

Ocean Carbon and Biogeochemistry Data System

[OCB DMO](#)
[BACK](#)

EDDIES cruise: OCEANUS 415-2 Tracer 1 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.

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.

There are 2 injection casts, 003 and 004, and 7 sampler casts, 001 through 007.

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

```
#  cruise: OC415-2 EDDIES Tracer 1
#
event      date      time  cast  lon      lat      ev_type  comments
-----
200507202354 20050720 2354  nd    nd        nd        Inject   Test
200507211601 20050721 1601  1     -67.123  30.560   Inject   Start Inject
200507211604 20050721 1604  1     -67.123  30.559   Inject   End Inject
200507220001 20050722 0001  2     -67.001  30.595   Inject   Start Inject
200507220018 20050722 0018  2     -67.003  30.591   Inject   End Inject
200507230018 20050723 0018  3     -67.241  30.450   Inject   Start Inject
200507231020 20050723 1020  3     -67.184  30.293   Inject   End Inject
200507231540 20050723 1540  4     -67.271  30.308   Inject   Start Inject
200507231800 20050723 1800  4     -67.259  30.265   Inject   End Inject
200507262333 20050726 2333  1     -66.515  28.169   Sampler  Sampler Start
200507270045 20050727 0045  1     -66.509  28.154   Sampler  Sampler End
200507280032 20050728 0032  2     -67.429  30.233   Sampler  Sampler Start
200507281202 20050728 1202  2     -67.190  30.017   Sampler  Sampler End
200507290048 20050729 0048  3     -67.717  30.090   Sampler  Sampler Start
200507291202 20050729 1202  3     -67.461  30.001   Sampler  Sampler End
200507300024 20050730 0024  4     -67.567  29.934   Sampler  Sampler Start
200507301201 20050730 1201  4     -67.618  30.161   Sampler  Sampler End
200507310034 20050731 0034  5     -67.618  30.003   Sampler  Sampler Start
200507311202 20050731 1202  5     -67.539  30.233   Sampler  Sampler End
200508010127 20050801 0127  6     -67.653  29.911   Sampler  Sampler Start
200508011230 20050801 1230  6     -67.642  30.159   Sampler  Sampler End
200508020130 20050802 0130  7     -67.049  29.890   Sampler  Sampler Start
```

200508021234 20050802 1234 7 -67.695 30.158 Sampler Sampler End

The primary variables added to the database from the original INJ_00?_*.mat files are:

scan scan number
 yearday time in decimal days, referenced to 0 at start of 2005
 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)
 v5 fluorometer voltage
 pump_1 Tracer pump 1 status: 1=ON; 0=OFF;
 pump_2 Tracer pump 2 status: 1=ON; 0=OFF;

and the derived variables are:

sal0 Salinity, primary sensor pair
 sal1 Salinity, secondary sensor pair
 fl Chlorophyll from fluorometer voltage, v5, (mg/m3):
 $fl = 3.5334*v5 - 0.3250$, with v5 in volts

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)
 v5 fluorometer voltage
 sampl Sampler status: 1=ON; 0=OFF

and the derived variables are:

sal0 Salinity, primary sensor pair
 sal1 Salinity, secondary sensor pair
 fluor_Wetl Chlorophyll from fluorometer voltage, v5, (mg/m3):
 $fluor = 3.5334*v5 - 0.3250$, with v5 in volts

Salinity Calibration

A few salinity samples were taken during the tows during both OC415-2.

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.
OC415-2	Tracer 1	12	0.0069	0.0023

PI notes pertaining to the Seabird 911plus CTD unit

SeaBird 911plus set up parameters

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

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

$a = 0.027300$, $b = 0.100000$

Calibration coefficients used on this run:

conductivity sensor 0 Serial No = 224

$g = -4.235789670000e+000$

$h = 5.030437210000e-001$

$i = -2.164846790000e-003$

$j = 1.373217080000e-004$

CTcor = $3.250000000000e-006$

CPcor = $3.616348326169e-230$

conductivity sensor 1 Serial No = 763

g = -4.219668290000e+000
h = 4.468958890000e-001
i = 8.929849640000e-005
j = 1.422904140000e-005
CTcor = 3.250000000000e-006
CPcor = 3.616348326169e-230

temperature sensor 0: (ITS090) Serial No. = 1080
f0 = 1.000000e+003
g = 4.795938520000e-003
h = 6.727434680000e-004
i = 2.635684590000e-005
j = 2.154517740000e-006

temperature sensor 1: (ITS-90) Serial No. = 1085
f0 = 1.000000e+003
g = 4.858597320000e-003
h = 6.721669580000e-004
i = 2.508981820000e-005
j = 1.909927960000e-006

pressure Serial No = 59933
C1 = -4.462697000000e+004
C2 = -2.850590000000e-001
C3 = 1.241750000000e-002
D1 = 3.985600000000e-002
D2 = 0.000000000000e+000

pressure:
T1 = 3.041551000000e+001
T2 = -4.168600000000e-004
T3 = 3.885970000000e-006
T4 = 3.330870000000e-009
T5 = 0.000000000000e+000

Voltage Assignments:

V0 = n/a
V1 = n/a
V2 = n/a
V3 = n/a
V4 = n/a
V5 = WetLabs Fluorometer
V6 = n/a
V7 = n/a

BACK

Go back to your previous page