SeaDataNet

PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

North Atlantic Climatology

Christine Coatanoan, WP10 Meeting, Athens, 08th April 2015

PLAN (following the report)

1. Methodology
   - Domain definition
   - Time-space resolution
   - DIVA settings (table with the parameters)
   - Description of the tuning of DIVA
   - Background field choice
   - Error Maps
2. Temperature Maps

Description of the main features

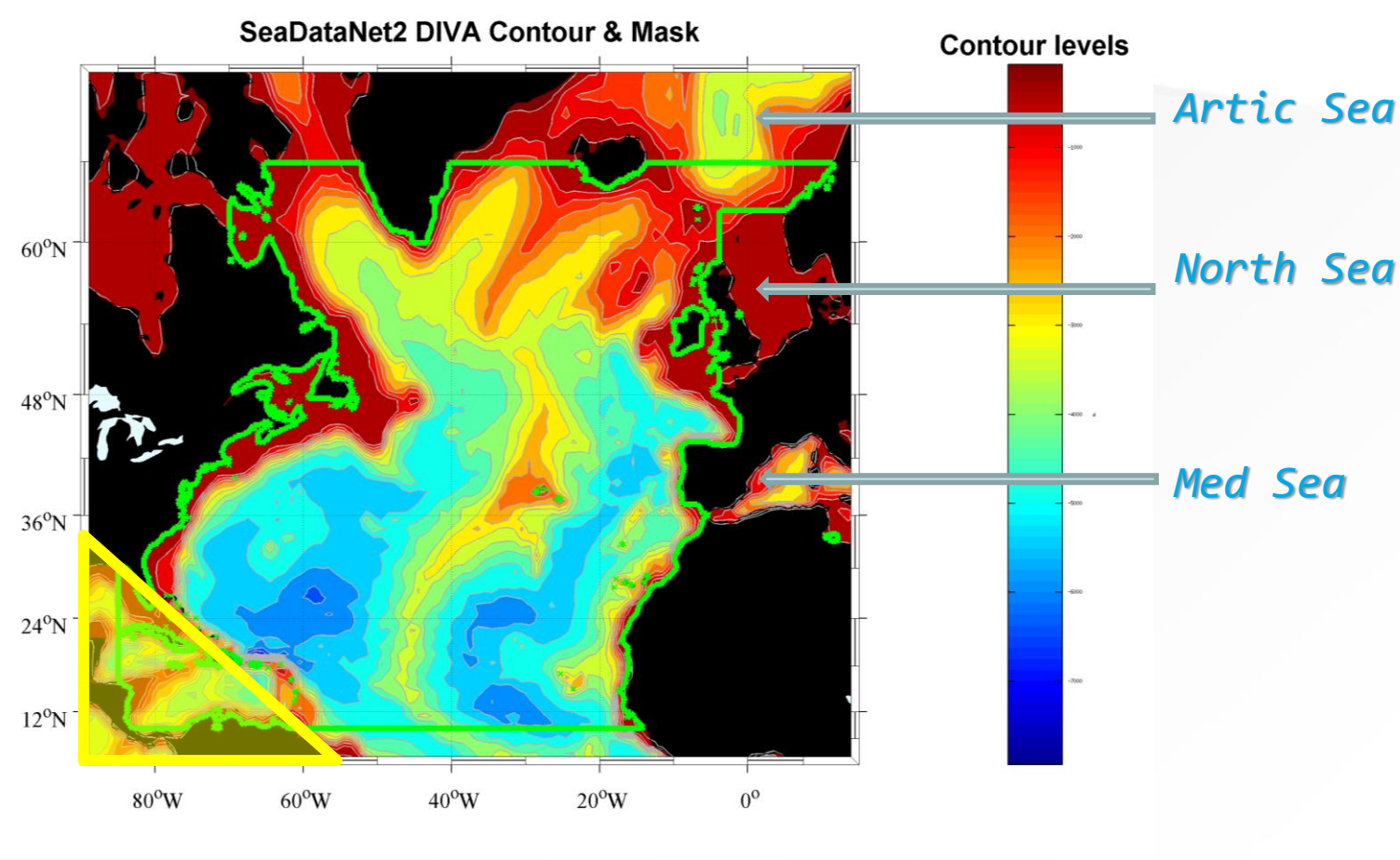
3. Salinity Maps

Description of the main features

4. Climatology validation

Comparison of SDN climatology with pre-existent ones (previous versions, WOA, …)

Domain definition and mask – North Atlantic area
(from Gebco bathymetry)



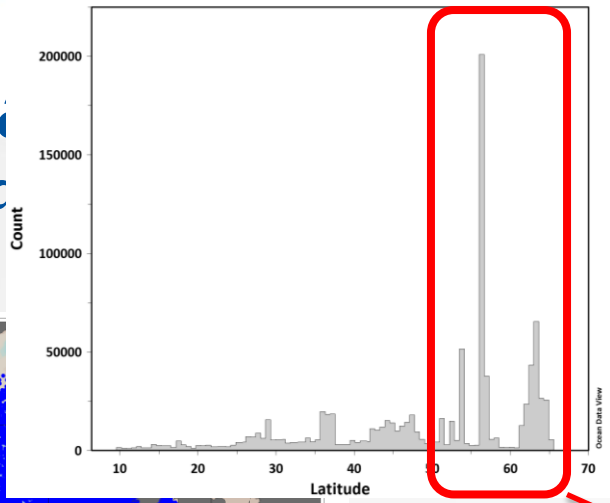
Time-space resolution

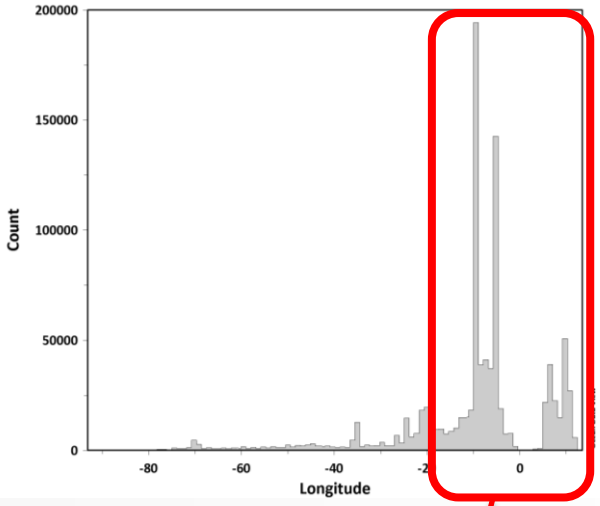
- Variable : Temperature & Salinity
- Year : 1900 to 2012
- Monthly : 01 to 12
- Season : 1202 – 0305 – 0608 – 0911
- Depth : (IODE) 33 levels - 0 to 5500 (used 0 to 4000)

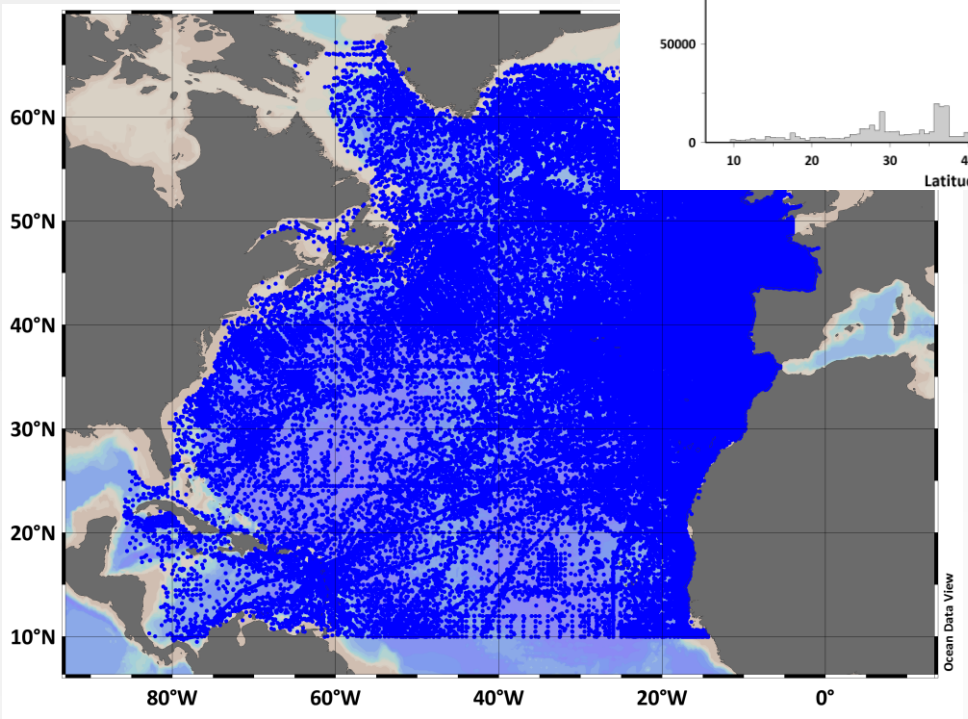
  (5500,5000,4500,4000,3500,3000,2500 ,2000,1750,1500,1400,1300, 1200,1100,1000,900, 800,700,600,500, 400,300,250, 200,150, 125,100,75,50,30, 20,10,0)
- Data : public and restricted

