Naval Oceanographic Office

Oceanographic Data Bases Division
Stennis Space Center, Mississippi 39522-5001

OAML-DBD-72E

DATABASE DESCRIPTION FOR THE GENERALIZED DIGITAL ENVIRONMENTAL MODEL – VARIABLE RESOLUTION (GDEM-V) (U)

OCTOBER 2003

APPROVED FOR PUBLIC RELEASE: DISTRUBUTION IS

DATABASE DESCRIPTION
FOR THE
GENERALIZED DIGITAL ENVIRONMENTAL MODEL (GDEM-V) (U)

VERSION 3.0

OCTOBER 2003

Naval Oceanographic Office
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Database Description for GDEM-V 3.0

1.0 (U) INTRODUCTION

1.1 (U) Purpose

(U) The purpose of the GDEM-V database is to provide global gridded monthly means and standard deviations of ocean temperature and salinity. It is constructed with sufficiently high vertical and horizontal resolution to fill many of the Navy's requirements for ocean modeling and ocean acoustics. It is the only global ocean temperature and salinity database which includes classified profiles, measured by the Navy, in its construction.

1.2 (U) Background

(U) Master databases to support the Naval Sea Systems Command (NAVSEASYSCOM) were identified by the Chief of Naval Operations (CNO) in CNO 1tr Ser 952D/4U342023 of 23 June 1984. Requirements for subsets to be extracted from these master databases were provided in COMNAVSEASYSCOM 1tr 9460 Ser 63D3/18 of 6 March 1985. Commander, Naval Oceanography Command (COMNAVOCEANCOM) directed the Naval Oceanographic Office (NAVOCEANO) to provide the CNO standards in COMNAVOCEANCOM 1tr 9460 Ser 3/167 of 19 March 1985. These standards are available from the Oceanographic and Atmospheric Master Library (OAML).

1.3 (U) Database Changes

(U) This is version 3.0 of GDEM-V. No part of the previous versions of GDEM-V has been retained, and the techniques used to construct this new version differ considerably from those used previously. Version 3.0 of GDEM-V now includes four variables: temperature, salinity, temperature standard deviation, and salinity standard deviation. Previous versions of Generalized Digital Environmental Model (GDEM) did not contain salinity standard deviation, and the temperature standard deviation was previously included in the temperature variability (TVAR) supplement to GDEM. Although version 3.0 is a total replacement of the previous version of GDEM, it should be replaced in 2003 when a new, and significantly expanded, profile data set becomes available. Unlike the previous versions, GDEM-V 3.0 uses a single-resolution global horizontal grid (15 arc-minutes of latitude and longitude). Subsequent versions of GDEM-V will provide higher-resolution grids where required. All fields in GDEM-V 3.0 are stored in standard Network Common Data Format (NetCDF) files, whereas previous versions of GDEM were stored in binary data and pointer files designed specifically for GDEM. The software to access the GDEM-V 3.0 data sets has completely changed, but the user-interface to the software is similar to that of the previous version.

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2.0 (U) GDEM-V 3.0

2.1 (U) Scope

(U) The GDEM-V 3.0 database is comprised of 49 NetCDF files containing global grids of temperature, salinity, bottom depth, temperature standard deviation and salinity standard deviation. The database is accompanied by a FORTRAN subroutine to read the database, as well as two driver routines that are provided as examples for calling the reading subroutine. Several examples of output from these two driver routines are provided in Appendix A. However, each NetCDF file is internally documented in a standard manner, and should allow developers to design their own extraction software with no further information.

2.2 (U) Source

(U) The original data source for the construction of this data base is the Master Oceanographic Observation Data Set (MOODS), which now contains nearly 8 million profiles of temperature, salinity, and sound speed. The dataset used for the construction of this version of GDEM was extracted from MOODS in 1995 and edited by Naval Research Lab (NRL) personnel. Later, a small amount of data observed through 1997 was added, bringing the total number of profiles up to about 2.7 million. This dataset was used by NRL to construct the Modular Ocean Data Assimilation System (MODAS) version 2.0 global temperature and salinity climatology and "synthetic" climatology (reference a). This dataset requires further editing, but it was not performed before being used for the production of GDEM-V 3.0 since another much larger dataset is being prepared instead. The full MOODS data set (8 million profiles) is presently being edited, but will not be ready to use for building GDEM until the end of 2002. Therefore, we consider the present version of GDEM-V to be temporary, and expect to replace it in 2003 with a version that uses the full MOODS data set.

2.3 (U) Application

(U) The GDEM database provides sound speed profile input to various acoustic propagation-loss models and all other applications that require a temperature, sound speed, or density profiles. The temperature and salinity standard deviations, together with the monthly mean temperatures and salinities, provide ranges of values to quality-control data at sea and in house. The GDEM-V databases do not store sound speed. Sound speed is computed by the GDEM extraction routines using either one of two possible sound speed equations.

2.4 (U) Coverage

2.4.1 (U) Geographic

(U) The database covers the entire global oceans from 82°S to 90°N, but excludes freshwater lakes and completely-land-locked seas such as the Great Lakes of North America and the Caspian Sea. The gridded values extend into shallow water to a minimum bottom depth of 2 m. The bottom depth is defined as the maximum depth from the DBDBV 5-minute bathymetry found in the ¼° by ¼ ° geographic cell centered at each database grid position. The geographic coverage is displayed on the world map in Figure 2.4.1-1. Monthly gridded values exist at all positions colored light blue.

