

Data Processing and Optimum Interpolation in HOPS

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Optimum interpolation is done by the program package OAG_5.6

```
onken on kokp24: /home/onken/data/IMEDEA/UVASSIM/HOPS/OAG_5.6 - Befehlsfenster - | _ □ |e X
Sitzung Bearbeiten Ansicht Lesezeichen Einstellungen Hilfe
acor.F      dhlev.F      get_ewpt.F   inppar.h    oagmain.F   set_type.F
blkdat.F    diagn.F      getobs.F     length.F    oagrid.h    svafunc.F
brent.F     domdat.h    GNUmakefile.alpha  linmin.F    oamap.F     svan.F
caldate.F   dynht.F     GNUmakefile.cray   lintrp.F    oamean.F    svel.F
cdescent.h  errscl.F   GNUmakefile.iris   l12xy.F     oa_netcdf.h trapzd.F
clima.h     erwin       GNUmakefile.linux_g77  lnblk.F    oapar.F     trapz.h
compile.com exitus.F    GNUmakefile.linux_ifort  locate.F    obscor.h    UPDATES
corscl.h    f1com.h     GNUmakefile.rs6000     lubksb.F   param.h     version.h
costfun.F   f1dim.F     GNUmakefile.sun3       ludcmp.F   qtrap.F    VMSmakefile.com
date.h      fdiagn.h    GNUmakefile.sun4       mapcor.F   readgrids.F  xclima.F
day_code.F  filter.F    GNUmakefile.sun5       mnbrak.F  readhydro.F  xhydro.F
dcostfun.F  gcircle.F   gregorian.F           my_handler.F  R readme.oag  xy211.F
debug.h     getclima.F  headln.F             nxt_blnk.F  rmbklines.F
defcdf.F    get_date.F  hydrobs.h            oa_err.F    rotparm.F
descent.F   getdynht.F  hydro.h              oag.in     rout_chk.F
```

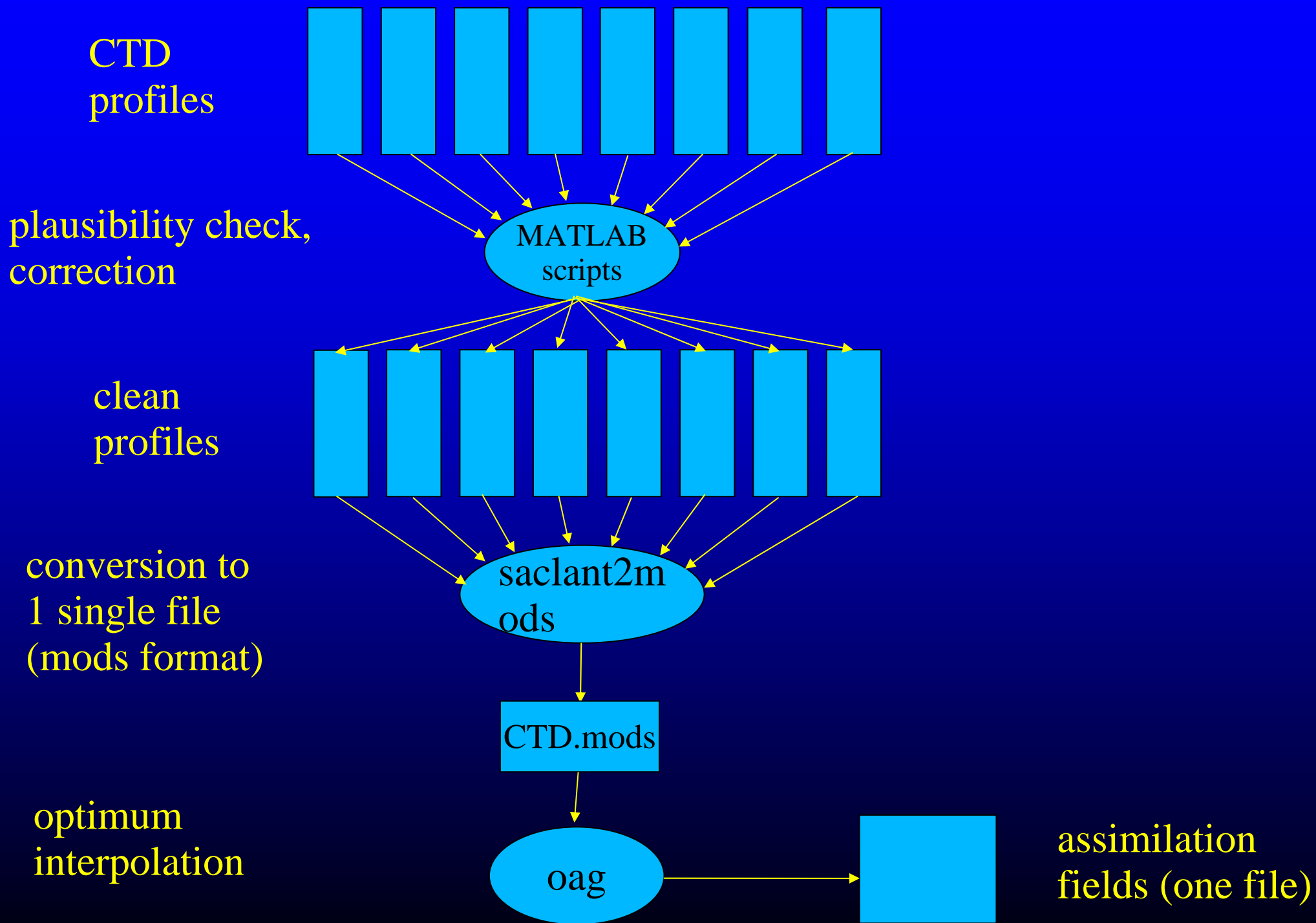
**Makefiles for
different archi-
tectures**