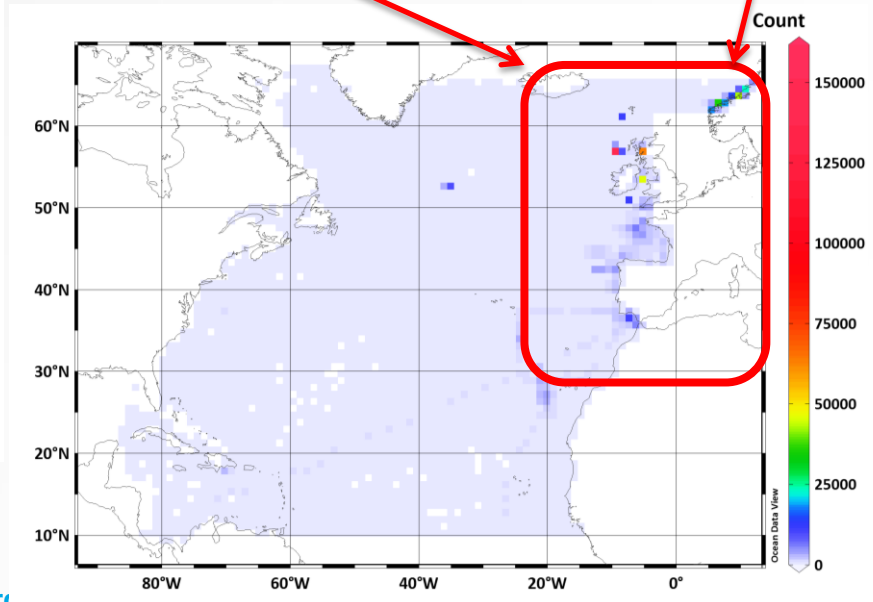
Aggregated da

public and restricted d

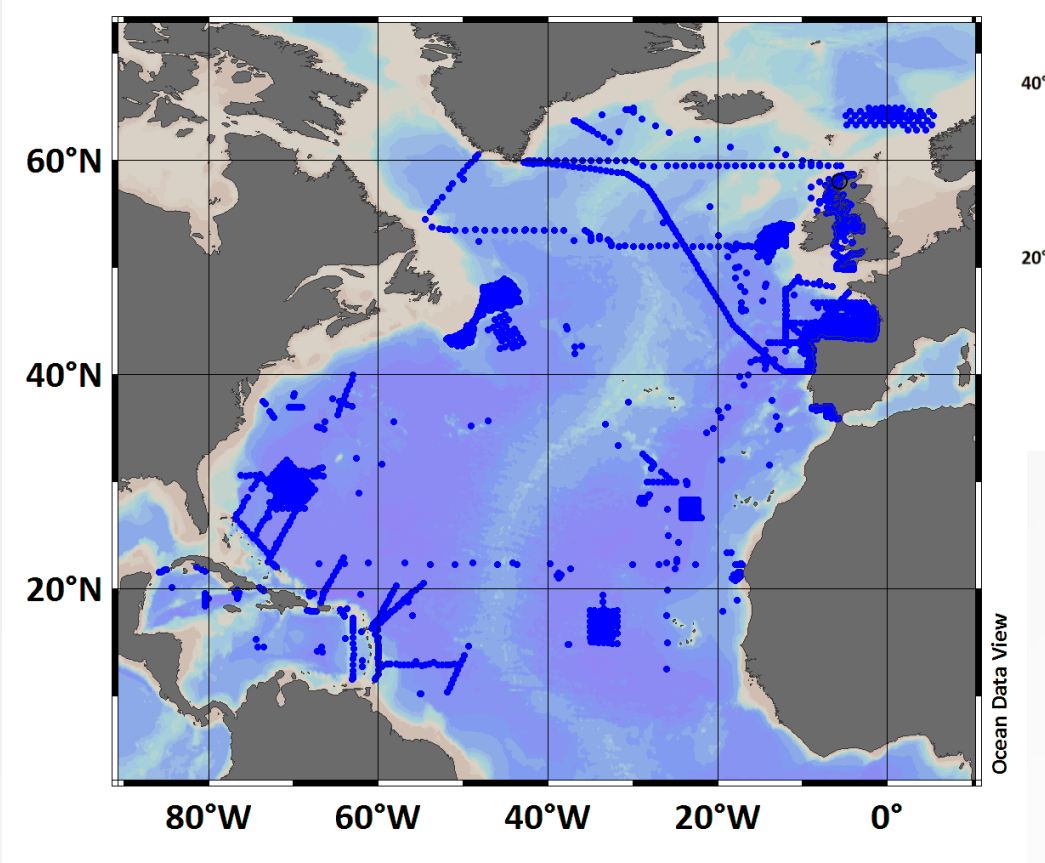


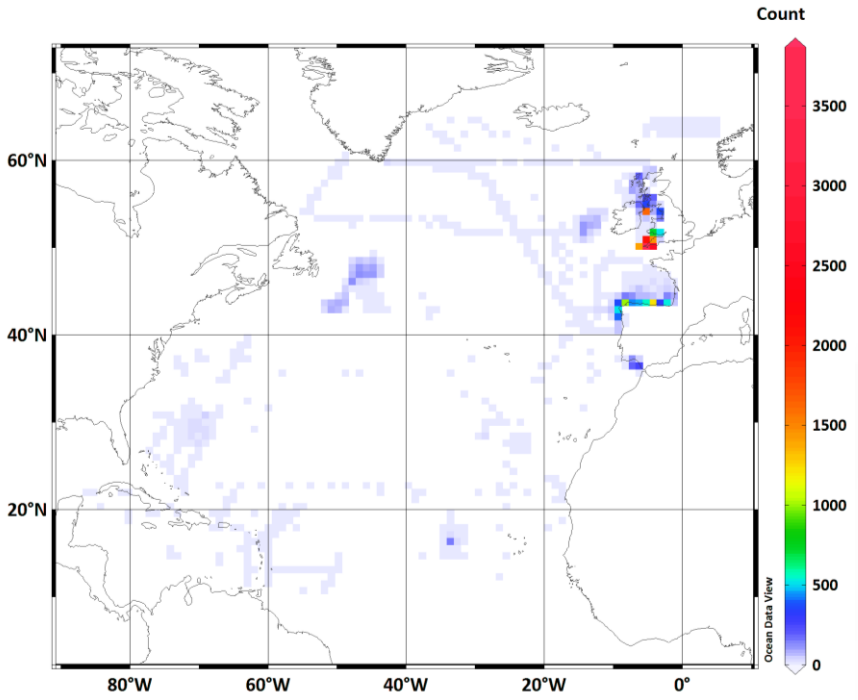






Restricted data

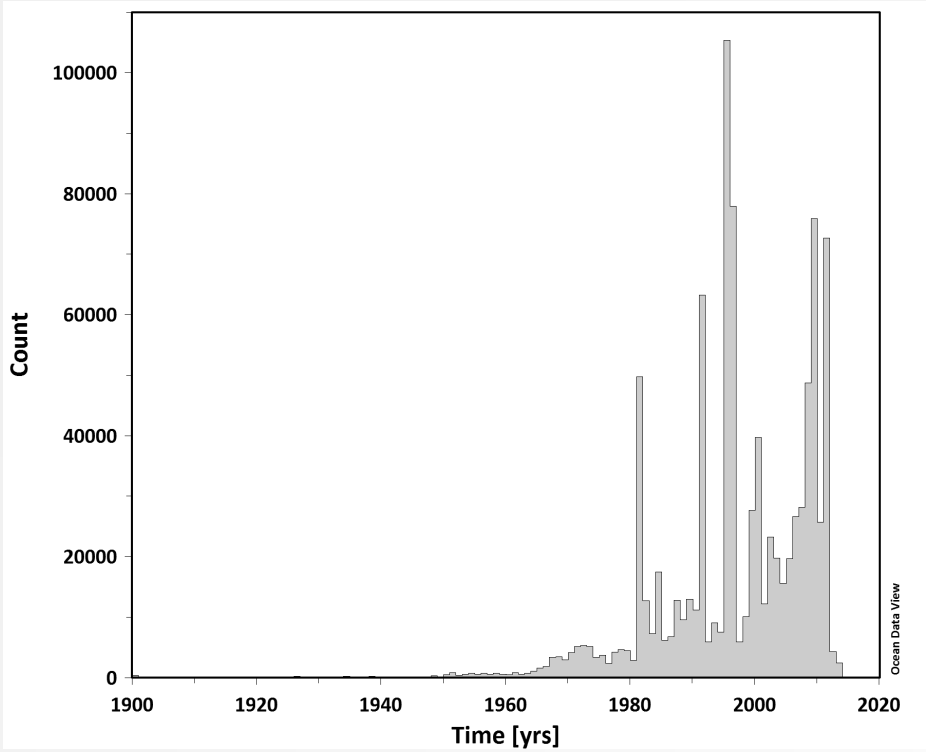


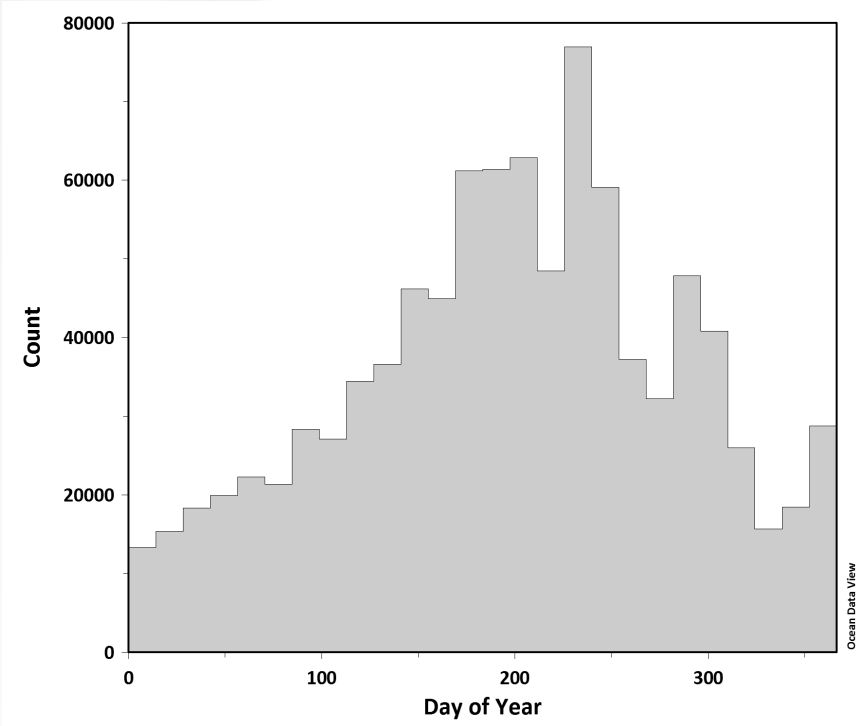


PAR	# points
	28338
T	15403
S	24873
TS	14922

1990 to 2011

Time scale - year and seasonal distribution





Configuration (1/2)

- Version of DIVA : 4.6.8
- DIVA : many configurations available

Which on to use ? Need to test a lot of runs….

- Horizontal projection, type, resolution
- Parameters determination : correlation length, signal-to-noise ratio
- Background field ? Which one ?
- Velocity or not ? Advection ?

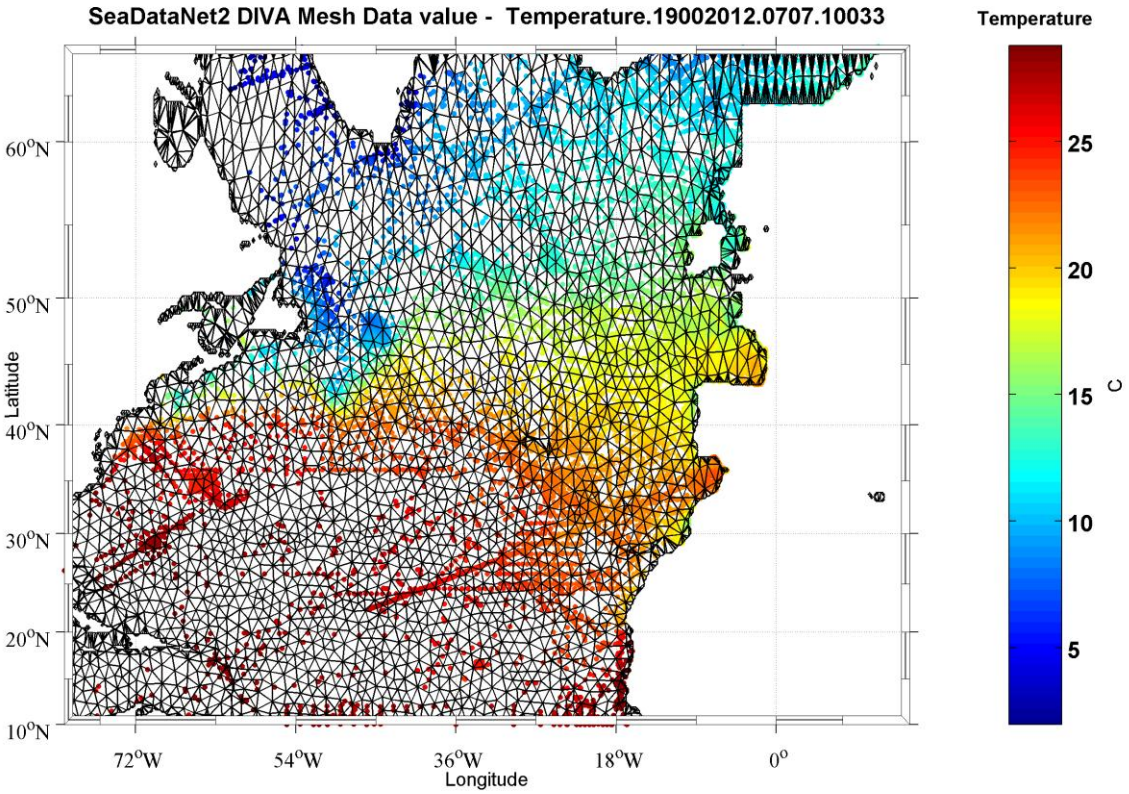
Configuration (2/2)

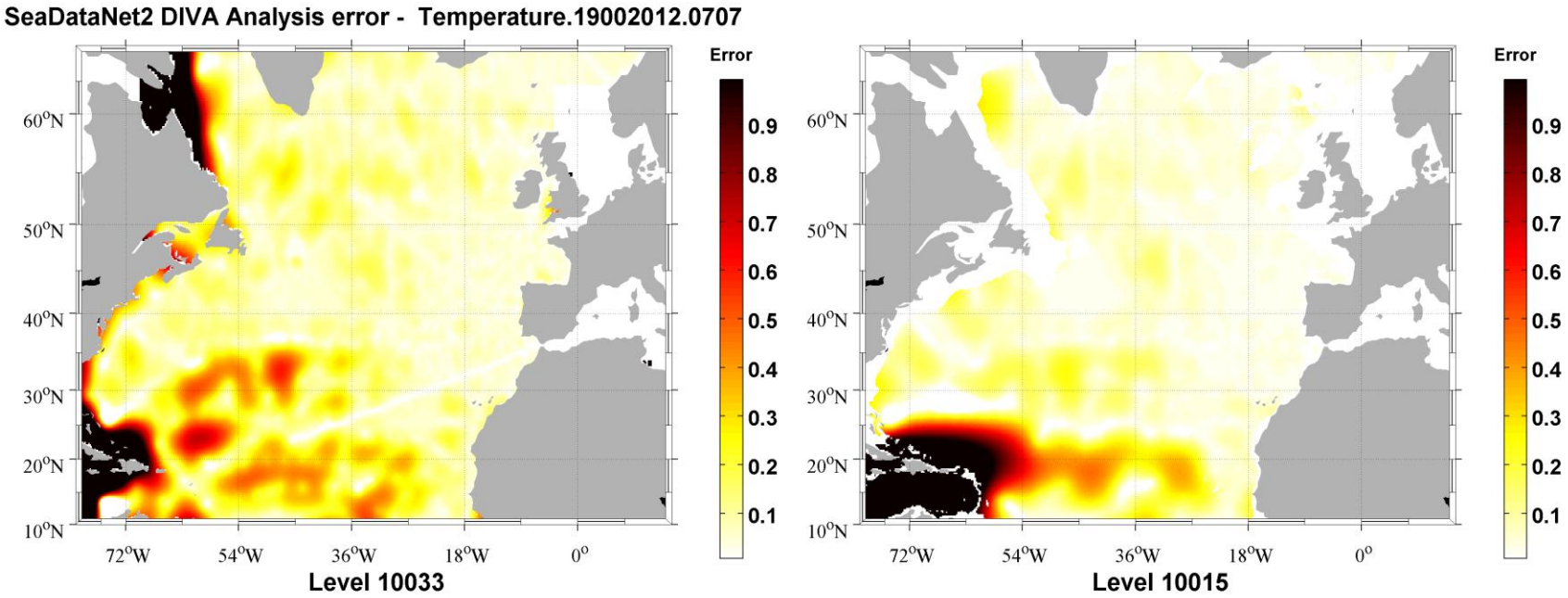
- correlation length estimated from diva tool, based on the dataset itself
- divafit => update of the param.par
- signal-to-noise ratio $\lambda = \sigma^2/\epsilon^2$ estimated from diva tool (a Generalized Cross-Validation (GCV)).
- No outliers elimination (already done with ODV)
- Background field ? First run :null - second one : mean

