NODC Greenland-Iceland-Norwegian Seas and north-eastern North Atlantic Regional Climatology: Online Atlas

(http://www.nodc.noaa.gov/OC5/regional_climate/gin-seas-climate/)

Summary

The Greenland, Iceland and Norwegian Seas (GINS) – the gateways for water exchange between the North Atlantic Ocean and the Arctic – play a key role in the entire high-latitudinal ocean climate formation and change. The magnitude of fisheries, oil and other material resources and climatic importance of GINS has spurred intensive observation and research programs in the region.

To provide an improved oceanographic foundation and reference for multi-disciplinary studies of the GINS, NODC developed a new set of high-resolution quality-controlled long-term annual, seasonal and monthly mean temperature and salinity fields on different depth levels. This new regional climatology is based on the World Ocean Database archive of temperature and salinity from observations spanning over more than a hundred years and incorporates a great deal of new data not previously available.

This is the first quality-controlled NODC regional ocean climatology with 1/10°x1/10° spatial resolution and monthly temporal resolution for both temperature and salinity.

Brief description of the GINS Regional Climatology

A set of mean fields for temperature and salinity in the GINS, between 64°N and 80°N, and adjacent areas of the northern North Atlantic south of 64°N and the Arctic Ocean north of 80°N are available for viewing and downloading.

Area: The area encompassed is from 45°W to 15°E longitudes and from 50°N to 84.5°N latitudes.

Horizontal resolution: Temperature and salinity are available on a 1°x1°, a 1/4°x1/4°, and a 1/10°x1/10° latitude/longitude grid.

Time resolution: All climatologies for all variables use all available data regardless of year of measurement. Climatologies were calculated for annual (all-data), seasonal, and monthly time periods. Seasons are as follows: Winter (Jan.-Mar.), Spring (Apr.-Jun.), Summer (Jul.-Aug.), Fall (Oct.-Dec.).

