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The BALTIC and NORTH SEAS CLIMATOLOGY (BNSC) - a comprehensive, observation-based data product of atmospheric and hydrographic parameters

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- Data and Methods
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Motivation

Climate modelling requires observational data as reference

However:

- **where to find observations?**
- **considerable amount of observations is needed**
- **observations probably not harmonized concerning quality and format**
- **gridded fields of observational data of different parameters would be best**

BNSC overview

atmospheric

hydrographic

both

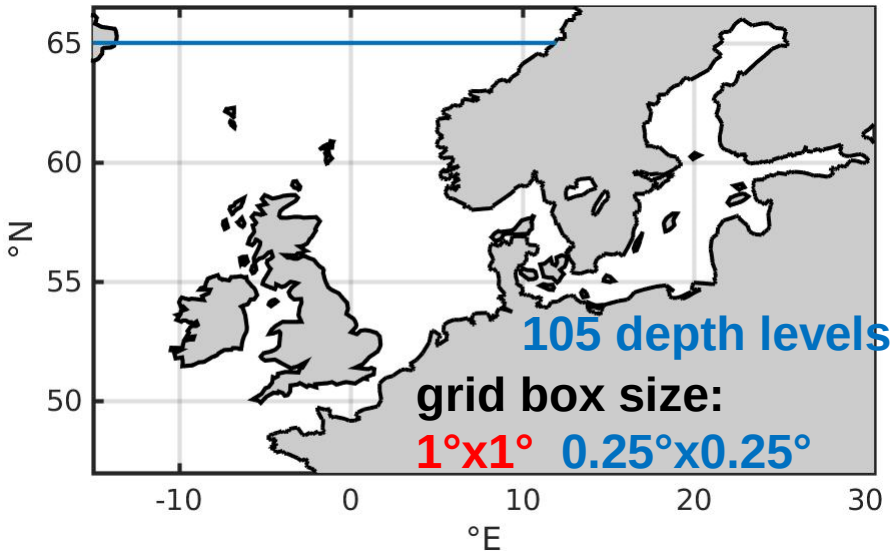
available variables

air temperature | water temperature

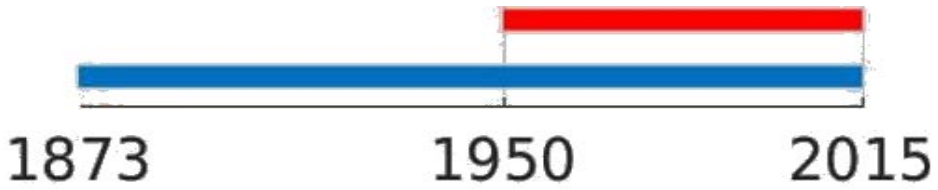
dew point t. | salinity

air pressure

spatial extent and resolutions



temporal extent and resolutions



monthly

30y monthly | decadal monthly

annual

Data and Methods

hydrographic in situ observations

source	explanation
WOD	World Ocean Data Center (Boyer et al. [2013])
DOD	German Oceanographic Data Centre
IOW	Leibniz Institute for Baltic Sea Research Warnemünde
ICES	International Council for Exploration of the Sea
IMGW-PIB	The Institute of Meteorology and Water Management – National Research Institute, Poland
NIOZ	"Royal Netherlands Institute for Sea Research"
BODC	British Oceanographic Data Centre
SCANFISH	SCANfish data, provided by BSH
CTD_DK	Danish National Marine Monitoring Data, Bioscience, Aarhus University - http://Mads.dmu.dk
ARGO	International ARGO-Project, www.ifremer.fr

atmospheric in situ observations

source
marine observations provided by the Marine Data Centre of the DWD

several sources

- **check for duplicate observations is required !**

Data and Methods

Elaborate Quality Control (QC) of hydrographic data,

following data quality control strategy developed during international initiative „International Quality Controlled Ocean Database (IquOD*)“