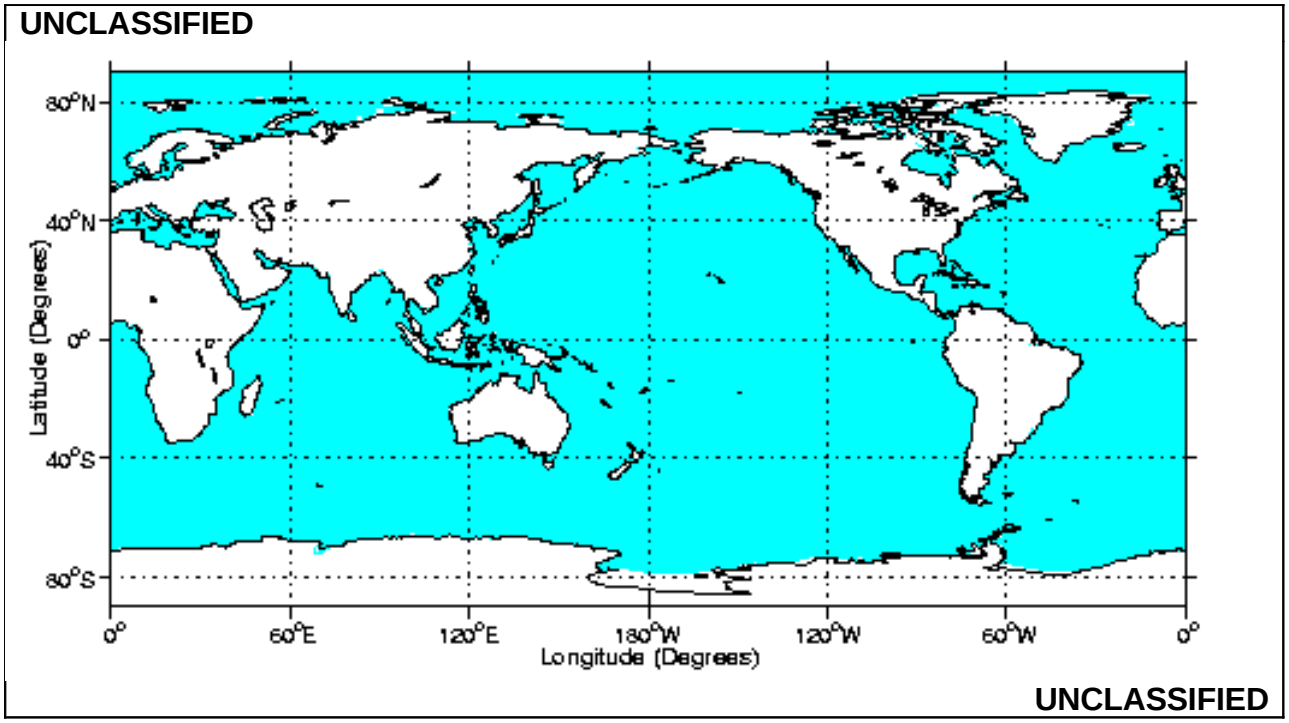

Figure 2.4.1-1 (U) GDEM-V 3.0 coverage.

2.4.2 (U) Grid

(U) Each database file contains a fully populated 3-dimensional grid (longitude, latitude, and depth) for each variable and each month of the year. At grid positions and depths over land or underground, the value of each variable is set to a special value. All data values are scaled and stored as 2-byte integers, and the special value (indicating no value) is set to –32000.

2.5 (U) Resolution

(U) The latitude and longitude grid resolution is ¼° over the entire database, and the depth grid is the same at each horizontal grid location.

(U) The latitude grid has 689 positions and ranges from –82.0° to 90.0° by increments of 0.25°, where negative values are in the Southern Hemisphere and positive values are Northern Hemisphere.

(U) The longitude grid has 1440 positions and ranges from 0° to 359.75° by increments of 0.25°.

(U) The depth grid has 78 nodes at the following depths (given in units of meters): 0, 2, 4, 6, 8, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 220, 240, 260, 280, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3200, 3400, 3600, 3800, 4000, 4200, 4400, 4600, 4800, 5000, 5200, 5400, 5600, 5800, 6000, 6200, 6400, 6600.

(U) The database contains one file for each variable and month of the year, i.e., one file for January temperature, one for February temperature, etc.. The time at the center of each month is defined in terms of the number of hours from the beginning of the (366-day) year as 366.0, 1096.485, 1826.97, 2557.455, 3287.94, 4018.425, 4748.91, 5479.395, 6209.88, 6940.365, 7670.85, 8401.335 hours for January, February, March, April, May, June, July, August, September, October, November, and December, respectively.

2.6 (U) Organization

(U) The database contains 48 NetCDF files containing 3-dimensional grids of the four variables, and one 2-dimensional grid of the bottom depth.

(U) The 12 monthly grids of temperature are stored in files named like tgdemv3sMM.nc, where MM represents one of the month numbers (01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, or 12).

(U) The 12 monthly grids of salinity are stored in files named like sgdemv3sMM.nc, where MM represents one of the month numbers.

(U) The 12 monthly grids of temperature standard deviation are stored in files named like tstdgdemv3sMM.nc, where MM represents one of the month numbers.

(U) The 12 monthly grids of salinity standard deviation are stored in files named like sstdgdemv3sMM.nc, where MM represents one of the month numbers.

(U) The 2-dimensional grid of bottom depth is stored in the file named dbdbvgdemv3s.nc.

(U) A FORTRAN subroutine is provided which extract profiles from the NetCDF database files. Subroutine rdgdem3s (stored in file rdgdem3s.f) extracts profiles of temperature and salinity, and optionally extracts temperature standard deviation, salinity standard deviation, and bottom depth at a single grid location. Two FORTRAN main programs, rdgdem3stest.f and rdgdem3stestm.f, provide examples for calling subroutine rdgdem3s.

2.7 (U) Size

(U) The total size of the database, including all 49 uncompressed NetCDF files is 7.27 gigabytes. The total size after optimized compression using gzip –best is 1.85 gigabytes, a 74.5% reduction.

(U) Compressed (gzipped) files have ".gz" appended to the end of the file name. The size of each file in the database in both compressed and uncompressed form is listed in Table 2.7-1.

Table 2.7-1 (U) GDEM-V 3.0 Database File Sizes

UNCLASSIFIED		
FILE NAME	**BYTES UNCOMPRESSED**	**BYTES COMPRESSED**
tgdemv3s01.nc	154,796,336	57,247,423
tgdemv3s02.nc	154,796,336	57,314,278
tgdemv3s03.nc	154,796,336	57,238,236
tgdemv3s04.nc	154,796,336	57,284,984
tgdemv3s05.nc	154,796,336	57,219,884
tgdemv3s06.nc	154,796,336	57,290,378
tgdemv3s07.nc	154,796,336	57,410,068
tgdemv3s08.nc	154,796,336	57,456,448
tgdemv3s09.nc	154,796,336	57,378,301
tgdemv3s10.nc	154,796,336	57,360,926
tgdemv3s11.nc	154,796,336	57,240,012
tgdemv3s12.nc	154,796,336	57,213,235
sgdemv3s01.nc	154,796,320	39,107,041
sgdemv3s02.nc	154,796,320	39,214,712
sgdemv3s03.nc	154,796,320	39,144,665
sgdemv3s04.nc	154,796,320	38,813,394
sgdemv3s05.nc	154,796,320	38,566,111
sgdemv3s06.nc	154,796,320	38,516,674
sgdemv3s07.nc	154,796,320	38,787,331
sgdemv3s08.nc	154,796,320	38,980,057
sgdemv3s09.nc	154,796,320	39,065,725
sgdemv3s10.nc	154,796,320	39,106,083
sgdemv3s11.nc	154,796,320	38,428,203
sgdemv3s12.nc	154,796,320	38,891,998
UNCLASSIFIED		
FILE NAME	**BYTES UNCOMPRESSED**	**BYTES COMPRESSED**

