SeaDataCloud 2ndPleanary Meeting,
Barcellona 8-9 October 2018

SeaDataCloud Temperature and Salinity data collections

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SeaDataCloud

Marine Data Value Chain

DISCOVER → COLLECT → ORGANIZE → INTEGRATE → ANALYZE → VALIDATE & REPORT → VISUALIZE & DISSEMINATE → USE

SUPPORT ACTIVITIES

- Coordination and Communication
- System Monitoring
- Technology Infrastructure
- Service Development

Create Knowledge, Derive Products, Develop Applications and Services, Drive Predictive Models, Rapid Environmental Assessment

INNOVATION

EFFECTIVE & TRANSPARENT DECISION SUPPORT

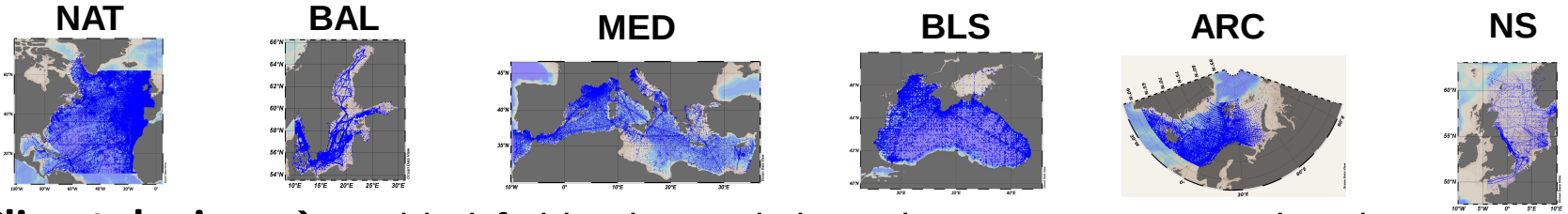
BLUE SUSTAINABLE GROWTH

FAIR guiding data management principle and linking data approach
Science support and supervision → Up to date QC procedures
User driven and provider/producer appreciative

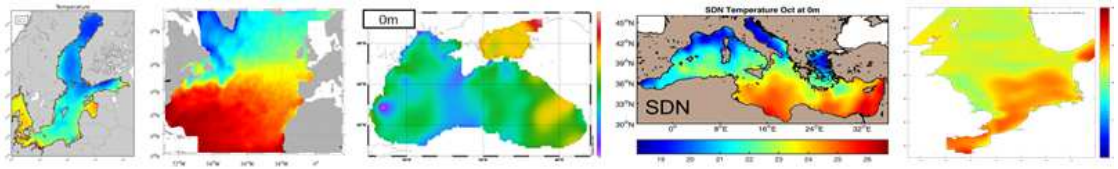
SeaDataCloud Products

GOAL: to provide the best **data products** from SeaDataNet at **regional and global scale** and serve diverse user communities (op. oceanography, climate, marine environment, institutional, academia)

1. **Aggregated data sets EU marginal seas**→ historical temperature and salinity data harvested from the central CDI and validated by regional leaders

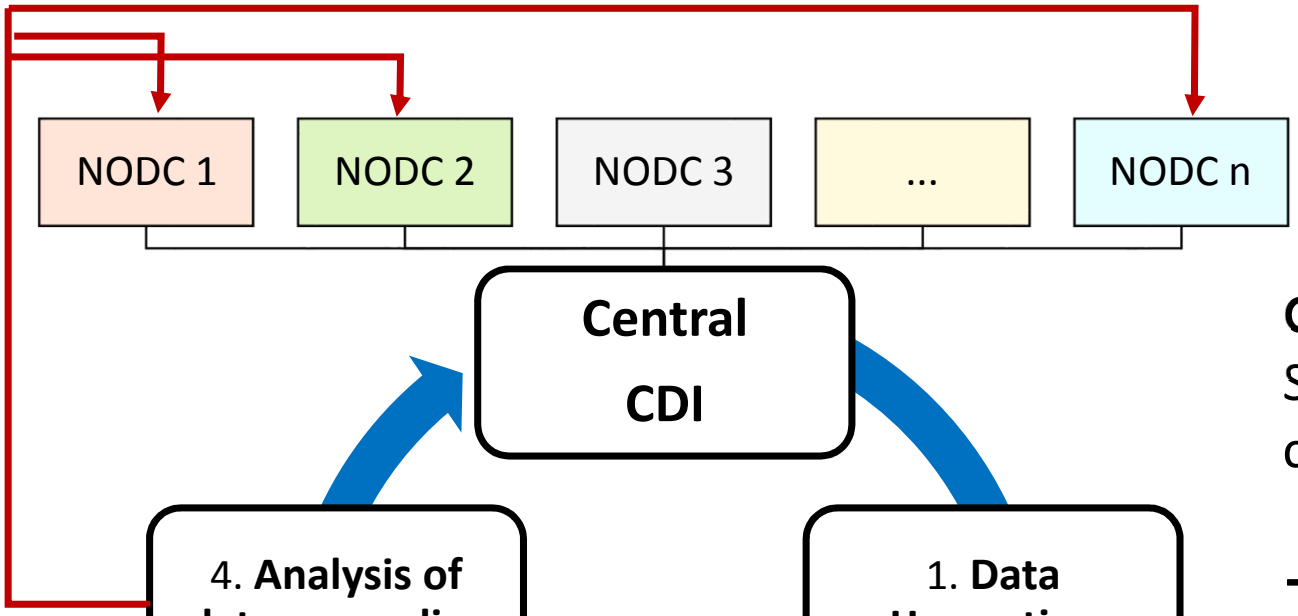


2. **Climatologies** → gridded fields obtained through DIVA mapping tool and representing the climate of the ocean at **regional and global scale**



3. **New data products** → multi-platform and multi-disciplinary approach combining in situ (e.g. gliders, Argo, ships, drifters, fixed platforms) and remote sensed observations, Ocean Monitoring Indicators for tracking ocean mechanisms and/or climate modes and trends

Quality Control Strategy (QCS)



GOAL: to improve the quality of SeaDataNet database content and create the best data products

→ **iterative approach** to facilitate the **upgrade** of the database and **versioning** of data products

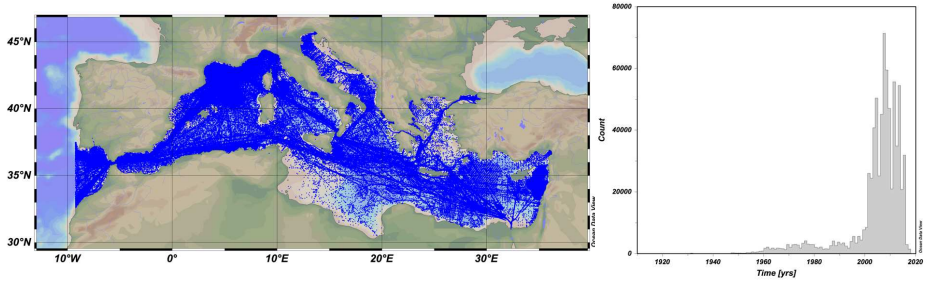
ODV5.0

Ocean Data View

Quality Control Analysis

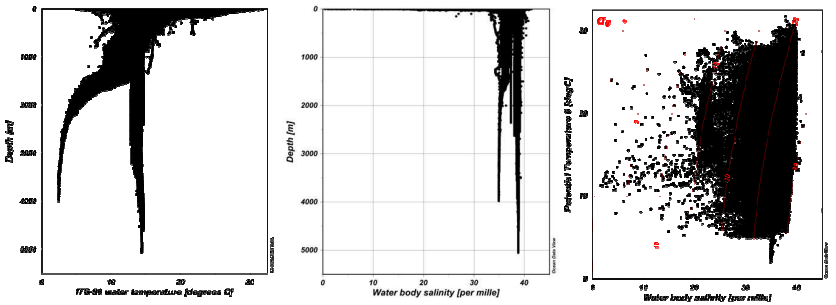
Common guidelines

1. Spatial data distribution
2. Temporal data distribution (annual, seasonal and monthly)
3. Quality Flags statistics
4. Scatter plots of good/probably good (QF1/QF2) observations
5. Gross range check
6. Analysis of QF0 data (not checked) to disclose good data
7. Visual check to identify wrong profiles (spikes, outliers)
8. Identification of stations on land
9. Identification of wrong/missing data (time, measurements)
10. Stability check



par	# stations	%	# samples
total	739784		
T	737102	**99,6**	41223938
S	667232	**90,2**	28518744
TS	665388	**89,9**	28119926