Summary of parameters

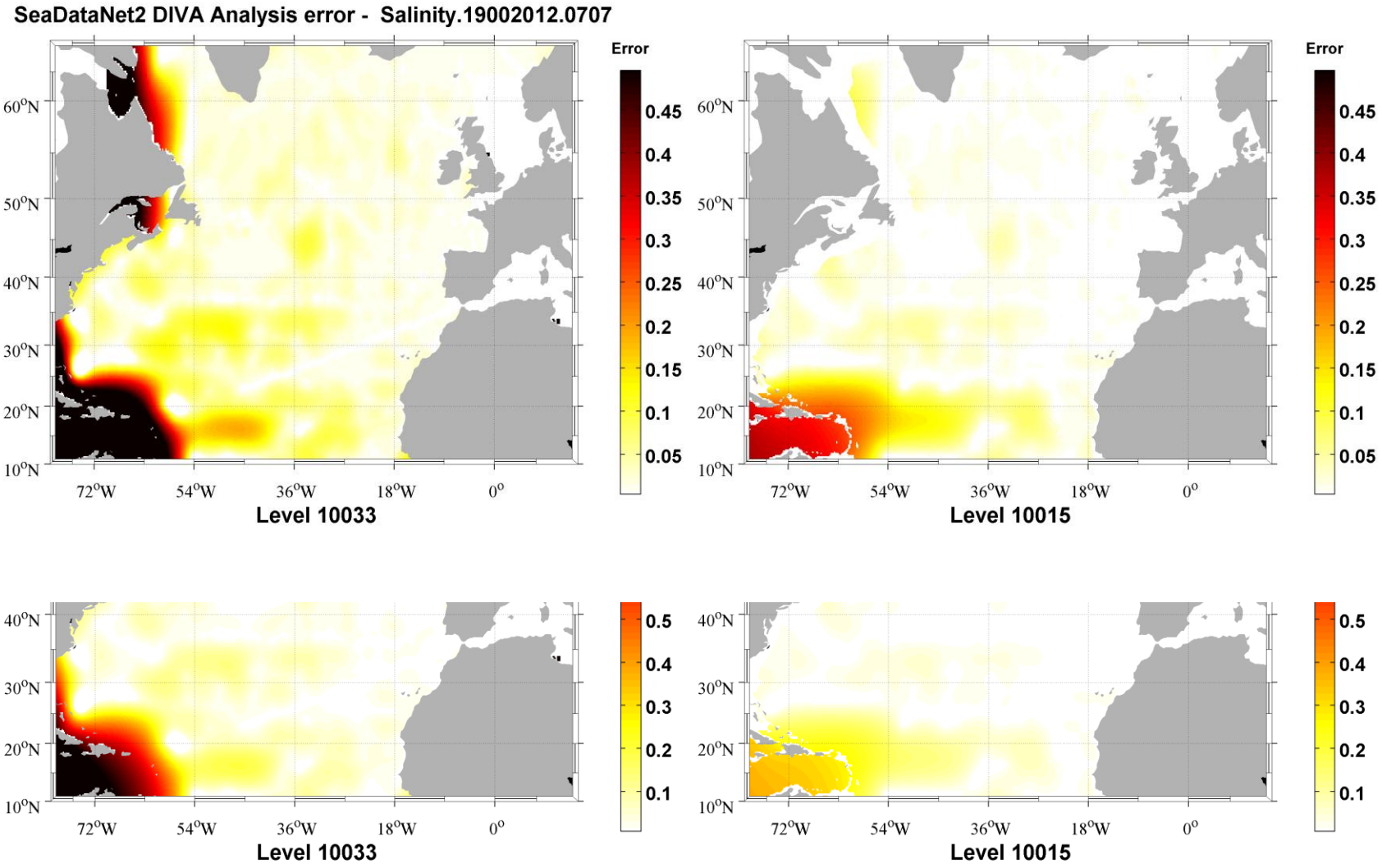
Lc: correlation length	**6.84083557**	
snr: signal to noise ratio	1.06429684	
varbak	5.41515350	
Parameters estimation and vertical filtering:	-30	Estimation and vertical filtering of SN ratio and Lc using data mean distance as a minimum for Lc
xori	-80	dx 0.20 – nx 460
yori	10	dy 0.20 – ny 275
vertical levels	33 levels	5500, 5000, 4500, 4000, 3500, 3000, 2500, 2000, 1750, 1500, 1400, 1300, 1200, 1100, 1000, 900, 800, 700, 600, 500, 400, 300, 250, 200, 150, 125, 100, 75, 50, 30, 20, 10, 0

Finite-element mesh and temperature measurements used for the run monthly



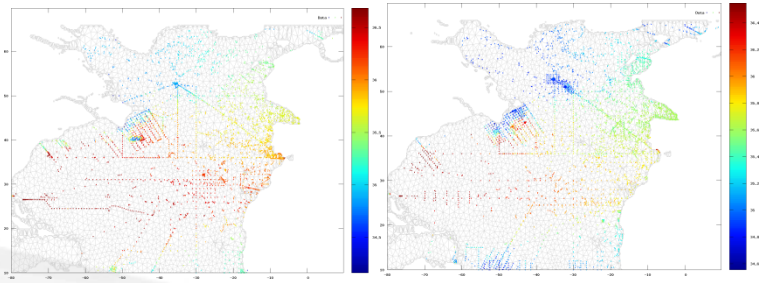


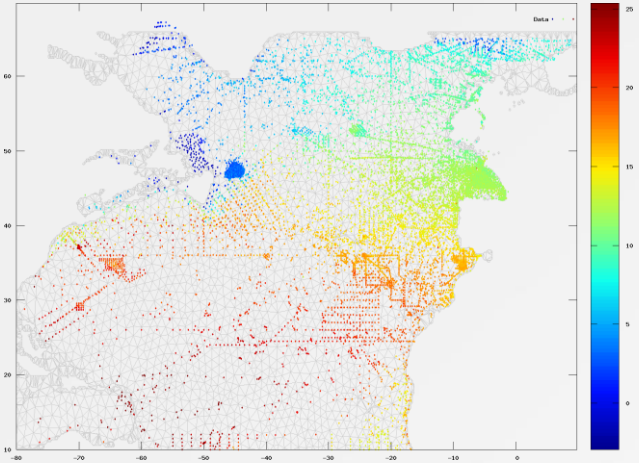
Error field for Temperature at surface and at 1000m depth

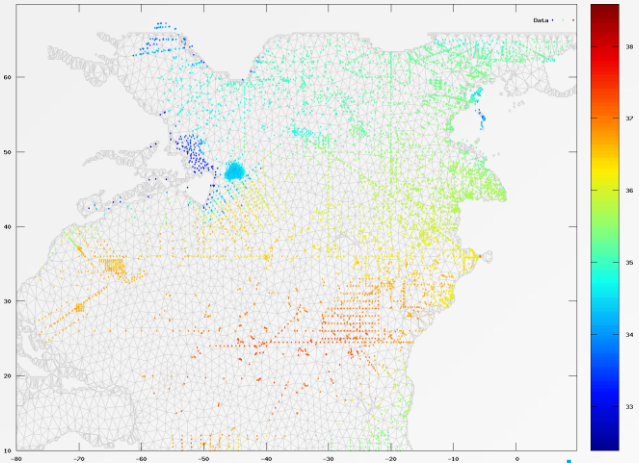


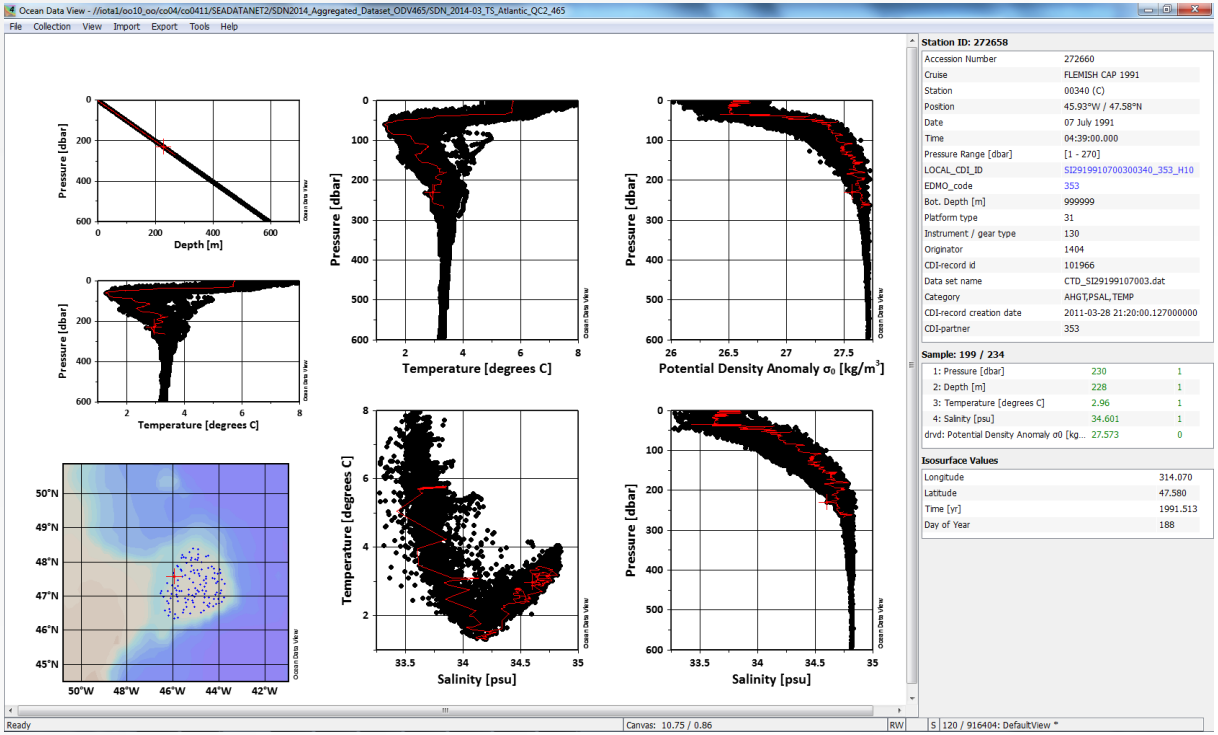
Error field for Salinity at surface and at 1000m depth

First run and first bad data

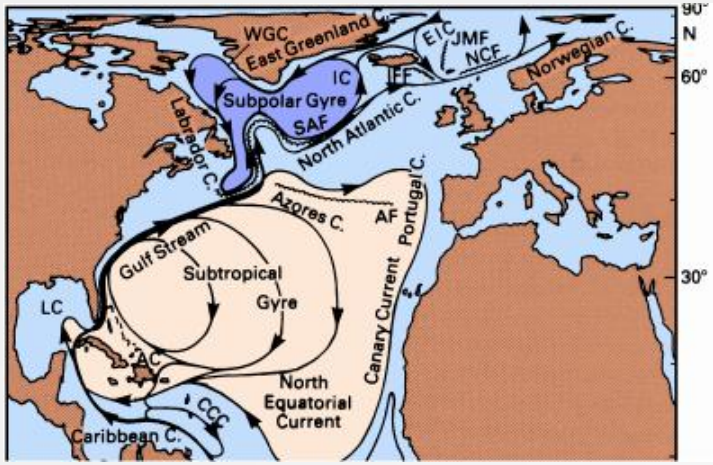




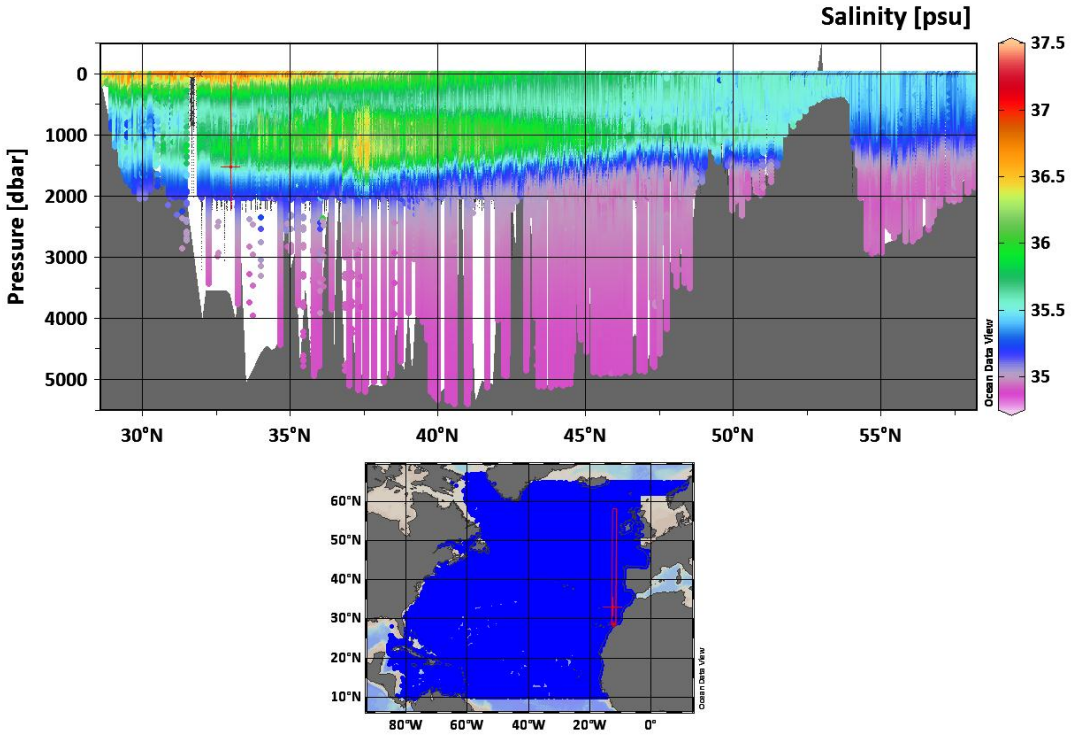




First results – study on surface level and 1000m



Tomczak, Matthias & J Stuart Godfrey: Regional Oceanography: an Introduction 2nd edition (2003))