UNCLASSIFIED		
tstdgdemv3s01.nc	154,796,348	41,553,689
tstdgdemv3s02.nc	154,796,348	41,901,294
tstdgdemv3s03.nc	154,796,348	41,177,844
tstdgdemv3s04.nc	154,796,348	40,576,407
tstdgdemv3s05.nc	154,796,348	40,451,136
tstdgdemv3s06.nc	154,796,348	39,589,455
tstdgdemv3s07.nc	154,796,348	39,449,335
tstdgdemv3s08.nc	154,796,348	40,001,258
tstdgdemv3s09.nc	154,796,348	40,039,184
tstdgdemv3s10.nc	154,796,348	40,434,769
tstdgdemv3s11.nc	154,796,348	40,511,733
tstdgdemv3s12.nc	154,796,348	40,896,134
sstdgdemv3s01.nc	154,796,340	19,947,963
sstdgdemv3s02.nc	154,796,340	20,083,355
sstdgdemv3s03.nc	154,796,340	19,659,944
sstdgdemv3s04.nc	154,796,340	19,063,428
sstdgdemv3s05.nc	154,796,340	19,041,087
sstdgdemv3s06.nc	154,796,340	18,737,429
sstdgdemv3s07.nc	154,796,340	18,907,605
sstdgdemv3s08.nc	154,796,340	19,076,651
sstdgdemv3s09.nc	154,796,340	18,823,348
sstdgdemv3s10.nc	154,796,340	18,896,712
sstdgdemv3s11.nc	154,796,340	19,015,141
sstdgdemv3s12.nc	154,796,340	19,251,252
dbdbvgdemv3s.nc	2,002,552	1,069,907
rdgdemv3s.f	54,697	--
rgdemv3stest.f	3,875	--
rgdemv3stestm.f	3,081	--
UNCLASSIFIED		

2.8 (U) Parameters

(U) The GDEM-V 3.0 database is stored in 49 files. Of these, 48 contain profile data and one contains bottom depth data. Each file contains both geographic and profile data (or bottom depth data). Each file is written in NetCDF. NetCDF was created under contract with the Division of Atmospheric Sciences of the National Scientific Foundation and is freely available from the Unidata Program Center in Boulder, Colorado on the Internet at http://www.unidata.ucar.edu/packages/netcdf. The GDEM NetCDF files were written using the conventions outlined in the NAVO_netcdf_v1.0 standards. The conventions specify the variable names, variable storage type (float, integer, etc.), and several variable attributes, such as the long variable name, the units, and the NAVO variable code number.

(U) Each NetCDF file stores coordinate variables (latitude, longitude, depth, and time) and their attributes, values (such as temperature and salinity) and their attributes, and global attributes (attributes which pertain to the entire file).

(U) Table 2.8-1 lists the parameters in the GDEM NetCDF data files. The first column lists the variable name. The second column lists the Long Name attribute for each variable. The third column lists the array size of the variable. The fourth column lists the variable type, where float is a 4-byte real number and integer*2 is a 2-byte integer. The fifth column lists the files where this variable appears. The files, A through E are identified as:

- A – temperature grids (tgdemv3s01.nc, tgdemv3s02.nc, etc.)
- B – salinity grids (sgdemv3s01.nc, sgdemv3s02.nc, etc.)
- C – temperature standard deviation grids (tstdevgdemv3s01.nc, tstdevgdemv3s02.nc, etc.)
- D – salinity standard deviation grids (sstdevgdemv3s01.nc, sstdevgdemv3s02.nc, etc.)
- E – bottom depth grid (dbdbvgdemv3s.nc).

(U) Variables stored in type integer*2 (including variable botdep) have been scaled and offset. Scaled variables have the attributes, scale_factor and add_offset, which are stored in the NetCDF files. The values of these variable attributes are:

- scale_factor = 0.001
- add_offset = 15.

(U) To recover the value of a variable, V, from its integer*2 scaled value I, the following operation must be performed,

$$V = \text{add\_offset} + \text{scale\_factor} * I$$

(U) Values recovered by re-scaling the integer*2 values have a precision of 3 decimal places.

(U) The variable attribute, missing_value, is the value a variable takes at positions over land or underground. It is stored as the scaled form and has the value –32000 (an integer*2 type), which when re-scaled has the value –17.0.

Table 2.8-1 (U) GDEM-V 3.0 Database Parameters

UNCLASSIFIED				
Variable Name	**Long Name Attribute**	**Array Size**	**Type**	**Files**
lat	Latitude	689	real*8	A,B,C,D,E
lon	Longitude	1440	real*8	A,B,C,D,E
depth	Depth	78	real*8	A,B,C,D
time	----	1	real*8	A,B,C,D
water_temp	Water Temperature	(1440,689,78)	integer*2	A
salinity	Salinity	(1440,689,78)	integer*2	B
water_temp_stdev	Water Temperature St. Dev.	(1440,689,78)	integer*2	C
salinity_stdev	Salinity St. Dev.	(1440,689,78)	integer*2	D
bbotdep	Bottom Depth	(1440,689)	integer*2	E
UNCLASSIFIED				

(U) A units attribute is provided in the database files for each variable. The units attribute and valid range for each variable is listed in Table 2.8-2.

Table 2.8-2 (U) GDEM-V 3.0 Database Parameter Units and Value Ranges

UNCLASSIFIED		
Variable Name	**Units**	**Value Range**
lat	degrees_north	-82 to 90
lon	degrees_east	0 to 359.75
depth	meters	0 to 6600
time	hour (after beginning of year)	366.0 to 8401.335 (mid month)
water_temp	degC	
salinity	psu	
water_temp_stdev	degC	
salinity_stdev	psu	
botdep	meters	
UNCLASSIFIED		

(U) Global attributes are stored in each file, which describe the entire data set. The Global attributes are listed in Table 2.8-3.

Table 2.8-3 (U) Global Attributes Stored in GDEM-V 3.0 Database NetCDF Files

UNCLASSIFIED	
Global Attribute	**Value**
CONVENTION	NAVO_netcdf_v1.0
INSTITUTION	Naval Oceanographic Office
CONTACT	NAVO, Code N312
HISTORY	Created: 08-Jul-2002 10:04:56
DESCRIPTION	GDEMV 3.0
CLASSIFY	UNCLASSIFIED
DISTRIBUTION	DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE: DISTRIBUTION is UNLIMITED.
DOWNGRADE	N/A
AUTHORITY	N/A
UNCLASSIFIED	

2.9 (U) Data Storage

(U) The GDEM-V 3.0 database is comprised of 49 NetCDF files that are internally documented. One file contains the 2-dimensional grid of the global bottom topography. There are twelve files each of the 3-dimensional grids of temperature, salinity, temperature standard deviation, and salinity standard deviation. The twelve files for each variable are comprised of one file for each month of the year.

