

**NAME**

**mblevitus** – Create a water velocity profile which is representative of the mean annual water column for a specified 1 degree by 1 degree region.

**VERSION**

Version 5.0

**SYNOPSIS**

**mblevitus** [-**R**lon/lat -**O**outfile -**V** -**H**]

**DESCRIPTION**

**mblevitus** generates a mean water sound velocity profile for a specified location using temperature and salinity data from the 1982 Climatological Atlas of the World Ocean [Levitus, 1982]. The water velocity profile is representative of the mean annual water column structure for a specified 1 degree by 1 degree region. The profile is output to a specified file which can be read and used by programs (e.g. **mb bath** or **mb-velocitytool**) which calculate swath sonar bathymetry from travel times by raytracing through a water velocity model.

The Levitus [1982] reference is:

Levitus, S, Climatological Atlas of the World Ocean,  
NOAA Professional Paper 13, U.S. Government Printing Office,  
Washington D.C., 173pp, 1982.

The water sound velocity values are calculated using the DelGrosso equations, following:

Dusha, B. D., P. F. Worcester, B. D. Cornuelle,  
B. M. Howe, "On equations for the speed of  
sound in seawater", J. Acoust. Soc. Am., 93,  
255-275, 1993

The implementation of these equations follows code written at the Ocean Data Facility of the Scripps Institution of Oceanography. The depth to which the Levitus database defines the water column reflects regional water depths which may be exceeded in places. **mblevitus** extends the water sound velocity profiles to a depth of 12000 meters using the deepest salinity and temperature values available in the database. If the specified location is subaerial, then no water velocity profile is calculated.

**MB-SYSTEM AUTHORSHIP**

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**OPTIONS**

- H** This "help" flag cause the program to print out a description of its operation and then exit immediately.
- O** *outfile*  
Sets the output file for the water velocity profile. Default: *outfile* = "velocity".
- R** *lon/lat*  
Sets the longitude and latitude of the location of the water velocity profile. Whole degrees should be used, as the database has a 1 degree by 1 degree resolution. Default: *lon*=0, *lat*=0.

- V Normally, **mblevitus** outputs only a minor bit of information to the stdout stream. If the –V flag is given, then **mblevitus** works in a "verbose" mode and also outputs the program version being used and the complete water column structure used to calculate the water velocity profile.

## EXAMPLES

Suppose that one wishes to obtain a mean annual water velocity profile for processing Hydrosweep DS bathymetry data collected on the Cocos-Nazca spreading center at 95W longitude and 2N latitude. The following will suffice:

```
mblevitus -R-95/2 -Ovelocity_profile -V
```

The output will be:

```
Program MBLEVITUS
MB-system Version 4.5
```

Location for mean annual water velocity profile:

Requested: -95.0000 longitude 2.0000 latitude

Used: 265.5000 longitude 2.5000 latitude

Values defined directly by Levitus database: 27

Values assuming deepest salinity and temperature: 19

Velocity points written: 46

Output file: velocity\_profile

Mean annual water column profile:

Depth	Temperature	Salinity	Velocity
0.0000	25.6560	33.8830	1534.6998
10.0000	25.4080	33.8230	1534.2112
20.0000	24.5410	34.0190	1532.5010
30.0000	23.3290	34.2400	1529.9032
50.0000	19.7940	34.7450	1521.4298
75.0000	15.9700	34.9210	1510.8373
100.0000	14.5630	34.9400	1506.8495
125.0000	13.9500	34.9320	1505.2728
150.0000	13.5920	34.9270	1504.5077
200.0000	13.0430	34.9100	1503.4935
250.0000	12.4510	34.8780	1502.2893
300.0000	11.4720	34.8190	1499.6840
400.0000	9.4060	34.6990	1493.8119
500.0000	8.0400	34.6390	1490.2903
600.0000	7.0330	34.5950	1488.0126
700.0000	6.2200	34.5740	1486.4380
800.0000	5.5640	34.5620	1485.4464
900.0000	5.0280	34.5620	1484.9211
1000.0000	4.5840	34.5650	1484.7546
1100.0000	4.1950	34.5730	1484.8076
1200.0000	3.8570	34.5820	1485.0649
1300.0000	3.5860	34.5970	1485.6061
1400.0000	3.3320	34.6090	1486.2123
1500.0000	3.1020	34.6140	1486.9097
1750.0000	2.6290	34.6280	1489.0920
2000.0000	2.3010	34.6440	1491.9139
2500.0000	1.8770	34.6670	1498.6154
3000.0000	0.0000	0.0000	1507.2345
3500.0000	0.0000	0.0000	1515.9406
4000.0000	0.0000	0.0000	1524.7273

