

1/26/20

SAMW

Day 1

1

Here we go

0740 GMT

Computers set to GMT

≈ 30 Knots SW - on our beam

steering 8.5 Knots @ 125

Seas 2-3 m - good roll

Working on UW Sys - Cal

VSE Dark currents

Dry - 169 - 171 - 165

Wet - 171 - 176 - 172

PH Cal 57.5 - 0.21 on meter

PH	V
4	1.818
7	2.561

Water CAL

026-1715.dat

 bb 1.4×10^{-3}
 Temp 21.14

AC4	A	C
412	0.04	0.023
440	0.09	0.056
488	0.05	0.105
510	0.032	0.098
555	0.033	0.072
630	0.029	0.075
650	0.022	0.068
676	0.021	0.065
715	0.03	0.094

GMT

1/26

1752

U/W turned on

026-1752 Lat

Stable after
trying Absolute Filtered Sea Water
Bypass

FSW U/W

026-1901 Lat

$b_b = 1.6 \times 10^{-3}$
 $CH \approx 20$
 Temp = 21.2

AK9	A	C
412	0.096	-0.015
444	0.031	0.011
488	-0.008	0.011
50	-0.020	0.014
55	0.050	0.013
60	-0.020	0.018
65	-0.036	0.009
676	-0.034	-0.007
75	-0.02	-0.017

1920 U/W re-started - Normal

026-1920 Lat

1942

A little cycling

38.15 N 22.44 W

U/W Water Intake @ 4.5 m

1/27/20

GMT

230 All power on ship went out ...
 propulsion, hotel, everything.

Ships emergency generator went on but
 U/W computer down.

202 - Power coming up again

223 Ship moving again - No GPS

0130 ship moving

0226 $38^{\circ} 33.1685' N$ $023^{\circ} 54.4' E$
 still no GPS to our U/W computer

0328 GPS BACK ON!

0322 SAs ON! (7 LOISINS)

SR 0329 30

LAN 10 30 33

SS 17 43 08

UTC

0307 SON 001 CAST 01

-38.583 N 24.001 W

FROM CAST

FL 001 MAX @ 37 M

EVENT # 20200127.0307.001

Significant b_b cycling - $b_b \approx 1 \times 10^{-3}$
 $CH \uparrow$ Temp $\uparrow$ SW $\downarrow$

1/27/20

1300 - Start Aerosol Sampling

40 Cubic Feet / hour

38.59 S x 24.98 E

1400 VPR being recovered early due
to deteriorating weather
≈ 35 knots

1700 VERY exciting VPR recovery
Successful

2002 CTD STN 2 - 250m

-38.7167 x 28.2328

2112 CTD Recover

transit to STN 3

2345 Shutting down U/W
For FSW run and re-start

Filtered run

027-2355.dat

1/28/20

0013 Re-started U/W

028-0012.dat

0341 Stopping for STN 3.01
CTD prod cont 202001280341

01/28/2020

214:20 - Retrieved 1st aerosol sample
(-38.79, 21.70)

2138 CTD STN 4

-38.8105 x 30.1489

2154 Running FSW Cal. on U/W

028-2354.dat

bb = 1.605 c⁻³

1/29

Re-start U/W

029-0010.dat

0610 UW 33

202001290610

Lat -38.98564

Long 031.51799

0747 Ship Engineer bored out fluorometer cuvette holder
- will be using centrifuge tubes w/out decanting
- will need to cover top w/ tinfoil, cap

As per Eads Anderson - nutrients to be done
every underway station w/out filters, refrigerated

0801 UW 34

20200129.0810

Lat -39.03069

Long 31.59551

1001 UW 835
20200129.1001

Lat -39.67495
Long 32.30524

1205 UW 436 * GMT 1205
20200129.1205
(-39.12607, 32.71729)

1229 retrieve 2nd Aerosol sample
(-39.13 32.79)

1400 UW 537
(-39.18288, 33.13986)

1427 UW 837 (bb' = 1.5e-3)
(-39.18573, 33.22615)

1602 UW 39
(-39.21203, 33.55154)

1800 UW 40
(-39.24472, 33.94511)

2000 UW 41
(-39.26178, 34.33061)

2120 Turned back to W to recover
VPR

Aiming For 39° 11.45' S X 33° 18' E

2127 UW 42
(-39.2708, 34.2563)
bb' 2.73e-3

maybe pretty due to
bubbles - Pitching a lot

1/29/20

2337 U/W Filter CAL

029-2337.DAT

$b_b = 1.76e^{-3}$

2357 Re-started U/W

029-2357.DAT

1/30/20
U/W Sample (43)

