SeaDataCloud temperature and salinity climatologies for the European marginal seas and the Global Ocean

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SeaDataCloud (SDC) Climatologies

- have been designed with **harmonized approach** to cover the time period after 1955 on World Ocean Atlas (WOA18) standard vertical levels
- monthly fields 1955-2018 and seasonal decadal fields have been produced with associated error fields
- SDC datasets integrated with external sources: World Ocean Database (WOD18) and/or Coriolis Ocean Dataset for ReAnalysis (CORA5.2)
- computed with **DIVAnd** tool
- **validation** through consistency analysis considering WOA18 as reference
- **documentation**: methodology, validation and usability have been reported in *Product Information Documents (PIDoc)* available with the NetCDF files in the SDC Product Catalogue
Workflow

Products

climatologies
aggregated datasets

Data Centres

NODC 1
NODC 2
NODC 3
...
NODC n

Central CDI

Analysis of data anomalies

Data Harvesting

QC Analysis

File/Parameter Aggregation

QAS

Ocean Data View

SeaDataCloud
<table>
<thead>
<tr>
<th>Name</th>
<th>horiz resolution</th>
<th>Time coverage</th>
<th>Seasonal</th>
<th>Monthly</th>
<th>External data sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLO_1</td>
<td>1/4°</td>
<td>1900-2017</td>
<td>x</td>
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<td>WOD18</td>
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<tr>
<td>GLO_2</td>
<td>1/4°</td>
<td>2003-2017</td>
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<tr>
<td>ARC_1</td>
<td>1x1/2°</td>
<td>decades</td>
<td>x</td>
<td>x</td>
<td>WOD18</td>
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<tr>
<td>ARC_2</td>
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<td>1955-2014</td>
<td>x</td>
<td>x</td>
<td>WOD18</td>
</tr>
<tr>
<td>BAL_1</td>
<td>1/16x1/32°</td>
<td>decades</td>
<td>x</td>
<td>x</td>
<td>CORA5.2</td>
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<tr>
<td>BAL_2</td>
<td>1/16x1/32°</td>
<td>1955-2018</td>
<td>x</td>
<td>x</td>
<td>CORA5.2</td>
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<tr>
<td>NS_1 (V1)</td>
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<td></td>
<td>x</td>
<td>WOD18</td>
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<td></td>
<td></td>
<td>WOD18</td>
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<td>1/2°</td>
<td>decades</td>
<td>x</td>
<td>x</td>
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<tr>
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<td>x</td>
<td>x</td>
<td>CORA5.1</td>
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<td>x</td>
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<tr>
<td>MED_1</td>
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<td>x</td>
<td>x</td>
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<tr>
<td>MED_2</td>
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<td>1955-1984</td>
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<td>x</td>
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<td>MED_3</td>
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<td>1985-2018</td>
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<td>x</td>
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<td>CORA5.2</td>
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<tr>
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<td>1955-1994</td>
<td>x</td>
<td>x</td>
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</table>

GLO climatology computed with data from WOD18 → the spatial coverage of SDN data at global scale is still too sparse
Integration with external sources

External data imported in ODV and additional QC has been performed through visual inspection before the integration with SDC datasets --> data spatial and temporal consistency

Percentage of SDC data and external sources per sea basin:

In general SDC represents the main contributor \( \rightarrow \) percentage of external data ranging from 5% in the North Atlantic to 50% in the North Sea
SDC_ARC_CLIM_TS_V2
Winter Temperature at 50m

SDC_GLO_CLIM_TS_V2_2
5m January 900m

T

S
SDC_BAL_CLIM_TS_V2_1 Surface Salinity 1955-2018

SDC_NAT_CLIM_TS_V2_1 Temperature 2000-2009
SDC_MED_CLIM_TS_V2
Spring Salinity at 300m

1955-1964
1965-1974
1975-1984
1985-1994
1995-2004
2005-2018

SDC_BLS_CLIM_TS_V2
Surface Temperature 1955-2019
Validation is essential for products reliability → global WOA18 climatology as reference

Twofold scope: (1) to detect possible drawbacks; (2) to highlight strength/weaknesses of SDC climatologies → usability information

Qualitative (visualization): ARC, BAL, NAT, NS
Quantitative (quality indices): GLO, MED, BLS
• 2 releases within SDC project: decadal gridded fields, integration of external data, DIVAnd software uptake and PIDocs

• Data integration process has been improved

• **SDC co-development/production** process is in place and will be further advanced exploiting the new SDC Virtual Research Environment (VRE)

• Good consistency with WOA and added value of the highest resolution regional climatologies

• Issues identified and reported in PIDocs under *Product Usability*

• Next improvements: gravitational stability, 3D interpolation, automation of multiple datasets integration, standardisation of duplicate detection and removal

• datasets and PIDocs have DOIs and are available at

  [https://www.seadatanet.org/Products#/search?from=1&to=30](https://www.seadatanet.org/Products#/search?from=1&to=30)
SeaDataNet provides aggregated datasets (ODV collections of all unrestricted SeaDataNet measurements of temperature and salinity by sea basins) and climatologies (regional gridded field products) based on the aggregated datasets and data from external data sources such as the Coriolis Ocean Dataset for Reanalysis (CORA) and the World Ocean Database (WOD) for all the European sea basins and the Global Ocean. Each SeaDataCloud product is described in a Product Information Document (PiDoc) that can be accessed from the product's landing page. Click on the User Manual tab on the top-right corner of the page for instructions.
Thanks to all partners
References and Acronyms

WOA  https://www.ncei.noaa.gov/products/world-ocean-atlas
WOD  https://www.ncei.noaa.gov/products/world-ocean-database
CORA  Szekely et al., 2019 https://archimer.ifremer.fr/doc/00595/70726/
ODV  https://odv.awi.de/
DIVAnd  Barth et al., 2014 http://dx.doi.org/10.5194/gmd-7-225-2014
QAS  Quality Assurance Strategy
PIDoc  Product Information Documents
VRE  Virtual Research Environment https://www.seadatanet.org/Software/VRE