MOAA GPV

Grid Point Value of the Monthly Objective
Analysis using the Argo data

Quick instruction

Ver.1.3 : August 25, 2022

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

1. About MOAA GPV

JAMSTEC produces a gridded dataset named "MOAA GPV" (Grid Point Value of the Monthly Objective Analysis using the Argo data) for the global mapping of temperature and salinity in quasi-real time. The gridded data is created from January 2001 by using 2-D optimal interpolation method (e.g., White, 1995) for temperature and salinity profiles obtained from Argo float, TRITON (Triangle Trans Ocean Buoy Network) mooring and available shipboard CTD (mainly from JAMSTEC). For all used Argo float data, real-time and delayed mode quality controls are conducted following Argo data processing procedure. TRITON mooring data are averaged as monthly mean data for each mooring site based on real-time and delayed mode quality control data.

Based on the temperature and salinity profiling data, monthly horizontal distributions of global temperature, salinity and those anomalies are estimated from World Ocean Atlas 2001 climatology, not only in surface layer but also subsurface and deeper layers (Boyer et al., 2002; Stephens et al., 2002). The grid point values of potential density and dynamical height are calculated from the gridded temperature and salinity values, being available through the same directories of our web site. We also display the monthly map of temperature and salinity distributions on Argo JAMSTEC web site

(http://www.jamstec.go.jp/ARGO/argo_web/argo/?page_id=56&lang=en). Specifications and notice for use of MOAA GPV are listed below. Further information of MOAA GPV is needed, please refer to the technical document (Hosoda et al., 2008).

Table1. Specification summary of MOAA GPV.

Method	2-dimensional optimal interpolation on pressure surface
Parameters	Temperature and salinity
Areas	Global Ocean without sea ice area (70.5°N-60.5°S, 0.5°-359°E) Pacific 60.5°N-60.5°S, Atlantic 70.5°N-60.5°S, Indian 30.5°N-60.5°S (Including Bering Sea and Excluding marginal seas)
Resolution	Horizontal: 1°x1°, 25 levels from 10 to 2000dbar (Standard pressure levels: 10, 20, 30, 50, 75, 100, 125, 150, 200, 250, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1750, 2000 dbar)

Data Source	Argo floats, TRITON buoys, available CTD casts (corporates with Japan Meteorological Agency, Japan Coast Guard and Japan Oceanographic Data Center)
Period	From January, 2001 – on going (monthly)

Table2. Conditions for profile selection.

Maximum depth	Deeper than 900 dbar
Minimum depth	Shallower than 15 dbar
Number of observed levels	More than 15 levels
Spacing of observed levels	< 400 dbar: Less than 50 dbar, 400 – 1000 dbar: Less than 100 dbar > 1000 dbar: Less than 300 dbar

1-1. Filename example

The conventions of NetCDF format for MOAA GPV have been registered with Unidata as the COARDS convention. Users can be converted for Ascii, GrADS, or Ocean Data View (ODV) format using ncdump in NetCDF utilities.

TS_YYYYMM_GLB.nc
RG_YYYYMM_GLB.nc
OBSPT_YYYYMM_GLB.dat
・"YYYYMM" is year and month.
・"TS" include Temperature (ITS90), Temperature interpolation error (ITS90), Salinity (PSS-78), and Salinity interpolation error (PSS-78) parameters.
・"RG" include Potential density (kg/m^3), and Dynamic height (m^2/s^2) parameters.
・Potential density and Dynamic height were calculated from the temperature and salinity.
・"OBSPT" include location information of profile which were used to create TS_YYYYMM_GLB.nc.

The datasets are provided as Near Real Time (hereafter NRT) data using RTQC data and as Deleyed Mode (hereafter DM) data using Argo profile data for the entire time period most recent at the time of the update. DM uses more DMQC profile data than

NRT. Both are provided in the same file name, but the version of NRT or DM is described at DATASET_TYPE variable in each NetCDF file.

[Types of dataset]

(i) monthly

   (i)-1 DM (updating data files for all period once a year)

   (i)-2 NRT (providing once a month)