T

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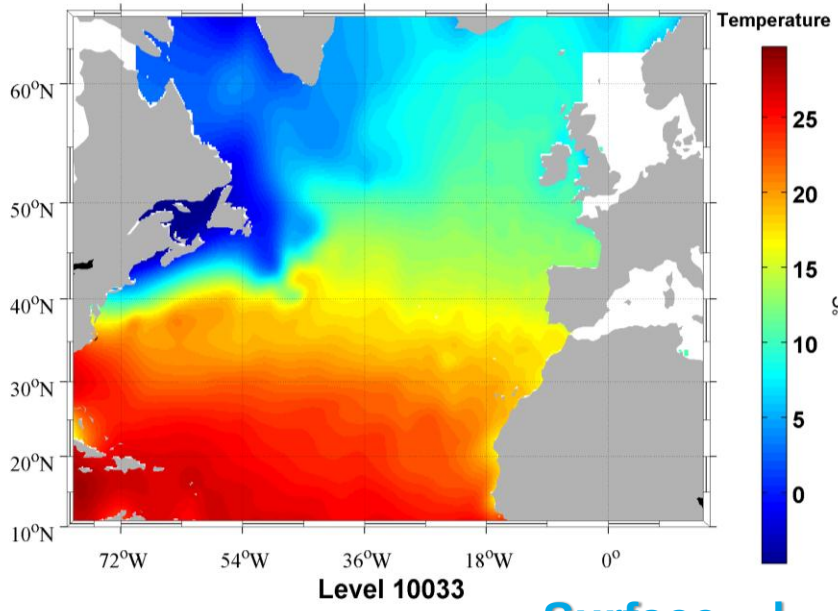
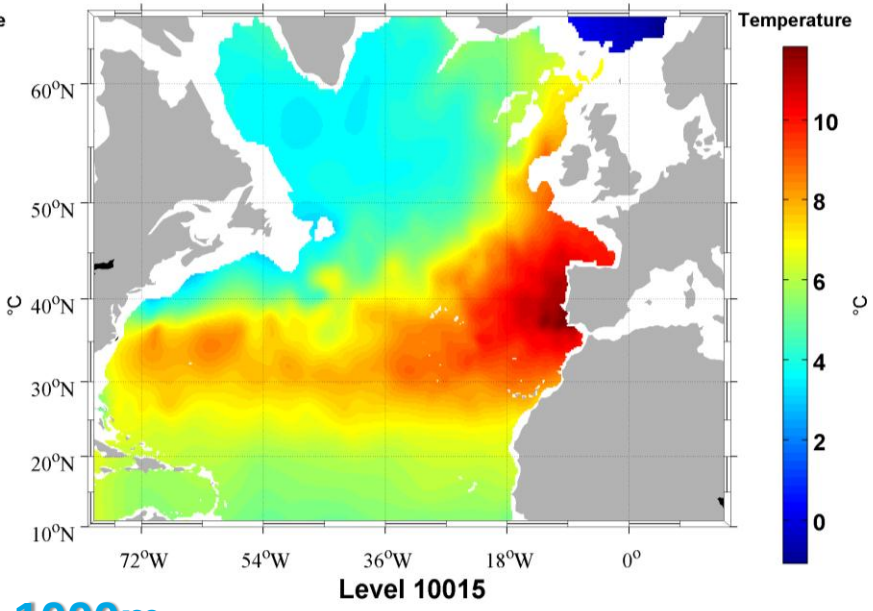
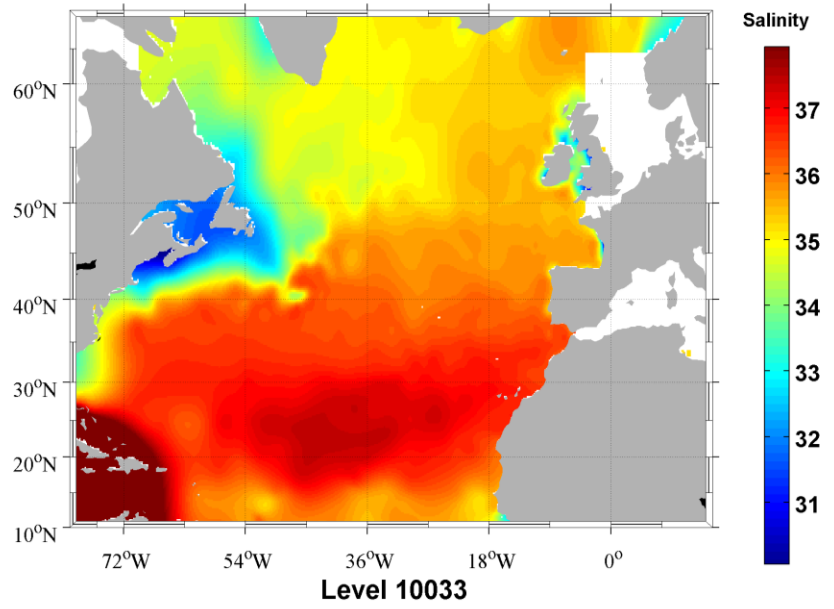
SeaDataNet2 DIVA Analysis - Temperature.19002012.0101

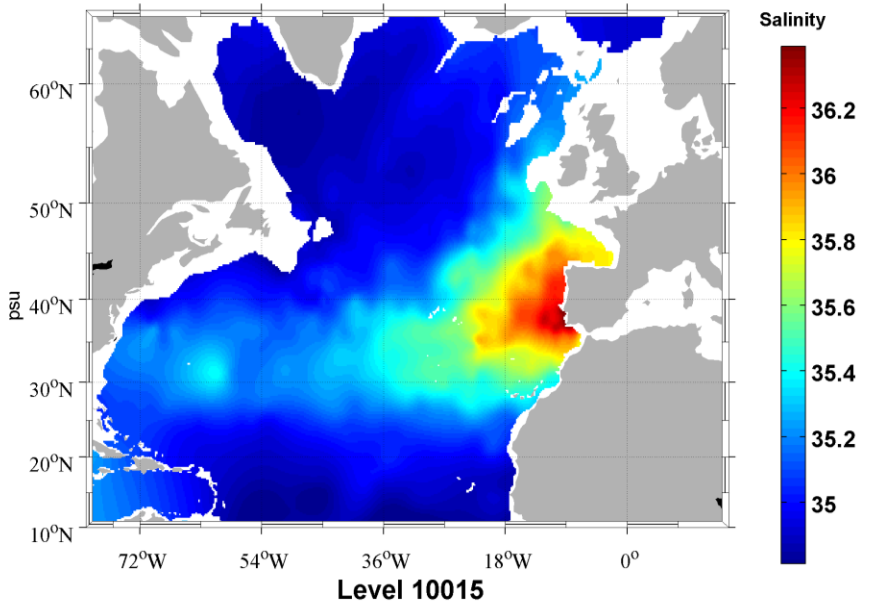




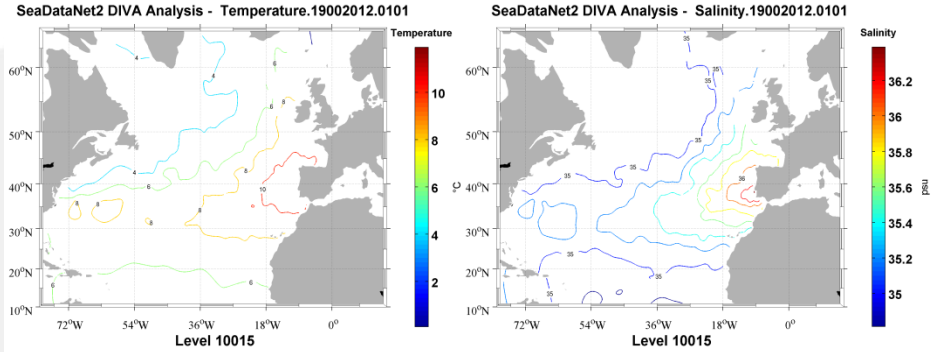
Surface | 1000m

SeaDataNet2 DIVA Analysis - Salinity.19002012.0101





Validation



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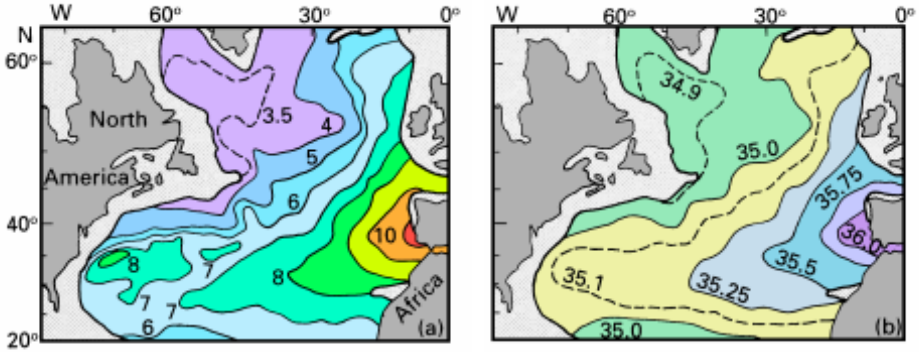
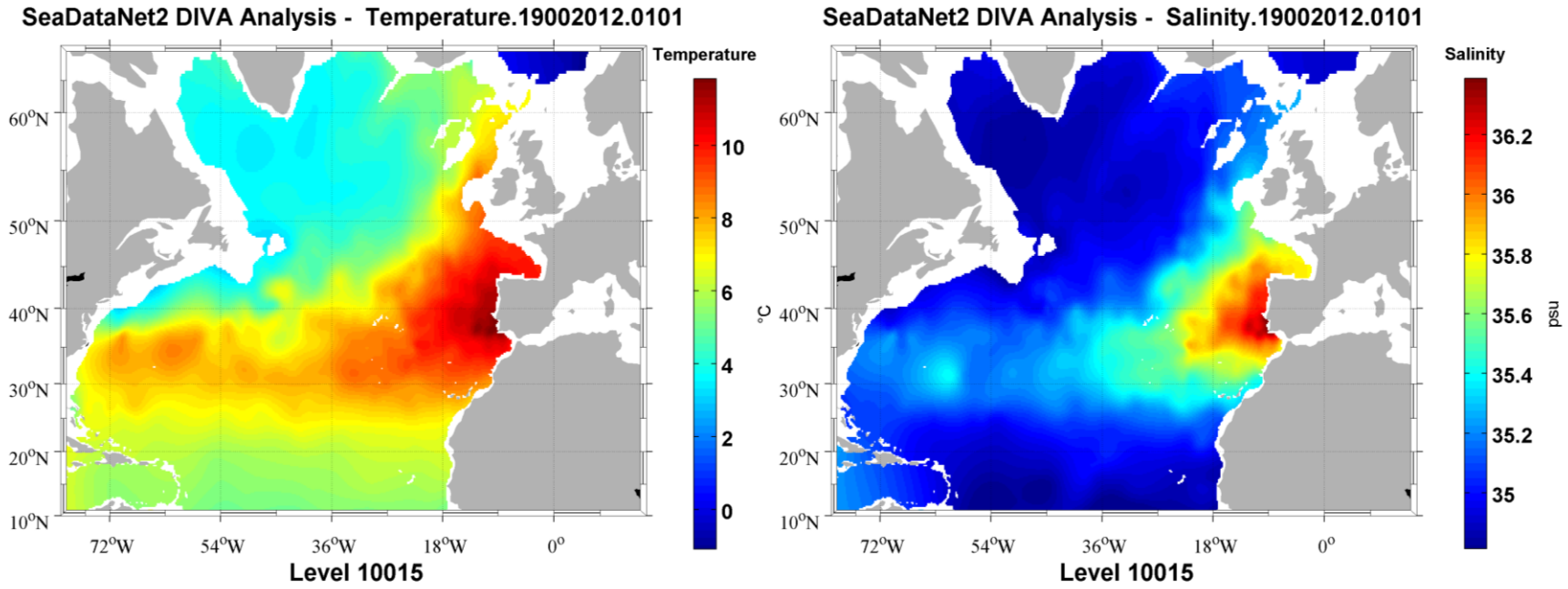


Fig. 15.4. Temperature (°C) (a) and salinity (b) in the North Atlantic Ocean at 1000 m depth.