-39.2310
33.7548

0158 b_b' still hanging at $5e^{-4}$, ~39.19976° x 33.3721°

0226 slowing down approaching Str 5 ^{coco} Bloom
 $b_b' 1.04e^{-3}$

0235 CTD Str 5 ^{coco} Bloom event 20200130.0235

0715 TM fish Sampling Started

-39.2369 x 33.2267

0909 TM fish done, Deploying UOR

-39.28583 x 33.14528

1/30/20

100 U/W Sample (55)

-39.38013
32.85489

20200130.1700 (GMT)

300 U/W Sample 56

-39.37958
32.74271

20200130.1300 (GMT)

Experiment 1

(57-59)

Incubator Set @ 17°C

Containers

Treatment

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

Control A

B

C

In Incubator 1145

+ N A

B

C

1220

+ SAMW Filter

B

C

1L A

+12 μ Ml

+ Si

+12 Si + 4 μ Ml Fe

+4 μ Ml

+ Fe

1315 Aerosol Filter Snapped
-39.39 x 32.66

1500 UW 60

(-39.51996, 32.42860) GMT 1500

1700 UW 61

(-39.6889, 32.40238)

1900 UW 62

(-39.67977, 32.7961)

Sal = 34.61

2100 UW 63

(-39.67887, 33.19406)

2245 UW 64

- hi bb' 1.12e-3

(-39.6908 x 33.5593)

2337 Re-start w/ Absolute 0.3um Filter

030-2336 dat

bb = 1.90 e-3

1/31/20

Re-start U/W

0100 UW 65

-39.68197 x 34.00714

Sal 35.25

0300 UW 66

-39.68136 x 34.40087

Sal 35.15

0430 Porpoises on port bow

1/31/20

11

0500 UW 67

Lat -39.68534

Long 34.81162

bb' still low

Sal 35.24

0541 -39.686 x 34.954 bb' = 1.06E-3

0625 -39.605 x 35.003 bb' = 1.04E-3

0700 UW 68

Lat -39.55255

Long 34.97988

Sal 35.07

0726 -39.558 x 34.972 bb' = 1.35E-3

0730 ship stopped to pull in VPR for repair

0742 -39.56090 x 34.97493 bb' = 1.72E-3

803 values have been consistently at 1.24E-3 so while we are waiting for the VPR to be repaired, we'll run a CTD

0820 CTD Str 006.01 -39.56773 x 34.9793°E

1207 Aerosol Filter Changed

-39.5584 x 34.9847

1230 Exp 1 T11 (324) Sampling Started

1605 (-39.47442, 34.31747) bb' = 1.56E-3 UW 95

1/31/20

06 - 39.47239
33.91913
UW #96

1800 Noticed chiller had shut down
water temp starting to climb

Probably due to high condenser
pressure - warmer surface water

Reset and adjusted cooling flow rate.

2000 - 39.47767
33.93575
UW #97

2159 - 39.46950
33.94191
UW #98

2/1/20

0052 CTD STN 007.01
Event 202002010052

- 39.4752 34.1997
center of filament or eddy
 $bb' = 1.33e-3 m^{-1}$

0230? TM Cast

13

2/1/20

110 Moving ship to periphery of eddy (N side)
to set it up for a VPR swath through
it at 1100Z. Heading for $-38^{\circ}30'S$ $\times$ $034^{\circ}12'E$

1200 - 39.49609 $\times$ 034.1957 $bb' = 1.3e-3$

1450 Move pH limit to 5.4 from 5.5

1500 crossing beginning of a front ⁰⁵²² Just a
chit bb' diving Temp $\downarrow$ Sal maybe diving
- 39.1317 034.200

1504 lowered pH to 5.30 to get bb' values
all similar (not a negative slope w/time.)

1554 Definitely at front
 $\uparrow$ fluor, $T \downarrow$ $S \downarrow$ $bb' \downarrow$
- 39.14185 034.2025E

1601 $bb' = 4.95e-4$

1610 UW 107

Lat - 39.09192
Long 34.20293
 $bb' = 4.36e-4$

1650 chl 4.81 SST 16.5 SSS = 34.83 $bb' = 2.43e-4$
- 38.915 034.20

2/1/2020

0702 T ↑ 20 S ↑ F ↓
38.9139 S x 103.2025

T = 19.63
F = 0.99
S = 35.27
 $bb' = 6.79 \times 10^{-4}$

0707 T ↓ S ↓ $bb' = 2.90 \times 10^{-4}$
(clipped from $\approx 1.3 \times 10^{-3}$)

0806 T ↓ S ↓ (17C, 35.1), $bb' \downarrow 2.0 \times 10^{-4}$, but
fluor. ↑ ≈ 11

0810 UW 108
-38.72401 x 34.20028
 $bb' = 2.09 \times 10^{-4}$

0945 finished transect arriving on sta
-38.4563 103.196E. Ship turning
for VPR deployment