(ii) Climatology

The dataset files can be downloaded at the following URL:

   https://www.jamstec.go.jp/argo_research/moaagpv/index_dataset.html

・File header information (NetCDF header).

```
netcdf TS_200707_GLB {
dimensions:
        LONGITUDE = 360 ;
        LATITUDE = 132 ;
        PRES = 25 ;
variables:
        float LONGITUDE(LONGITUDE) ;
                LONGITUDE:name = "LONGITUDE" ;
                LONGITUDE:units = "degrees_east" ;
        float LATITUDE(LATITUDE) ;
                LATITUDE:name = "LATITUDE" ;
                LATITUDE:units = "degrees_north" ;
        float PRES(PRES) ;
                PRES:name = "PRES" ;
                PRES:long_name = "Pressure" ;
                PRES:positive = "down" ;
                 PRES:units = "decibar" ;
        float TOI(PRES, LATITUDE, LONGITUDE) ;
                TOI:name = "TOI" ;
                TOI:long_name = "Temperature.(ITS90)" ;
                TOI:_FillValue = 99999.f ;
                TOI:units = "degree_Celsius" ;
        float TOI_ERR(PRES, LATITUDE, LONGITUDE) ;
```

```
                TOI_ERR:name = "TOI_ERR" ;
                TOI_ERR:long_name = "Temperature Interpolation Error." ;
                TOI_ERR:_FillValue = 99999.f ;
                TOI_ERR:units = "degree_Celsius" ;
        float SOI(PRES, LATITUDE, LONGITUDE) ;
                SOI:name = "SOI" ;
                SOI:long_name = "Salinity.(PSS-78)" ;
                SOI:_FillValue = 99999.f ;
                SOI:units = "psu" ;
        float SOI_ERR(PRES, LATITUDE, LONGITUDE) ;
                SOI_ERR:name = "SOI_ERR" ;
                SOI_ERR:long_name = "Salinity Interpolation Error." ;
                SOI_ERR:_FillValue = 99999.f ;
                SOI_ERR:units = "psu" ;
         char DATE_GDAC_DOWNLOAD(STRING8) ;
                DATE_GDAC_DOWNLOAD:name = "DATE_GDAC_DOWNLOAD" ;
                DATE_GDAC_DOWNLOAD:long_name = "Date of GDAC data." ;
                DATE_GDAC_DOWNLOAD:units = "YYYYMMDD(UTC)" ;
                DATE_GDAC_DOWNLOAD:_FillValue = 99999.f ;
        char DATE_UPDATE(STRING8) ;
                DATE_UPDATE:name = "DATE_UPDATE" ;
                DATE_UPDATE:long_name = "Date of MOAA." ;
                DATE_UPDATE:units = "YYYYMMDD(UTC)" ;
                DATE_UPDATE:_FillValue = 99999.f ;
        char DATASET_TYPE(STRING4) ;
                DATASET_TYPE:name = "DATASET_TYPE" ;
                DATASET_TYPE:long_name = "Dataset type." ;
                DATASET_TYPE:_FillValue = 99999.f ;


// global attributes:
                :Conventions = "COARDS" ;
                :Title = "Argo OI TS 2007JUL Global ocean" ;
                :Version = "Created Aug.22,2007 by JAMSTEC/IORGC/ArgoGroup" ;
}
```

2. Notice of use of MOAA GPV

- Reprint without permission, the re-distribution, the modification, and the commercial use are prohibited though JAMSTEC doesn't disturb the free use of this data in principle.

> S. Hosoda, T. Ohira, T. Nakamura, 2008: A monthly mean dataset of global oceanic temperature and salinity derived from Argo float observations. JAMSTEC Rep. Res. Dev., Vol. 8, 47-59.

- Please source the above when you make the result using this data public.
- JAMSTEC doesn't assume the responsibility to any damage of the user of this data.

3. References

Boyer, T. P., C. Stephens, J. I. Antonov, M. E. Conkright, R. A. Locarnini, T. D. O'Brien, and H. E. Garcia (2002): World Ocean Atlas 2001, vol. 2: Salinity, NOAA Atlas NESDIS 50, U.S. Gov. Print. Off., Washington, D. C., 165pp.

Hosoda, S., T. Ohira, and T. Nakamura (2008): A monthly mean dataset of global oceanic temperature and salinity derived from Argo float observations. JAMSTEC Rep. Res. Dev., Vol. 8, 47-59.

Stephens, C., J. I. Antonov, T. P. Boyer, M. E. Conkright, R. A. Locarnini, T. D. O'Brien, and H. E. Garcia (2002), World Ocean Atlas 2001, vol. 1: Temperature, NOAA Atlas NESDIS 49, U.S. Gov. Print. Off., Washington, D. C., 167 pp.

White, W. B. (1995), Design of a global observing system for gyre-scale upper ocean temperature variability, *Prog. Oceanogr., 36*, 169-217.

Appendix

Format of OBSPT_YYYYMM_GLB.dat

10dbar longitude
10dbar latitude
20dbar longitude
20dbar latitude
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・・・
～omission～
・・・
・・・
2000dbar longitude
2000dbar latitude

Repeat one line for each reference pressure of
10,20,30,50,75,100,125,150,200,250,300,500,600,700,800,900,1000,1100,1200,1300
1400,1500,1750,2000 dbar in order of longitude latitude.

Each value is in ASCII format, separated by commas.