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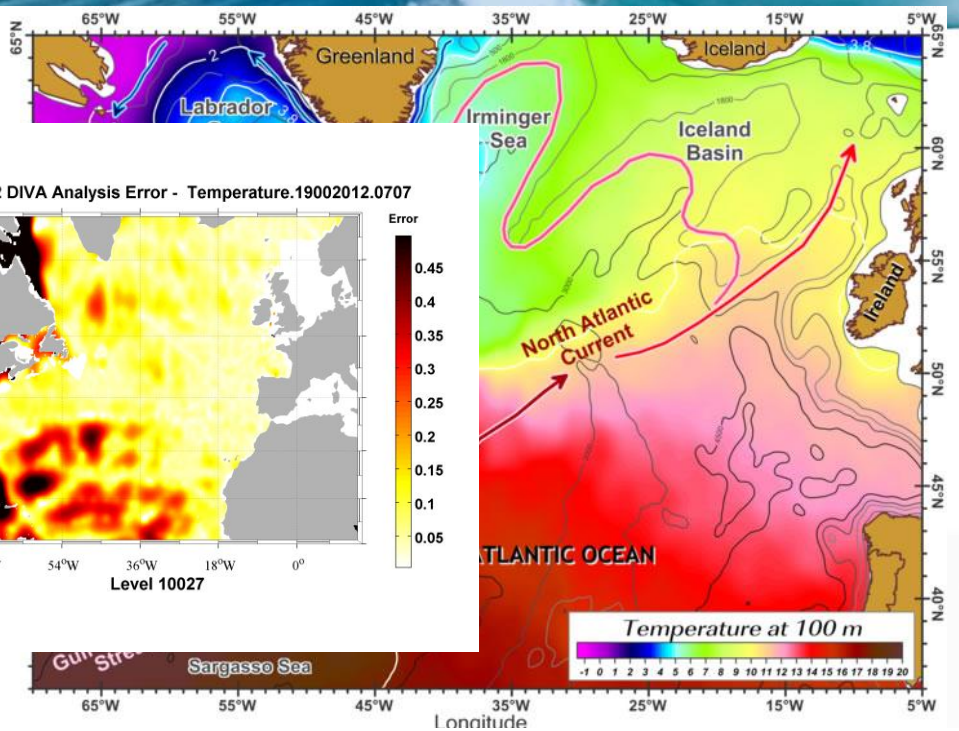
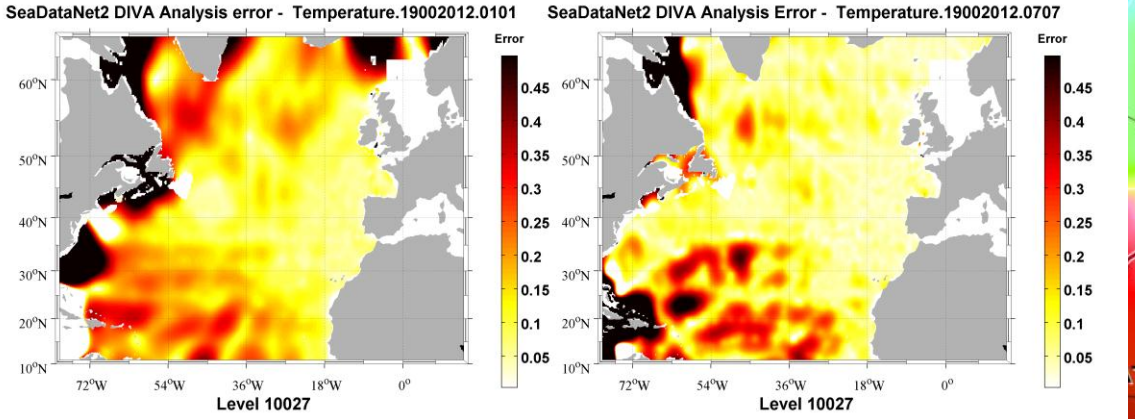
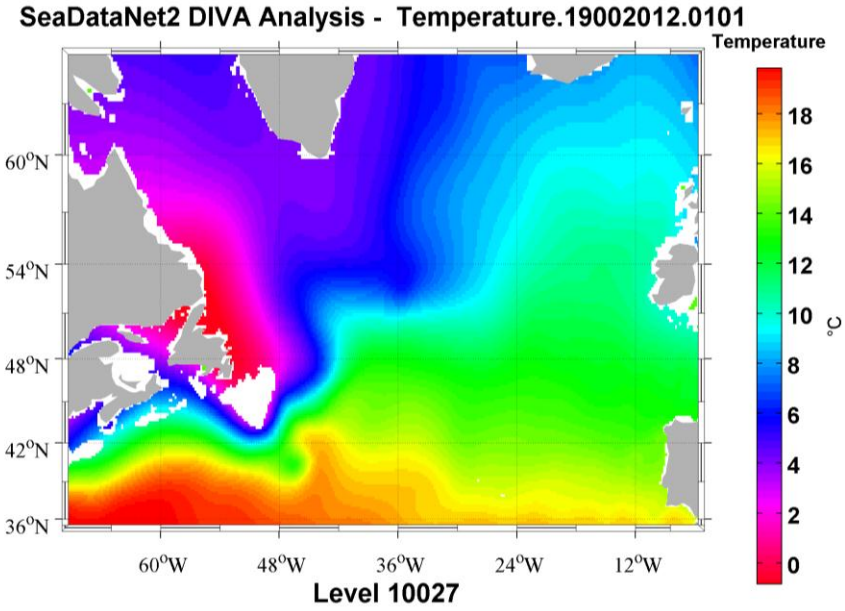
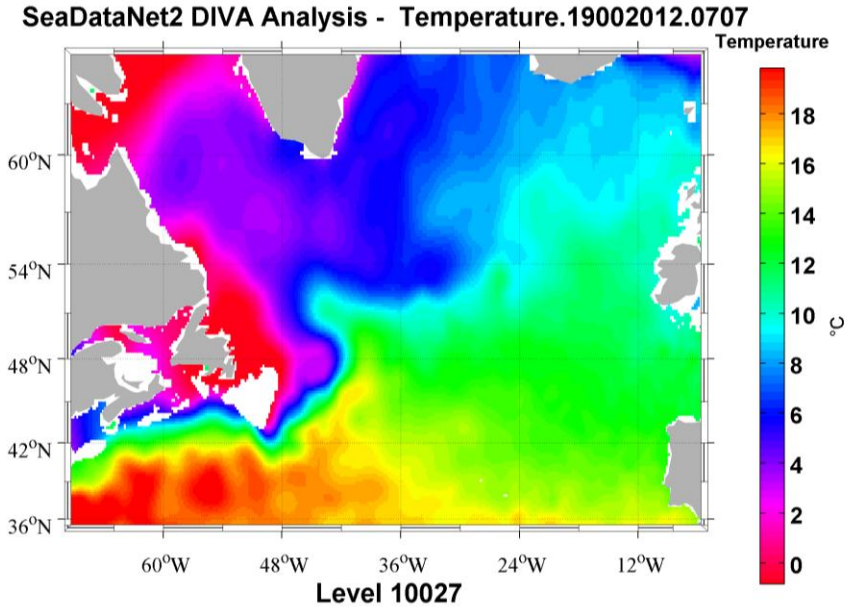
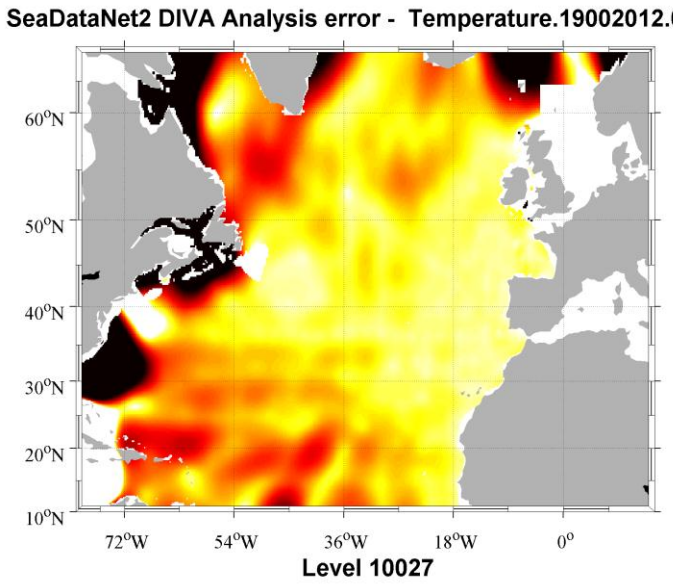


