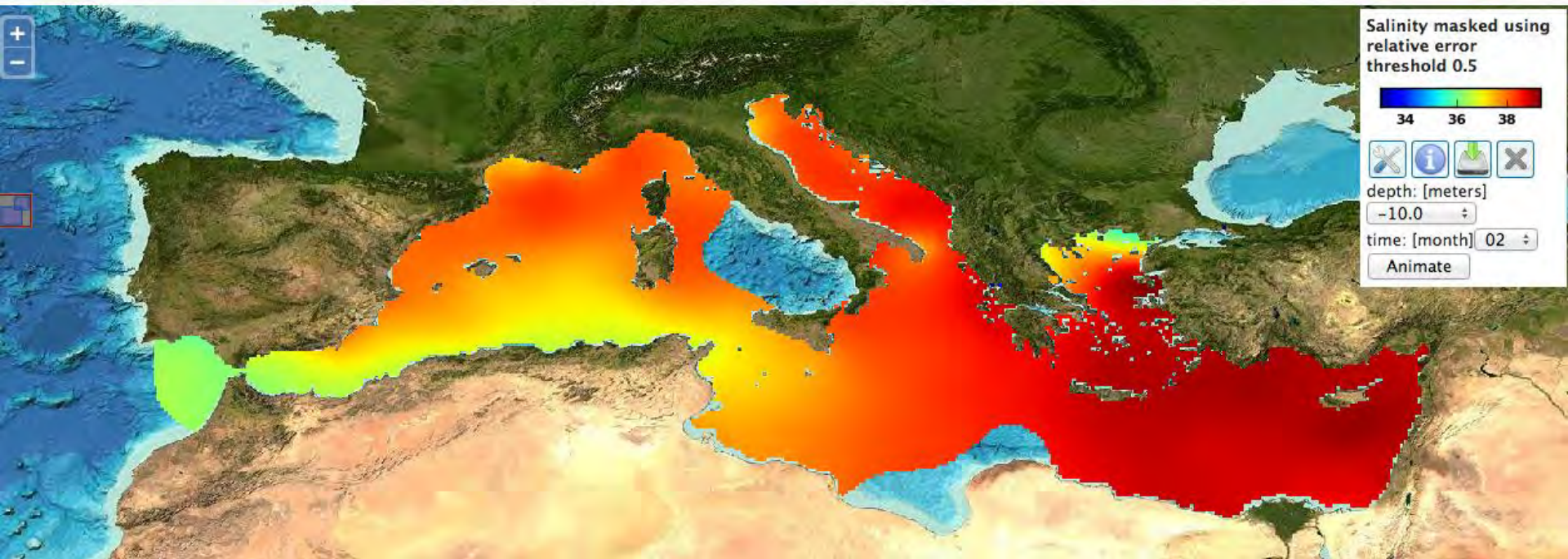
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<http://www.emodnet-physics.eu/portal/Products>

DISSEMINATION

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Products

At European level, different groups are contributing to high quality ocean physics data products or services. They are developed, operated and made available by the research or the environment monitoring communities.

Here EMODNET-Physics federates access to the data products provided by Copernicus Marine Environment Monitoring Service (DG Growth) and SeaDataNet (DG Research) in a single catalogue.

The function, provided by Sextant technical component, is currently in demonstration mode.