Fluor low, sal, temp. high, bb' low
We are in Agulhas Current

0933 STOPPING UW FOR PSW Pump
032 - 6933.DAS

acq	412	0.06
440	0.17	0.07
488	0.14	0.07
510	0.13	0.07
555	0.12	0.07
630	0.19	0.06
650	0.12	0.06
676	0.11	0.04
715	0.04	0.03

$bb' = 1.52 \times 10^{-3}$

2/1/20

0941 VPR in water for southward transect

0950 UW system restarted
file 032 = 0949.dat

1010 ~~UW 109~~ → NO underway, turning
-38.5998 x 34.2036
 $bb' = 1.52 \times 10^{-4}$
Heading South
on same track

1149 small fluor bump 20' ago
Sampling Sal ↓ $bb' \uparrow = 6.39 \times 10^{-4}$

1200 UW 109 $bb' = 5.11 \times 10^{-4}$
(-38.88356, 34.19749)

1215 Aerosol C
(-38.92408, 34.19363)

1200 Sampling of Exp 1 T2

1600 UW Sample (128)
-39.4952 x 34.19.73
 $bb' = 1.32 \times 10^{-3}$

1800 UW Sample 129
(-39.79825, 34.19859)

2000 UW Sample 130
(-40.10332, 34.20029)

Ground Hog Day!

404 - 40.439 x 034.19157

bb' = 1.48e-3

404 - 40.439, 034.1934 bb' 1.45e-3

0601 - 40.1586 034.2021 bb' 1.2e-3

0720 on str 009.01 - 40.0006 x 34.19952

0830 off str 009.01 slip during 800's, on two small generators

0838 - 39.9953 x 034.19818E bb' = 1.19E-3

0950 - 39.8320 x 034.19905E bb' = 1.12e-3

1020 - 39.76572 x 034.20170 bb' = 9.92e-4

1211 2/2/20 (-39.47318, 34.19964)

Aerosol 6

1218 U/W off for FSW run
033 - 1221. DAT For 10 S 100
bb' = 1.88e-3

033 - 1231. DAT For acc?

1238 Back on for regular work
033 - 1238. DAT

2/2/20

17

1900 ARGOS Chiller Assembly
#137

and put out on fantail

-39.358 x 34.199

2339 Re-start U/W

FSW Calibration

bb' = 1.5 e-3

2/3

Restart U/W

40010. dat

0000

VPR deployed

0048

-38.49575 34.20882E

bb' 8.85e-5

0200 U/W 171

Lat -38.61906

Long 34.35290

bb' 9.05e-5

0305 Incubators uncovered

-38.7449 34.52189

bb' 8.6e-5

0400 U/W 172

Lat -38.85095

Long 34.66099

bb' 8.86e-5

0550 Very Low Power (<1), $bb' 1.33 e^{-5}$

0600 UW 173

Lat -39.68577

Long 34.96670

$bb' 2.90 e^{-5}$

0800 UW 174

Lat -39.31264

Long 35.25704

$bb' 1.97 e^{-4}$

0956 coming onto str 012.01, beginning
E $\rightarrow$ W CTD line
-39.48095 035.51615
 $bb' 1.19 e^{-3}$ (shot up least 5 miles)

1202 Aerosol
-39.47417
35.43418

1030 CTD Stat. 13
-39.4752
35.4670

$bb' 5.91 e^{-4}$

1449 CTD 14
-39.475 x 34.8335

1847 CTD 15
-39.4748 x 34.2003

2241 CTD 16
-39.4754 x 33.5653

2/3

2340 u/w restart w/ FSW
 $bb' 2.5 e^{-3}$ 034-2340. det

2/4 u/w re-start
035-0001. det

0525 VPR in water, start moving

0715 UW 215

Lat -39.27506

Long 33.18120

$bb' 3.77 e^{-4}$

0915 UW 216

Lat -39.3291

Long 33.0889

$bb' 5.12 e^{-4}$

1004 COOPS FORGOT TO TURN ON SAS
ITS ON NOW

1115 UW 217

Lat -38.86963

Long 33.73946

$bb' 2.59 e^{-4}$

2/4

1211

Aerosol

(-38.76823, 33.86381)

1602

Fsw

234

-38.3661 x 34.297

1610

Shutting down U/W for cleaning/maintenance

Fsw 035-1611.dat

 $bb = 1.67e^{-3}$

MR Run - Dirty

035-1635.dat

 $bb = 1.4e^{-3}$

AC9 Aerosol - wet! Still water in Aerosol um

MR Clean

035-1732.dat

 $bb = 1.4e^{-3}$ $T = 23.16$

1819

Restart

035-1820.dat

2000

Underway 238

(-37.75133, 34.72124)