**FORTTRAN
modules (*.F)**

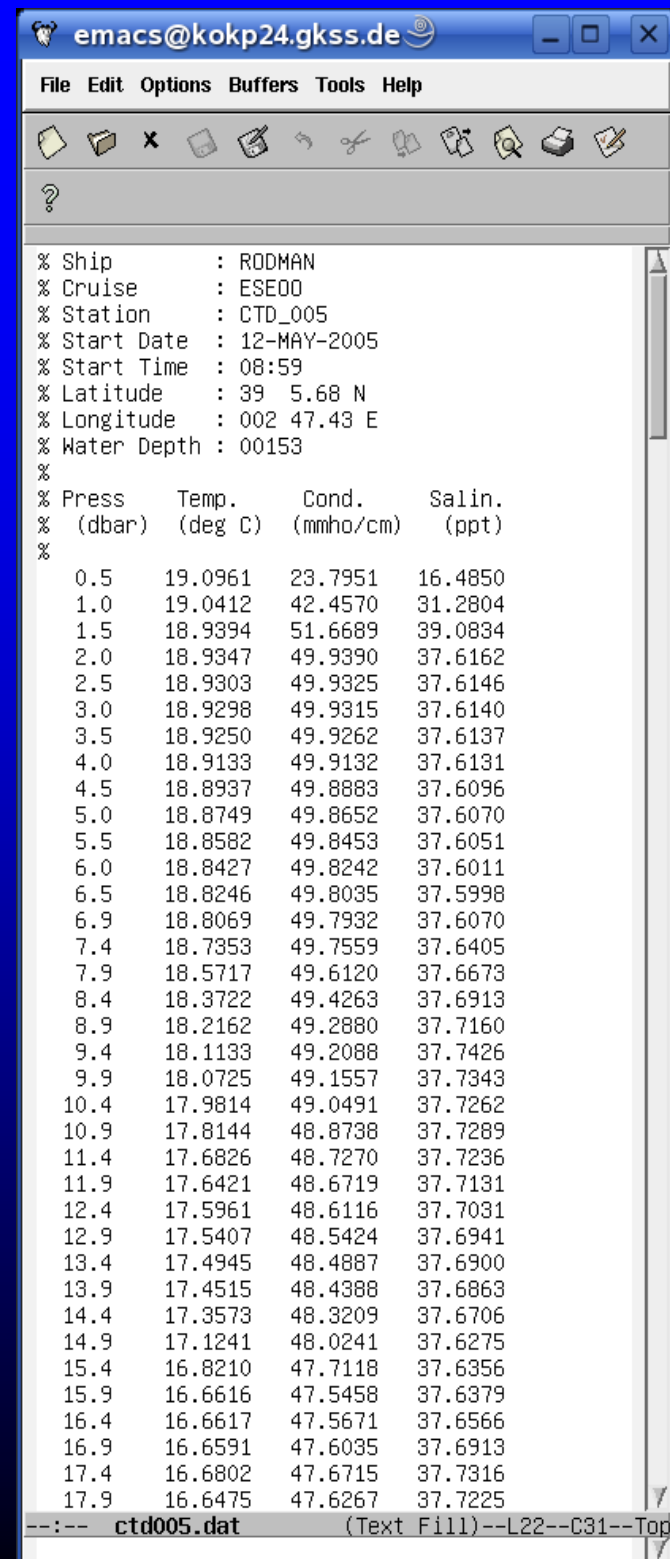
**include
files (*.h)**

**a Readme
file**

Data Flow



CTD profile (sample)



The image shows a screenshot of an Emacs window titled "emacs@kokp24.gkss.de". The window displays a text file named "ctd005.dat" containing CTD profile data. The data is organized into a header section and a table of measurements.