QC checks

depth dependant **parameter range** (overall, local climatological)

observed depth vs. digital bathymetry (GEBCO**)

profile structure (number of extreme values, vertical gradient, spikes, constant values)

max. of observed depth compliant with data type

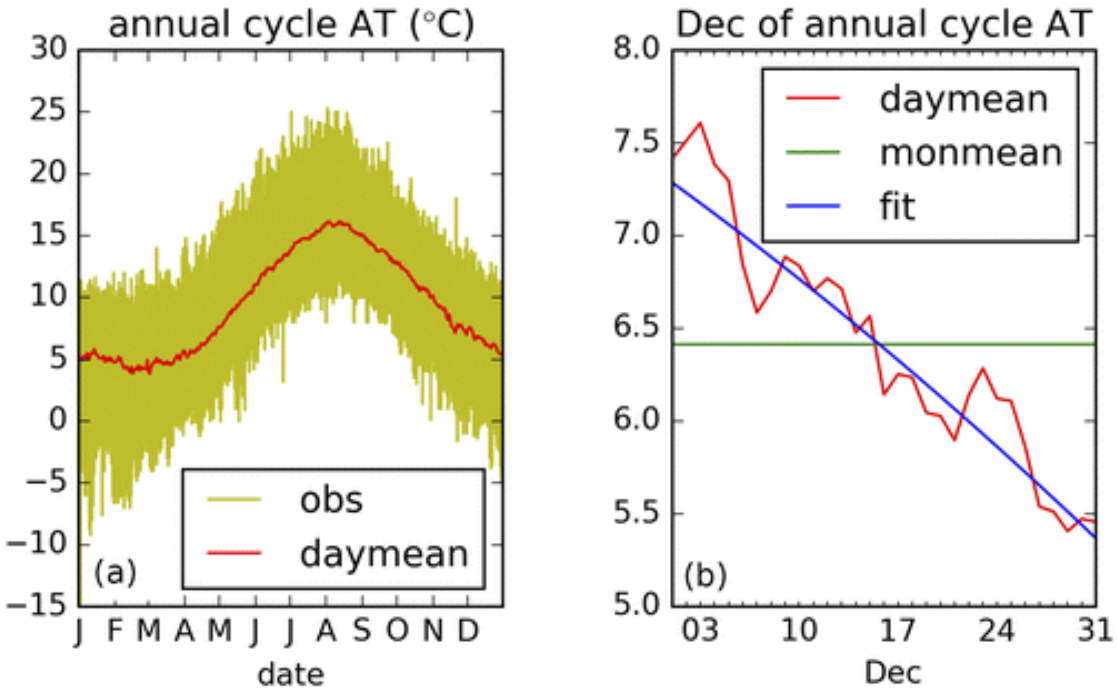
***http://www.iquod.org/**

****Weatherall et al., 2015**

Data and Methods

correction of temporal sampling error

example: air temperature (AT) in a single lat-lon grid box



(from Sadikni et al., 2018)