<<<See the products from our contributing partners >>>

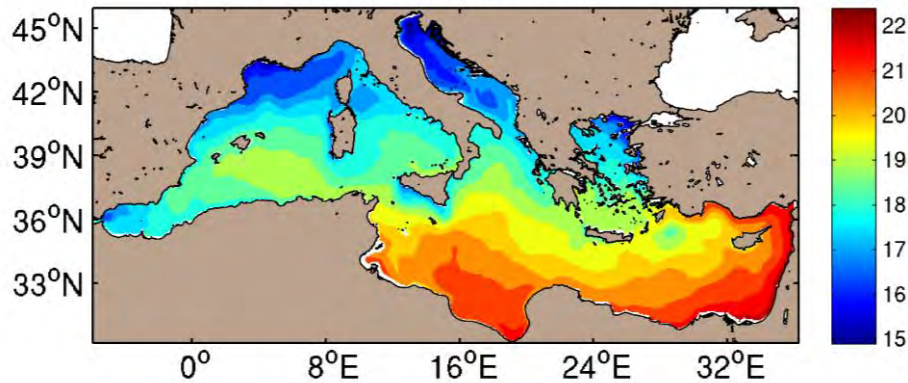


WORK IN PROGRESS

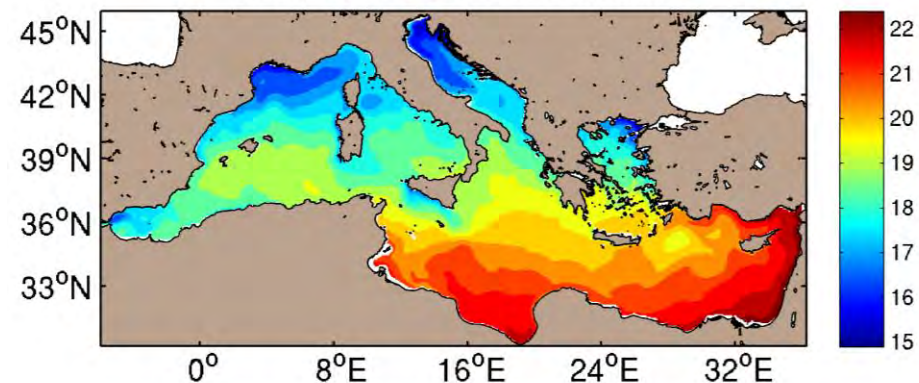
in collaboration with *S.lona* EMODnet Chemistry