Header information:

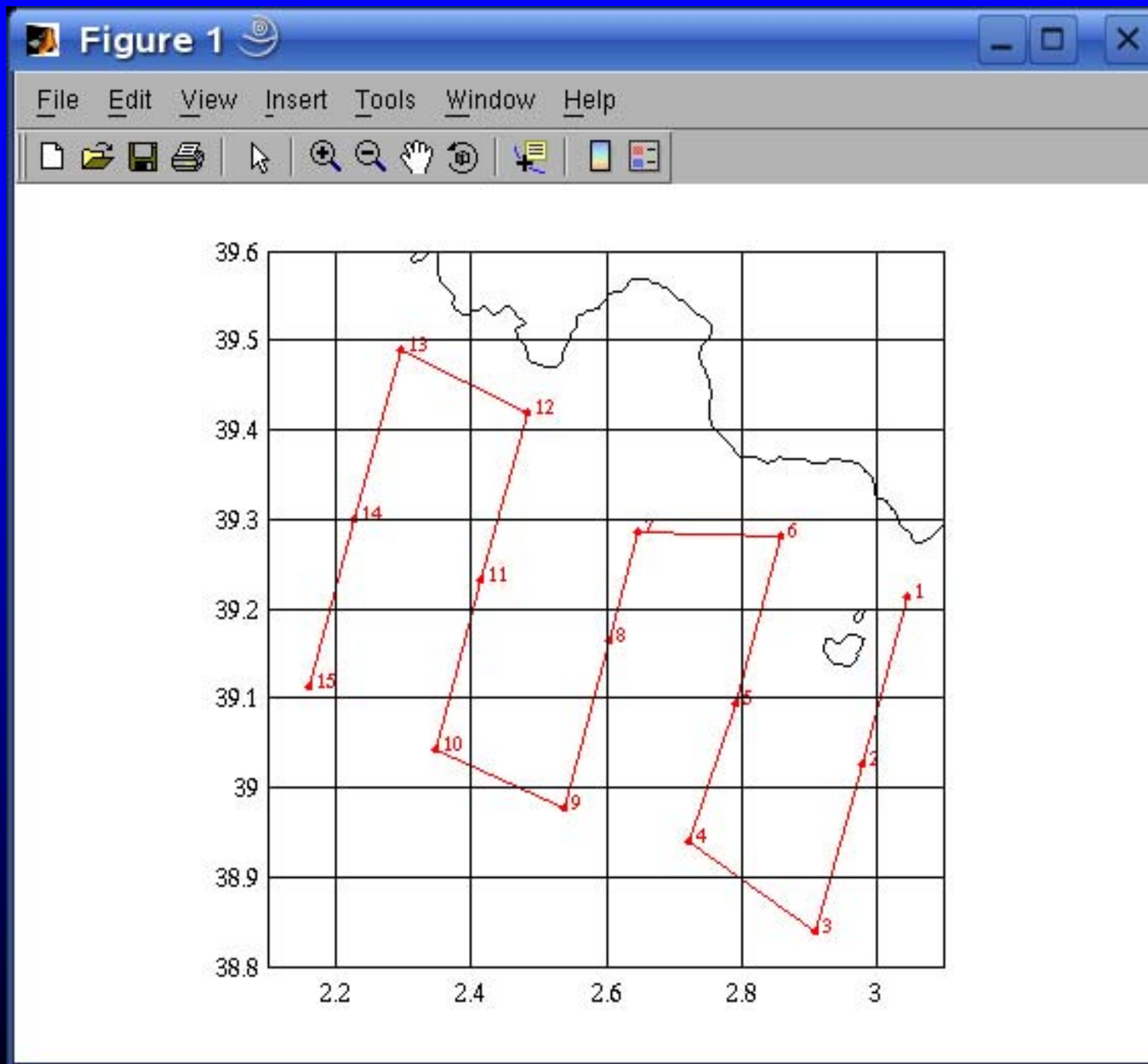
- % Ship : RODMAN
- % Cruise : ESE00
- % Station : CTD_005
- % Start Date : 12-MAY-2005
- % Start Time : 08:59
- % Latitude : 39 5.68 N
- % Longitude : 002 47.43 E
- % Water Depth : 00153

Table of measurements:

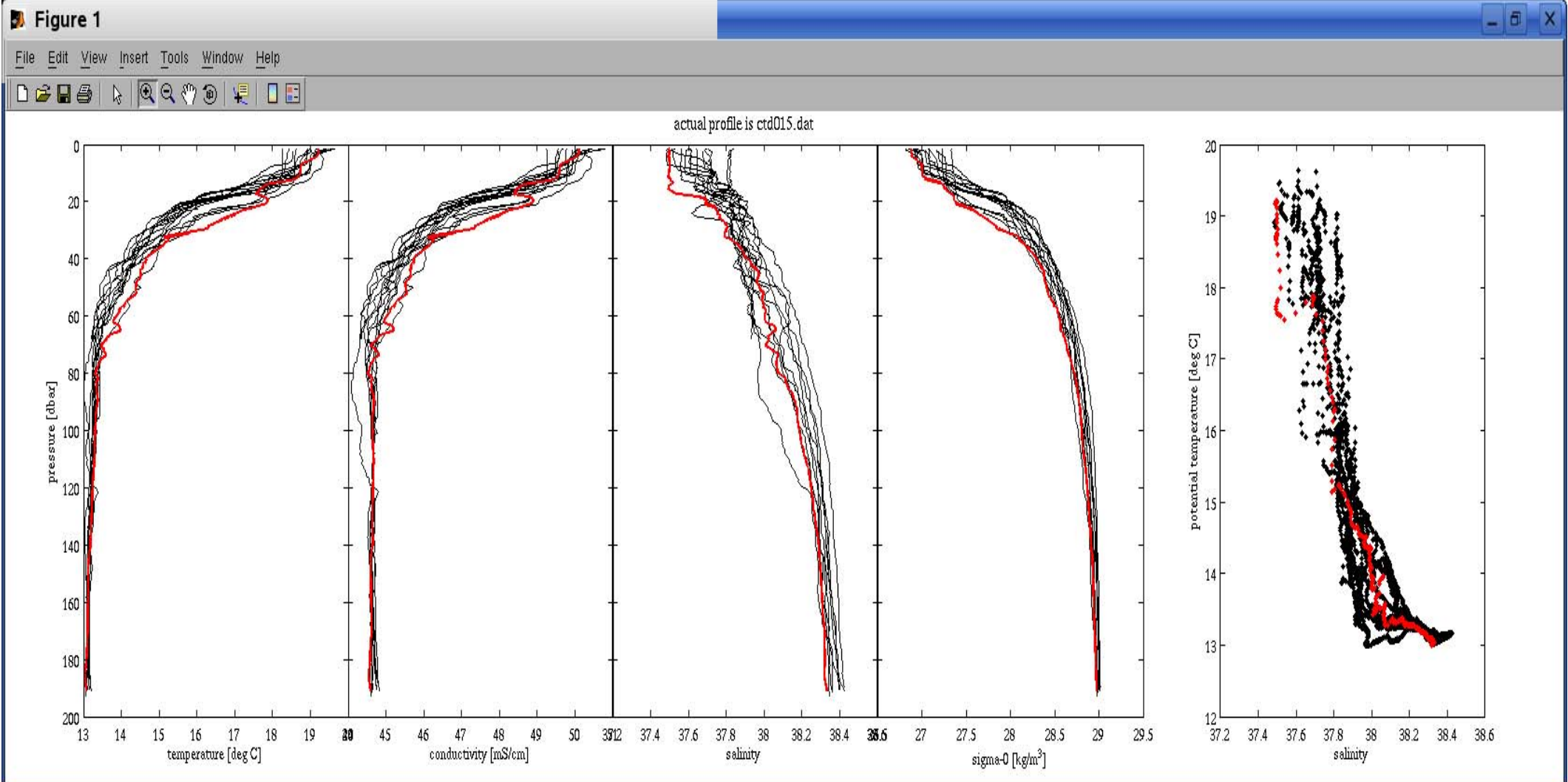
%	Press (dbar)	Temp. (deg C)	Cond. (mmho/cm)	Salin. (ppt)
%	0.5	19.0961	23.7951	16.4850
	1.0	19.0412	42.4570	31.2804
	1.5	18.9394	51.6689	39.0834
	2.0	18.9347	49.9390	37.6162
	2.5	18.9303	49.9325	37.6146
	3.0	18.9298	49.9315	37.6140
	3.5	18.9250	49.9262	37.6137
	4.0	18.9133	49.9132	37.6131
	4.5	18.8937	49.8883	37.6096
	5.0	18.8749	49.8652	37.6070
	5.5	18.8582	49.8453	37.6051
	6.0	18.8427	49.8242	37.6011
	6.5	18.8246	49.8035	37.5998
	6.9	18.8069	49.7932	37.6070
	7.4	18.7353	49.7559	37.6405
	7.9	18.5717	49.6120	37.6673
	8.4	18.3722	49.4263	37.6913
	8.9	18.2162	49.2880	37.7160
	9.4	18.1133	49.2088	37.7426
	9.9	18.0725	49.1557	37.7343
	10.4	17.9814	49.0491	37.7262
	10.9	17.8144	48.8738	37.7289
	11.4	17.6826	48.7270	37.7236
	11.9	17.6421	48.6719	37.7131
	12.4	17.5961	48.6116	37.7031
	12.9	17.5407	48.5424	37.6941
	13.4	17.4945	48.4887	37.6900
	13.9	17.4515	48.4388	37.6863
	14.4	17.3573	48.3209	37.6706
	14.9	17.1241	48.0241	37.6275
	15.4	16.8210	47.7118	37.6356
	15.9	16.6616	47.5458	37.6379
	16.4	16.6617	47.5671	37.6566
	16.9	16.6591	47.6035	37.6913
	17.4	16.6802	47.6715	37.7316
	17.9	16.6475	47.6267	37.7225