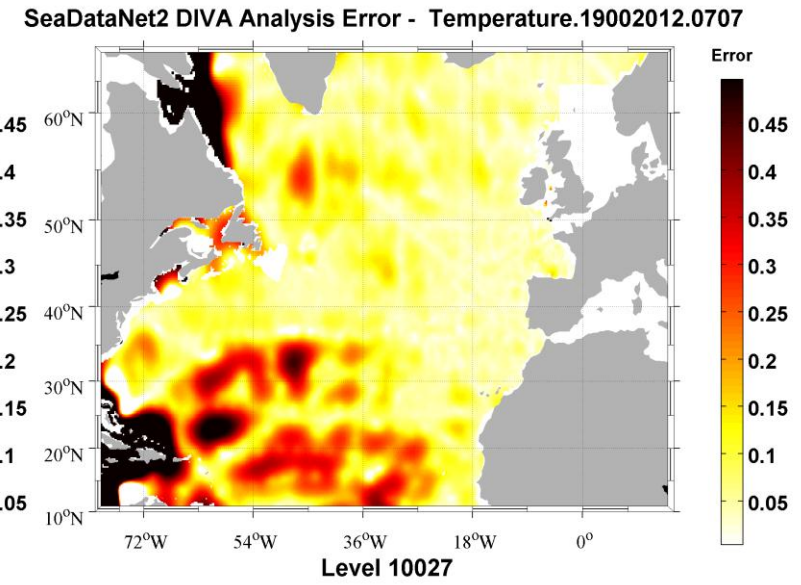


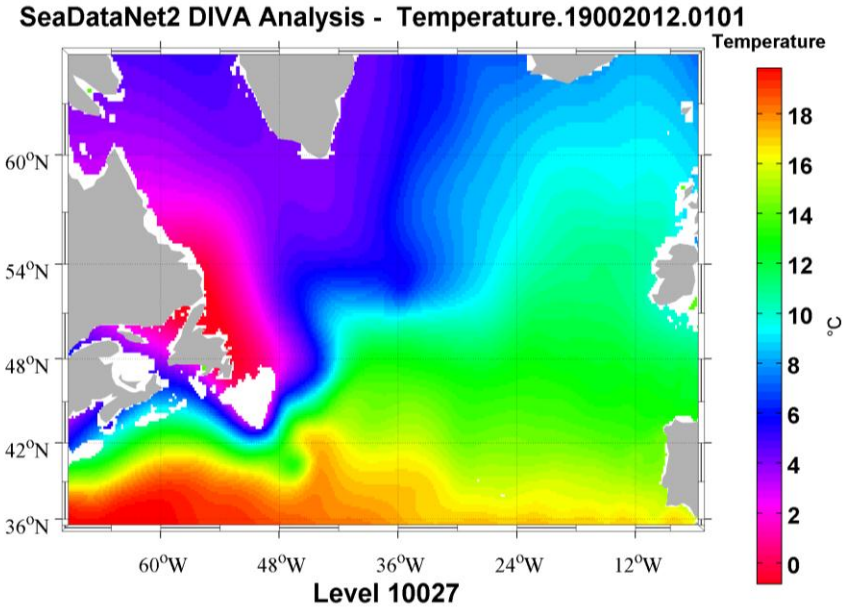


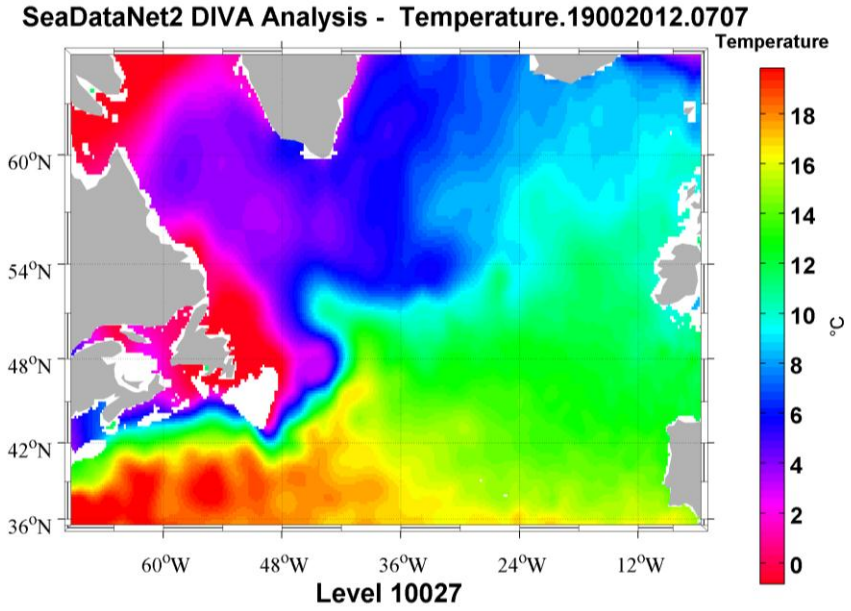


Level at 100m depth









Level at 100m depth

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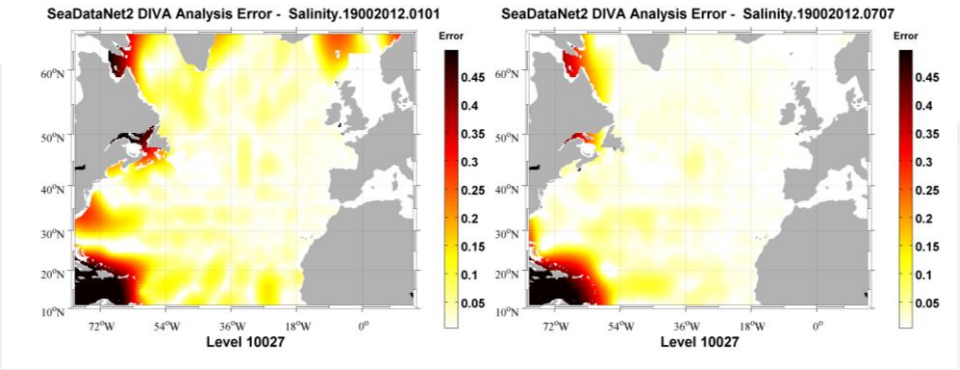
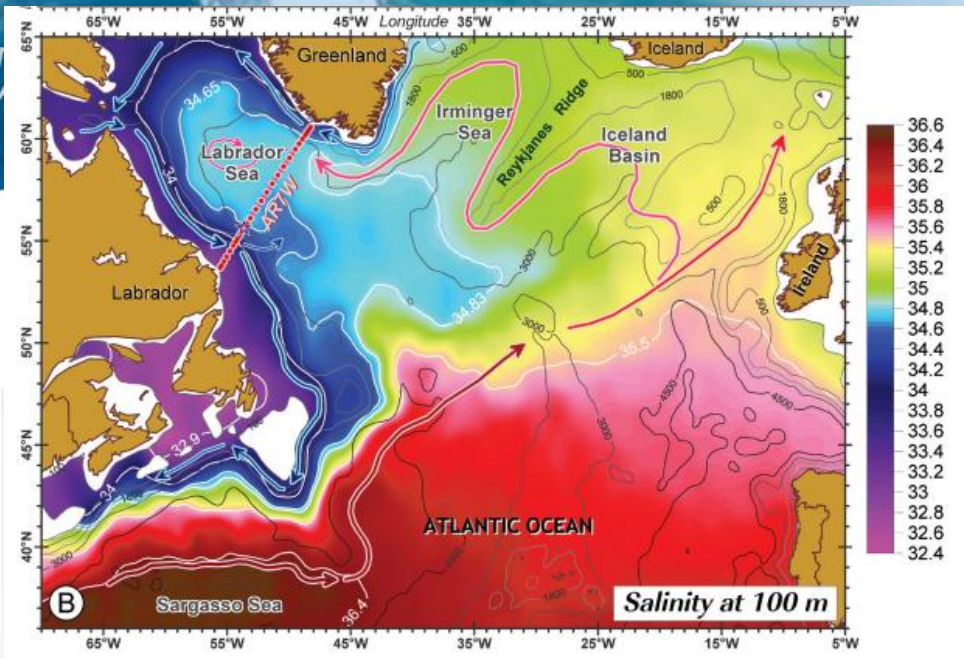
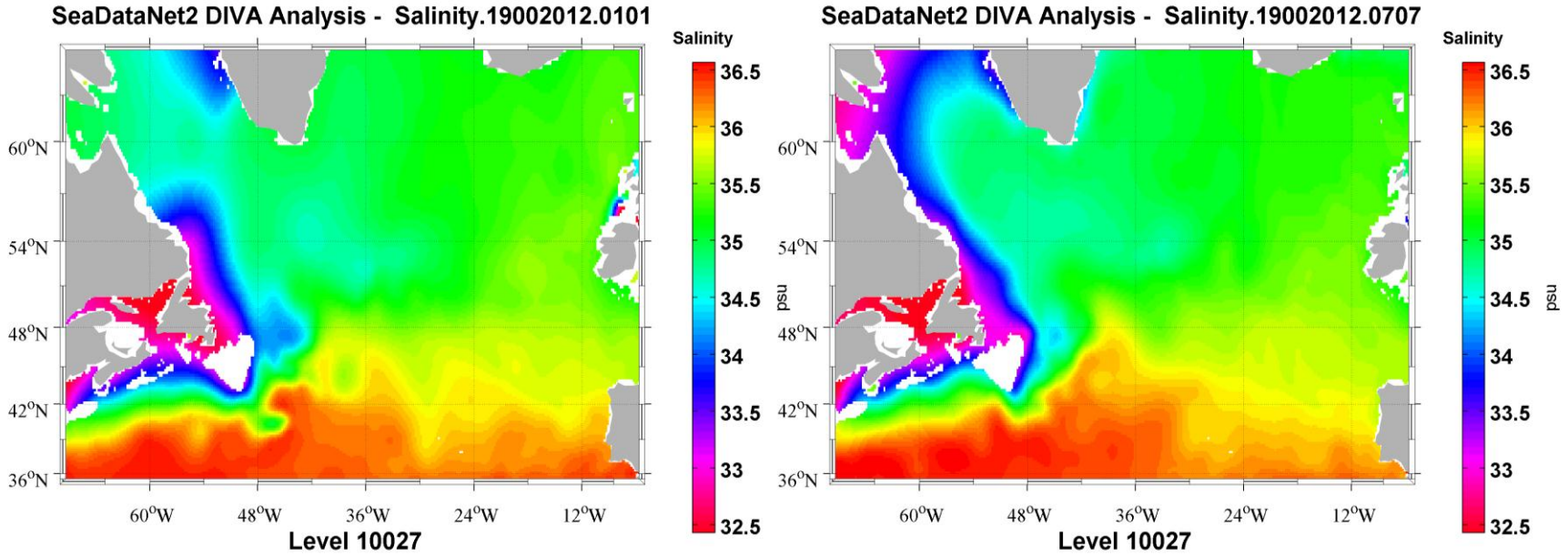
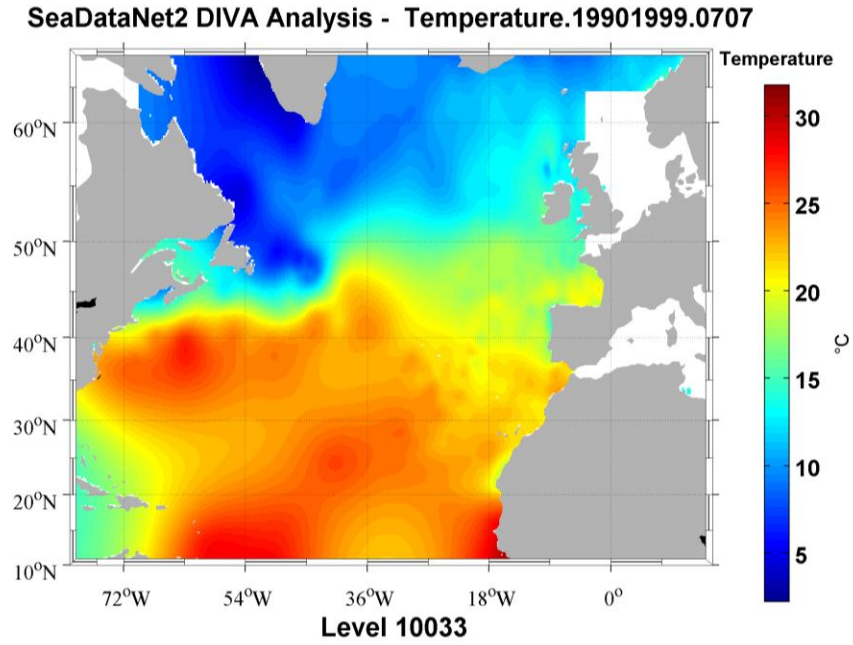
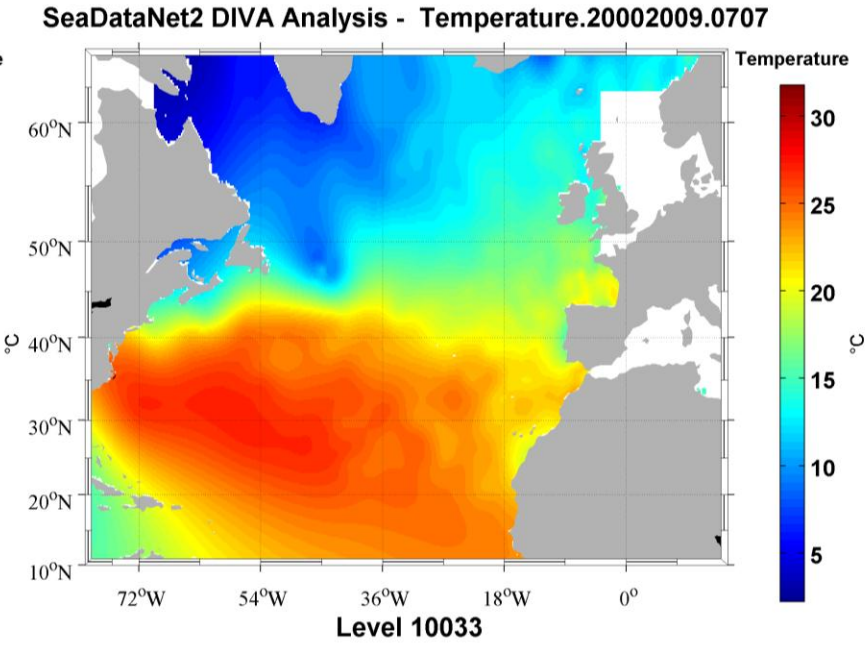