%	QF0	QF1-2	Q3-4
dpt	3.0→0	**96.9→99.8**	0.1
T	2.7→0	**97.0→99.8**	0.3
S	4.5→0	**94.6→99.2**	0.9
dpt&T&S	3.0	**94,4**	0.3



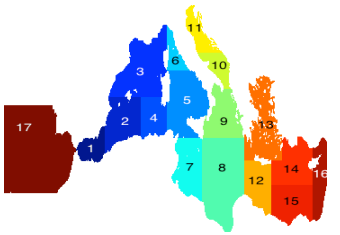
ODV5.0

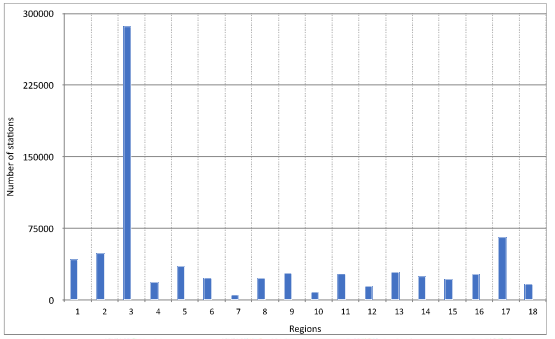
Ocean Data View

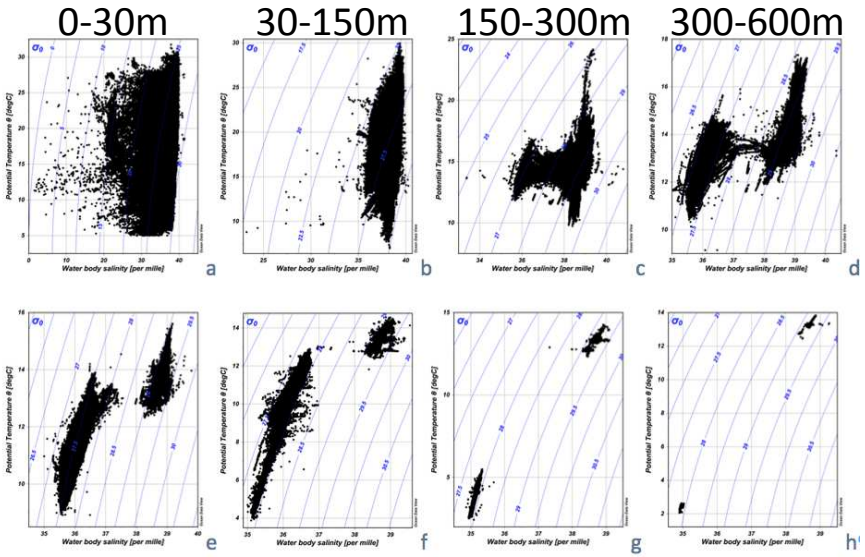
Quality Control Analysis

Specific checks per

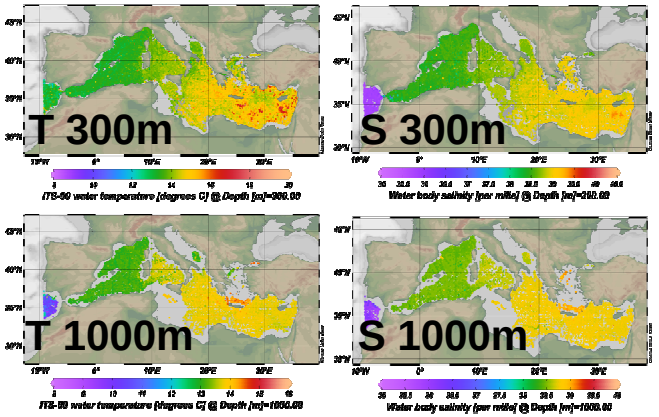
- **areas** (similar hydrodynamic characteristics)
- **layers** (surface, intermediate, bottom)
- **time periods** (decades or specific periods)
- **Instrument type** (consistency issue of historical data)

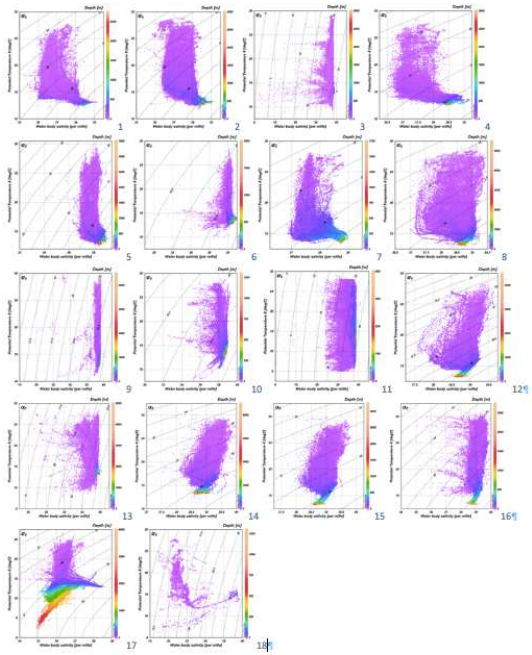






600-1000m 1000-2000m 2000-3000m 3000-5500m





ODV5.0

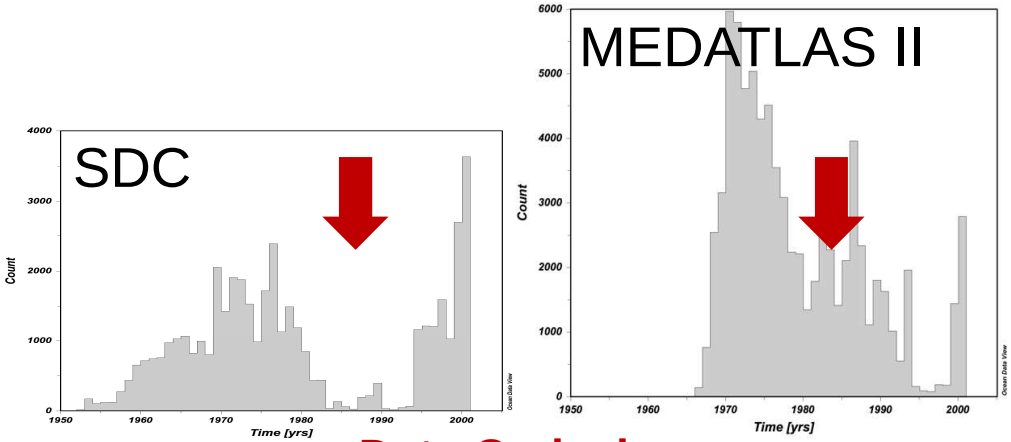
Ocean Data View

Metadata Analysis

- New **data distributors/originators statistics** → QC filtering by EDMO code → detection of systematic (format, flagging) errors
- New **instrument type statistics** → analysis of monitoring space-time coverage → detection of data omissions

Instrument/Gear Type	# stations	%
CTD	52031	7
bathythermograph	56558	8
discrete water sampler	32258	4
thermosalinograph	555269	75
thermistor chains	22	0
continuous water sampler	1577	0
salinity sensor; water temperature sensor	19852	3
salinometers	100	0
salinity sensor	143	0
water temperature sensor	1	0
none info	21973	**3**

MED XBTs 1950-2000



Data Omission

!!!Actions needed to ingest missing XBTs!!!