atmospheric

hydrographic

both

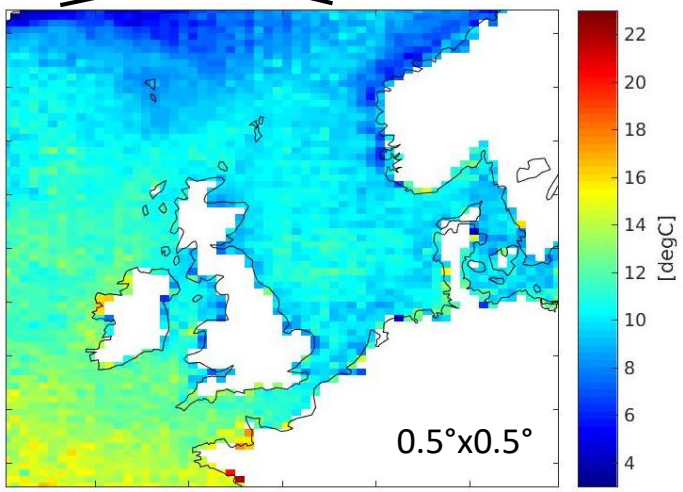
Data and Methods

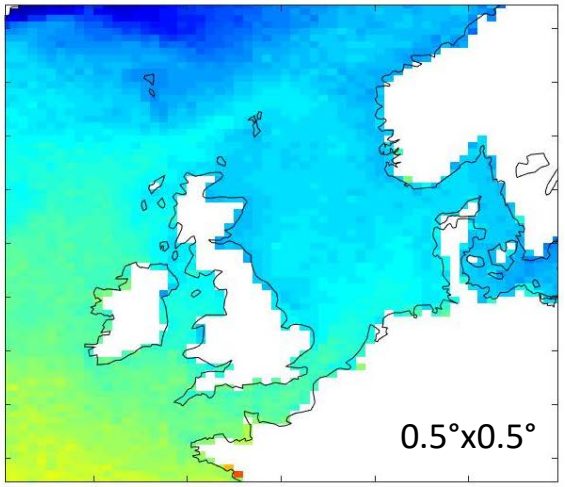
SST longterm mean

~~correction~~

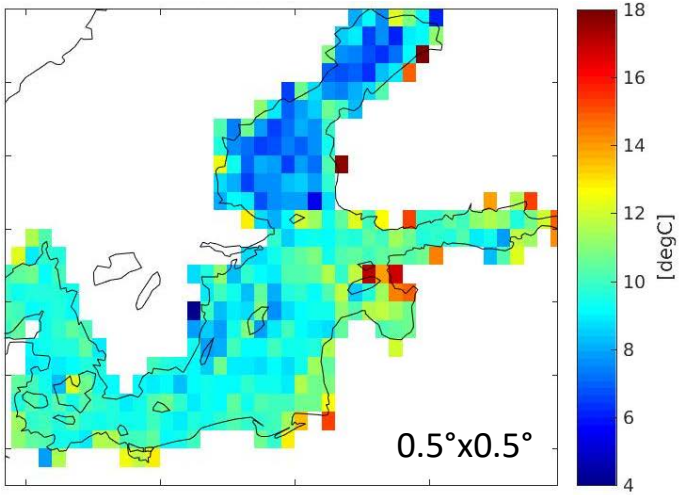
correction

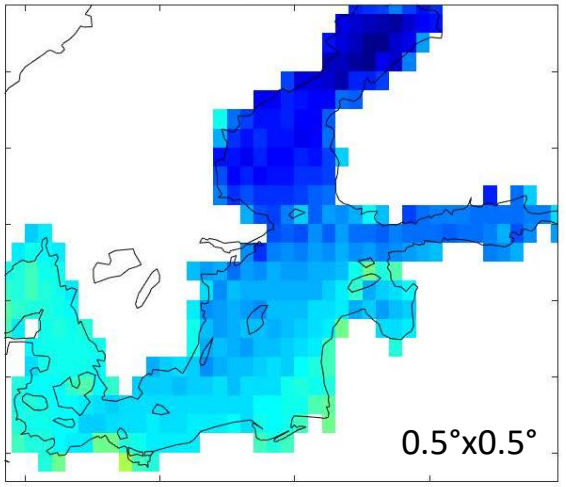
North Sea
(1890-2011)





Baltic Sea
(1898-2015)





Availability

The Baltic and North Seas Climatology is freely and publicly available in NetCDF under :