Footer information: ---:-- ctd005.dat (Text Fill)--L22--C31--Top

Plausibility checks: positions and timings



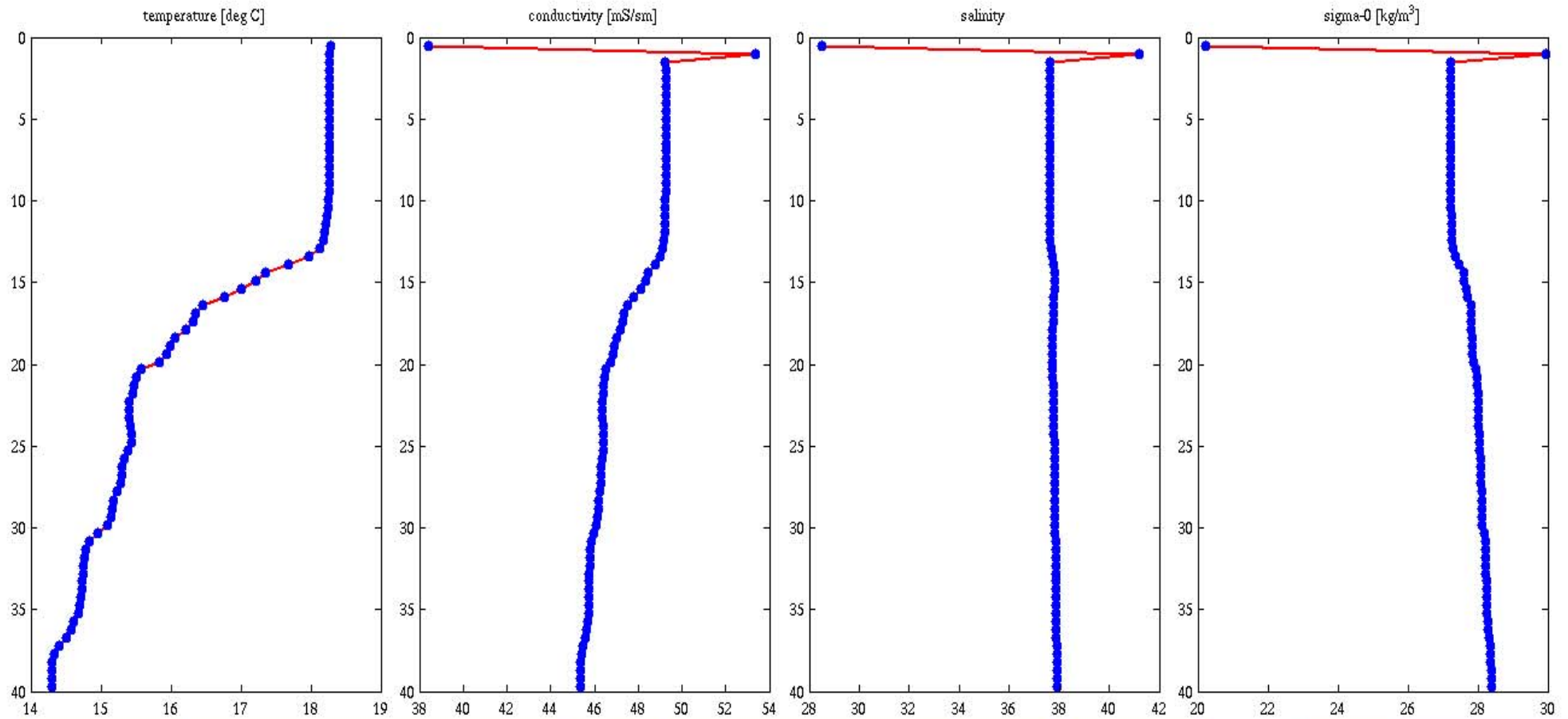
Consistency check



cleaning

Figure 1

File Edit View Insert Tools Window Help



shift temperature						shift conductivity						salinity median filter				undo	count: 0
-1	-01	-001	+001	+01	+1	-1	-01	-001	+001	+01	+1	3pt	5pt	7pt	9pt	reset axes	
<input type="checkbox"/>	kill cycles					<input checked="" type="checkbox"/>	markers					save	ctd001.dat	reject	exit		