2/4/20

2201

Underway #239

-37.44336, 34.94116

23/20

0000

UW

240

-37.12885 x 35.15344

 $bb' = 1.16e^{-4}$

200

UW

241

-36.81359 x 35.37307

 $bb' = 2.80e^{-4}$

400

UW

242

-36.49475 x 35.59441

 $bb' = 2.94e^{-4}$

0600

UW

243

-36.15873 x 35.82434

 $bb' = 2.83e^{-4}$

0800

UW

244

-35.88477 x 36.07138

 $bb' = 3.5e^{-4}$

1000

UW

245

-35.88835 x 36.45454

 $bb' = 1.43e^{-4}$

1200

UW

246

-35.88135, 36.81235

22 2/5/20

1214 bb' trending upward as we steam into eddy
 -35.8814 36.85177 bb' = $5.61e-4$
 36.85177

1219 -35.88172 036.86664 bb' = $5.07e-4$

1225 -35.88203 036.88322 bb' = $4.92e-4$

1231 -35.886 036.900 bb' = $4.57e-4$

1237 -36.88131 036.9194 bb' = $4.44e-4$

1242 -35.88150 036.9336 bb' = $4.58e-4$

1249 -35.8815 036.9487 bb' = $4.64e-4$

1255 -35.880 036.973 bb' = $4.75e-4$ ←

1301 -35.88067 036.98377 bb' = $4.37e-4$

1305 Turning 90° to port to find bristler
 reflectance. Ship turns 15°/min so 6' to 90°
 1306 -35.88063 036.98000 bb' = $4.23e-4$
 Tow for 15' to see if signal goes up then

1313 -35.8667 037.01031 bb' = $3.89e-4$

1315 -35.85496 037.00902 bb' = $4.34e-4$

1324 3.19e-4

1330 -35.82932 037.00117 bb' = $3.17e-4$

1336 -35.82603 037.98548 3.05e-4

1348 VPR aboard heading back to spot at 1255 GMT
 -35.880 036.98000 in 4 miles
 -35.880 036.983 where bb' was $4.75e-4$
 -35.52.85 036° 58.38 E T.M. last T.M. collection
 CTD str

23

2/5/20

142 On str 018.01 for TM cont,
 T.M. Fish, Pred Count

bb' = $4.074e-4$ bb_{tot} = $2.23e-3 - 1.4e-3$ blank

-35.88011 036.97138

$\frac{2.23}{0.83}e-3$ bb_{tot} corrected

$\frac{0.407e-3}{0.83e-3} = \frac{bb'}{bb_{tot}} = 0.49$

0.49%
 Pic bb

2300 UW # 261
 -35.88195, 37.50292

2340 bb' minima @ eddy center

0100 UW # 262
 -35.88579 x 37.90995

bb' = $2.02e-4$

0301 UW # 263

-35.88529 x 38.31889

bb' = $2.48e-4$

0430 GMT

0632 TURNING FOR NORTH EDGE
 35.87825 x 038.6312

0500 GMT

0700 UW 264

-35.82580 x 38.62421

bb' = $1.3e-4$

0700 UW #265
 Lat: -35.63701
 Long: 38.39392
 bb' = $1.20e^{-4}$

0900 UW #266
 Lat: -35.46787
 Long: 38.13869
 bb' = $1.16e^{-4}$

1100 UW #267
 Lat: -35.30364
 Long: 37.87746
 bb' = $2.28e^{-4}$

1215 Northern edge off eddy
 -35.19' x 37.70'

Positions of Eddy locations

Eddy North	35° 09.0 S	x 037° 37.7 E
Eddy Center	35° 53.0 S	037° 37.7 E
Eddy South	36° 34' S	037° 37.7 E

Approx Donut S	36° 15'	037° 37.7 E
Approx Donut N	35° 27'	037° 37.7 E

Eddy East	35° 53' S	038° 39 E
Eddy West	35° 53' S	036° 36 E

253 - Turning at Northern end of line

Re-starting U/W

037.1254 dat

-35.161 x 37.634

300 UW #268
 (-35.17016, 37.63256)

415 bb' High = $5.36e^{-4}$

-35.3825 x 37.6252

500 UW (-35.5050, 37.6242)
 #269

1710 Passing middle

bb' Variable - some artificial high $> 5e^{-4}$
 cause by swings in bb tot

-35.924 x 37.623

1907 UW 286
 (-36.173, 37.608)

2145 Hauling back UPR
 -36.61 x 37.63

2/7/20

0000 CTD 019 Eddy S -36.6168 037.6274
Event 20200206.2302

0124 Steaming Northwards

-36.41414 037.62124 $bb' = 6.02 e^{-4}$

0235 Sharp Salinity front
CTD/Prod Cast 020.01 Event 20200207.0235 $bb' = 4.72 e^{-4}$

0345 Station SPS and Ed was way too high
AND NOT ~~WAS~~ VARYING

Get SURF TO CHECK END OF DAY / 1500

POWER CYCLE ALL AND ITS BACK MAKING
SENSE

Ed seems to HAVE 'GONE MISSING'
AROUND 12:30 UTC ON 2/6/2020

(0850)

