North Sea Climatology

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1. General Information	
Model name	North Sea Climatology
Version	1.0
Author(s) / First publication	Manfred Bersch, Remon Sadikni, Nils Schade **Data citations** Hydrographic: Manfred Bersch, Viktor Gouretski, Remon Sadikni (2013): The hydrographic climatology of the North Sea and surrounding regions, Centre for Earth System Research and Sustainability (CEN), University of Hamburg Atmospheric: Remon Sadikni, Manfred Bersch, Annika Jahnke-Bornemann (2013): The meteorolgical climatology of the North Sea and surrounding regions, Centre for Earth System Research and Sustainability (CEN), University of Hamburg
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Institute	Integrated Climate Data Centre (ICDC), Federal Maritime and Hydrographic Agency (BSH)
Web site	http://icdc.zmaw.de/knsc.html
General modelling objectives	Regional climatology
Domain of applicability	North Sea and adjacent parts of the North Atlantic
KLIWAS contact (authority, name, email)	BSH, Nils Schade, nils.schade@bsh.de
Model adaption in KLIWAS	
Model coupling in KLIWAS	Input data from maritime atmospheric and oceanic observations
2. Model description	
Model type	Regional climatology for hydrographic and atmospheric parameters
Temporal discretization	
Temporal resolution	Monthly and yearly means Hydrographic: 1890-2011 Atmospheric: 1950-2010
Spatial discretization	Gridded
Spatial resolution	Hydrographic: 0.25° x 0.5° (lon/lat), 179 depth levels Atmospheric: 1° x 1°
Dimension	Hydrographic: 3D Atmospheric: 2D
Short description of model structure detailing main function	**Hydrographic:** This is the first version (1.0) of a hydrographic climatology for the region 47 to 65 °N, 15 °W to 15 °E. It contains monthly and yearly mean temperature and salinity data at 179 depth levels on a 0.25° x 0.5° latitude-longitude grid in

	the period 1890 to 2011. For the calculation of the means all available temperature and salinity data from water sample, CTD, and float measurements in this period were selected from the World Ocean Database 2009 (Boyer et al., 2009), the ICES (International Council for the Exploration of the Sea) data base, and the BSH data base, rejecting double stations. The derived data base consisted of about 735,000 stations. The original profiles of temperature and salinity were interpolated on 179 depth levels: 0 to 10 m every 2 m, 10 to 200 m every 5 m, 200 to 500 m every 10 m, 500 to 1000 m every 20 m, 1000 to 5000 m every 50 m. There was no interpolation if the gap between two measurements in the original profile was too large. This yielded about 13.3 and 12.8 Mio. temperature and salinity data, respectively, at the selected depth levels. The data were then sorted in 0.25° x 0.5° latitude-longitude boxes. For these boxes an extensive data quality control was carried out, including statistical checks for different time intervals and detection of erroneous data by visual methods. Finally, about 2.4 and 7.9 percent of the original temperature and salinity data, respectively, were rejected. Though the quality of the data base was significantly improved, some undetected erroneous data may have remained and could have influenced the monthly and yearly mean values of individual boxes. Thus, the climatology has to be used with care, especially on small spatial scales. Before calculating the monthly and yearly means of the boxes, a polynomial was fitted to the data to eliminate the seasonal variation for the yearly mean and the intramonthly variation for the monthly mean. Some residuals of the seasonal and intramonthly variations may have remained and thus contributed to the uncertainty of individual means. The calculated monthly and yearly means were assigned to the centres of the boxes. **Atmospheric:** This is the first version (1.0) of a meteorological climatology for the region 47 to 65 °N, 15 °W to 15 °E. It contains monthly mean air temperature, air pressure, dew point, relative humidity and windspeed data on a 1° x 1° latitude-longitude grid in the period 1950 to 2010. For the calculation of the means all available data from voluntary ship

	observations and buoys measurements in this period provided quality controlled by the DWD (Deutscher Wetterdienst) were taken. Before calculating the monthly means of the boxes, a polynomial was fitted to the data to eliminate the intramonthly variation for the monthly mean. Some residuals of intramonthly variations may have remained and thus contributed to the uncertainty of individual means. The calculated monthly and yearly means were assigned to the centres of the boxes.
Scheme of model structure	
Procedure of model parameter estimation	Measurement, manual or automatic algorithm,
3. Model inputs / Model outputs	
List and characteristics of input variables	Hydrographic: Temperature °C Salinity - Atmospheric: 2m air temperature °C Sea level pressure hPa Dew point °C Relative humidity % 10m windspeed m/s Both unequally distributed in space and time
List and characteristics of output variables	Same as input variables, but gridded and averaged
4. Examples of model applications	
Catchments, objectives etc.	Atmospheric and hydrographic reference data base for climate model validations.
Results of existing comparisons with other models	The new climatology was compared coarsely with existing climatologies, e.g. HadISST1 (Rayner et al., 2003), showing no obvious erroneous deviations.
Application in the framework of KLIWAS	Atmospheric and hydrographic reference data base for climate research studies
5. List of 5 selected references	
Boyer, T. P., J. I. Antonov, O. K. Baranova, H. E. Garcia, D. R. Johnson, R. A. Locarnini, A. V. Mishonov, T. D. O'Brien, D. Seidov, I. V. Smolyar, M. M. Zweng (2009): World Ocean Database 2009, Chapter 1: Introduction, NOAA Atlas NESDIS 66, Ed. S. Levitus, U.S. Gov. Printing Office, Wash., D.C., 216 pp, DVD. Michaelsen, K (1998): Climate of the North Sea, Verlag: Deutscher Wetterdienst, ISBN : 978-3-88148-370-4. Rayner, N.A., D. E. Parker, E. B. Horton, C. K. Folland, L. V. Alexander, D. P. Rowell, E. C. Kent, A. Kaplan (2003): Global analyses of sea surface temperature, sea ice, and night marine air temperature since the late nineteenth century, J. Geophys. Res., 108 (D14), 4407, doi: 10.1029/2002JD002670.	