... all CTD profiles in
one *.mods file

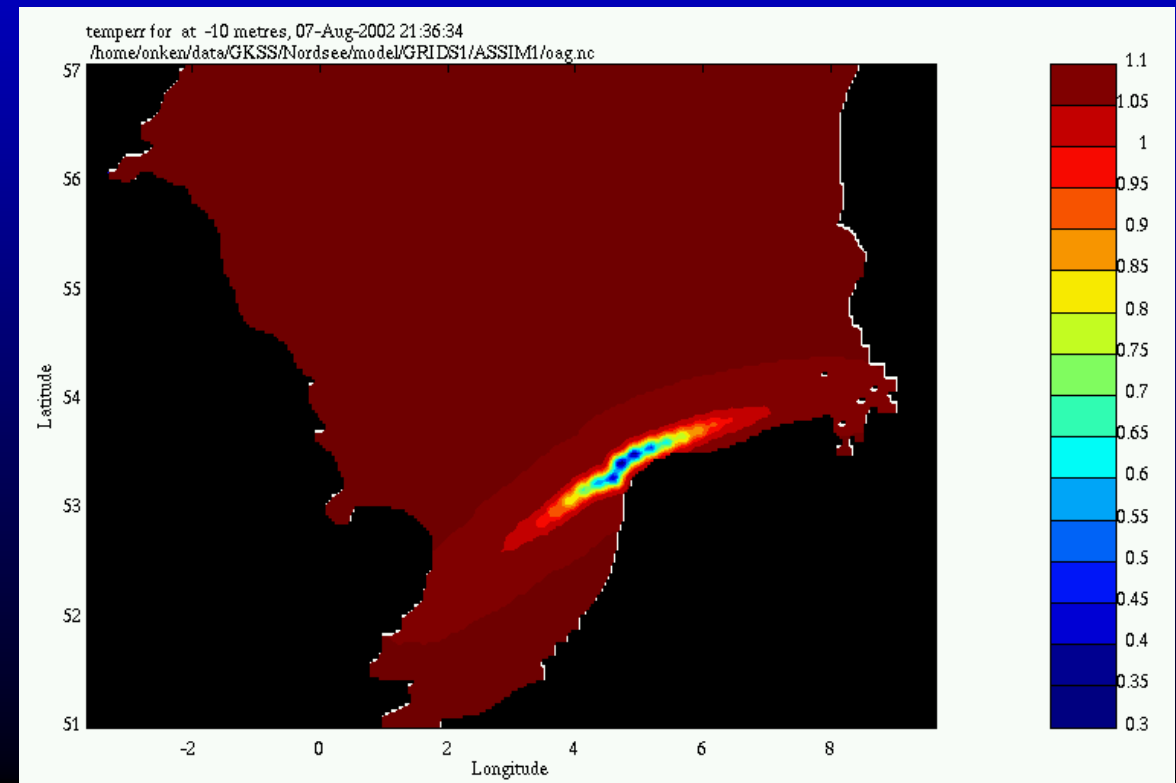
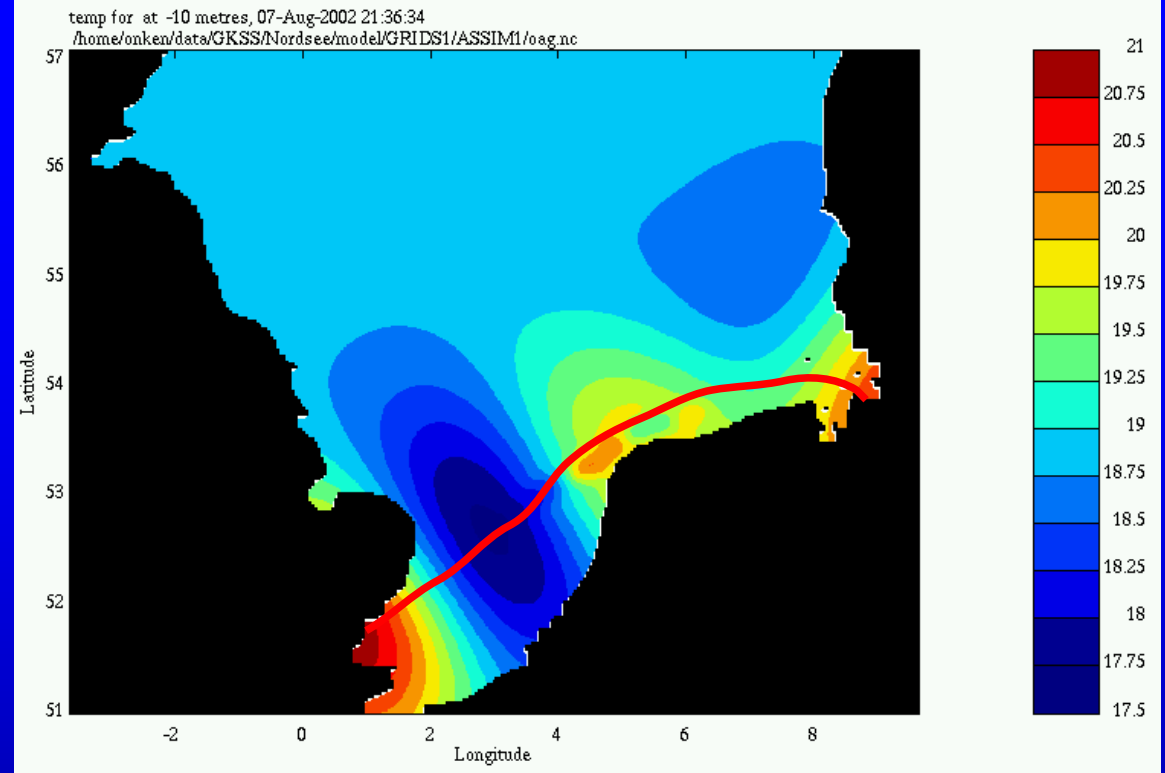
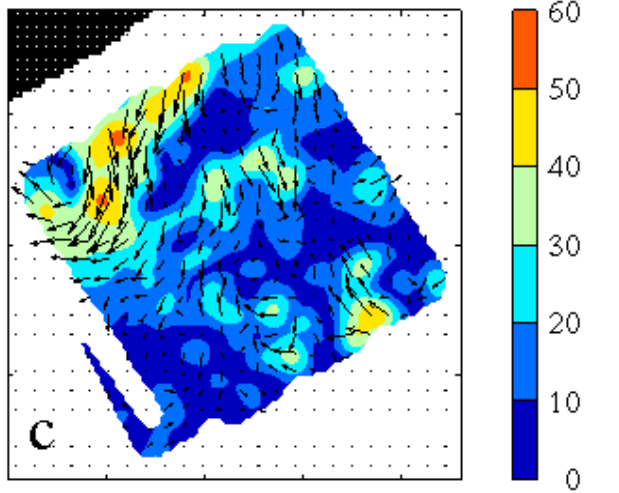
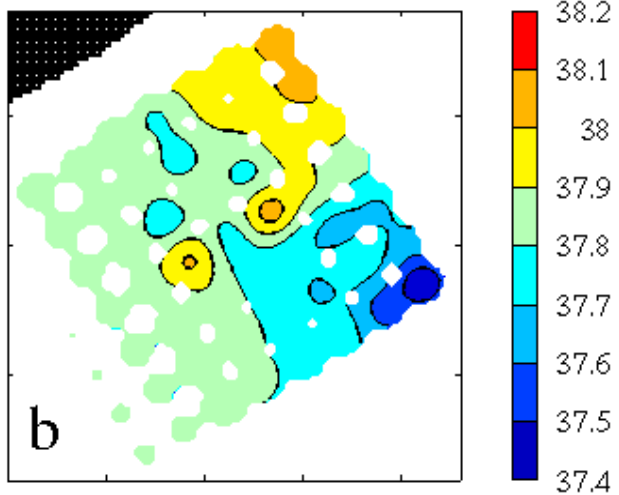
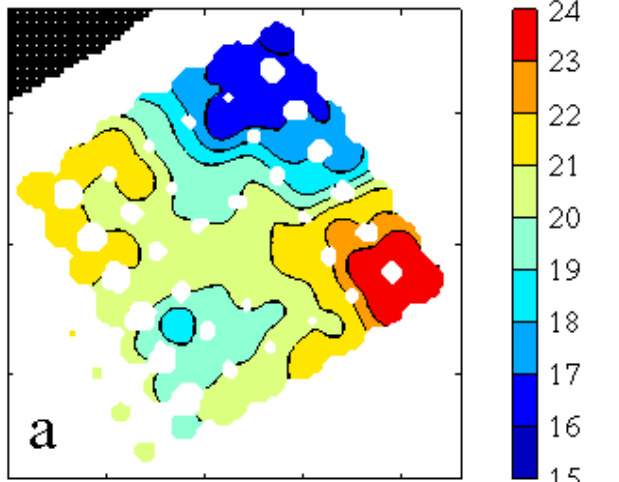
```
emacs@kokp24.gkss.de
File Edit Options Buffers Tools Help

title = ESE00 CTD Data
stations = 14
str_time = 13503.2266, May 12 2005 05:26:15
end_time = 13503.7812, May 12 2005 18:45:00
Jday_offset = 2440000
lng_min = 2.1583
lng_max = 3.0450
lat_min = 38.8367
lat_max = 39.4183
format = ascii, record interleaving
type = CTD
fields = depth, temperature, salinity
units = meter, Celsius, PSU
creation_date = Sunday - March 12, 2006 - 1:20:36 am
END
3 79 1 3.0450 39.2133 40.0 13503.2266 1.00E-01 1.00E-03 1.00E-03
0 'CTD: z t s'
0 15 20 25 30 35 40 45 50 55
60 65 69 74 79 84 89 94 99 104
109 114 119 124 129 134 139 144 149 154
159 164 169 174 179 184 189 194 199 203
208 213 218 223 228 233 238 243 248 253
258 263 268 273 278 283 288 293 298 303
308 313 318 323 328 332 337 342 347 352
357 362 367 372 377 382 387 392 397
18263 18263 18264 18263 18264 18264 18264 18264 18264 18263
18263 18263 18263 18264 18264 18263 18263 18263 18255 18247
18239 18222 18204 18180 18121 17974 17681 17353 17222 17016