!!!Actions needed to complete crucial metadata information!!!

ODV5.0

Ocean Data View

Metadata Analysis

- New **data distributors/originators statistics** → QC filtering by EDMO code → detection of systematic (format, flagging) errors
- New **instrument type statistics** → analysis of monitoring space-time coverage → detection of data omissions

Instrument Info	Probe	# stations	%
''		26162	**46**
'SDN:P01::ADEPZZ01 SDN:L22::TOOL0262 SDN:L33::011 | SDN:P01::TEMPET01 SDN:L22::TOOL0262'	T-5 XBT	1239	2
'SDN:P01::ADEPZZ01 SDN:L22::TOOL0263 SDN:L33::041 | SDN:P01::TEMPET01 SDN:L22::TOOL0263'	T-7 XBT	9995	18
'SDN:P01::ADEPZZ01 SDN:L22::TOOL0263 SDN:L33::041 | SDN:P01::TEMPPR01 SDN:L22::TOOL0263'	T-7 XBT	14	0
'SDN:P01::ADEPZZ01 SDN:L22::TOOL0435 SDN:L33::001 | SDN:P01::TEMPET01 SDN:L22::TOOL0435'	T-4 XBT	16732	30
'SDN:P01::ADEPZZ01 SDN:L22::TOOL0592 SDN:L33::710 | SDN:P01::TEMPET01 SDN:L22::TOOL0592'	XCTD-2	6	0
'SDN:P01::ADEPZZ01 SDN:L22::TOOL0718 SDN:L33::061 | SDN:P01::TEMPET01 SDN:L22::TOOL0718'	T-10 XBT	2126	4

!!!Actions needed to complete crucial metadata information!!!

Data and Metadata Omissions: MED XBTs

	EDMO	# stations	%
OGS	120	491	1
ENEA	136	10488	19
HCMR	269	869	2
Ifremer	486	13549	24
SHOM	540	30876	55
MHI	727	1	0

ENEA, OGS and Ifremer have been informed:

- ENEA will insert all the probe info available and missing metadata
- Ifremer checked and added additional available metadata and ~91k French XBTs
- OGS will insert missing probe and instrument type info

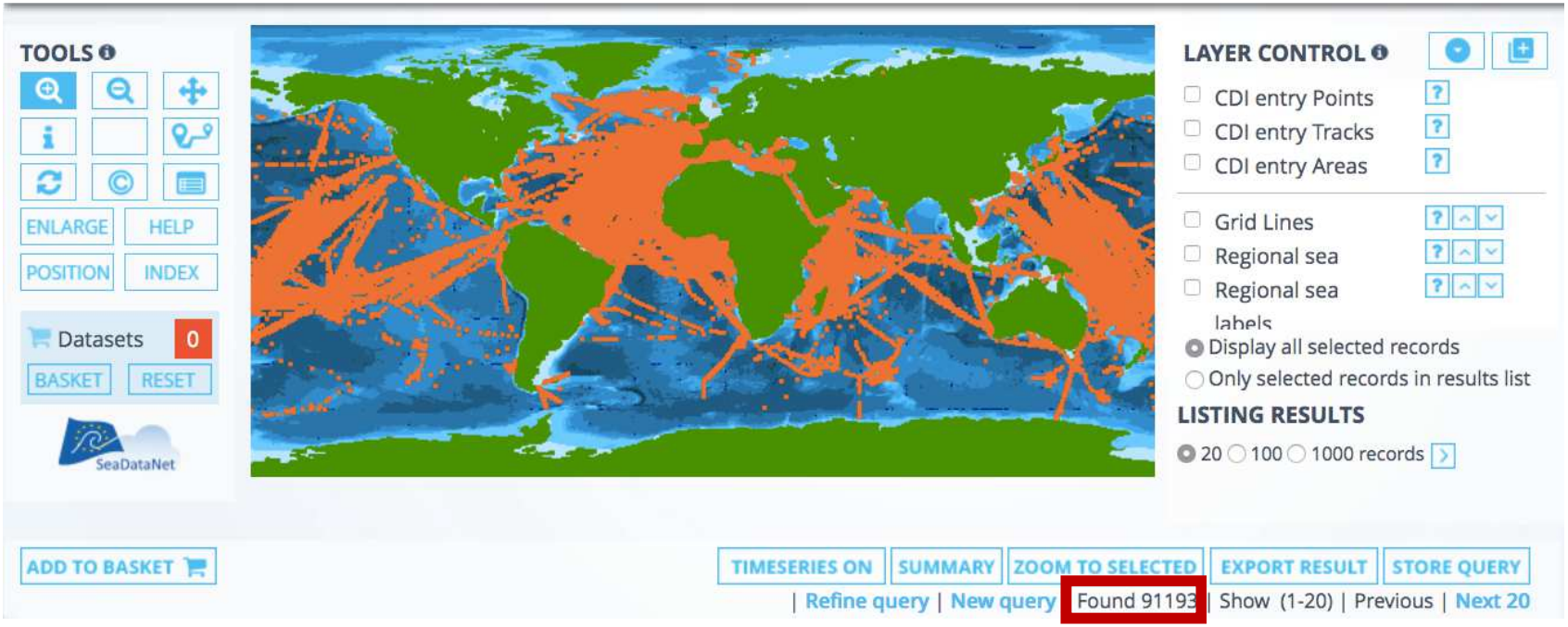
Filling data and metadata omissions highly improves the quality of the infrastructure content and increases users' confidence

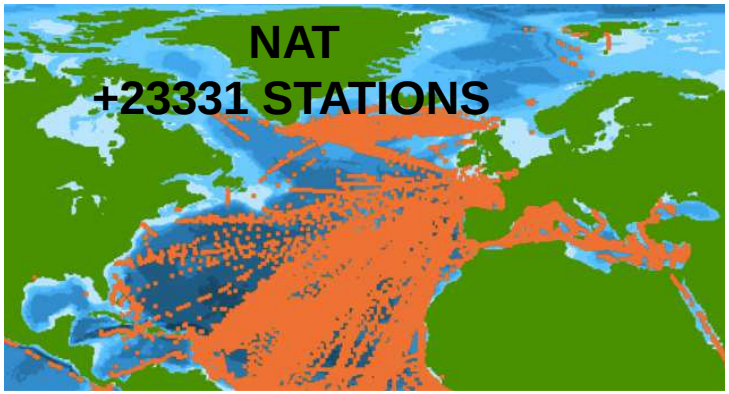
Reprocessing at the data center level allows

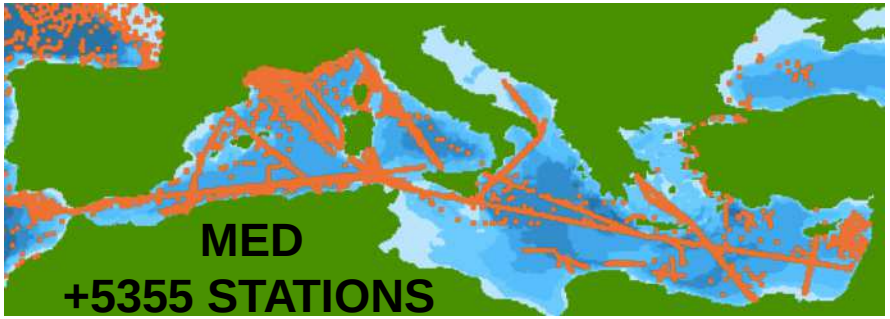
→ to secure and preserve crucial historical info (international approach of preserving the original data)

→to apply the latest XBT bias correction (ODV development)