2.10 (U) Data Quality

(U) GDEM-V 3.0 is a temporary product intended to fill a gap between the previous versions of GDEM-V (versions 2.x) and the version expected to be produced in 2003 from the fully edited MOODS database. No effort was made to re-edit the NRL MOODS profile dataset, even though spot checks of the database indicate that further editing is required. Examination of the GDEM-V 3.0 grids identified a few small isolated locations where gridded values of temperature or salinity are substandard. Locations of remaining bad observations can be identified by "bullseyes" in plots of the standard deviation fields. Also, lack of profile observations in the edited dataset resulted in overly-smoothed results in some regions such as in the Arabian Gulf and in the Gulf of Oman in some months. Results for these and other regions are expected to improve in the forthcoming version of GDEM-V once the newly-edited MOODS dataset is used.

2.11 (U) References.

(a) (U) D. N. Fox, W.J. Teague, C. N. Barron, M. R. Carnes, and C. M. Lee, 2002: The Modular Ocean Data Assimilation System (MODAS), J. Atmos. Ocean. Tech., 19, 240-252.

(b) (U) Wilson, W. D., 1960: Speed of sound in sea water as a function of temperature, pressure and salinity. J. Acoust. Soc. Am., 32, 641-644.

(c) (U) Chen, C. T., and F. J. Millero, 1977: Sound speed in seawater at high pressures. J. Acoust. Soc. Am., 62, 1129-1135.

(d) (U) F. J. Millero and Xu Li, 1994: Comments on "On equations for the speed of sound in seawater", J. Acoust. Soc. Am., 95, 2757-2759.

2.12 (U) Classification/Distribution

(U) The parameters and area coverage are UNCLASSIFIED. The distribution statement for the GDEM-V 3.0 database is as follows:

DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE: DISTRIBUTION IS UNLIMITED.

2.13 (U) Point of Contact

(U) Questions relating to the GDEM-V 3.0 database should be directed to:

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(U) For distribution questions: Attn: Code N641
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(U) For technical questions: Attn: Code N312
Comm: (228) 688-5648
Email: carnesm@navo.navy.mil

2.14 (U) Extraction/Retrieval

(U) The GDEM-V data files are stored in standard NetCDF files. This file structure is self-describing and should allow users to easily design and write extraction software without any further information. However, GDEM-V 3.0 is delivered with extraction software written in FORTRAN 77 which has a user-interface similar to the software provided with the previous versions (version 2.x) of GDEM-V. Subroutine rdgdem3s.f extracts a single profile of temperature and salinity that is nearest the position and time requested by the user. The sound speed profile is computed by the requested method (either by Wilson's equation, reference b, or by the equation of Chen and Millero, reference c, including modification made later by Millero and Li, reference d). Optionally the corresponding profiles of temperature standard deviation and salinity standard deviation and bottom depth are also output. Also, if requested, each profile will be extended to the ocean bottom. The extension is performed in a manner which ensures that the extended segment is statically stable (Brunt-Vaisala frequency squared is positive). Two FORTRAN driver programs are also included as examples for calling subroutine rdgdem3s.f. Descriptions of this subroutine and the two driver programs follow.

2.14.1 (U) Subroutine rdgdem3s.f

(U) Subroutine rdgdem3(sndspdtype, getstd, getbot, depthout, tprof, sprof, sndspd, tstdprof, sstdprof, rlonin, rlatin, rdayin, rlonout, rlatout, monthout, nzout, nzoutflag, botdep, extenddepth, directory)

(U) Arguments:

Table 2.14-1 (U) Call Arguments to Subroutine rdgdem3s.f

UNCLASSIFIED			
VARIABLE	**IN/OUT**	**TYPE**	**DESCRIPTION**
sndspdtype	Input	Char*3	Sound speed calculation. 'cml' computes sound speed using the Chen, Miller, Li equation. 'wil' computes sound speed using Wilson's equation.
getstd	Input	Logical	.true. extract and return temperature and salinity std. dev. .false. do not extract standard deviations.
getbot	Input	Logical	.true. extract and return ocean bottom depth (m) .false. do not extract and return
depthout	Output	Real*4	Array of length nzout of vertical profile depths (m)
tprof	Output	Real*4	Array of length nzout of temperature profile (degC)
sprof	Output	Real*4	Array of length nzout of salinity profile (psu)
sndspd	Output	Real*4	Array of length nzout of sound speed profile (m/s)
tstdprof	Output	Real*4	Array of length nzout of temperature standard deviation (degC). Only output if getstd = .true.
sstdprof	Output	Real*4	Array of length nzout of salinity standard deviation (psu). Only ouput if getstd = .true.
UNCLASSIFIED			
UNCLASSIFIED			
VARIABLE	**IN/OUT**	**TYPE**	**DESCRIPTION**
rlonin	Input	Real*4	Requested decimal longitude of profile. Either 0.° to 360.° or –180.° to 180.°.
rlatin	Input	Real*4	Requested decimal latitude of profile, -82.° to 90.°.
rdayin	Input	Real*4	Requested decimal day of the year of profile, 0. to 366.
rlonout	Output	Real*4	Decimal longitude (0.° to 360.°) of output profile from GDEM-V grid position closest to requested longitude.
rlatout	Output	Real*4	Decimal latitude (-82.° to 90.°) of output profile from GDEM-V grid position closest to requested latitude.
monthout	Output	Integer	Month number (Jan = 1, Feb = 2, Dec = 12) of the month containing the user-requested day of the year (rdayin).
nzout	Output	Integer	Length of the output arrays (tprof, sprof, tstdprof, sstdprof, and sndspd). The total length of arrays should be set to 78 or greater, but on output, only the first nzout positions contain valid (not below ocean bottom) output profile values.
nzoutflag	Output	Integer	0 if extended, a non-standard greatest profile depth was not added. 1 extension to the bottom resulted in addition of a non-standard depth at the bottom of the profile.
botdep	Output	Real*4	Bottom depth (m) at output profile position. Not output if getbot = .false. Extracted from file dbdbvgdemv3s.nc.
extenddepth	Input	Logical	If both extenddepth = .true. and getbot = .true., extends profiles from the deepest standard depth (with valid values) to the ocean bottom depth (botdep). Typically, the ocean bottom depth is between the deepest standard depth with valid values and the next standard depth. The extension procedure is as follows: • The salinity and standard deviation profiles are extended downward by linear extrapolation using the gradient between the last two depths with valid values.