Looking for decadal variability patterns: CMEMS REANALYSIS

MEDREA TEMPERATURE 15m 1987-1996

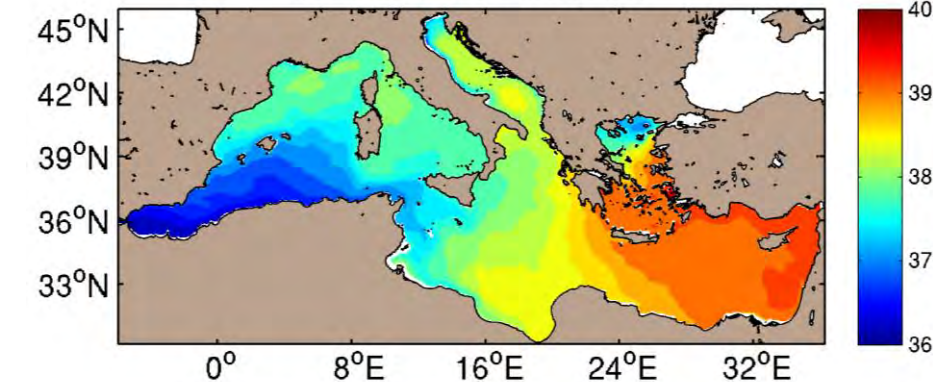


MEDREA TEMPERATURE 15m 1997-2006

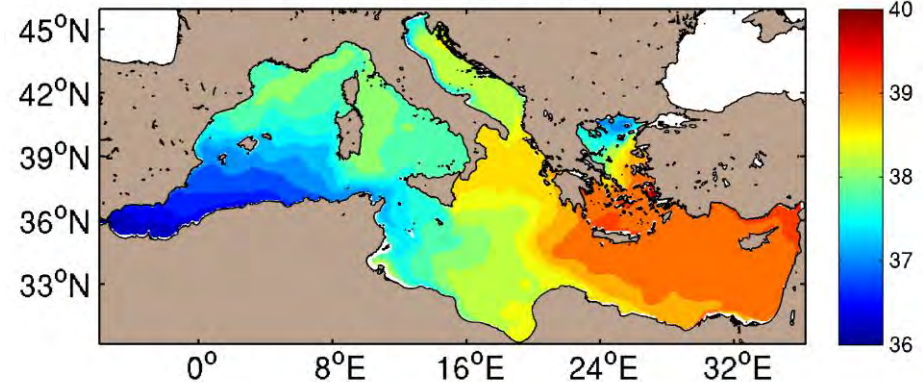


Warming in the Levantine basin

MEDREA SALINITY 15m 1987-1996



MEDREA SALINITY 15m 1997-2006

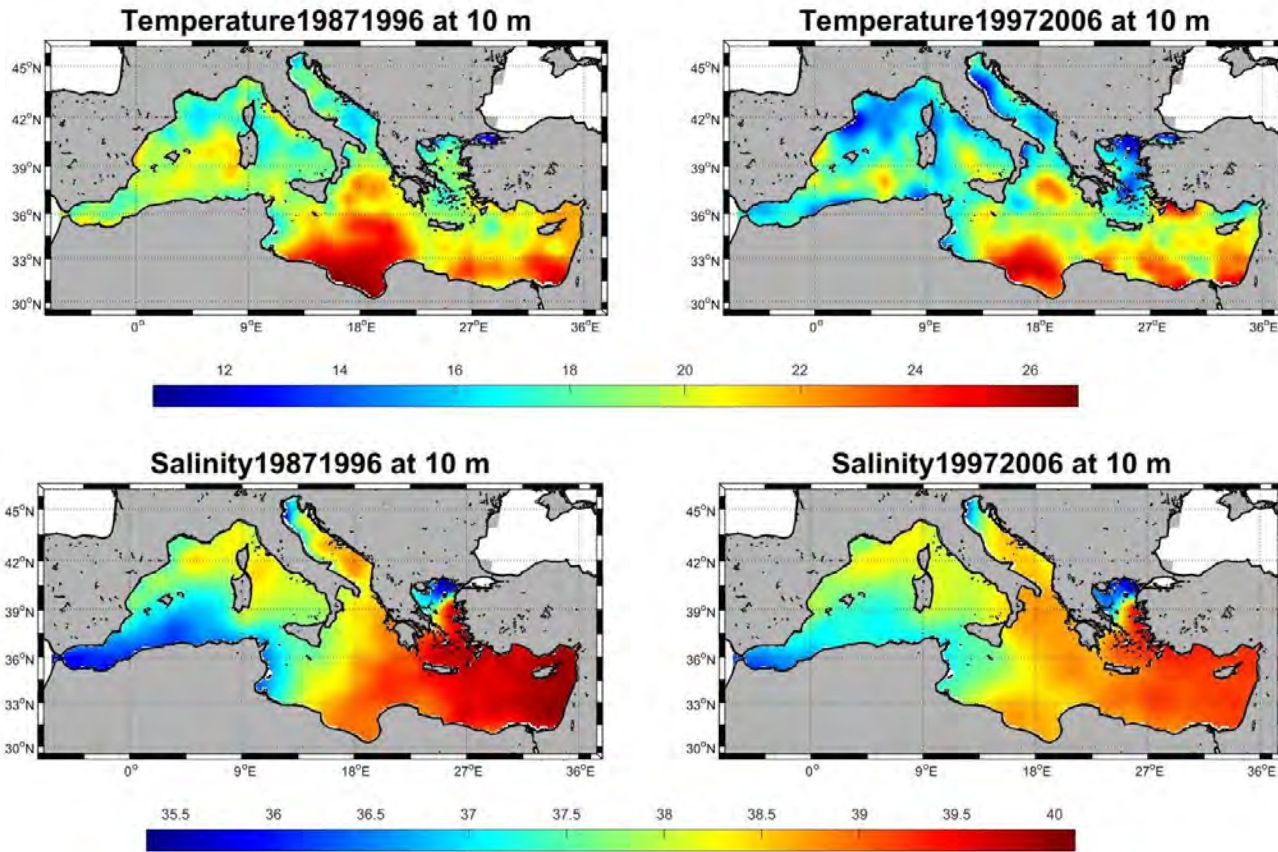


Salinity increase in the northern Ionian (NIR)

WORK IN PROGRESS

in collaboration with S.Iona EMODnet Chemistry

Looking for decadal variability patterns: climatologies



Do we have enough data to solve these decadal patterns?

More Tuning of DIVA parameters is needed

CONCLUSIONS

- SDN2 V1.1 Mediterranean Sea climatology have been produced and distributed through SDN and EMODnet Physics catalogues
- SDN2 V1.1 climatology is consistent with the WOA2013V2, it has higher horizontal resolution and it solves better the coastal gradients
- The standard validation procedure provides a simple and efficient view to check the quality of the climatology and the consistency with other available products
- This standard validation will raise user awareness and products uptake

FUTURE WORK (SeaDataCloud)

- Increase of horizontal and vertical resolution
- Merge different datasets: SDN+CMEMS REP
- Compute different climatologies on decadal base but considering the long term variability of the basin (EMT, NIR)
- Use of different reference datasets for validation/consistency: CMEMS REP SST, CMEMS reanalysis
- Test the standard validation methodology for EMODnet chemistry products (e.g. nutrient/oxygen/chlorophyll climatologies)