New French XBTs







Results: database progresses

Cruises			Stations			Samples (data)		
SDN2_V2	SDC_V1	±%	SDN2_V2	SDC_V1	±%	SDN2_V2	SDC_V1	±%
Mediterranean Sea								
			212887	734957	+245,%	26625173	42294299	+59%
Black Sea								
1723	2284	+32.6%	96487	137723	+43%	2696215	4240346	+57%
Arctic Sea								
1075	1956	+82%	266291	731286	+175%	19681474	24203161	+23%
Baltic Sea								
						11100238	13780801	+24%
North Atlantic								
			1807266	9091773	+403%			
North Sea								
			115 596	162 452	+41%	6670529	7817193	+17%

Product Information Documents (PIDoc)

PIDocs contain all specifications and descriptions of:

- Product's characteristics (format, space-time coverage, resolution)
- Quality (validation methodology and results)
- Product's usability
- **data distributors and data originators list** (add statistics)
- instrument type statistics

PIDocs have DOI and are available through the product landing page

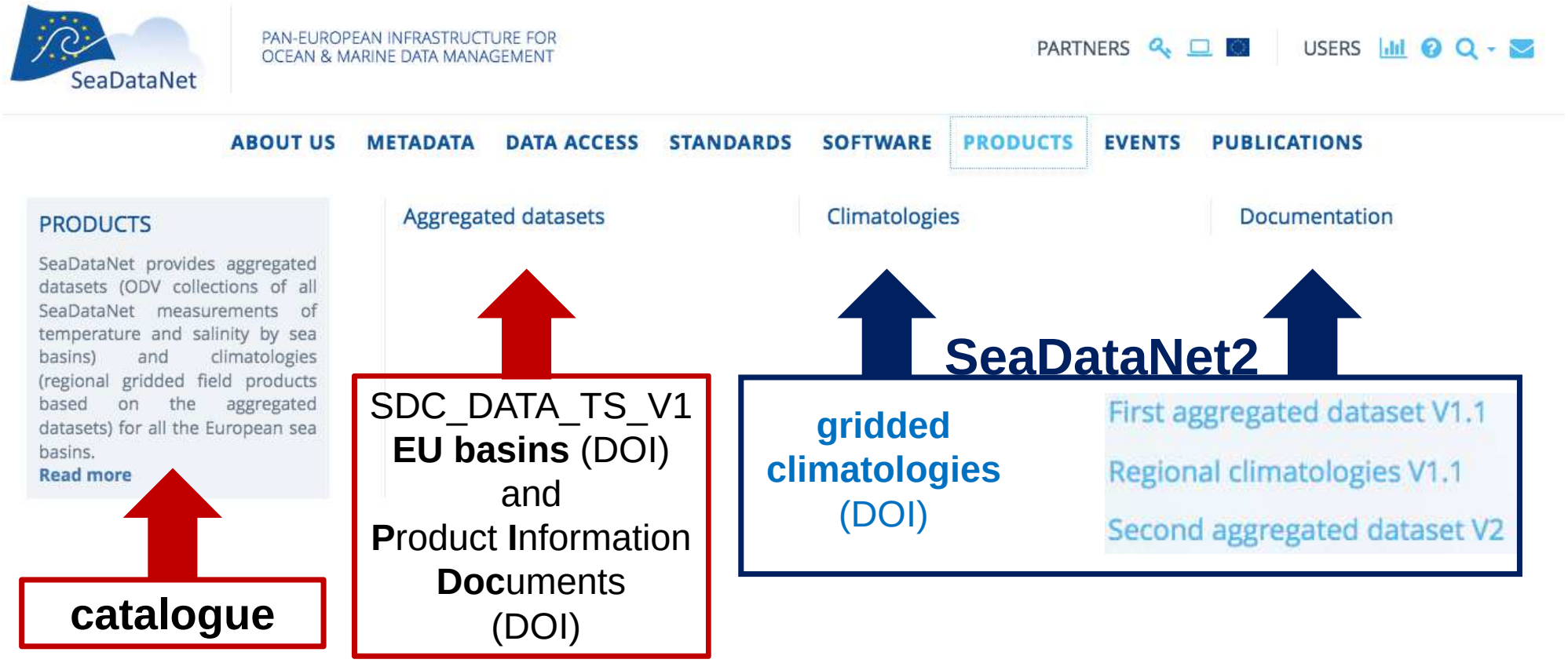
→ **Big effort to produce/revise and publish PIDocs**

→**Major improvement to increase user confidence and products uptake**

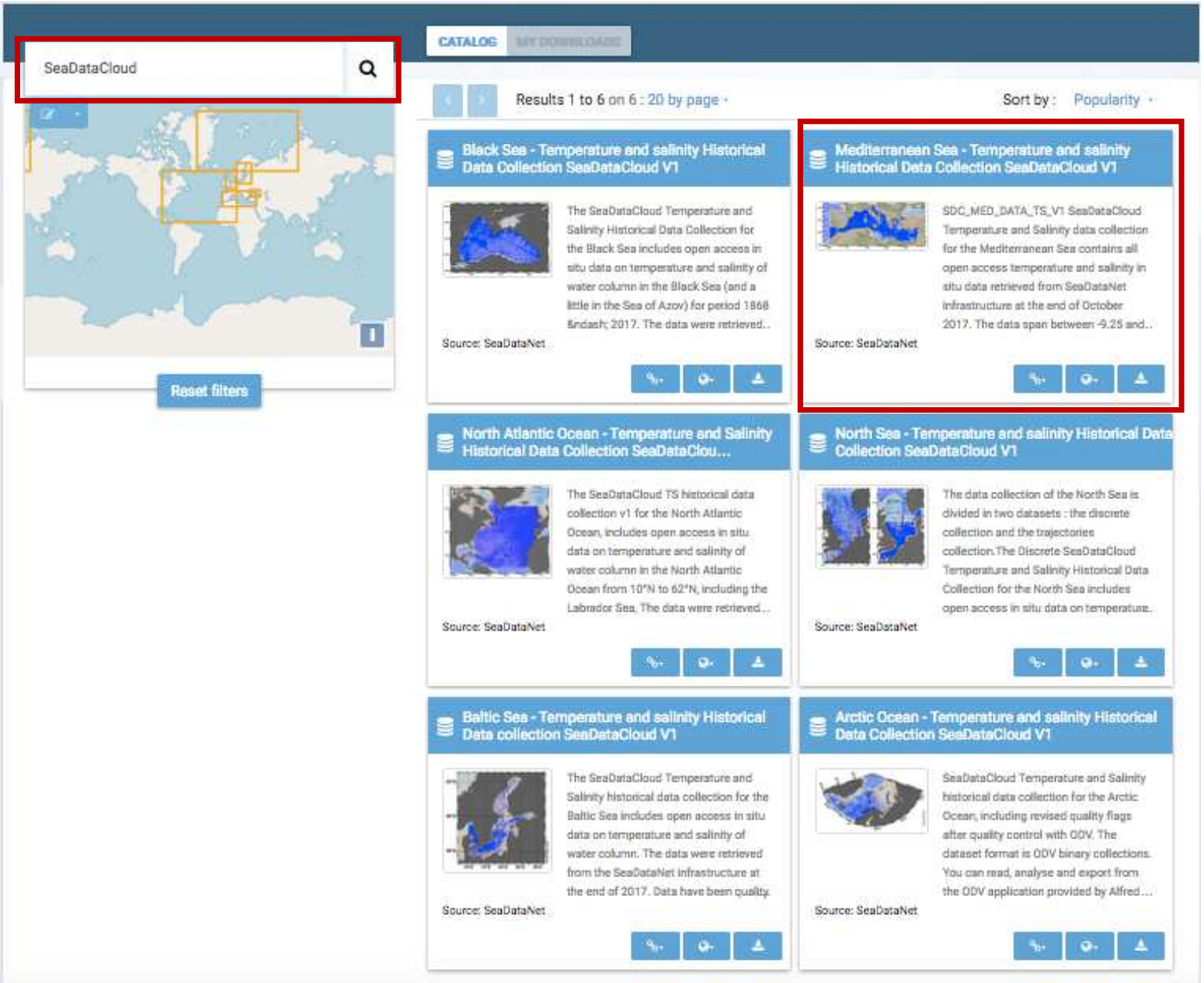
Results

- Data population statistics per sea basin show a progressive increase of available data
- Data quality also improved thanks to the introduction of additional checks by regional experts (sub-regions, depth layers, iso-surfaces)
- QF statistics after QC present very high percentages of good data (QF1,2) ~99% MED; 98-99% BLS; ~99% ARC; ~99% BAL; 98-99% NS 96(S)-99% NAT
- **metadata statistics** about data distributors/originators highlights systematic (format, flagging) errors and allows the monitoring the EU data sharing landscape but also fair acknowledgment to providers
- **instrument type statistics** highlighs omissions and suggests the need of systematic check and data reprocessing at the data centers level