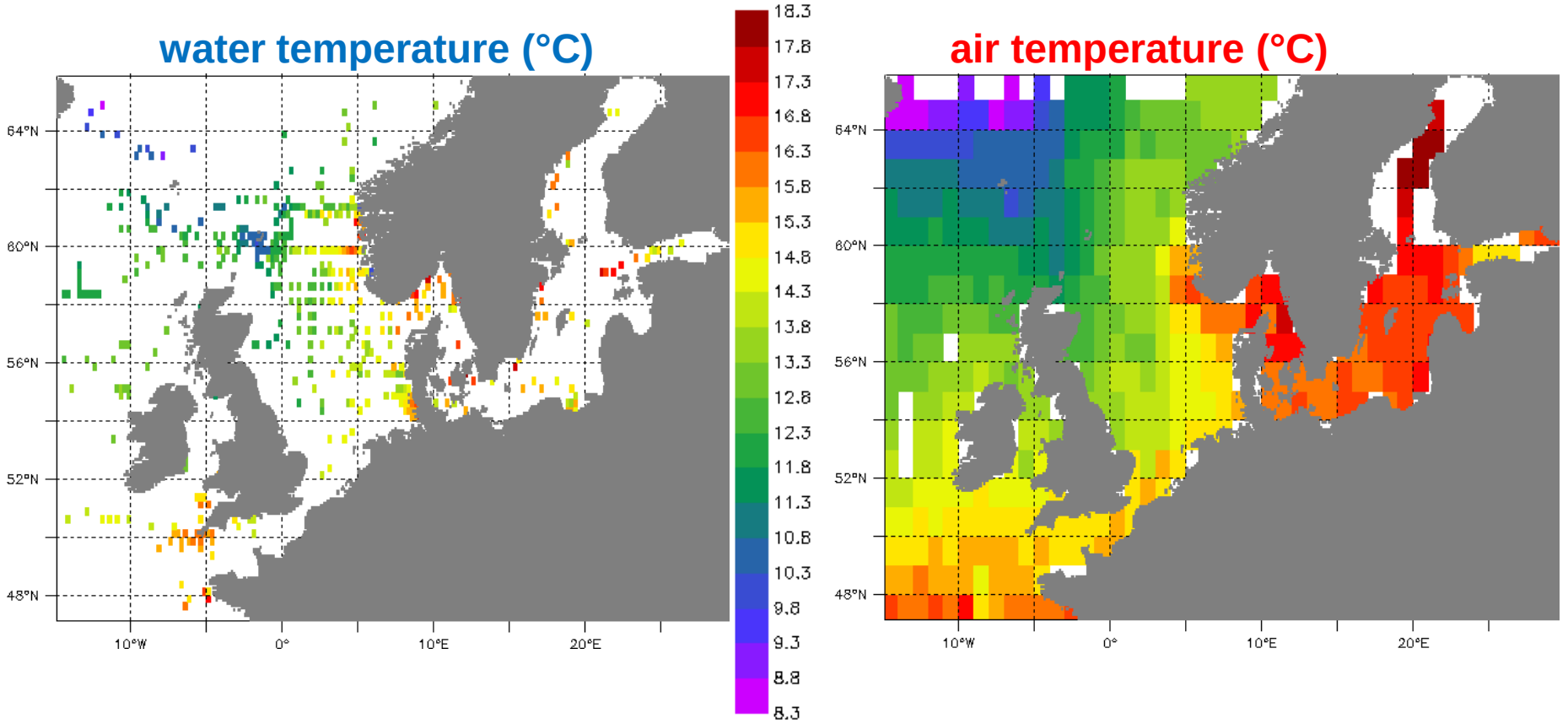
https://icdc.cen.uni-hamburg.de/1/projekte/bnsc/