			• The temperature is extended by extrapolating the potential temperature, and then converting the potential temperature back to insitu temperature. • If the Brunt-Vaisala frequency squared of the extended profile segment is less than $1.5x10^{-7}/s^2$, then the temperature and salinity of the extended segment are modified to produce a Brunt-Vaisala frequency squared of $1.5x10^{-7}/s^2$.
directory	Input	Char*132	Name of directory containing the GDEM-V NetCDF files of temperature, salinity, temperature standard deviation, salinity standard deviation, and ocean bottom depth. Only the monthly files being accessed must be present in directory.
UNCLASSIFIED			

2.14.2 (U) Program rdgdem3stest.f

(U) Program rdgdem3stest.f is a simple driver program for subroutine rdgdem3s.f. It is compiled and linked on a Unix operating system using,

```
f77 –o rdgdem3stest  rdgdem3stest.f  rdgdem3s.f  netcdfdir/libnetcdf.a  -Inetcdfdir
```

to create an executable named rdgdem3stest. The directory netcdfdir (change this to the actual full path on your computer) is assumed to contain the files libnetcdf.a and netcdf.inc.

(U) This is an interactive program that prompts the user to input the decimal latitude, longitude, and day of the year. The GDEM-V profiles of depth, temperature, salinity, sound speed, and (optionally) the temperature standard deviation and salinity standard deviation are extracted from the GDEM-V files at the grid point location and month closest to the requested position and time. The extracted profiles are then listed to the screen and written to the ASCII file, gdemv3out.asc. Once listed, the user is prompted to enter another set of coordinates. Program execution is halted if the user inputs 0, 0, 0 at the prompt. A specific example of a short session with this program is listed in Appendix A. See Appendix B for compiling and linking on a PC using Cygwin.

(U) The specific form of the output depends upon five parameters set in rdgdem3stest.f before it is compiled and linked. These parameters are:

1) directory Name of the directory containing the GDEM-V 3.0 database files. When specifying this directory on a UNIX or PC machine include the ‘/’ or ‘\\’, respectively at the end of the directory name. Directory assignment examples are as follows:

   directory=’/home/carnesm/GDEMV3/DATABASE/’ - UNIX
   directory=’\\C:\\GDEMV3\\DATABASE\\’ – PC

2) Sndspdtype Sets equation to use for calculation of sound speed. When set to ‘cml’, sound speed is computed using the Chen, Miller, Li equation, and when set to ‘wil’, sound speed is computed using Wilson’s equation. For example, sndspdtype=’cml’.

3) getstd If getstd=.true., temperature and salinity standard deviation profiles are extracted and printed.

4) getbot If getbot=.true., the ocean bottom depth at the profile location is extracted and printed.

5) extenddepth If extendepth=.true., the profiles are extended to the ocean bottom depth.

2.14.3 (U) Program rdgdem3stestm.f

(U) Program rdgdem3stestm.f is similar to rdgdem3stest.f, but it outputs all profiles found within the user-defined geographic boundaries. It is compiled and linked on a UNIX operating system using,

```
f77 –o rdgdem3stestm rdgdem3stestm.f  rdgdem3s.f  netcdfdir/libnetcdf.a  -Inetcdfdir
```

to create an executable named rdgdem3stestm. The directory netcdfdir (change this to the actual full path on your computer) is assumed to contain the files libnetcdf.a and netcdf.inc.

(U) This is an interactive program that prompts the user to input the decimal bottom latitude, top latitude, left longitude, right longitude, and day of the year. All GDEM-V profiles of depth, temperature, salinity, sound speed, and (optionally) the temperature standard deviation and salinity standard deviation within the boundaries defined by these latitudes and longitudes are extracted from the GDEM-V files for the month closest to the requested time. The extracted profiles are then output to the ASCII file named gdemv3out.asc. A specific example of a short session with this program is listed in Appendix A. See Appendix B for compiling and linking on a PC using Cygwin.

(U) The specific form of the output depends upon five parameters set in rdgdem3stest.f before it is compiled and linked. These are the same parameters specified in program rdgdem3test.f above.

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3.0 (U) DATABASE FORMAT AND MEDIA READ INSTRUCTIONS

3.1 (U) General

(U) The database is provided on four CD-ROMs. Each is labeled with the appropriate classification statement. The contents of the CD-ROMs are as follows:

- CD-ROM 1 – FORTRAN extraction software, Readme file, this database description document, NetCDF library for Cygwin, 12 monthly files of temperature, bottom depth file.
- CD-ROM 2 – 12 monthly files of salinity.
- CD-ROM 3 – 12 monthly files of temperature standard deviation.
- CD-ROM 4 – 12 monthly files of salinity standard deviation.

(U) All files except the FORTRAN extraction software were compressed using gzip. Before being used, the required files (only the months being accessed) must be copied to a hard disk and uncompressed. On a UNIX system, the files can be uncompressed using the command gunzip or gzip –d. On a Windows operating system, the files can be uncompressed using commercial packages such as Winzip.

(U) All data files are binary NetCDF files. Since this is a well-known standard format, many free software packages are available for viewing and manipulating these files on machines with either UNIX or WINDOWS operating systems. Among these are ferret, available on the web at http://ferret.wrc.noaa.gov/Ferret/, and ncbrowse, available at http://www.epic.noaa.gov/java/ncBrowse/ . Other packages can be found at http://www.unidata.ucar.edu/packages/netcdf/software.html. Software is also available to read NetCDF files using FORTRAN, C, Matlab, Perl, Java, and Python.

(U) The FORTRAN extraction software supplied with GDEM-V 3.0 must be compiled and linked with the NetCDF software library. Source code as well as compiled binaries of the NetCDF package can be found at http://www.unidata.ucar.edu/packages/netcdf/index.html. On a UNIX platform, the only two files needed are the NetCDF library archive, libnetcdf.a, and the associated include file, netcdf.inc.

3.2 (U) Media Read Instructions

(U) The database files are stored on four CD-ROMS in compressed (gzipped) NetCDF (binary) files. These files should be transferred from media to hard disk using a current operating system file transfer routine. Once transferred, each file should be uncompressed using gunzip (or gzip –d) on a UNIX system or Winzip on a PC.

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APPENDIX A

Test Cases

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(U) APPENDIX A – Test Cases

(U) Test Cases 1 and 2 show examples of output from rdgdem3stest.f and test cases 3 and 4 show examples of output from rdgdem3stestm.f

A.1 (U) Test Case 1

(U) In file rdgdem3stest.f, set

- sndspdtype = 'wil'
- getstd = .false.
- getbot = .false.
- extenddepth = .false.