SDC_DATA_TS_V1 release (June 2018)

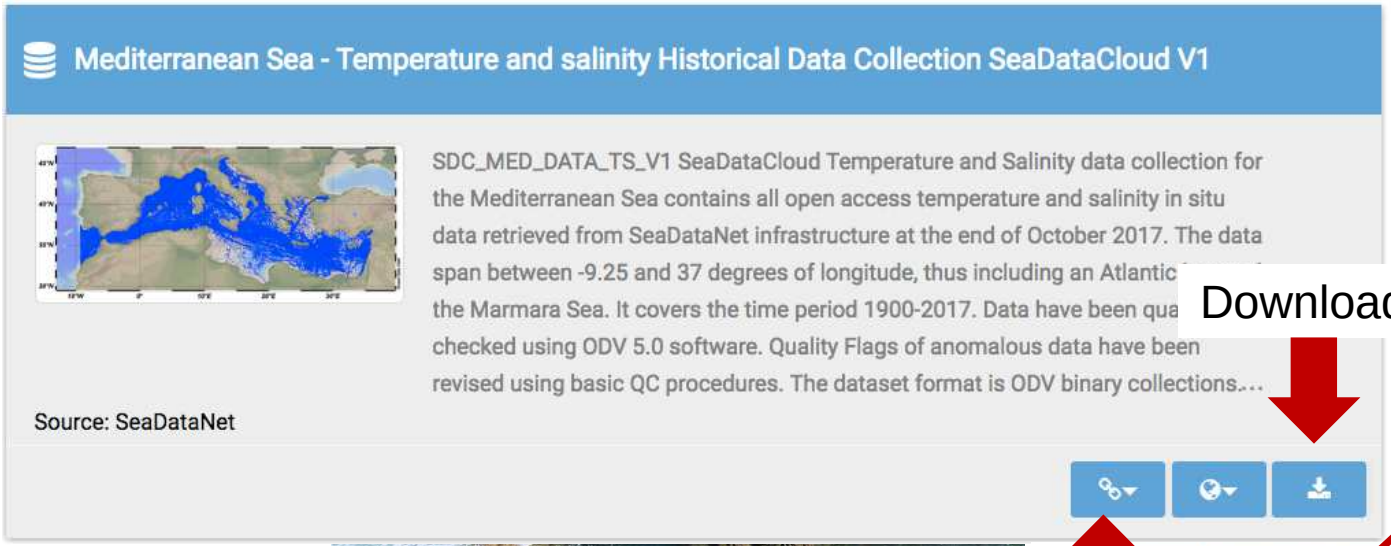


Products Catalogue

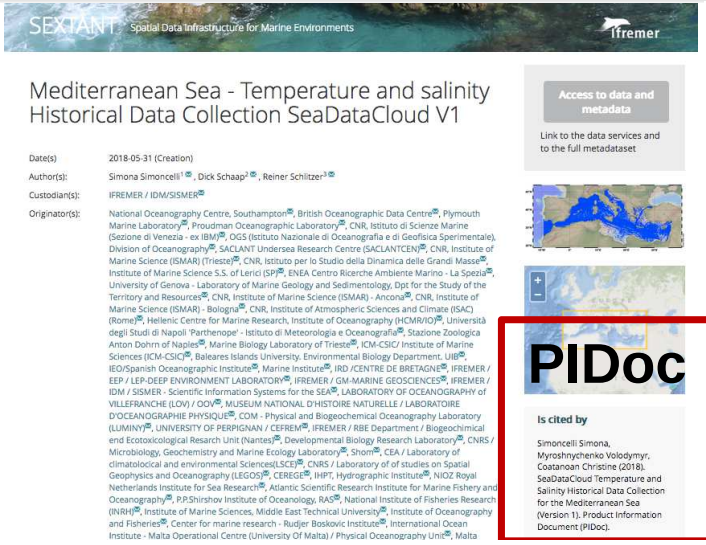


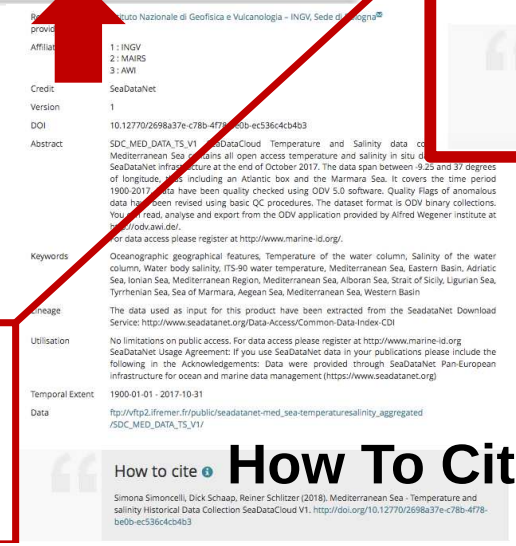
Products Catalogue

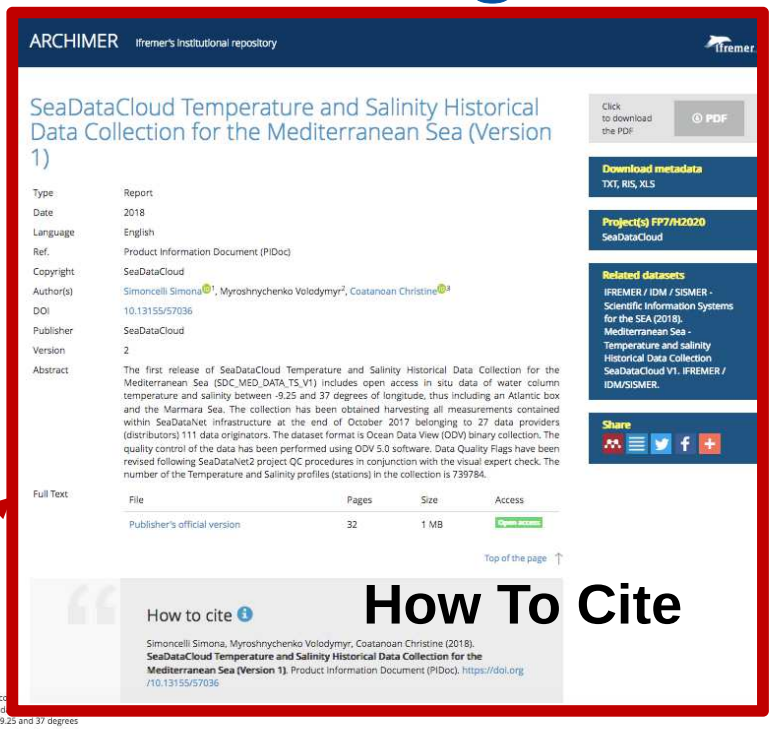
Landing Page



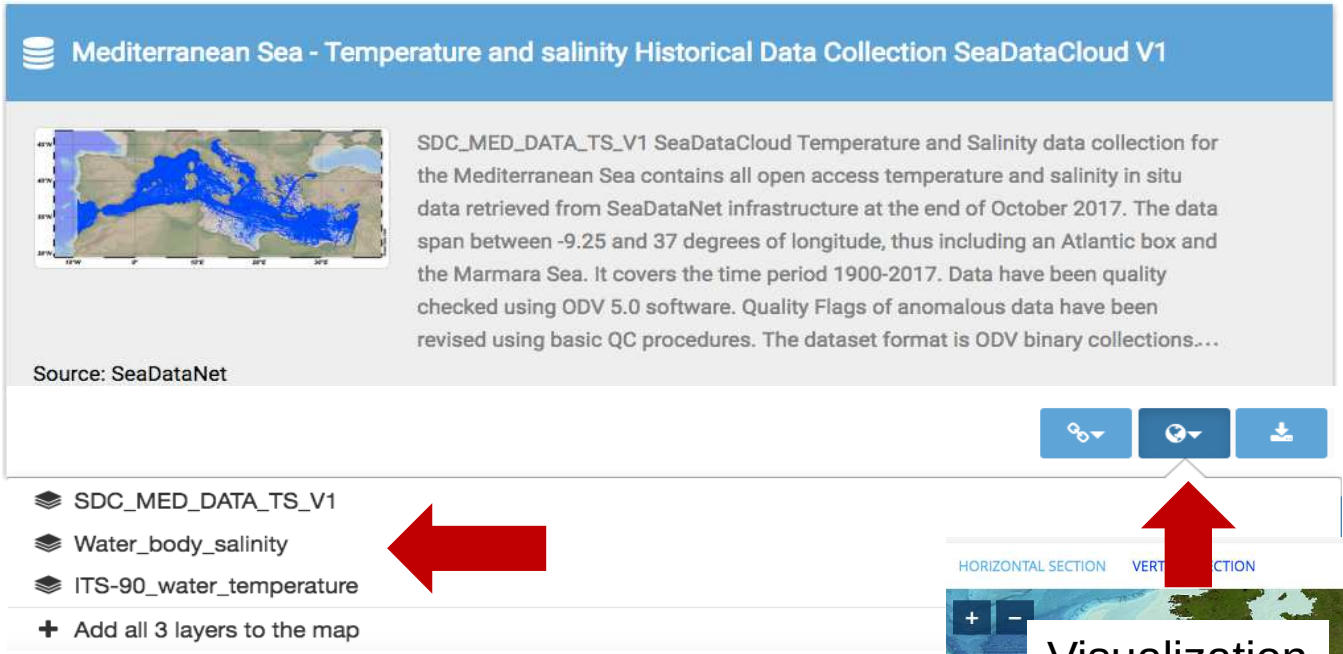
Download







Products Catalogue



Restricted data analysis

- PIDocs are available
- Metadata stats →

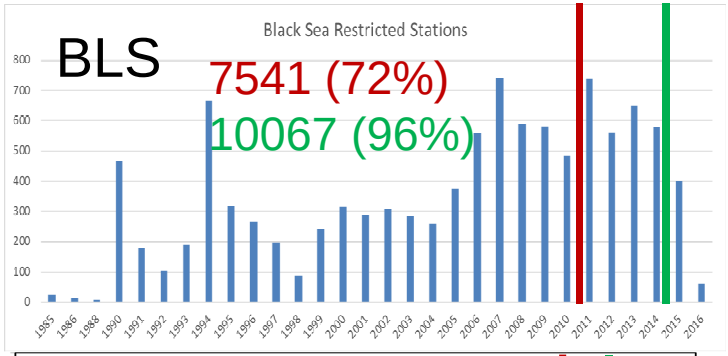