or search the internet for

„ICDC BNSC“

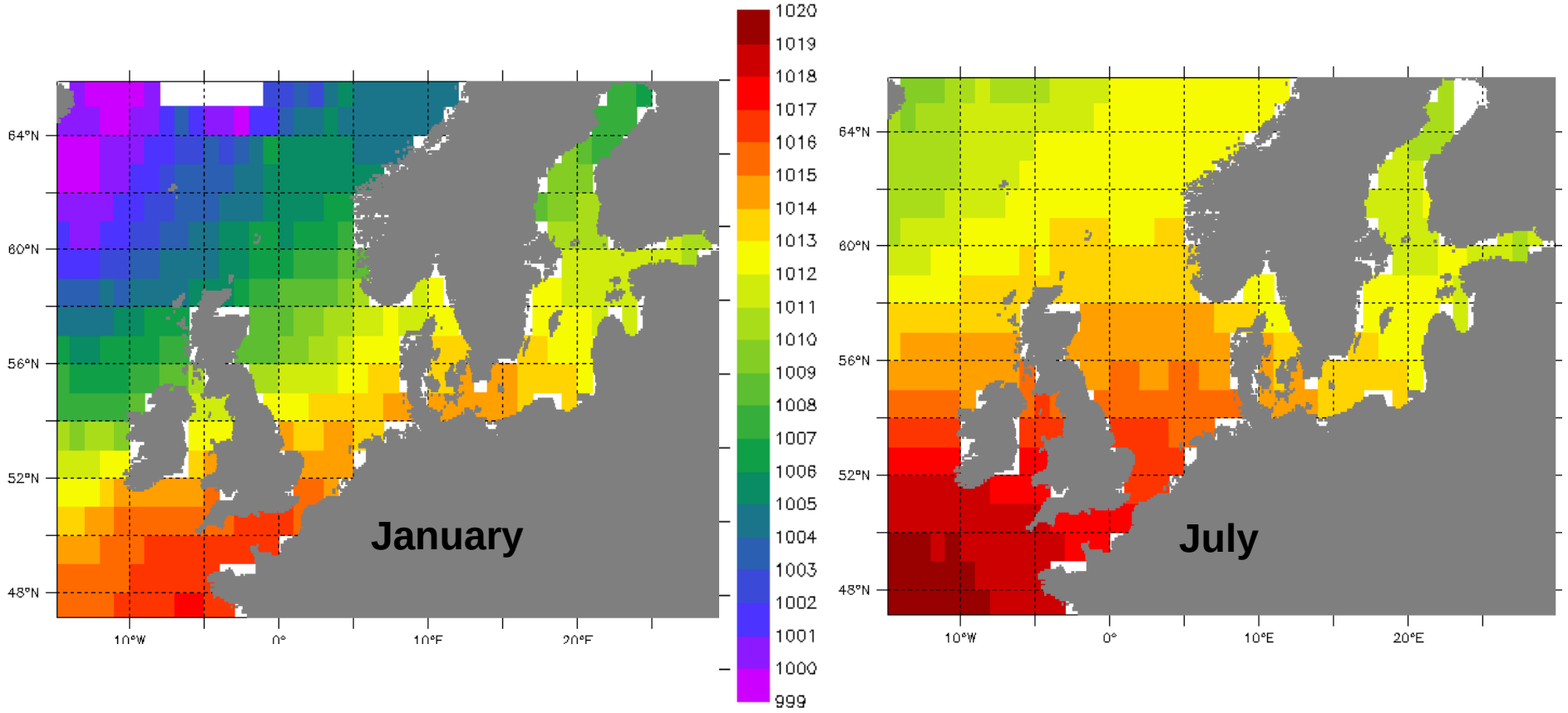
Results

monthly mean fields, July 1980



Results

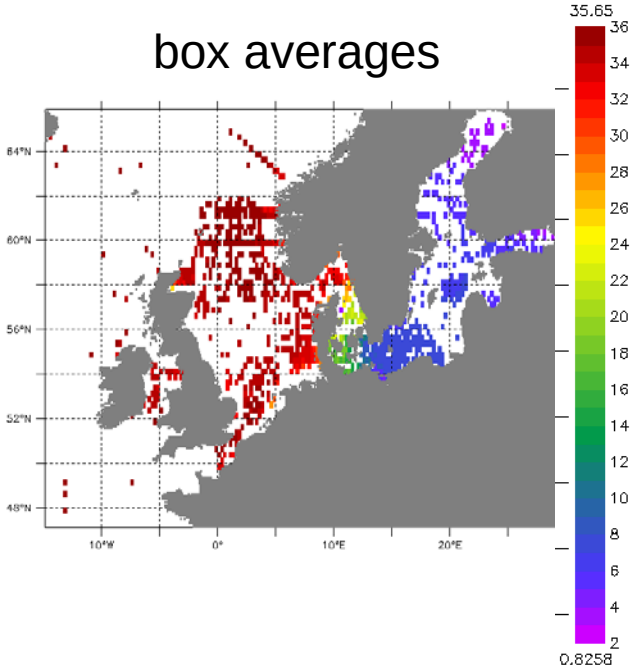
30year-monthly mean fields, e.g. 1971-2000, air pressure (hPa)