(U) Then compile and link, and then run rdgdemvstest.

At the prompt,
➢ Enter: lat, lon, day (0,0,0 to quit)
enter,
29.6, -88.1, 360.2

At the next prompt,
➢ Enter: lat, lon, day (0,0,0 to quit)
enter,
33.1, 125.2, 185.5

At the next prompt,
➢ Enter: lat, lon, day (0,0,0 to quit)
enter,
0,0,0
which will end the program run.

(U) The output in file gdemv3out.asc should contain,

```
 271.900  29.600 360.2  Requested lon,lat,day
 272.000  29.500 12  Extracted lon,lat,month
 21 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s)
   0.0  21.480  35.046  1525.97
   2.0  21.498  35.137  1526.16
   4.0  21.516  35.229  1526.34
   6.0  21.537  35.316  1526.53
   8.0  21.584  35.419  1526.81
  10.0  21.635  35.541  1527.11
  15.0  21.827  35.719  1527.90
  20.0  21.968  35.909  1528.56
  25.0  22.049  35.991  1528.94
  30.0  22.146  36.055  1529.34
```

```
  35.0  22.160  36.074  1529.48
  40.0  22.146  36.092  1529.55
  45.0  22.079  36.180  1529.56
  50.0  22.040  36.185  1529.55
  55.0  21.919  36.282  1529.43
  60.0  21.748  36.287  1529.08
  65.0  21.356  36.284  1528.14
  70.0  21.016  36.286  1527.33
  75.0  20.729  36.295  1526.66
  80.0  20.389  36.307  1525.84
  85.0  19.958  36.323  1524.77
 125.200  33.100 185.5  Requested lon,lat,day
 125.250  33.000  7  Extracted lon,lat,month
 23 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s)
   0.0  24.537  31.082  1529.19
   2.0  24.261  31.149  1528.62
   4.0  23.986  31.216  1528.05
   6.0  23.671  31.289  1527.39
   8.0  23.272  31.377  1526.52
  10.0  22.819  31.474  1525.51
  15.0  20.173  31.986  1519.16
  20.0  17.603  32.422  1512.41
  25.0  15.723  32.827  1507.25
  30.0  14.191  33.156  1502.84
  35.0  13.627  33.328  1501.28
  40.0  13.263  33.463  1500.31
  45.0  12.959  33.580  1499.52
  50.0  12.699  33.683  1498.85
  55.0  12.656  33.714  1498.82
  60.0  12.633  33.730  1498.84
  65.0  12.610  33.749  1498.87
  70.0  12.591  33.779  1498.92
  75.0  12.570  33.826  1498.99
  80.0  12.551  33.866  1499.05
  85.0  12.542  33.864  1499.10
  90.0  12.522  33.888  1499.14
  95.0  12.507  33.945  1499.24
```

A.2 (U) Test Case 2

(U) In file rdgdem3stest.f, set

- sndspdtype = ‘cml’
- getstd = .true.
- getbot = .true.
- extenddepth = .true.

(U) Then compile and link, and then run rdgdem3stest.

At the prompt,
- Enter: lat, lon, day (0,0,0 to quit)

enter,
29.6, -88.1, 360.2

At the next prompt,
- Enter: lat, lon, day (0,0,0 to quit)

enter,
33.1, 125.2,185.5

At the next prompt,
- Enter: lat, lon, day (0,0,0 to quit)

enter,
0,0,0
which will end the program run.

(U) The output in file gdemv3out.asc should contain,

```
 271.900  29.600 360.2  Requested lon,lat,day
 272.000  29.500 12   87.  Extracted lon,lat,month,bot dep
 22 1 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s) tstdev sstdev
   0.0  21.480  35.046  1525.53   2.239   1.614
   2.0  21.498  35.137  1525.71   2.212   1.427
   4.0  21.516  35.229  1525.89   2.196   1.256
   6.0  21.537  35.316  1526.08   2.194   0.989
   8.0  21.584  35.419  1526.35   2.173   0.887
  10.0  21.635  35.541  1526.65   2.162   0.798
  15.0  21.827  35.719  1527.43   2.099   0.572
  20.0  21.968  35.909  1528.09   2.047   0.482
  25.0  22.049  35.991  1528.48   2.032   0.480
  30.0  22.146  36.055  1528.88   2.058   0.444
  35.0  22.160  36.074  1529.02   2.096   0.448
  40.0  22.146  36.092  1529.09   1.842   0.483
  45.0  22.079  36.180  1529.09   1.932   0.355
  50.0  22.040  36.185  1529.08   1.899   0.419
  55.0  21.919  36.282  1528.95   1.842   0.153
  60.0  21.748  36.287  1528.59   1.690   0.121
  65.0  21.356  36.284  1527.63   1.509   0.099
  70.0  21.016  36.286  1526.81   1.496   0.093
  75.0  20.729  36.295  1526.13   1.463   0.090
  80.0  20.389  36.307  1525.30   1.438   0.091
  85.0  19.958  36.323  1524.22   1.371   0.090
  87.0  19.786  36.329  1523.78   1.371   0.090
 125.200  33.100 185.5  Requested lon,lat,day
```

```
 125.250  33.000  7   95.  Extracted lon,lat,month,bot dep
 23 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s) tstdev sstdev
   0.0  24.537  31.082  1529.04   3.129   1.427
   2.0  24.261  31.149  1528.46   3.091   1.317
   4.0  23.986  31.216  1527.88   3.093   1.222
   6.0  23.671  31.289  1527.20   3.142   1.145
   8.0  23.272  31.377  1526.31   3.276   1.092
  10.0  22.819  31.474  1525.28   3.456   1.067
  15.0  20.173  31.986  1518.82   3.395   0.820
  20.0  17.603  32.422  1512.00   3.590   0.734
  25.0  15.723  32.827  1506.82   3.107   0.641
  30.0  14.191  33.156  1502.41   2.721   0.619
  35.0  13.627  33.328  1500.85   2.392   0.563
  40.0  13.263  33.463  1499.89   2.102   0.534
  45.0  12.959  33.580  1499.10   1.822   0.465
  50.0  12.699  33.683  1498.43   1.601   0.462
  55.0  12.656  33.714  1498.41   1.463   0.434
  60.0  12.633  33.730  1498.43   1.383   0.414
  65.0  12.610  33.749  1498.46   1.312   0.409
  70.0  12.591  33.779  1498.51   1.292   0.410
  75.0  12.570  33.826  1498.58   1.273   0.377
  80.0  12.551  33.866  1498.64   1.193   0.341
  85.0  12.542  33.864  1498.69   1.105   0.319
  90.0  12.522  33.888  1498.74   1.030   0.299
  95.0  12.507  33.945  1498.84   1.110   0.305
```

A.3 (U) Test Case 3

(U) In file rdgdem3stestm.f, set

- sndspdtype = ‘wil’
- getstd = .false.
- getbot = .false.
- extenddepth = .false.