4500.0000	0.0000	0.0000	1533.5883
5000.0000	0.0000	0.0000	1542.5173
5500.0000	0.0000	0.0000	1551.5078
6000.0000	0.0000	0.0000	1560.5533
6500.0000	0.0000	0.0000	1569.6471
7000.0000	0.0000	0.0000	1578.7823
7500.0000	0.0000	0.0000	1587.9523
8000.0000	0.0000	0.0000	1597.1499
8500.0000	0.0000	0.0000	1606.3682
9000.0000	0.0000	0.0000	1615.6001
9500.0000	0.0000	0.0000	1624.8383
10000.0000	0.0000	0.0000	1634.0754
10500.0000	0.0000	0.0000	1643.3042
11000.0000	0.0000	0.0000	1652.5171
11500.0000	0.0000	0.0000	1661.7062
12000.0000	0.0000	0.0000	1670.8641

The contents of the output file velocity\_profile are:

```
# Water velocity profile created by program MBLEVITUS
# MB-system Version 4.5
# Run by user <caress> on cpu <menard> at <Wed Mar 26 15:43:53 1997>
# Water velocity profile derived from Levitus
# temperature and salinity database. This profile
# represents the annual average water velocity
# structure for a 1 degree X 1 degree area centered
# at 265.5000 longitude and 2.5000 latitude.
# This water velocity profile is in the form
# of discrete (depth, velocity) points where
# the depth is in meters and the velocity in
# meters/second.
# The first 27 velocity values are defined using the
# salinity and temperature values available in the
# Levitus database; the remaining 19 velocity values are
# calculated using the deepest temperature
# and salinity value available.
0.000000 1534.699829
10.000000 1534.211182
20.000000 1532.500977
30.000000 1529.903198
50.000000 1521.429810
75.000000 1510.837280
100.000000 1506.849487
125.000000 1505.272827
150.000000 1504.507690
200.000000 1503.493530
250.000000 1502.289307
300.000000 1499.683960
400.000000 1493.811890
500.000000 1490.290283
600.000000 1488.012573
700.000000 1486.437988
800.000000 1485.446411
900.000000 1484.921143
1000.000000 1484.754639
```

1100.000000	1484.807617
1200.000000	1485.064941
1300.000000	1485.606079
1400.000000	1486.212280
1500.000000	1486.909668
1750.000000	1489.092041
2000.000000	1491.913940
2500.000000	1498.615356
3000.000000	1507.234497
3500.000000	1515.940552
4000.000000	1524.727295
4500.000000	1533.588257
5000.000000	1542.517334
5500.000000	1551.507812
6000.000000	1560.553345
6500.000000	1569.647095
7000.000000	1578.782349
7500.000000	1587.952271
8000.000000	1597.149902
8500.000000	1606.368164
9000.000000	1615.600098
9500.000000	1624.838257
10000.000000	1634.075439
10500.000000	1643.304199
11000.000000	1652.517090
11500.000000	1661.706177
12000.000000	1670.864136

**SEE ALSO**

**mbsystem**(1), **mbvelocitytool**(1), **mbprocess**(1), **mbset**(1), **mbm\_xbt**(1)

**BUGS**

None known.