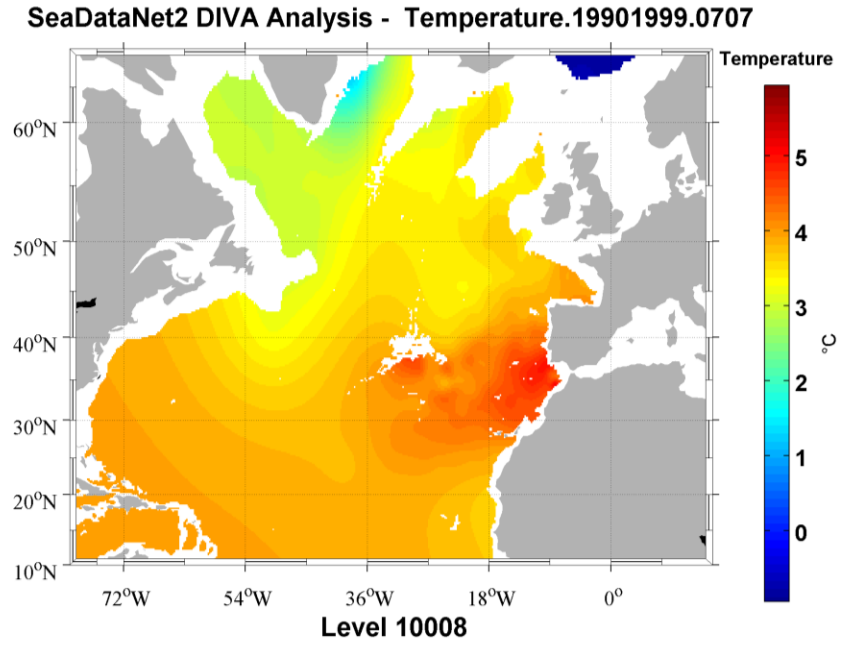
0m

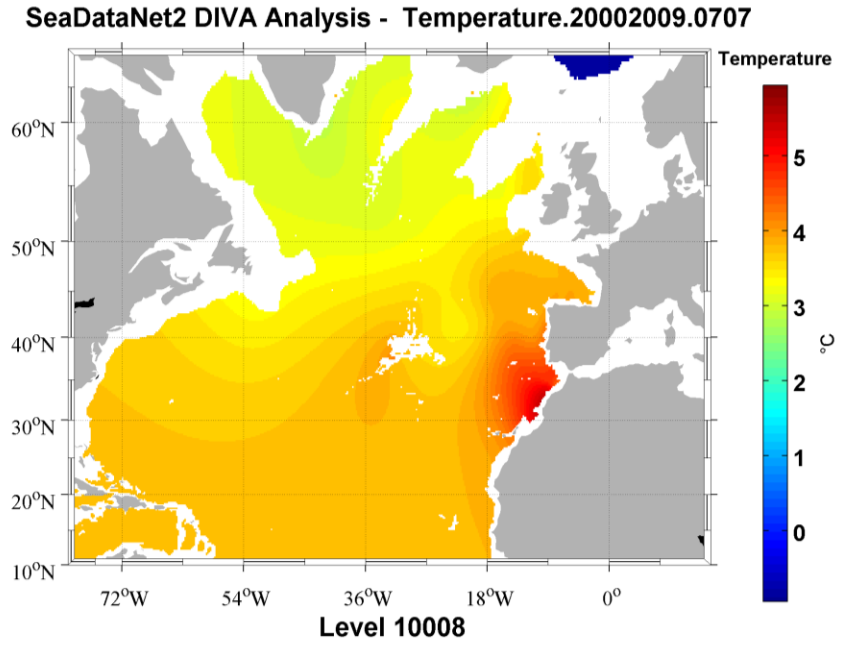


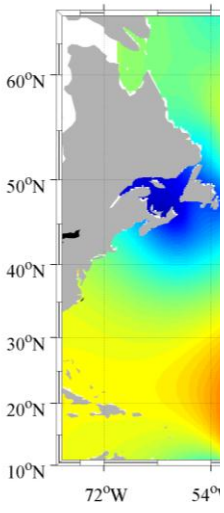


DECADAL STUDY

2000m

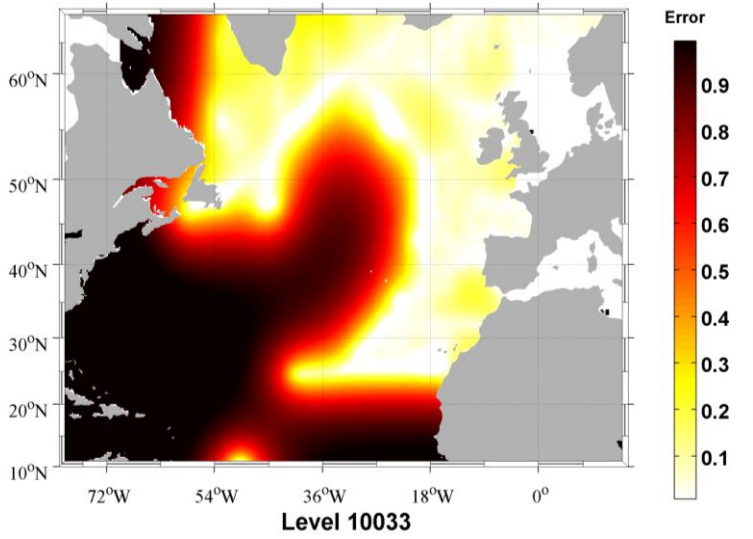






SeaDataNet2 DIVA Analysis - Salinity.19901999.0707

SeaDataNet2 DIVA Analysis Error - Salinity.19901999.0707



SeaDataNet2 DIVA Analysis - Salinity.20002009.0707

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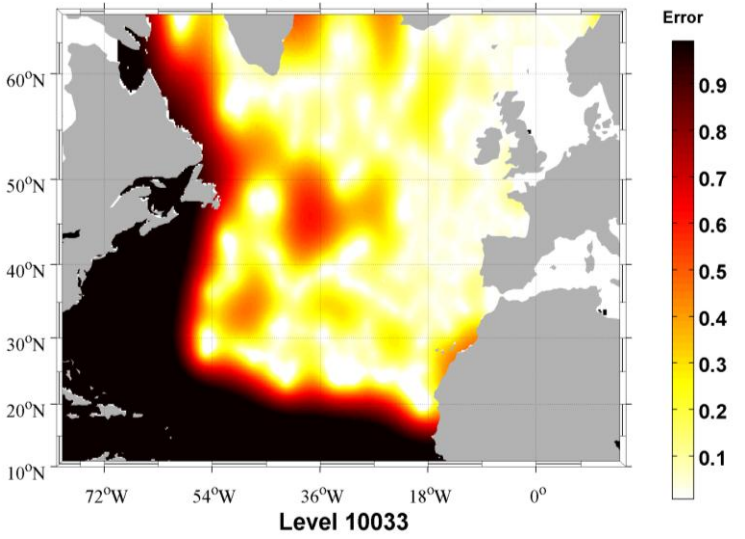

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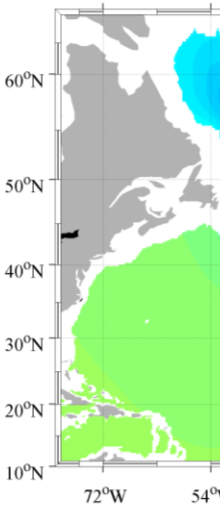
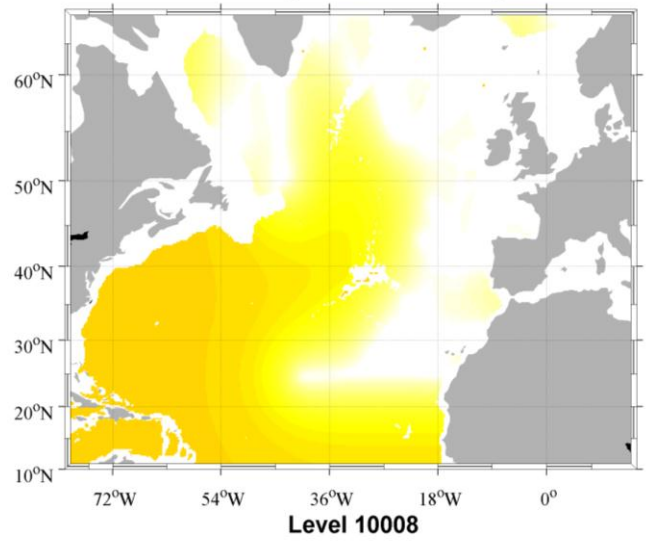
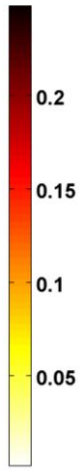
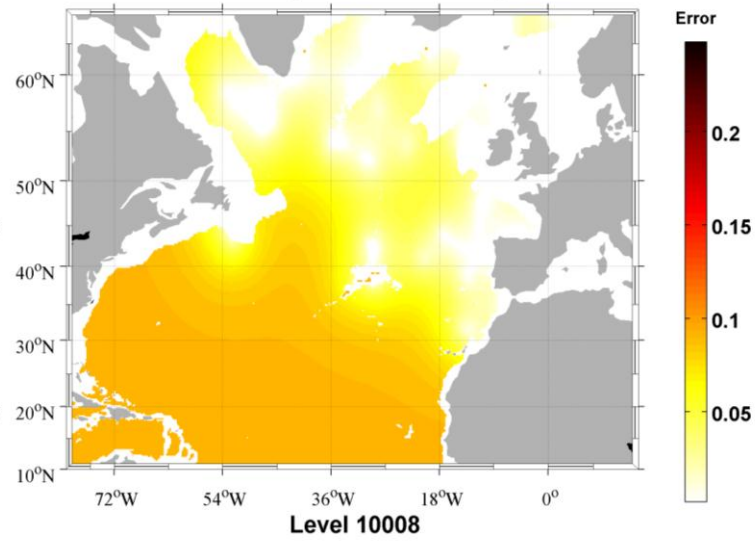


SeaDataNet2 DIVA Analysis Error - Salinity.19901999.0707



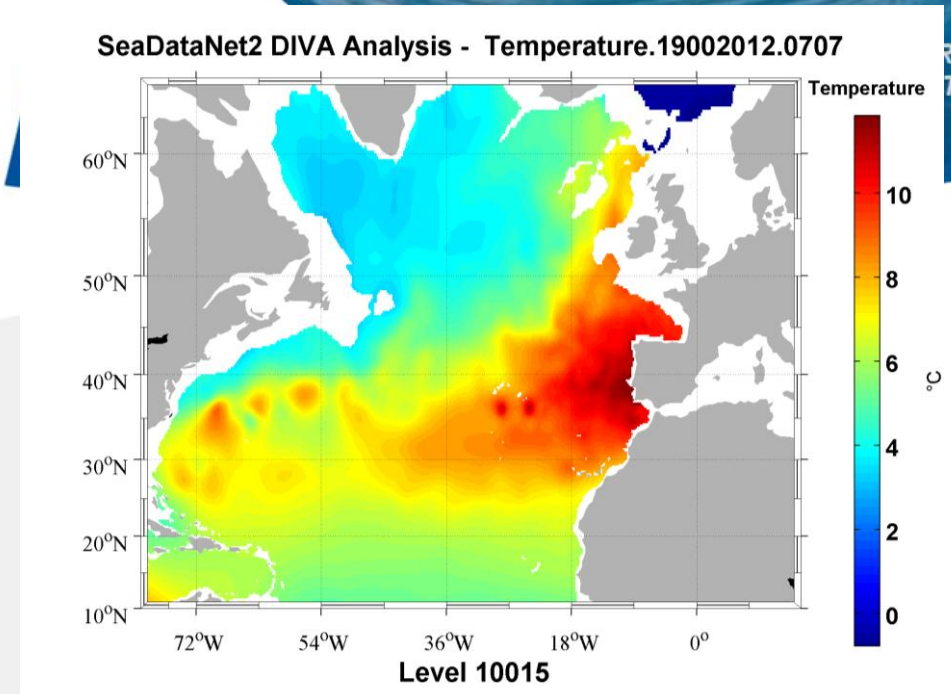


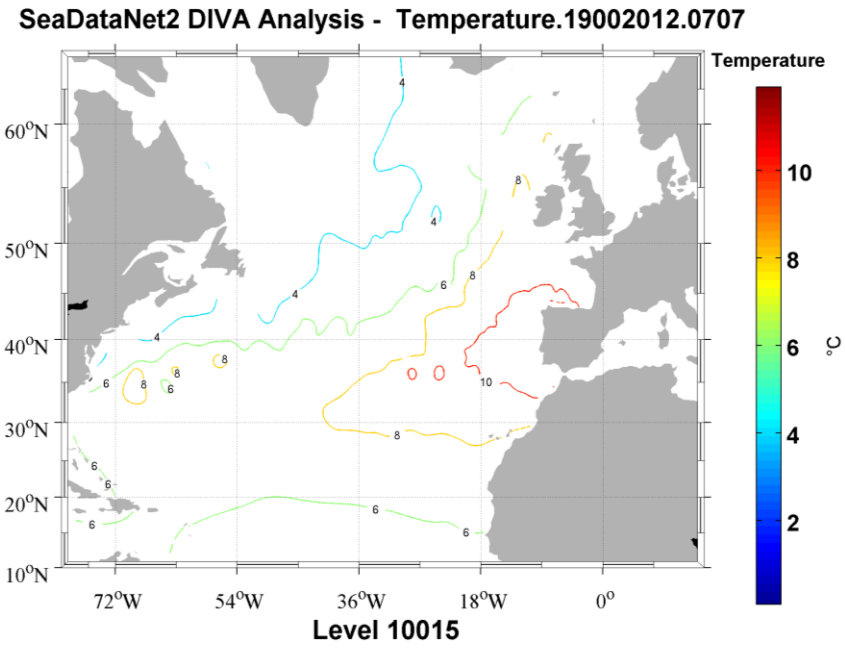
SeaDataNet2 DIVA Analysis Error - Salinity.20002009.0707



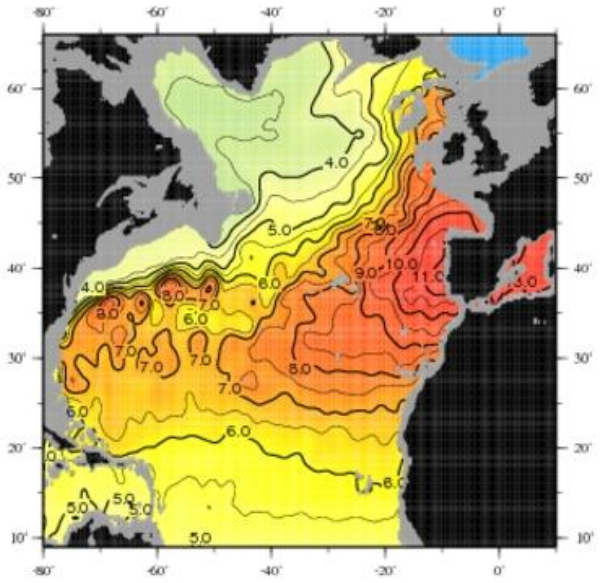
COMPARISON - VALIDATION

- WOA 2013
- ISAS
- Others





WOD 2013



July mean temperature [°C] at 1000 m. depth.

Min Value= -1.99 Max Value= 13.37 Contour Interval= 0.50

1/4° Climatology

31 Mar 2015

Color Scale

Locarnini, R. A., A. V. Mishonov, J. I. Antonov, T. P. Boyer, H. E. Garcia, O. K. Baranova, M. M. Zweng, C. R. Paver, J. R. Reagan, D. R. Johnson, M. Hamilton, and D. Seidov, 2013. *World Ocean Atlas 2013, Volume 1: Temperature.* S. Levitus, Ed., A. Mishonov Technical Ed.; NOAA Atlas NESDIS 73, 40 pp.