ARCOS drifter deploy

Bay 140137 - Light Flushing 'C' -

0800	35° 52.97	x	37° 37.79
0815	35° 52.98		37° 37.80

1207 Aerosol (-35.4004, 37.6336)

1318 CTD 22 recovered - Steaming
to Edy N
(-35.4027, 37.6305)

2/7/20

Underway 319

1518 (-35.1519, 37.6307)

1701 (-35.3708, 37.9363) Underway 320

1615 SAS shut down

Taking water out bow - bubbles in u/w

1900 Underway 321

(-35.6339, 38.3012)

2125 Underway 322

(-35.8831, 38.6493)

2342 038-2342 dat U/w restart - FSW

$bb' = 1.6 e^{-3}$

2/8/20

0000

UW BACK ON

039-0001. dat

0131 UW 323

-35.8845 x 37.98915

$bb' = 2.79 e^{-4}$

0203 As we approach center bb' drops as
Salinity & SST fall and chl fluor slowly rises
 $bb' = 1.45 e^{-4}$

0305 Coming on Eddy Center str $bb' = 4.3 e^{-4}$

0645 off str

0732 Turned up acid (lowered pH) to pH 5.32 since at 5.5,
the mean trace was not level but trended downwards.

0803

0930

2/8/20
CTD 024.01 Event 202002080803
off station 24 Eddy Interior East
headed for Eddy West

1130

$$b_s' = 5.5 \times 10^{-4}$$

$$-35.880 \times 36.919$$

1138

$$b_s' = 5.8 \times 10^{-4}$$

$$-35.88 \times 36.898$$

1620

Experiment 2 Day 3 Sampling

2/9/20

037

$$b_s' = 1.15 \times 10^{-4}$$

$$-34.3582 \times 35.2851 \text{ E}$$

Mid-Cruise Inventory of Supplies

Product	Quantity left	quantity needed
100 nucleopore	1750	9116
100 HA	1675	898
filters	425	378
tubers	2475	378
tubers	2475	378
ori dishes	775	(796) need to free-up 21 recycled dishes

Assumptions Made: (for calculations)

- 20 CTD stns left
- 1/4 productivity stns (5 total), 24 nucleopore filters/stn req.
- 48 UWL stns left (12/feature, 12 per stream)
- 170 experimental stns left (3 exp, 4 times/exp)
- up to midpoint: 363 samples

In future: - more GFF filters
- more pear dishes
- potentially more open space would help

Sample Assumptions:

/CTD: 8 PUC 8 Bsi 10 chl
8 POC 8 CC 2 Stm
*24 productivity

/UWL: 1 PUC 1 Bsi 3 chl
1 POC 1 CC

/exp: 18 PUC 18 Bsi 18 chl
18 POC 18 CC

*1 out of 4 CTD includes productivity

1015 U/W w/ FSW
 dat $bb = 1.48e^{-3}$

1017 off, Aerosol sampler off
 2.8666 033.9735

1030 U/W Shutting down

1306 mg dirty Cal

070-1306 dat

Temp = 24.91 $bb = 1.29e^{-3}$

Cs good ground 1318

As good ground 1320-21

1017 End Aerosol 13 (-37.8666, 33.9735)

2/11/20

AC9 clean and dry Air CAC

11Feb20 AR296 dat

is an order of magnitude higher than CS
 ≈ 0.1 ≈ 0.02

2/13/20

Checking VSF Pnks before
 re-assembly

Dry	169	171	166
Wet	176	177	174

2/14/20

PH Cal $y = 57.7x - 0.27$

4 = 1.822 V
 7 = 2.565 V

2000 U/W with mg - Clean

045-2002 dat

$bb = 1.20e^{-3}$

Temp 20.85

2045 System full/clean
 U/W restarted

045-2048 dat

2/14

1140 045-1137 dat FSW run
on U/V

2/15/20 bb = 1.51×10^{-3}

0200 UW 380

Lat -36.14265

Long 32.62211

bb' 1.95×10^{-4}

0400 UW 381

Lat -36.5474

Long 32.71920

bb' 2.30×10^{-4}

0600 UW 382

Lat -36.97567

Long 32.81644

bb' 1.39×10^{-4}

0800 UW 383

Lat -37.41653

Long 32.91059

bb' 2.17×10^{-4}

1007 UW 384

Lat -37.88129

Long 32.99897

bb' 1.76×10^{-4}

2/15/20

1151 Aerosol (-38.2481, 33.0382)

1730 big spike in $\frac{bb'}{TS} \approx 8.9 \times 10^{-4}$
dropping

Fluorescence spike is 65 drops

1830 65' over 1×10^{-3}

2000 55' 2.5×10^{-3}

Above 2×10^{-3} from
32.931° to 40.180° S

$\approx 40^\circ$ S

2050 FF slide Vol? 100ml

-40.1075 x 33.376
Event 202002.15.2050

2/16

0323 U/V SHUT DOWN FOR FSW

047-0323.DAT

bb = 1.84×10^{-3}

0338 BACK ON

047-0338.DAT

0347 Beginning South line

-41.50216 033.62267 bb' = 9.96×10^{-4}

0509

Going through lines of brown algae, looks like *Tucho*
Event 202002.16.0509 -41.4495 033.3204E bb' = 1.06×10^{-3}
Took water sample but not sure I'll see anything since intake

2/16/20

0600 UW 385
 Lat -41.49995
 Long 33.13701
 bb' $1.26e^{-3}$

0608 bb' $1.5e^{-3}$ -41.5 033.1046

0649 DID WE PASS THE HIGH ~ 10 MINUTES AGO?

0710 HEADING INTO LOW @ CENTER OF FEATURES

0800 UW 386
 Lat -41.50283
 Long 32.70440
 bb' $1.45e^{-3}$

0816 Now NEAR @ AN EDGE
 -41.50182 x 032.643
 $b_b' = 2.1e^{-3}$
 TH 0.5° IN ONE CYCLE
 SA 0.2 PSU
 FL ↓

1000 UW 387
 Lat -41.49928
 Long 32.29343
 bb' $1.32e^{-3}$

01 UW (-41.4975, 32.17521)

52 Crossing STN 28 @ 31.64° E
 where productivity and TM casts
 Exp supposed to start
 Chl was dropped from 13 to ~ 6
 ss' looks like slowly increasing
 ~ $9e^{-4}$

Temp 16.67
 SAL 34.64

553 ss' above $1e^{-3}$
 -41.495 x 31.418

Temp = 17.41 ↑
 Sal = 34.96 ↑
 Fluor = 6.6 ↓

500 UW # 389
 -41.4955 x 31.3945
 bb' = $1.18e^{-3}$

T = 17.54
 S = 34.91
 F = 6.6

We want station 27 ~ 15 miles E of where
 28 happens - 26 needs to be outside

28 @ near $31^\circ 24'$ or 31.4°

1610 Recovering UPR -
 -41.4934 x 30.928

T = 19.53
 S = 35.33
 F = 1.1
 bb' = $2.19e^{-4}$

2/16/20

New Station 26 @ $41^{\circ}39.775$
 $30^{\circ}57.025E$

1630 U/W Shutdown for UPR Recovery
 Re-start

1726 CTD 26

-41.4962×30.9487

2008 CTD 27 - NO water (Trip on Fly)

$bb' = 7e^{-4}$

-41.5002×31.2148

2208 CTD 28 - Productivity

$bb' = 9e^{-4}$

-41.4999×31.4010

2/17/20

0114 STOP U/W for FSW Run

$bb' = 2.12e^{-3}$

048-0115.DAT

0129 BACK ON

048-0128.DAT

0252 Exp 3 TO

0330 Departing stn 28

-41.3916

$031.421^{\circ}E$

Was drifted well off
 the stn

0600 DEPARTING STN 29 NOWATER "trip'n fly"

$-41.50167 \times 031.75467$

0804 Arriving son 30 water In "Donut hole"

$-41.49992 \times 32.30479$

$bb' = 1.16e^{-3}$

0925 Departing stn 30

$-41.50244 \times 032.31588$

$bb' = 1.17e^{-3}$

1010 Crossing the Donut. $bb' = 1.12e^{-3}$
 for last few hours -41.49969×32.5075

3/17/20

1055 ON STN 031.01

-41.459835 32.65038E

1157 off STN 031.01

-41.4594 32.64906

1157 Aerosol (-41.4998, 32.6489)

1337 CTD 32.01

-41.5 x 32.9885

 $bb' = 2e^{-3}$

2004 CTD 34

-41.5013 x 33.6692

2325 Re-starting upw

FSW $1.99e^{-3}$

3/18/20

2000 RE-STARTING

049-0000.DAT

Heading from S line
to middle line052 $bb' = 6.75e^{-4}$ and going up
-40.898315 33.8688E0230 $bb' = 1.53e^{-3}$ started climbing 11450310 VPR deployed heaving west
-40.55 33.4E0320 -40.499 33.495 $bb' = 1.14e^{-3}$ 0340 LOTS OF BUBBLES AS WE BOAT INTO THE
JAWS