(U) Then compile and link, and then run rdgdem3stestm.

At the prompt,

➢ Enter: lat_bot,lat_top,lon_left,lon_right,day

enter,

54.4,54.8,13.6,14.1,17.3

(U) The program will extract the profiles within the specified latitude/longitude boundaries and then write the results to file gdemv3out.asc and then stop without further prompting.

(U) The output in file gdemv3out.asc should contain,

```
  13.750  54.500  1  lon,lat,month
  8 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s)
   0.0   2.739   8.390  1426.14
   2.0   2.750   8.431  1426.28
   4.0   2.762   8.471  1426.41
   6.0   2.764   8.495  1426.49
   8.0   2.767   8.528  1426.57
  10.0   2.771   8.557  1426.66
  15.0   2.797   8.669  1427.00
  20.0   2.873   8.817  1427.62
  13.750  54.750  1  lon,lat,month
  9 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s)
   0.0   2.908   8.402  1426.94
   2.0   2.915   8.437  1427.04
   4.0   2.922   8.472  1427.15
   6.0   2.925   8.499  1427.23
   8.0   2.929   8.538  1427.33
  10.0   2.934   8.572  1427.43
  15.0   2.962   8.698  1427.80
  20.0   3.034   8.861  1428.42
  25.0   3.130   9.166  1429.33
  14.000  54.500  1  lon,lat,month
  9 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s)
   0.0   2.917   8.215  1426.74
   2.0   2.929   8.252  1426.87
   4.0   2.942   8.289  1427.01
   6.0   2.944   8.309  1427.08
   8.0   2.945   8.332  1427.14
  10.0   2.949   8.354  1427.22
  15.0   2.973   8.442  1427.53
  20.0   3.048   8.556  1428.09
  25.0   3.163   8.863  1429.09
  14.000  54.750  1  lon,lat,month
  9 0 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s)
   0.0   3.100   8.234  1427.60
   2.0   3.107   8.262  1427.70
   4.0   3.114   8.291  1427.81
   6.0   3.115   8.311  1427.87
   8.0   3.118   8.336  1427.94
  10.0   3.122   8.360  1428.03
  15.0   3.148   8.453  1428.34
  20.0   3.221   8.577  1428.91
```

```
25.0   3.323   8.870  1429.83
```

A.4 (U) Test Case 4

(U) In file rdgdem3stestm.f, set

- sndspdtype = 'cml'
- getstd = .true.
- getbot = .true.
- extenddepth = .true.

(U) Then compile and link, and then run rdgdem3stestm.

At the prompt,

➢ Enter: lat_bot,lat_top,lon_left,lon_right,day

enter,

54.4,54.8,13.6,14.1,17.3

(U) The program will extract the profiles within the specified latitude/longitude boundaries and then write the results to file gdemv3out.asc and then stop without further prompting.

(U) The output in file gdemv3out.asc should contain,

```
  13.750  54.500  1   23.  lon,lat,month,bot dep
  9 1 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s) tstdev sstdev
   0.0   2.739   8.390  1426.78   2.019   0.978
   2.0   2.750   8.431  1426.91   1.999   1.099
   4.0   2.762   8.471  1427.05   1.989   1.113
   6.0   2.764   8.495  1427.12   2.010   0.778
   8.0   2.767   8.528  1427.21   2.011   0.815
  10.0   2.771   8.557  1427.30   2.007   0.873
  15.0   2.797   8.669  1427.64   2.015   0.973
  20.0   2.873   8.817  1428.26   2.011   1.138
  23.0   2.919   8.906  1428.63   2.011   1.138
  13.750  54.750  1   29.  lon,lat,month,bot dep
 10 1 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s) tstdev sstdev
   0.0   2.908   8.402  1427.57   2.008   1.053
   2.0   2.915   8.437  1427.68   1.990   1.151
   4.0   2.922   8.472  1427.79   1.982   1.174
   6.0   2.925   8.499  1427.87   2.006   0.814
   8.0   2.929   8.538  1427.97   2.007   0.850
  10.0   2.934   8.572  1428.07   2.002   0.910
  15.0   2.962   8.698  1428.44   2.011   1.008
  20.0   3.034   8.861  1429.06   2.009   1.169
  25.0   3.130   9.166  1429.97   1.990   1.248
  29.0   3.207   9.410  1430.70   1.990   1.248
  14.000  54.500  1   25.  lon,lat,month,bot dep
  9 0 Num depths, flag(1=extended)
```

```
depth(m) temp(C) salin  sspd(m/s) tstdev sstdev
   0.0   2.917   8.215  1427.37   2.030   0.806
   2.0   2.929   8.252  1427.50   2.011   0.912
   4.0   2.942   8.289  1427.64   1.999   0.921
   6.0   2.944   8.309  1427.71   2.015   0.703
   8.0   2.945   8.332  1427.78   2.015   0.736
  10.0   2.949   8.354  1427.85   2.011   0.788
  15.0   2.973   8.442  1428.16   2.016   0.883
  20.0   3.048   8.556  1428.73   2.012   1.047
  25.0   3.163   8.863  1429.73   1.995   1.121
  14.000  54.750  1   29.  lon,lat,month,bot dep
 10 1 Num depths, flag(1=extended)
depth(m) temp(C) salin  sspd(m/s) tstdev sstdev
   0.0   3.100   8.234  1428.24   2.019   0.849
   2.0   3.107   8.262  1428.34   2.003   0.932
   4.0   3.114   8.291  1428.44   1.994   0.945
   6.0   3.115   8.311  1428.50   2.012   0.712
   8.0   3.118   8.336  1428.58   2.012   0.745
  10.0   3.122   8.360  1428.66   2.007   0.797
  15.0   3.148   8.453  1428.97   2.013   0.891
  20.0   3.221   8.577  1429.55   2.009   1.052
  25.0   3.323   8.870  1430.47   1.993   1.142
  29.0   3.405   9.104  1431.21   1.993   1.142
```

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APPENDIX B

Distribution Information

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(U) APPENDIX B – Distribution Information

B.1 (U) CD-ROM Descriptions

(U) This four CD-ROM set contains the GDEM-V 3.0 model databases and extraction software, including all required supporting libraries and four sample test runs.