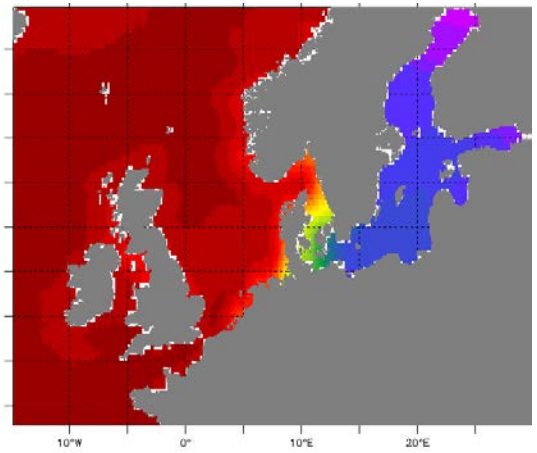
Results

decadal monthly mean fields, e.g. 1996-2005, salinity, January

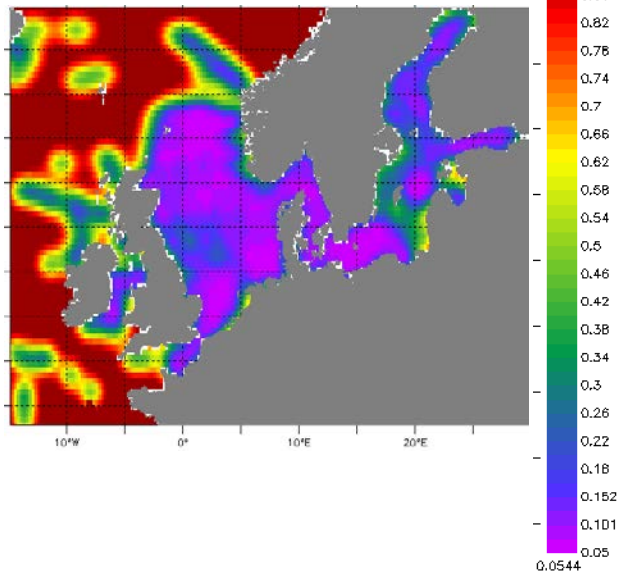
box averages



interpolated field



relative interpolation error



Comparison other data products
ERA-Interim (Dee et al., 2011)