16765 16449 16353 16314 16216 16055 15987 15944 15838 15583
15510 15475 15448 15412 15401 15407 15428 15435 15432 15388
15336 15307 15301 15278 15226 15182 15162 15139 15090 14961
14839 14785 14760 14748 14746 14740 14729 14717 14697 14686
14619 14573 14505 14403 14331 14303 14301 14300 14299
37639 37639 37648 37648 37648 37648 37648 37648 37648 37647
37647 37647 37647 37648 37647 37647 37647 37647 37647 37647
37646 37649 37652 37654 37665 37708 37754 37817 37808 37808
37782 37793 37781 37766 37738 37746 37731 37718 37715 37743
37747 37761 37767 37772 37775 37781 37789 37799 37805 37816
37824 37828 37825 37825 37833 37835 37834 37833 37825 37838
37857 37857 37860 37863 37862 37863 37867 37869 37875 37877
37892 37894 37891 37906 37915 37916 37919 37921 37920
3 382 2 2.9767 39.0250 191.0 13503.2627 1.00E-01 1.00E-03 1.00E-03
0 'CTD: z t s'
0 25 30 35 40 45 50 55 60 65
69 74 79 84 89 94 99 104 109 114
119 124 129 134 139 144 149 154 159 164
169 174 179 184 189 194 199 203 208 213
218 223 228 233 238 243 248 253 258 263
268 273 278 283 288 293 298 303 308 313
318 323 328 332 337 342 347 352 357 362
367 372 377 382 387 392 397 402 407 412
--- ctd01-15.mods (Text Fill)--L1--CO--Top
Loading muwheel...done
```