to monitor continuously the amount of restricted data, the providers

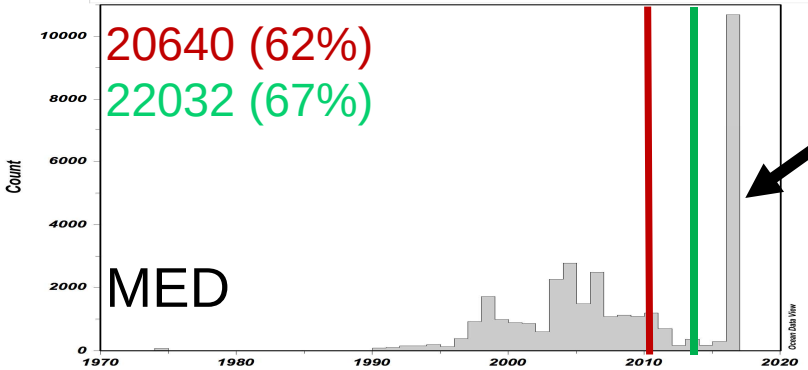
GOAL unlock old data and avoid stagnation

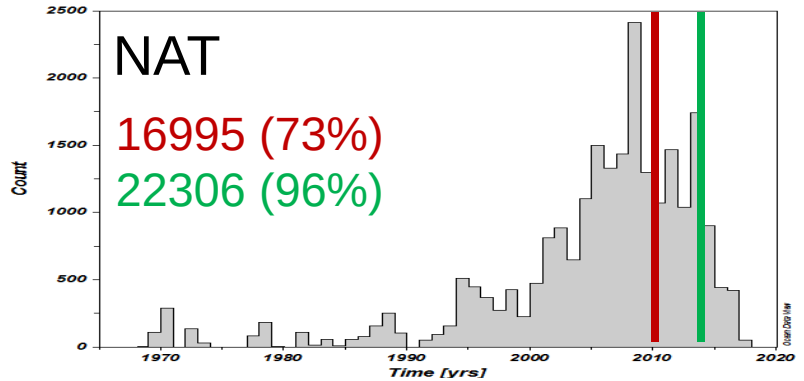
Restricted/Unrestricted ratio

	STATIONS		
	unrestricted	restricted	%
NAT	9091773	23217	0,3
BAL		10221	1,0
MED	734957	33022	4,5
BLS	137723	10528	7,6
ARC	731286	374	0,1
NS	1385289	12011	0,9

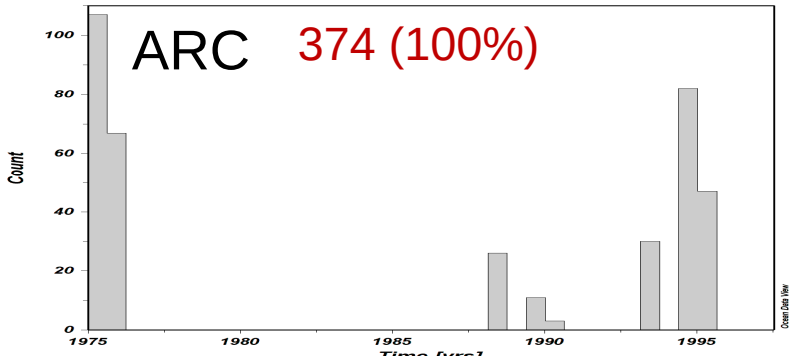
Unlock restricted data before 2010? 2014?