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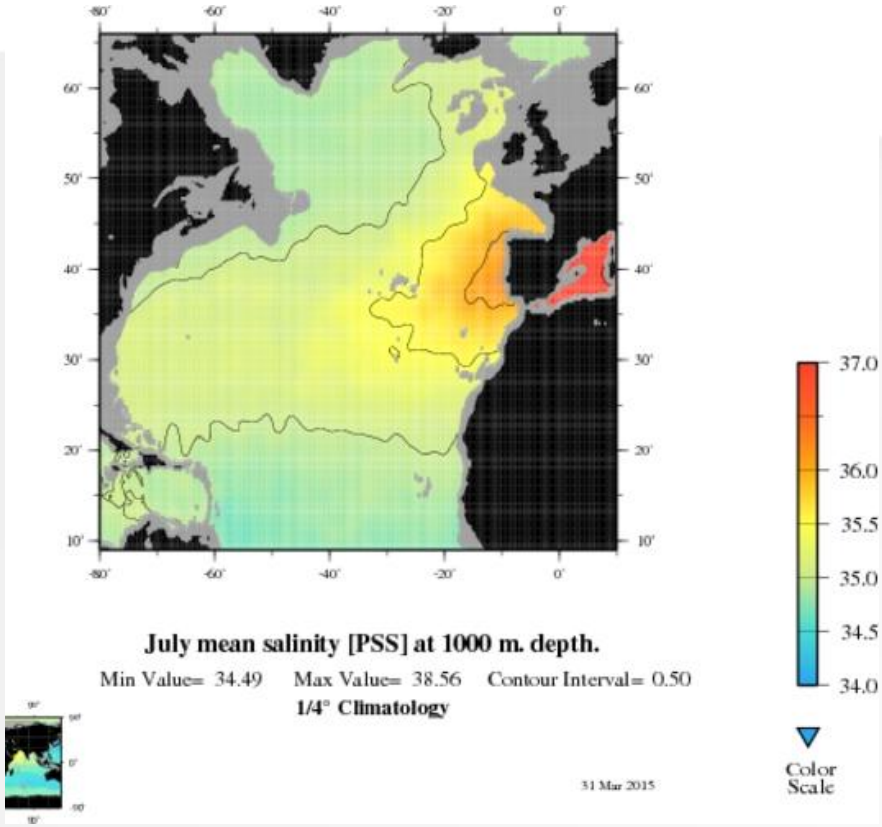
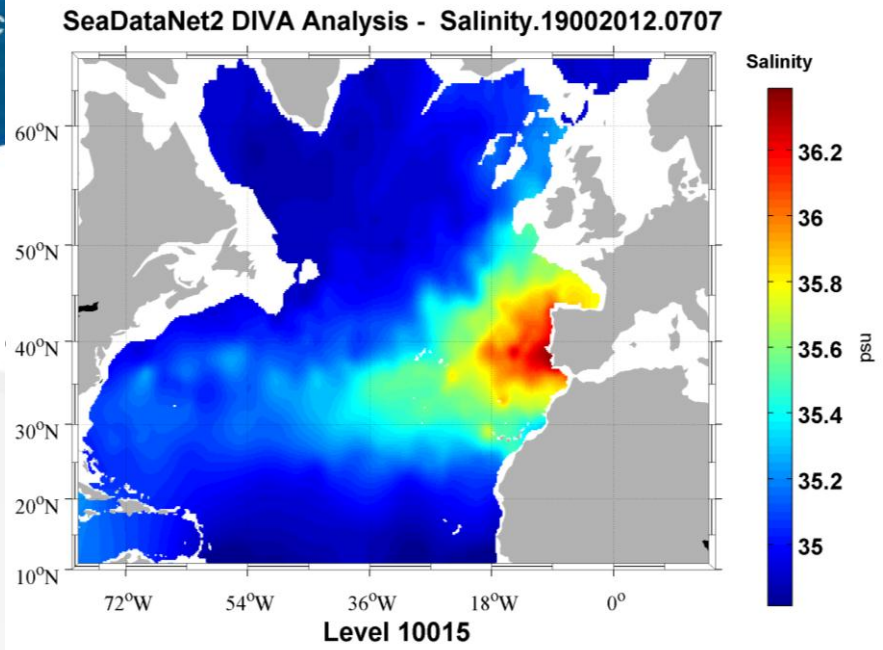
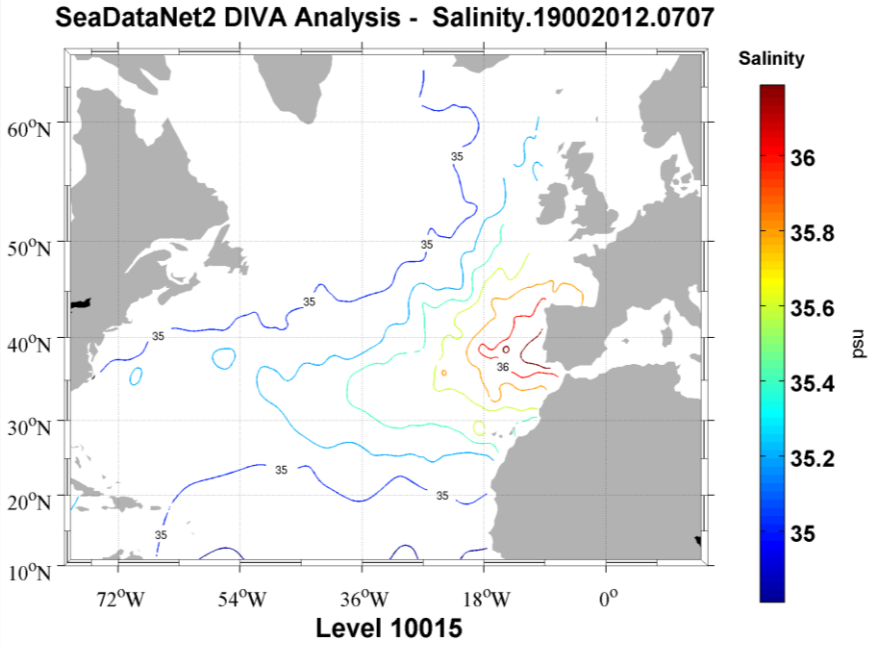
SeaDataNet



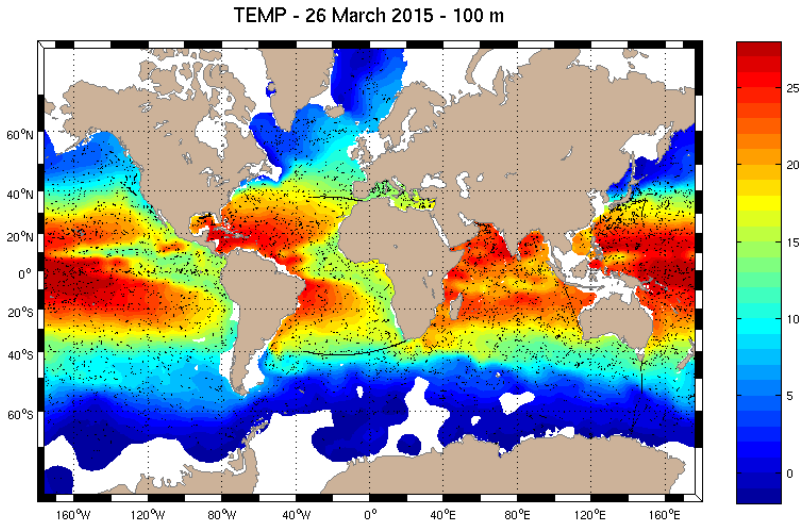


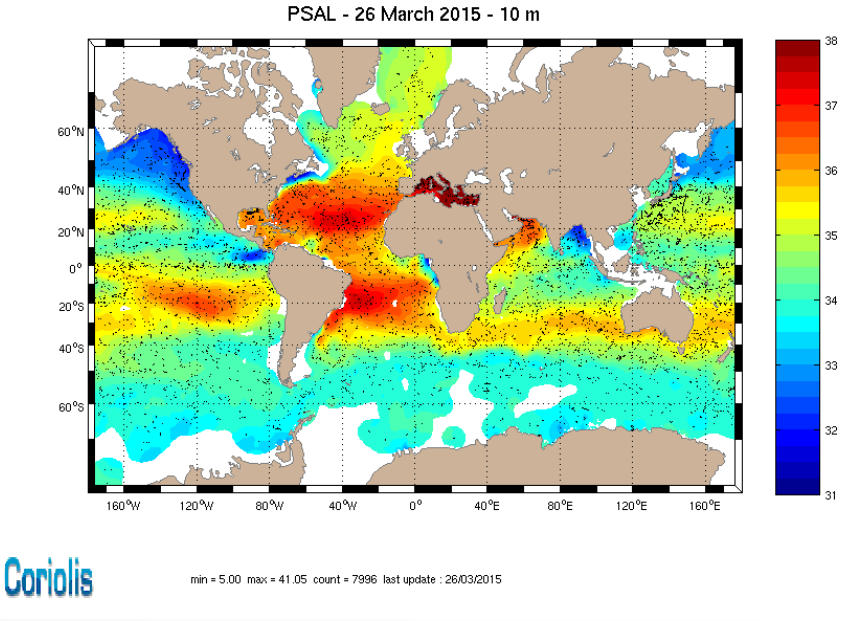


Zweng, M.M, J.R. Reagan, J.I. Antonov, R.A. Locarnini, A.V. Mishonov, T.P. Boyer, H.E. Garcia, O.K. Baranova, D.R. Johnson, D.Seidov, M.M. Biddle, 2013. *World Ocean Atlas 2013, Volume 2: Salinity.* S. Levitus, Ed., A. Mishonov Technical Ed.; NOAA Atlas NESDIS 74, 39 pp.

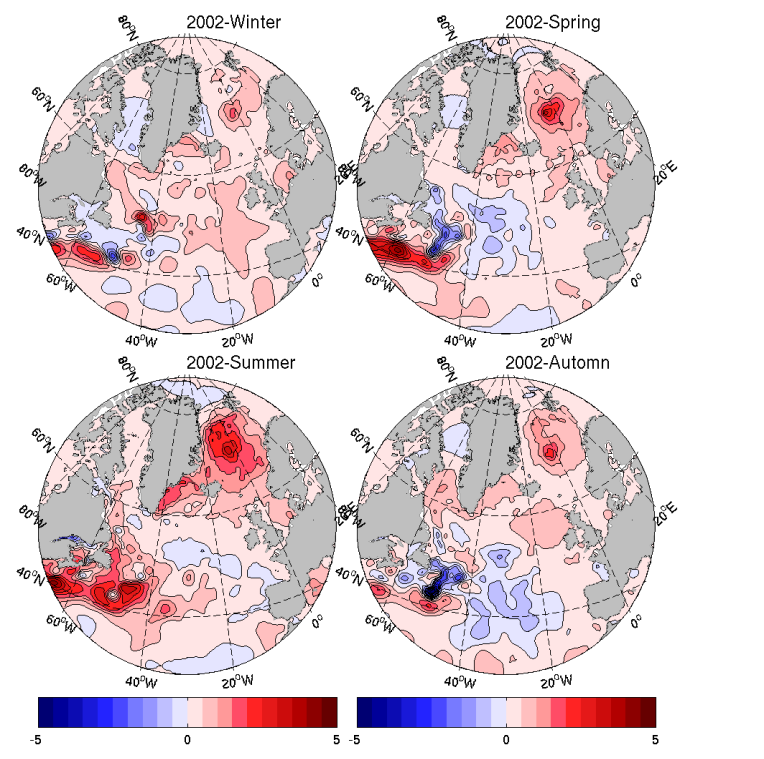
Other validation (ISAS, Ifremer)

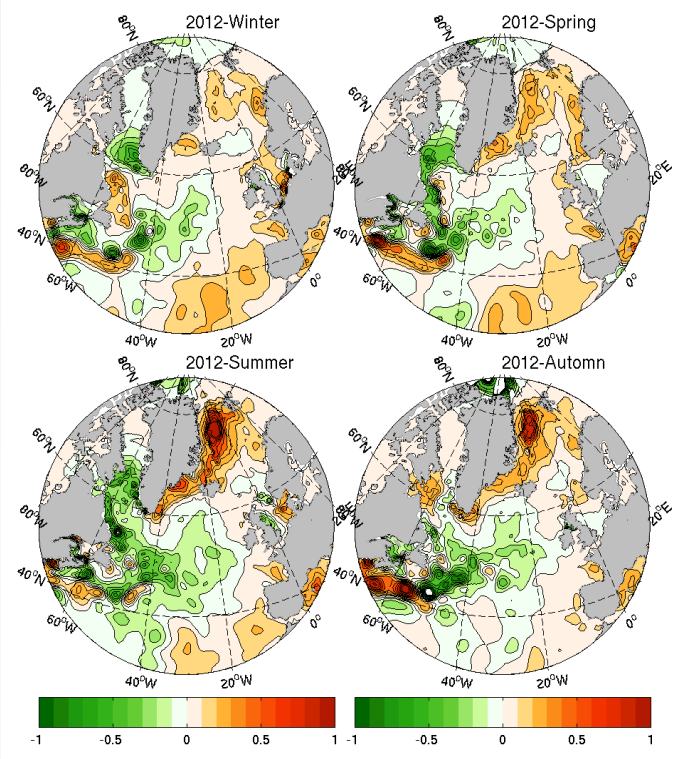
http://www.coriolis.eu.org/Data-Products/Products/Gridded-Fields





Temperature and Salinity anomalies for near surface seasonal cycles (2002 for temperature and 2012 for salinity)





DIVA method

- ispec (param.par) change errors output
- Need to exploit more in details the log and error list
- Min Max L & SN

Validation

- To exploite more in details model results
- Comparison not only with plots but also from gridded fields

Difficulties

- DIVA different versions (installation – cygwin and NetCDF library need to be updated)
- DIVA : several runs : cleaning of the directories not clear
- DIVA : not easy following results between DIVA3D/divastripped/output/ and JRA4/Climatology/output/
- DIVA : error lists : not easy to know what we have to do (true errors or just warning ?)

- DATASET : Bad data still existing (feedback to originator)

Improvements – tuning (for next version)

- Decrease domain definition (focus on east)
- On boundaries : add others datasets (north sea, artic sea, med sea close to Gibraltar strait)
- Remove deepest levels (not enough data)
- Check outliers for some levels
- Use data detrending (group on years/levels)
- Use advection
- Use better reference field
- See description metadata field in NetCDF files