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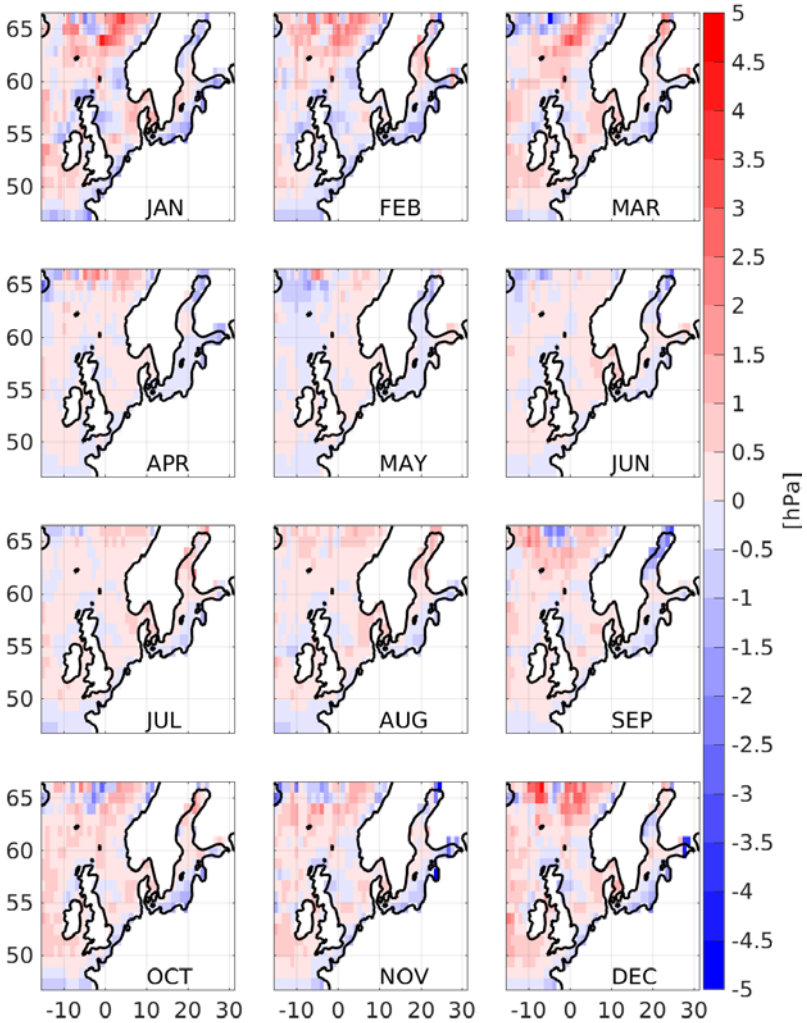
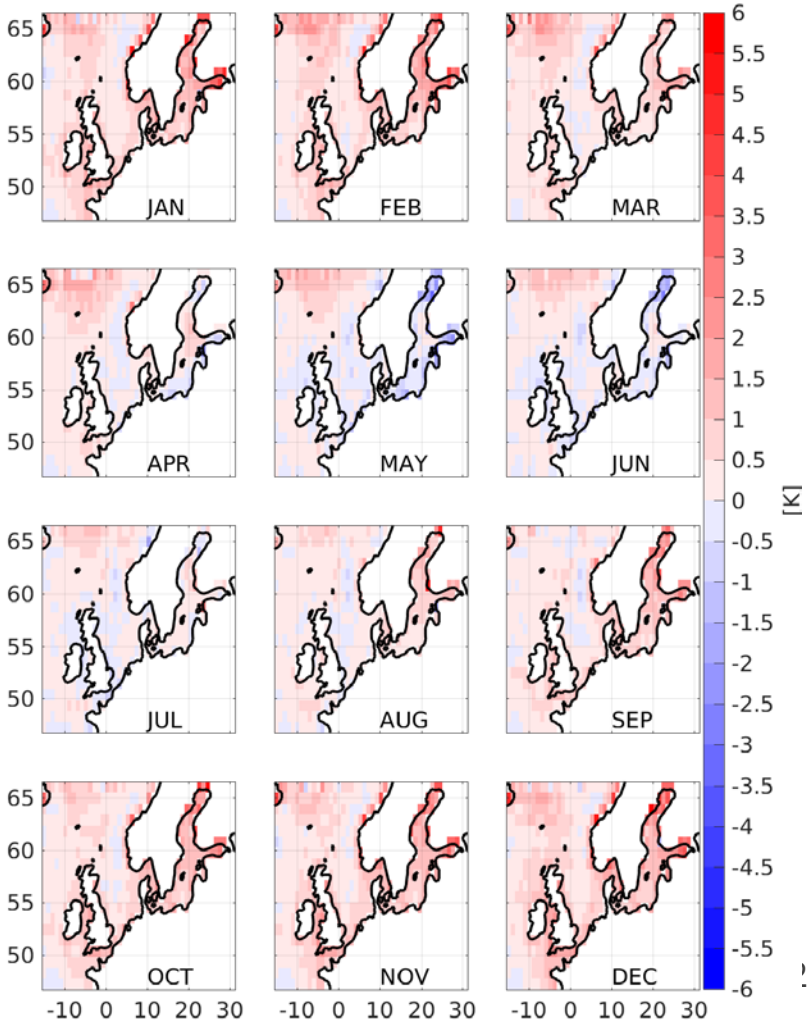
BNSC-ERA-Int, 1981-2010

air pressure (hPa)



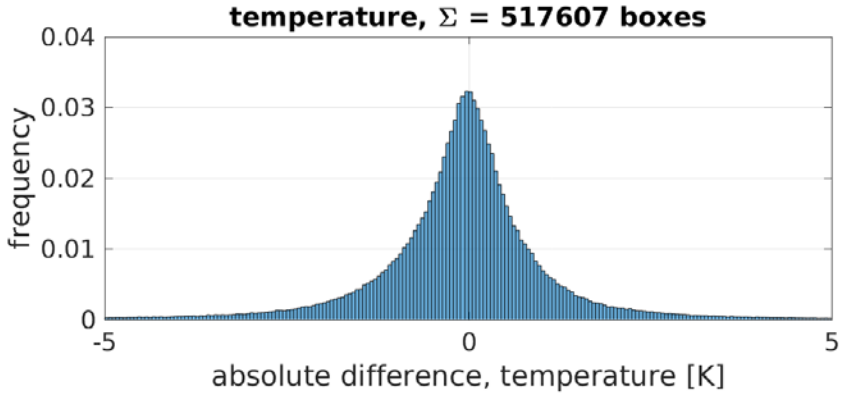
air temperature (K)