0500 UN 436 - VPR ON E → W line &

Lat -40.51360

Long 33.47175

 $bb' = 1.83e^{-3}$? Air in instrument0525 -40.51185 33.58577 $bb' = 1.49e^{-3}$ 0629 -40.49742 33.37966 $bb' = 1.45e^{-3}$
Bridge called down - saw color change ahead

0629 Exp 3 T1

1014 -40.5 x 32.583
2 cycles of θ_0 2E-3

1106 UW 455
-40.5035 x 32.4003
 $b_b' = 9.48 e^{-4}$

1212 Aerosol 17 start
(-40.50199, 32.17554)

1300 UW 456
(-40.499, 32.0198)
 $b_b' = 1.17 e^{-3}$

1500 UW 457
(-40.50029, 31.61438)

1708 VRR (recovered) ≈ 2.5 miles W of
mark - to be outside pasture
U/W Restart

049-1719. dat

2/19/20

1102 CTD #36 TRAP #FLY
-40.5 x 32.226
 $b_b' = 1.13 e^{-3}$

1157 CTD ON DECK & UNDERWAY TO NEXT STN

1202 -40.4979 032.2359 $b_b' = 1.10 e^{-3}$ and rising

1256 -40.5003 032.6202 $b_b' = 1.33 e^{-3}$

1254 -40.5022 032.6429 $b_b' = 1.34 e^{-3}$
Moving to Stn 40

1345 -40.5009 032.8125 ON STN 40

1334 -40.50152 32.8114 departing STN 40
 $b_b' = 1.5 e^{-3}$

1336 STN 41
-40.5 x 033.05
 $b_b' = 1.5 e^{-3}$

1445 OFF ON TO THE NEXT STN

1214 -40.50073 033.40374 $b_b' = 2.21 e^{-3}$

1212 Aerosol (-40.50091, 33.40364)

1214 Under way 516
(-39.5126, 34.00069)
 $b_b' \approx 1.5 e^{-3}$

2/20/20

UW 517

2400 0000 (-39.50086, 32.63973)

2/20/20

0147

-39.49821 -033.61667

 $bb' = 1.22e^{-3}$

Position correct?
GPS time wrong

GPS FIXED APPARENTLY WENT OUT
AROUND MIDNIGHT

0200

UW 518

Lat -39.49378

Long 33.21040

 $bb' = 1.41e^{-3}$

0248

-39.49657 033.03992 $1.28e^{-3}$

0400

UW 519

Lat -39.49993

Long 32.79444

 $bb' = 1.60e^{-3}$

0442

 $bb' = 1.7e^{-3} \rightarrow 1.8e^{-3}$

-39.495 x 032.621

02/20/2020

48

-39.49163 032.41574 $bb' = 1.22e^{-3}$

00

UW 520

Lat -39.49433

Long 32.38099

 $bb' = 1.19e^{-3}$

213

-39.49963° 032.12553° $bb' = 2.65e^{-4}$

Fluor = 1.12 SST = 19.44 SSS 35.46

 $bb_{TOT} = 2.24e^{-3}$

We are into clear Southern SubTropical water
(South of Agulhas meander)

0820

WPP RECOVERED POSITIONS FOR
CTD #44

0837

-39.5 x 032.044 ON STATION

0939

END ON DECK

0948

Off str heading east -39.49811 032.05889
 $bb' = 2e^{-4}$

1115

CHALK STARTING TO APPEAR $bb' = 6.2e^{-4}$

-39.494 x 032.411

1128

CTD Stn 45.01 event 20200220.1128

1156

Aerosol (-39.4996, 32.4171)

1331

CTD 4601 -39.5006 x 032.6682 $bb' = 1.2e^{-3}$

1546

CTD 4701 -39.5006 032.5017

1810

CTD 48.0 -39.50 x 033.10 Engine room cancelled cast
due to hull clogging cooling sieves

1851

CTD 48.01 2 miles east -39.5003 x 033.2096 $bb' = 1.5e^{-3}$

2052

CTD 49.01 Tap'n flr -39.5002 x 033.3995 $bb' = 1.2e^{-3}$

2/26/20

0040 On stn 50 doing TM cont

0052 still on stn 50 TM $bb' = 1.21e-3$ 0235 on stn 51
-39.5202 x 33.83820329 off stn 51 incubators discovered
-39.50380 033.83861
 $bb' = 1.55e-3$ 0419 ON STN 52 $bb' = 1.49e-3$

-39.50 x 34.0

0525 off stn 52 $bb' = 1.49e-3$
-39.50580 034.00188E0615 OUT OF IT $bb' = 4.7E-4$

