

Ocean Carbon and Biogeochemistry Data System

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EDDIES cruise: OCEANUS 415-4 Tracer 2 PI notes for Tracer Injection and Sampling Sled Data

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Tracer Injection Sled Description

The tracer injection sled for the EDDIES project lowered to the target potential density surface and then towed along that surface at 0.5 m/s while the tracer is injected. The sled is neutrally buoyant and is towed at the end of a 2-meter tether attached to the end of the CTD cable, which removes much of the ship motion. To follow lower frequency displacements of the target surface, the winch is controlled automatically with feedback from a SeaBird 911plus CTD system (Ledwell et al., 1998). The CTD has dual pumped C/T sensors mounted at the front of the sled to sample water not perturbed by the thermal wake of the sled. Also with the CTD was the same WET Labs fluorometer that had been used on Survey 1 on the Oceanus CTD/Rosette system. On the injection sled are also mounted injection orifices, pumps, batteries, fluid reservoirs, and control electronics for the injection. No injection sled data were reported for this cruise.

Sampling Sled Description

The sampling sled is similar to the injection sled in that it carries the same SeaBird 9 CTD and the WET Labs fluorometer. It is mounted directly at the end of the CTD cable, with no tether, and with an array of integrating samplers above and below it (Ledwell et al. 1998). It is oriented into the flow with wedge-shaped panels on the aft end, and is also controlled to stay as near as possible to a target isopycnal surface.

Ledwell *et al.*, 1998

Ledwell, J. R., A. J. Watson, and C. S. Law, Mixing of a tracer in the pycnocline, *J. Geophys. Res.*, 103 (C10), pp. 21,499-21,529, 1998.

Sled Data Description

Data from the casts with the injection and sampling sleds are divided into downcast, flights along the target surface, and upcasts, indicated by "down", "flight" and "up" in the filenames, respectively.

Thirteen casts were done with the sampling sled on this cruise. Casts 5 and 12 were for calibration only. The others were all part of the tracer survey, and are labeled sampling tows 1 through 11. There are 13 sampler casts, 001 through 013. Data from cast 1 are reported separately because the CTD unit was configured with two fluorometer sensors, a WET Labs ECO-AFL/FL and a Chelsea Instruments fluorometer. Chlorophyll-a estimates from the Chelsea fluorometer for the first scan reported from each downcast were set to 'nd', because the values were erroneously high (2600-3200).

The sled sampling events as reported in the cruise event log are:

```
#  cruise: OC415-4 EDDIES Tracer 2
#
event      date      time  lon      lat      cast  ev_type  comments
-----
200508310100  20050831  0100  -70.845  29.882  1      Sampler  Tow
200508311230  20050831  1230  -69.845  29.711  1      Sampler  End Tow
200509010100  20050901  0100  -70.784  29.791  2      Sampler  Tow
200509011200  20050901  1200  -70.518  29.727  2      Sampler  End Tow
200509020100  20050902  0100  -70.723  29.808  3      Sampler  Tow
200509021200  20050902  1200  -70.436  29.737  3      Sampler  End Tow
200509030100  20050903  0100  -70.720  29.726  4      Sampler  Tow
200509031200  20050903  1200  -70.425  29.614  4      Sampler  End Tow
200509040030  20050904  0030  -70.408  29.922  5/6    Sampler  Tow/Cast
200509041130  20050904  1130  -70.193  30.095  5/6    Sampler  End Tow
200509050130  20050905  0130  -70.578  29.735  7/6    Sampler  Tow/Cast
200509051200  20050905  1200  -70.289  29.685  7/6    Sampler  End Tow
200509060100  20050906  0100  -70.453  29.821  8/7    Sampler  Tow/Cast
200509061130  20050906  1130  -70.276  30.027  8/7    Sampler  End Tow
200509080230  20050908  0230  -70.453  29.821  9/8    Sampler  Tow/Cast
200509081330  20050908  1330  -70.276  30.027  9/8    Sampler  End Tow
200509090030  20050909  0030  -70.544  29.696  10/9   Sampler  Tow/Cast
200509091200  20050909  1200  -70.776  29.762  10/9   Sampler  End Tow
```

200509100030	20050910	0030	-70.559	29.712	11/10	Sampler	Tow/Cast
200509101200	20050910	1200	-70.926	29.853	11/10	Sampler	End Tow
200509110100	20050911	0100	-70.181	29.875	11/12	Sampler	Tow/Cast
200509111230	20050911	1230	-70.421	29.722	11/12	Sampler	Recovery

The primary variables added to the database from the original SAM_00?_*.mat files are:

scan	scan number
yearday	time in decimal days, referenced to 0 at start of 2005
lat	decimal degrees north
lon	decimal degrees east (negative in our case)
temp0	temperature, primary sensor pair (T90, deg C))
temp1	temperature, secondary sensor pair (T90, deg C))
cond0	conductivity, primary sensor pair
cond1	conductivity, secondary sensor pair
press	pressure (dbar)
v0	Chelsea Instruments fluorometer voltage
v5	Wetlabs fluorometer voltage (only for Cast 001)
sampl	Sampler status: 1=ON; 0=OFF (estimated)

and the derived variables are:

sal0	Salinity, primary sensor pair
sal1	Salinity, secondary sensor pair
WetI	Chlorophyll from WetLabs fluorometer on Cast 1 WetI = 3.5334*v5 - 0.3250, with v5 in volts
fluor_chla	Chlorophyll from Chelsea Instruments fluorometer voltage, v0, (mg/m3): inter-calibrated with the WetLabs fluorometer used on cast 1

Salinity Calibration

A few salinity samples were taken during the tows during OC415-4.

The mean values should be subtracted from sal0, and potential temperature and potential density should be recalculated accordingly.

Cruise	Name	No. of samples	Mean S - Autosal	Std. Dev.
OC415-4	Tracer 2	6	0.0040	0.0034

PI notes pertaining to the Seabird 911plus CTD unit

24 scans were averaged, so data were recorded at 1 hz.

A correction for the thermal mass effect was made with coefficients:

a = 0.027300, b = 0.100000

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