**% GRIDDING CODE:** **con\_tprof0\_monthly.m**

$Rev: 47 $

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make from a vertival dicrete temperature and salinity profiles quasi

continous ones by guessing the course of the profiles between the vertical

grid points using a geographically local dt/dp climatology

output data is then interpolated onto a given vertical grid

the dt/dp climatology method is dicribed in:

William E. Johns et al:

The Kuroshio east of Taiwan: Moored transport observations from the WOCE

PCM-1 Array

% March 2012

con\_tprof0\_v3\_bim has been adapted to use a monthly climatology

bim: Notes from bim (March 2012).

1. for a given discrete temperature, estimate the next measurement at pressure + incrementby finding the temperature gradient \*\* at that temperature (from climatology) and projecting it forwards a distance incrememnt.

Repeat for each pressure level between the discrete measurements.

Do it starting at the shallower measurement (downwards) and then again starting at the deeper measurement (upwards).

1. for a given discrete salinity estimate the next measurement at pressure +increment by finding the salinity gradient \*\* at that salinity (from climatology) and projecting it forwards a distance incrememnt.

Repeat for each pressure level between the discrete measurements.

Do it starting at the shallower measurement (downwards) and then again starting at the deeper measurement (upwards).

1. calculate weights based on the distance from the shallower measurement (downwards and distance from the deeper measurement (upwards).
2. Temperature profile between discrete measurements is estimated from

solving dT/Dp (interpolated from climatology, see \*\* above) over the required pressure. Add in the start temperature and apply the weighting.

This is done in the downwards and upwards directions.

The temperature profile between the discrete measurements is the sum of the upwards and downwards profiles.

1. Salinity is treated in the same way (see 4).

%

function [t\_con,s\_con] = con\_tprof0(tg,sg,pg,PG,time,int\_step,TSclim,TS\_CLIMATOLOGY,TS\_CLIMATOLOGY\_NAME)

input:

tg = mooring temperature time series (stored as rows in tg)

rows are the microcats at different depths

sg = mooring salinity time series (stored as rows in sg)

rows are the microcats at different depths

pg = corresponding pressure time series, (stored as rows in pg)

dummies in tg and pg

have to be marked as NaNs! ! !

PG = vertical pressure grid onto which quasi continous profiles

will be interpolated -- must be column vector

e.g. pg = 0:20:4820; depths in 20dbar bins

time = month -- must be row vector

correspnding to tg

note: all values passed to the function were zero in previous versions

int\_step = integration step size [dbar] between grid points for

dp/dt method, if empty will be set to 20 dbar

%

TSclim = path to the file containing the dT/dP and dS/dP climatology

%

TS\_CLIMATOLOGY -- climatology, e.g. deep, slope or full region.

TS\_CLIMATOLOGY\_NAME -- climatology name, e.g. argo or hbase

%

output:

t\_con and s\_con = output temperature interpolated onto the pressure grid (PG)

%

uses t\_int0.m (that one needs further user defined functions),

t\_bound0.m, sst\_check.m

%

T.Kanzow 3.4.00

CODE HISTORY

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v3: 25 May 2010 added t\_int0.m and t\_bound0.m as sub-functions, with

preverse variable added. Previous problems with multiple copies of

different edits. Pressure grid variable changed to stop integration at

the upper MicroCAT at each time step.

1 July 2010 changed to require a minimum of 4 MCs rather than 2.

seasonal: 27th March 2012 Ben Moat

**LATER IN THE CODE:**

% estimate the temperature between gridpoints

% pass in T,S,P from the mooring at a time step ti

% innerT -- temperature between gridpoints

% innerS -- Salinity between gridpoints

% innerP -- Pressure between gridpoints

[innerT,innerS,innerP] = t\_int0(T,S,P,time(ti),int\_step,cTg,cSg,cT,tTg,tT,tt, 4000);

**%% SUB-function t\_int0.m**

% guess temperatures between vertical grid points using a dtdp climatology

%

% function [innerT,innerS,innerP,uncert] = t\_int0(t,s,p,time,step,cTg,cSg,cT,tTg,tT,tt,preverse)

%

% input: t -- discrete temperature Profile from sensors at one point of time

% (must be column vector)

% s -- discrete salinity Profile from sensors at one point of time

% (must be column vector)

% p -- corresponding pressures of sensors [dbar]

% time-- month

% step-- integation step size for dtdp method (int\_step (e.g. 10) passed to con\_tprof0\_v3.m)

% cTg -- 2.3 < T < 18 (dT/dP) from climatology

% cT -- corresponding temperature (tgrid)

% cSg -- (dS/dP) from climatology

% tTg -- time dependend temp. gradient [C/dbar] for: 18<T<26 (passing in 0 )

% tT -- corresponding temperature (tgrid) (passing in 0 )

% tt -- corresponding time (decimal months) (passing in 0 )

% preverse -- If a temperature inversion (i.e. increasing temperature with depth) is found below preverse [dbar] instead of dT/dP and dS/dP a simple linear interpolation scheme is used to avoid ambiguities in the climatologies.%

%

%

% output: innerT-- Temperature profile between discreate data for a given time step gridded onto the size 'step'

% innerS-- Salinity profile between discreate data for a given time stepgridded onto the size 'step'

% innerP-- Pressure profile between discreate data for a given time step

% gridded onto the size 'step'

%

% uses: spacing.m

%

% T.Kanzow 4.4.00

% 6.4.00 nearest.m replaced to speed up code

% 29.06.07 input variable preverse added (see description above)

% for deep ocean cases where temperature gradient reverses (i.e., increases with depth), a linear interpolation should be used because the climatology is ambiguous.

=> this where preverse intervenes - no use of climatology gradients in case of temperature reversal below that depth, a linear interpolation between the instruments is used instead.

% UPPER BOUNDARY TEMPERATURE

% if the measured temperature is within the tgrid range then store the value of dT/Dp and dS/dT at that temperature

% if the measured temperature is below the tgrid range store the value of dT/Dp and dS/dT at the minimum temperature

% if the measured temperature is above the tgrid range store the value of dT/Dp and dS/dT at the maximum temperature

% give a temperature at depth j project it to the next point using the rate of change and the distance to the next depth

% LOWER BOUNDARY TEMPERATURE

% if the measured temperature is within the tgrid range find the value of dT/Dp and dS/dT at that temperature

% if the measured temperature is below the tgrid range find the value of dT/Dp and dS/dT at the minimum temperature

% if the measured temperature is above the tgrid range find the value of dT/Dp and dS/dT at the maximum temperature

% given a temperature at depth j, project it to the next point using the temperature gradient and the distance to the next depth.

% dinc2 is used so the temperature at the next depth is shallower i.e. moving towards the surface

*Uses t\_bound0 for extrapolation above shallowest M/C and below deepest M/C:*