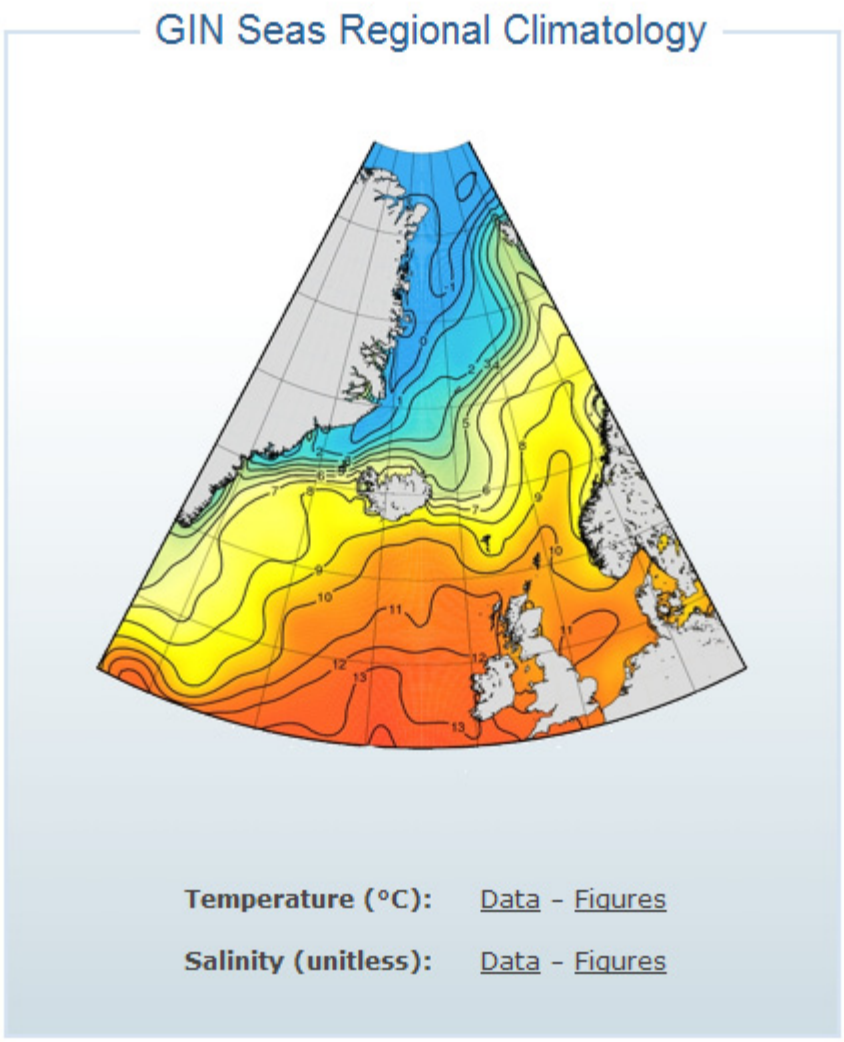

Figure 1. Frontend of the GINS Online Atlas. Maps can be viewed by clicking on Figures for either temperature or salinity and selecting the options from dropdown menus (Figure type, Time period, Depth and Grids). Data available for download by clicking on Data for either temperature or salinity; data are available in three different formats (ASCII, ArcGIS and netCDF). Maps for viewing and data for downloading are available on the spatial grids with 1°, 0.25° abd 0.1° resolutions.

This is the first quality-controlled regional climatology with 1/10°x1/10° spatial resolution and monthly temporal resolution for both temperature and salinity.

Higher spatial resolutions – here the 1/10°x1/10° resolution – provide major advantages in the areas where such resolutions are feasible and supported by data availability. The quality control on a higher-resolution grid reveals more outliers than an analysis on coarser resolution grids. More importantly, with the significantly shorter radius of influence in the objective analysis

procedure, the structure of the gridded fields is far better sustained, especially in regions with sharp gradients of the essential oceanographic parameter (temperature, salinity, etc.). In subpolar latitudes, mesoscale elements of hydrological fields can be seen on the maps with 1/10°x1/10° resolution. They are better preserved in the generated climatological fields, which makes high-resolution climatologies more valuable for ocean modeling and other applications.

Vertical resolution: Temperature and salinity are available on 87 standard levels with higher vertical resolution than the World Ocean Atlas 2009 (WOA09), but levels extend from the surface to 4000 meters. Annual and seasonal fields are available from the surface to 4000 meters; monthly fields are available from the surface to 1500 meters only.

Additional fields: In addition to climatological mean fields, fields of statistical means (before objective analysis), standard deviation, standard error, data distribution, observed minus analyzed, and difference of time period from annual climatological mean, are also available.

Units: Temperature units are °C. Salinity is unitless on the Practical Salinity Scale-1978 [PSS].

Data used: All data from the area found in the World Ocean Database (WOD) as of the end of 2012. For a description of this dataset, please see World Ocean Database 2009 Introduction

Bathymetry used: For the 1° and 1/4° climatologies, the mean value within a grid square from the ETOPO2 was used.

Method: The method followed for calculation of the mean climatological fields is detailed in the following publications: Temperature: Locarnini et al., 2010, Salinity: Antonov et al., 2010.

Additional details on the 1/4° climatological calculation are found in Boyer et al., 2005.

The table from this publication giving radius of influence for the analysis procedure can be filled out with values for the 1/4° procedure as follows:

Pass	1° radius of influence	1/4° radius of influence	1/10° radius of influence
1	892 km	321 km	253 km
2	669 km	267 km	198 km
3	446 km	214 km	154 km

Data formats: Data are presented in the netCDF format and in a comma separated value (csv) format which gives latitudes and longitudes of the center of a grid box and the value at each depth in that grid box. Data are also presented and in ArcGIS compatible format.

References

Antonov, J. I., D. Seidov, T. P. Boyer, R. A. Locarnini, A. V. Mishonov, H. E. Garcia, O. K. Baranova, M. M. Zweng, and D. R. Johnson, 2010: World Ocean Atlas 2009, Volume 2: Salinity. S. Levitus, Ed. NOAA Atlas NESDIS 69, U.S. Government Printing Office, Washington, D.C., 184 pp.

Boyer, T., S. Levitus, H. Garcia, R. A. Locarnini, C. Stephens, J. Antonov, 2005: Objective analyses of annual, seasonal, and monthly temperature and salinity for the world ocean on a 0.25 degree grid. Int. J. Clim., 25, 931-945.

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Locarnini, R. A., A. V. Mishonov, J. I. Antonov, T. P. Boyer, H. E. Garcia, O. K. Baranova, M. M. Zweng, and D. R. Johnson, 2010: World Ocean Atlas 2009, Volume 1: Temperature. S. Levitus, Ed. NOAA Atlas NESDIS 68, U.S. Government Printing Office, Washington, D.C., 184 pp.