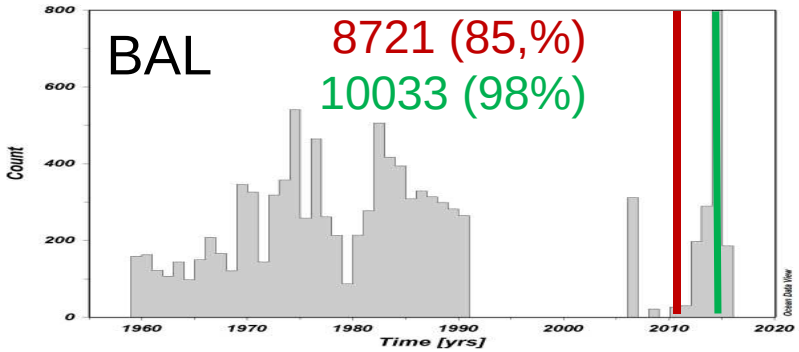


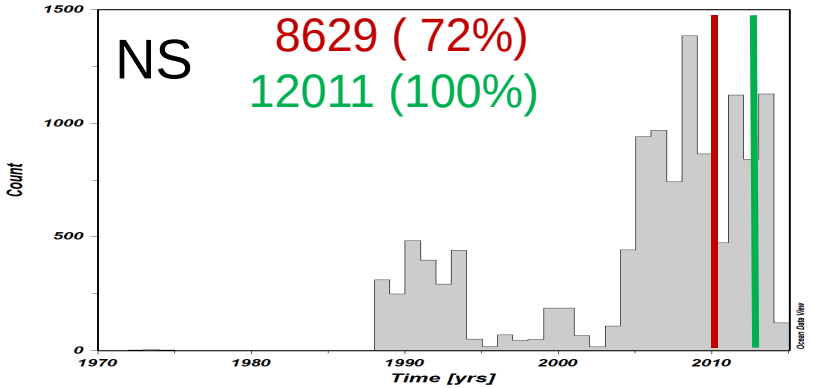




10522 stations from INSTM with missing depth (QF9)







Major providers of restricted data

Region	EDMO	Originator	% st
MED	1232	Institut National des Sciences et Technologies de la Mer (INSTM)	51
BLS	723	State Oceanographic Institute (SOI)	56
ARC			
BAL	193	Institute of Meteorology and Water Management National Research Institute, Maritime Branch in Gdynia (IMWM MB)	81
NAT		IEO	66
NS	2135	Marine Scotland Science	37

Coming soon → monitoring of restricted/unrestricted rationper data provider to assure that the balance is reasonable

TRAINING and DISSEMINATION

DIVA training 3-6 April 2018 → wide participation, all RC were present

Very good and efficient course

SDC_WP11_D11.14_StrategyForTrainingActivities.pdf

Modified on: 22 December, 2017 By: Michele FICHAUT

SDC_WP11_D11.15_OutcomeOfTrainingActivities.pdf

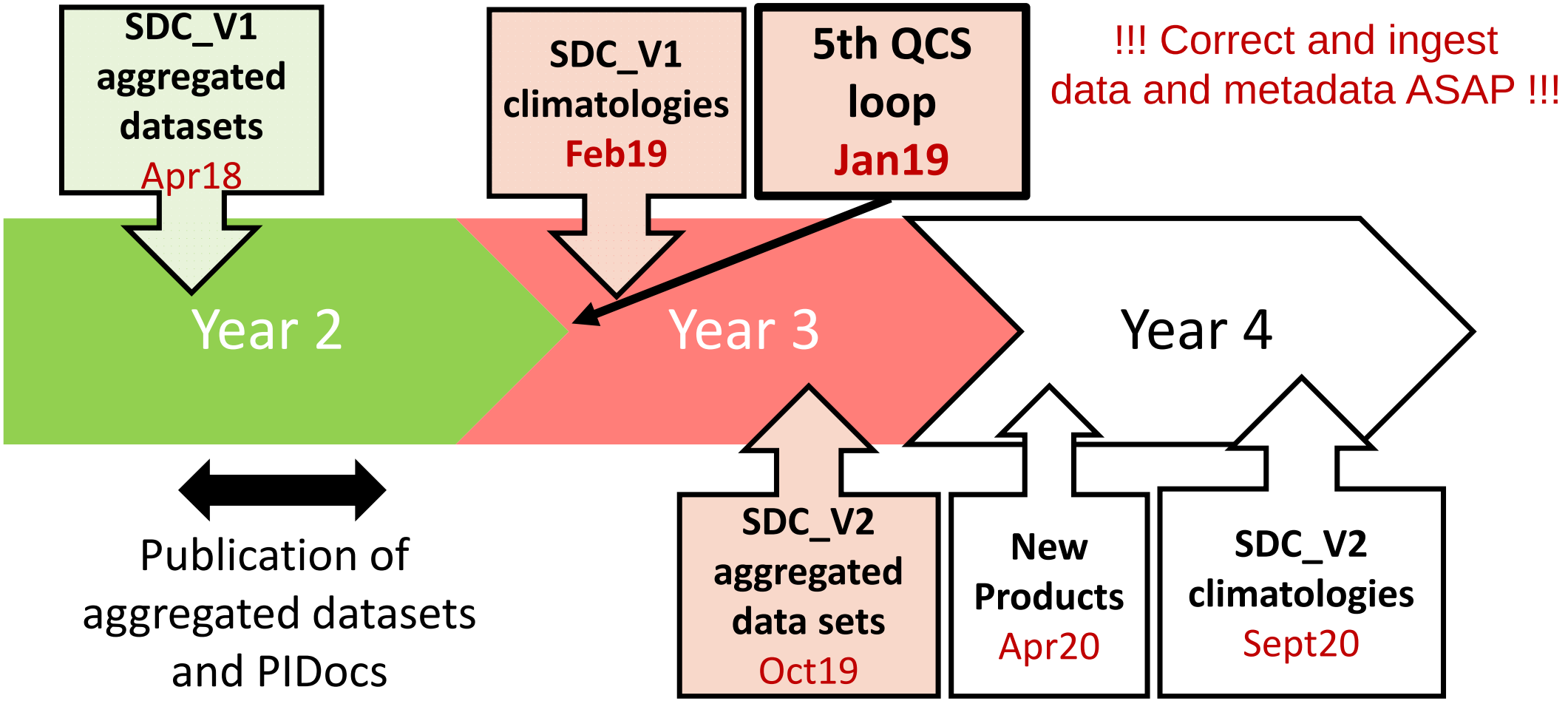
Modified on: 20 April, 2018 By: Michele FICHAUT

→Importance Quality Control SDC WP11 Introduction

Prestentation to the 1st SDC training workshop (Serge, Simona, Christine)

WP11 promoted and presented SDC in many workshop and conferences (WP4 presentation)

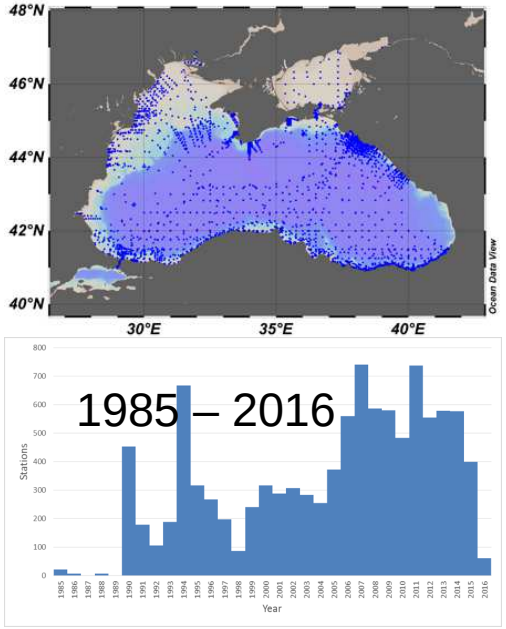
Work Plan and Timeline



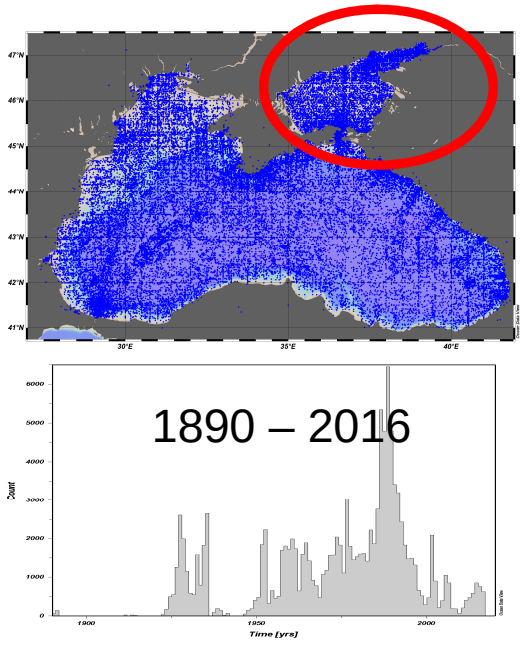
Ongoing Activities: data integration Black Sea