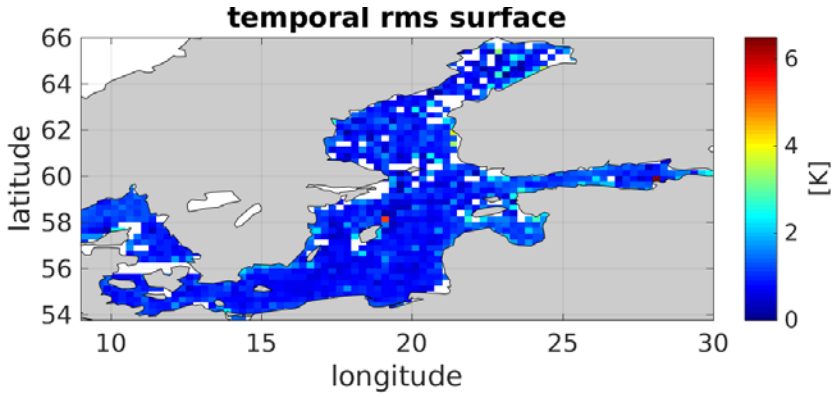


Comparison other data products Baltic Sea Physical RA Product (Axell et al., 2016)

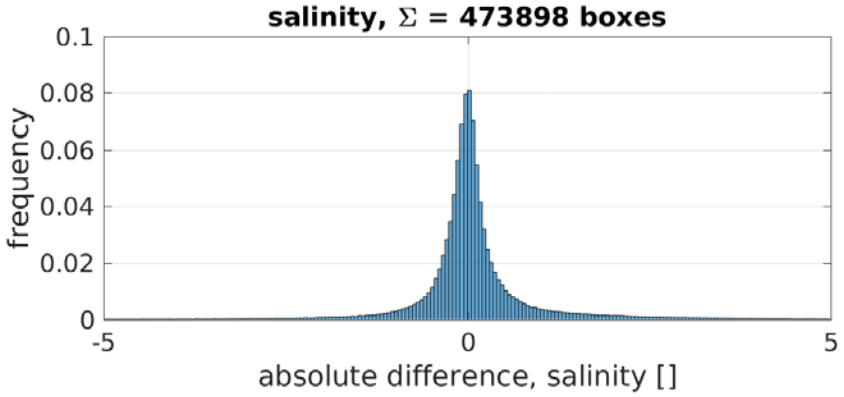
BNSC-Baltic Sea RA, 1989-2015, monthly mean

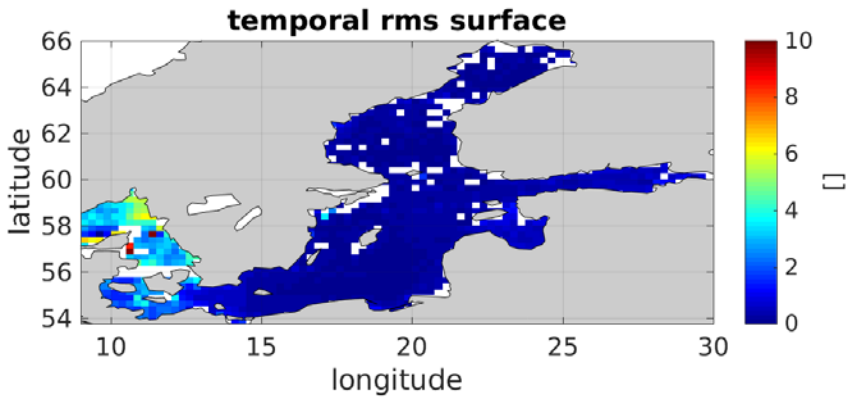
temperature





salinity





Summary and outlook

Baltic and North Seas Climatology, BNSC:

- **gridded data product based on quality controlled observations**
- **5 variables so far : air temperature, air pressure, dew point temperature, water temperature, salinity.**

  => We are working on wind speed& direction!
- **annual, monthly, decadal and 30y monthly mean fields**
- **box averages and interpolated fields (decadal mean)**
- **Data product in good agreement with ERA-Int and Baltic Sea Physical RA**
- **further information and free access to data under**

  https://icdc.cen.uni-hamburg.de/1/projekte/bnsc/

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