B.1.1 (U) CD-ROM #1 Contents:

dbdbvgdemv3s.nc.gz	Digital Bathymetry Data
GDEMV_3.0_DBD.doc	GDEM-V 3.0 Database Design Description
rdgdem3s.f.gz	Extraction Routine
rdgdem3stest.f.gz	Point Extraction Driver Routine
rdgdem3stestm.f.gz	Area Extraction Driver Routine
libnetcdf.a.gz	NetCDF Library for Cygwin
netcdf.inc.gz	NetCDF Include File for Cygwin
Readme.txt	This Readme File
GDEM-V3pt0-QAV-2003.doc	GDEM-V Version 3.0Quality Assurance Verification Report

(U) NetCDF Temperature Files

tgdemv3s01.nc.gz	January
tgdemv3s02.nc.gz	February
tgdemv3s03.nc.gz	March
tgdemv3s04.nc.gz	April
tgdemv3s05.nc.gz	May
tgdemv3s06.nc.gz	June
tgdemv3s07.nc.gz	July
tgdemv3s08.nc.gz	August
tgdemv3s09.nc.gz	September
tgdemv3s10.nc.gz	October
tgdemv3s11.nc.gz	November
tgdemv3s12.nc.gz	December

B.1.2 (U) CD-ROM #2 contents:

(U) NetCDF Salinity Files

sgdemv3s01.nc.gz	January
sgdemv3s02.nc.gz	February

sgdemv3s03.nc.gz	March
sgdemv3s04.nc.gz	April
sgdemv3s05.nc.gz	May
sgdemv3s06.nc.gz	June
sgdemv3s07.nc.gz	July
sgdemv3s08.nc.gz	August
sgdemv3s09.nc.gz	September
sgdemv3s10.nc.gz	October
sgdemv3s11.nc.gz	November
sgdemv3s12.nc.gz	December

B.1.3 (U) CD-ROM #3 contents:

(U) NetCDF Temperature Standard Deviation Files

tstgdemv3s01.nc.gz	January
tstgdemv3s02.nc.gz	February
tstgdemv3s03.nc.gz	March
tstgdemv3s04.nc.gz	April
tstgdemv3s05.nc.gz	May
tstgdemv3s06.nc.gz	June
tstgdemv3s07.nc.gz	July
tstgdemv3s08.nc.gz	August
tstgdemv3s09.nc.gz	September
tstgdemv3s10.nc.gz	October
tstgdemv3s11.nc.gz	November
tstgdemv3s12.nc.gz	December

B.1.4 (U) CD-ROM #4 contents:

(U) NetCDF Salinity Standard Deviation Files

sstgdemv3s01.nc.gz	January
sstgdemv3s02.nc.gz	February
sstgdemv3s03.nc.gz	March
sstgdemv3s04.nc.gz	April
sstgdemv3s05.nc.gz	May
sstgdemv3s06.nc.gz	June
sstgdemv3s07.nc.gz	July
sstgdemv3s08.nc.gz	August
sstgdemv3s09.nc.gz	September
sstgdemv3s10.nc.gz	October
sstgdemv3s11.nc.gz	November
sstgdemv3s12.nc.gz	December

B.2 (U) Database and Software Extraction and Setup

1. (U) Extract NetCDF files (extension "nc") from archives to the desired directory (NetCDF_files).

2. (U) Extract the driver and extraction routines from their respective archives to another directory for compilation, linking, and execution.

3. (U) Change the directory name in the driver routines to agree with the one containing GDEM-V 3.0 NetCDF files.

   (U) Note: Remember in FORTRAN use "\\" instead of "\" when naming the NetCDF files directory on the PC. Do not forget to include the final "/" or "\\" - it is needed for the software to work correctly.

(U) Example directory names for GDEM-V 3.0 NetCDF data files are:

```
directory='/opt/home/NetCDF_files/'  Unix version
directory='c:\\NetCDF_files\\'       PC version
```

B.3 (U) Source Description and Compilation Information

1. (U) Programs rdgdem3stest.f and rdgdem3stestm.f are simple driver programs for subroutine rdgdem3s.f. To create executables named rdgdem3stest and rdgdem3stestm on a Unix operating system, they are compiled and linked using,

   f77 -o rdgdem3stest rdgdem3stest.f rdgdem3s.f netcdfdir/libnetcdf.a -Inetcdfdir

   f77 -o rdgdem3stestm rdgdem3stestm.f rdgdem3s.f netcdfdir/libnetcdf.a -Inetcdfdir

2. (U) The directory netcdfdir (change this to the actual full path of the NetCDF library on your computer) is assumed to contain the files libnetcdf.a and netcdf.inc. The g77 compiler can be used by changing f77 to g77.

3. (U) These programs can be compiled under Cygwin (Unix emulation interface) by substituting g77 for f77 and using the supplied libnetcdf.a library. The sound speed can be calculated using the Chen-Millero-Li formulation (OAML standard) or Wilson's Equation by editing the driver routine. Other options are available for extraction by editing the driver routine as desired. Appendix A contains four FORTRAN Test Cases to verify the correct installation of the database and describes the options.

4. (U) NetCDF binary libraries and source may be downloaded from the following URL

   http://www.unidata.ucar.edu/packages/netcdf/

   for your particular Unix machine or PC development configuration - the binary library for Solaris 5.7 worked flawlessly with the g77 compiler. Make sure that netcdf.inc is downloaded with the NetCDF library.

5. (U) Cygwin may be downloaded from the following URL

http://www.cygwin.com/

and make sure the gcc compiler is downloaded.

6. (U) The NetCDF Library for Cygwin is provided in an archive (libnetcdf.a.gz). The NetCDF Include File for Cygwin is provided in an archive (netcdf.inc.gz). Unzip these files to the same directory as the rdgdem3s.f, rdgdem3stest.f, and rdgdem3stestm.f source code or the directory netcdfdir identified above.

B.4 (U) Program Execution

1. The rdgdem3stest program is an interactive program that prompts the user to input the decimal latitude, longitude, and day of the year.

2. The rdgdem3stestm program is an interactive program that prompts the user to input the decimal lower latitude, upper latitude, left longitude, right longitude, and day of the year.

3. The GDEM-V profiles of depth, temperature, salinity, sound speed, and (optionally) the temperature standard deviation and salinity standard deviation are extracted from the GDEM-V files at the grid point location and month closest to the requested position and time.

4. The extracted profiles are then listed to the screen and written to the ASCII file, gdemv3out.asc. Once listed, the user is prompted by rdgdem3stest to enter another set of coordinates - program execution is halted if the user inputs 0, 0, 0 at the prompt.

5. Since rdgdem3stestm is an area extraction, the extracted profiles are written to the ASCII file, gdemv3out.asc, and the program terminates.