Estimates from metadata:
60% duplicates
80000 stations
(+50%)

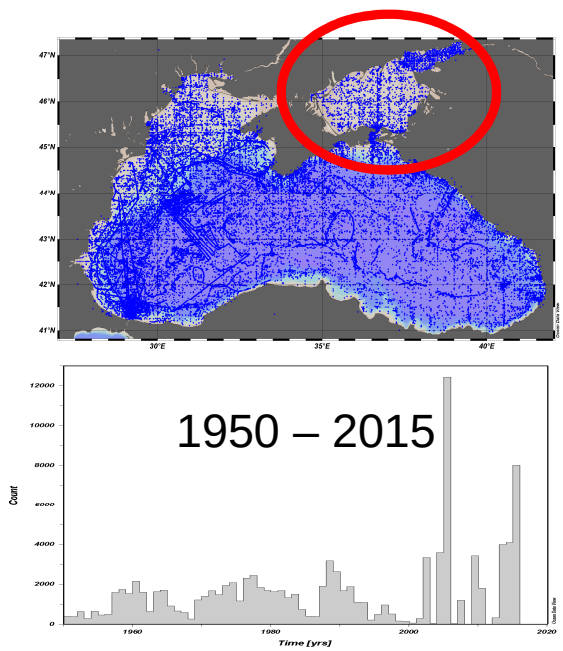
Restricted Dataset



WOD2013



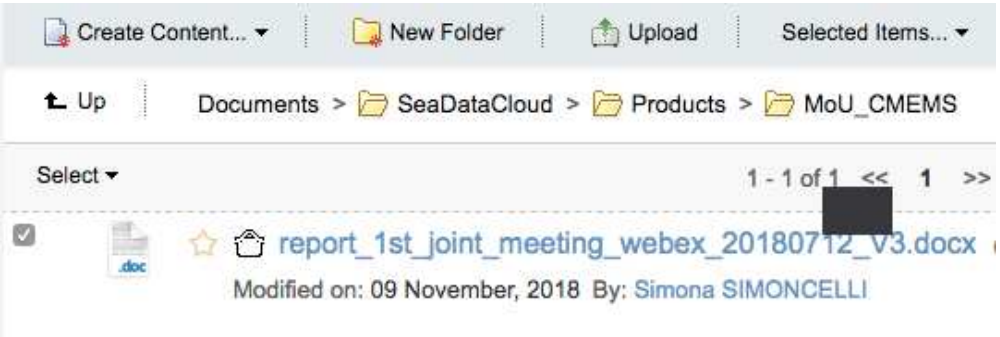
CORA 5.1



	unestricted	restricted	WOD2013	CORA 5.1
stations	137723	10528	120845	103721
	148251			

Ongoing Activities: collaboration with CMEMS Ins TAC

1st Joint Meeting July 12th 2018



AGENDA

General introduction

1. From SeaDataNet to SeaDataCloud: new data products and innovation
2. From phase I to phase II: CMEMS in situ TAC developments

DISCUSSION

Review of Quality Check procedures

3. SDN Quality Check Strategy: from visual inspection to automatic approac
4. CMEMS quality check procedures

DISCUSSION → find a common strategy

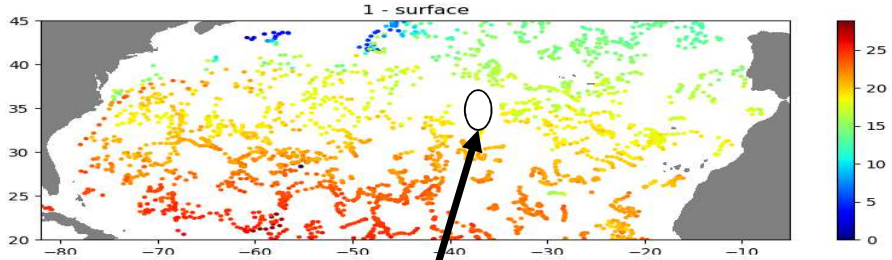
5. First release of SDC_xxx_DATA_TS_V1 and Product Information Documents (PIDocs)
6. CMEMS new data types?

DISCUSSION --> data type approach/timelines/mutual requirements

Advanced estimates of GLOBAL climatologies

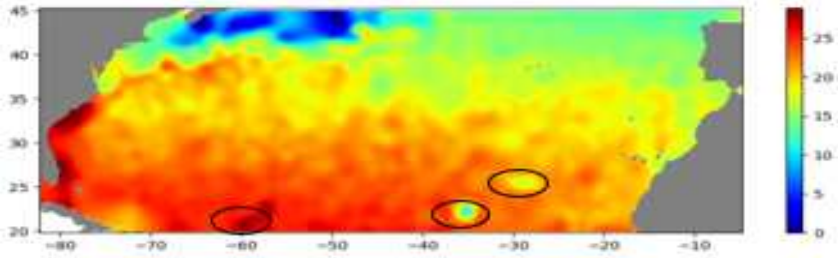
K. Shahzadi, N.Pinardi, M.Zavatarelli (UNIBO), S.Lyubartsev (CMCC), S.Simoncelli (INGV)

World Ocean Database (WOD2013)



Temperature from ARGO, Spring (2012-2013)

What's the **CLIMATOLOGICAL value** at this location?



DIVA estimate of 2012-2013 observations

Preliminary results from DIVA
→ anomalous features
→ **better quality control to eliminate outliers**

Errors in observations could be:

- Instrumental Error (limited precision or bias of the sensor)
- Representativeness Error
- Synoptic Error (time)
- Gross Error: Human error, Instrumental failure, Incorrect communication, calibration error

→ Quality Control

Need to develop a new **NONLINEAR QC (NQC)** to reduce the representatinevess error

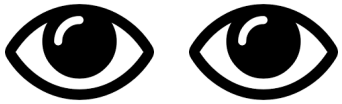
Climatologies SDC_CLIM_TS_V1

- T and S monthly and seasonal climatologies with **increased horizontal** and **vertical resolution** (WOA standard depth) covering the time period 1955-2017
- **Integration** of SeaDataCloud data collections **with external data sets** to increase data coverage (CMEMS, WOD2018, ICES)
- Analysis of (1) space/time data distribution; (2) data types consistency; (3) long term variability to compute climatologies on a decadal basis (sliding decades when possible)
- **Product validation** → consistency analysis with WOA and CMEMS products (satellite reprocessed data sets and reanalysis)

→PIDoc will contain all this information

→SDC_CLIM_TS_V1 will be also accessible through EMODnet Physics

Conclusions

- Introduction of **PIDocs** represented a very good progress
- SDC_DATA_TS_V1 publication → *data set paper* and submission of SDN QCS as Ocean Best Practice
- **Metadata analysis** will be extended to all the regional seas in the next QCS loop
- Hunting of **data omissions** will be intensified 
- **QC analysis per data type** will continue to assure data consistency
- **Integration with external datasets** (WOD2018, CMEMS) for climatology production (upcoming milestone)

- **WP11 met regularly online to monitor and harmonize the activities**
- **High participation/great collaboration/very good progresses**
- **Deliverables and reports were all submitted in time**

SeaDataCloud

Open Issues

- **underway data**→ data have been subsampled in SDC_DATA_TS_V1 release (1 over 7) → wish to manage underway data (FerryBox and TSG) separately and provide the full resolution (on going discussion)
- **restricted data** → need to reduce its percentage (unlock data older than 2010)
- **Time series** → fragmented and difficult to manage for QC and data products→ how do we want to proceed? WP11 wish a reprocessing at the data center level
- Meeting with Ins-TAC CMEMS ASAP

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