OAG parameter settings

```
emacs@kokp24.gkss.de
File Edit Options Buffers Tools Help
ESE00 2005: Assimilation fields from surface drifters and CTD
6 IHRMT : input hydrography file format (see below)
0 ICLMA : option to compute mean fields (see below)
6 ICFRMT : input climatology file format (see below)
0 COORD : grid: [0] Cartesian, [1] spherical, [2] rotated spherical
276 IM : number of points in the zonal direction
314 JM : number of points in the meridional direction
2. DX : zonal grid spacing (km or degrees)
2. DY : meridional grid spacing (km or degrees)
2.75 CLNG : domain centroid longitude (degrees, west values are negative)
40.8 CLAT : domain centroid latitude (degrees, south values are negative)
0 DELX : X-offset from transformation point to grid center. (km or deg)
0 DELY : Y-offset from transformation point to grid center. (km or deg)
0 THETAD : domain rotation (degrees, positive counterclockwise from EAST)
1000 ROUT : outlier radius (km), observations. outside ROUT are rejected
0 METHOD : [0] direct: LU decomposition, [1] minimization: CG
1 ICORR : type of analytical correlation (see below)
20 XZERO : correlation, zonal zero crossing (km)
20 YZERO : correlation, meridional zero crossing (km)
10 XDCAY : zonal decorrelation (decay) scale (km)
10 YDCAY : meridional decorrelation (decay) scale (km)
2 TDCAY : temporal decorrelation (decay) scale (days)
0 UPHSE : correlation, zonal phase speed (km/day)
0 VPHSE : correlation, meridional phase speed (km/day)
0 CORANG : correlation, rotation angle (deg) counterclockwise from EAST
200 XZEROM : MEAN - correlation, zonal zero crossing (km)
200 YZEROM : MEAN - correlation, meridional zero crossing (km)
100 XDCAYM : MEAN - zonal decorrelation (decay) scale (km)
100 YDCAYM : MEAN - meridional decorrelation (decay) scale (km)
20 TDCAYM : MEAN - temporal decorrelation (decay) scale (days)
0 UPHSEM : MEAN - correlation, zonal phase speed (km/day)
0 VPHSEM : MEAN - correlation, meridional phase speed (km/day)
0 CORANGM : MEAN - correlation, rotation angle (deg) from EAST
0.1 OBSERR : observation error (value to add to correlation matrix diagonal)
0.4 CLMERR : climatology error (value to add to correlation matrix diagonal)
4 NORD : order to of Shapiro filter to apply to each OA field
0 NFRQ : number of times to Shapiro filter the field (0 no filtering)
4 NFLD : number of fields to OA
2,3,8,9 IDFLD : field(s) type to OA, IDFLD(1),...,IDFLD(NFLD), (see ID below)
0 IDHOPT : dynamic height option: [0] no, [1,2,3,4] yes (see below)
100 ZREF : level of no motion (in meters) for dynamic height computation
15 NDAY : number of days to OA. Line below, OADAY(1),...,OADAY(NDAY)
13502.5 13503.5 13504.5 13505.5 13506.5 13507.5 13508.5 13509.5 13510.5 13511.5 13512.5 13513.5 13514.5 13515.5 13516.5
16 NLEV : number of depth levels to OA. Line below, depth(s) in meters:
0 10 20 30 40 50 60 70 80 90 100 120 140 160 180 200
1 IGRIDS : flag to read in GRIDS NetCDF file: [0] no, [1] yes
1 IWRT : flag to write out verbose output: [0] no, [1] yes
oag.nc
oag.echo
/home/onken/data/IMEDEA/UVASSIM/ESE00/CTD_and_buoys/ctd_and_buoys.mods
/dev/null
../grids.nc
--:** oag.in (Text Fill)--L20--C8--Top-----
Auto-saving...done
```

OAG products



Assimilation of gliders (tentative)

potential problem:

- too many profiles (for > 500 profiles OAG very time consuming)

strategy:

- map glider profiles on model grid points *before* running OAG
- method? (linear or nearest neighbour interpolation, cubic splines, simple average)

====> reduction of number of profiles