0732 STOPPING U/W FOR FSW RUN

052-0737 DAT

 $bb' = 1.62E-3$

NOT SURV 1 BULWARK ACS FSW #5

0754 BACK ON

052-0752 DAT

1156 Aerosol 20 start
(-38.4136, 34.6799)

2/26/20

-36.779 35.678E $bb' = 9.72e-5$

Start VPR tow east at final feature

-36.78781 x 35.93813

UW 579 W → E transsect final feature

Lat -36.30003

Long 36.04437

 $bb' = 2.15e-4$ 2 -36.2445 036.33256 $bb' = 7.9e-4$

UW 580

Lat -36.29873

Long 36.42464

 $bb' = 2.47e-4$

UW 581

Lat -36.30081

Long 36.81361

 $bb' = 4.38e-4$

UW 582

Lat -36.30445

Long 37.19171

 $bb' = 7.62e-5$ 1204 Aerosol 21 start
(-36.2855, 37.3697)

2/22/20

1243 CTD 54 East end of 1st transect
through "Eddy 3" (old dredged eddy)
-36.3006 x 037.3003

1759 CTD 55
-36.3004 036.9
event 20200222.1759

2300 CTD 56
event 20200222.2300
-36.3 x 036.7518

2/23/20

0053 -36.32356 x 036.766 $bb' = 2.64e-4$

0158 -36.34025 x 036.7792 $bb' = 2.50e-4$
still on str

0325 -36.3928 x 036.7032
 $bb' = 4.11e-4$

0353 MAKING WEATHER COURSE TO NEXT
STN TO AVOID SEAS ON THE BEACH

0408 NOISY bb don't believe bb'

0521 CTD 057.01

2/23/20

633 off str 57 (trip in fly)
-36.303 x 036.605 $bb' = 2.94e-4$

0823 ON STN 58 CTD WIND ROADOUT FIXED
-36.2998 x 036.3792 $bb' = 2.46e-4$

0945 UW- Restart
054-0947.dat

0954 NO GPS

~~1019 GPS BACK~~

1142 Aerosol
(-36.3024, 36.3858)

1041 - Liz code to get POS V NMEA
String to us - INGA

Re-starter UW- looks like it works
054-2041.dat

2/24/2025

0244 Arrived Eddy N final feature

-35.38452 x 36.38130

bb' $2.85e^{-5}$ start CTD line N $\rightarrow$ S

0409 finished CTD #62

-35.39908 x 36.387 bb' = $8.86e^{-5}$

0656 DOWN WITH #63

-35.7481 x 36.3815

1036 ON STN 65

-36.1673 x 36.3733

1143 OF STN 65

1303 Aerosol (-36.2943, 36.3940)

2136 Underway 653

(-36.4438, 36.37920)

would have been 67

2240

SCS Interruption - GPS $bb' = 2.9e^{-4}$

2/25/2020

UW 654

Lat -36.5427

Long 36.37932

bb' $2.75e^{-4}$

Drage recovery successful

-36.68185 x 36.13804

PH NAKKY - ~~ROBERTING~~ STARTING

NOW NO GPS

Loose connection @ HUB

01 BACK ON

1515 OFF STN

057 ON STN #67

bb' = $3.8e^{-4}$

-36.4420 x 36.3810

153

Aerosol (-36.3099, 36.3928)

2003 UW #697

-37.028 x 36.379

bb' = $3.1e^{-4}$

2/25

2330 Re-Start U/W w/ FSW

056-2333 det

 1.8×10^{-3}

Temp = 20.94

ACF values higher, especially Cs

2359 Underway

-36.74588, 36.37842

bb prime -3.13E-5

CHI = 0.4

2/26/20

0052

Acid pump not turned on after restart
Just now turned on-36.59311 036.38317 $\frac{1}{2}$

0200 UW 699

lat -36.42626

long 36.37935

bb' 2.14×10^{-4}

0400 UW 700

lat -36.12179

long 36.37787

bb' 3.31×10^{-4}

2/26/20

0 UW 701

lat -35.83501

long 36.38180

bb' 2.11×10^{-4}

00 Start EAT2

050 VPR recovered - underway

055 Aerosol -35.1357, 36.8170

0814 Stopped for deep cast

CTD str 072.01.

Dave catches (almost) big squid!

2/27/20

0012 -34.19810 38.44627 bb' 1.31×10^{-4} 0847 -33.19013 40.12148 bb' 1.31×10^{-4}
but recently got up to 2×10^{-4} 1106 -32.93136 40.60019 bb' 2×10^{-4} 1227 bb' 5×10^{-4} -32.794 x 040.851
A now-wide feature1650 -32.27557 41.7413 bb' 9.42×10^{-5}

2/28/20

0431 -30.9352 014.0039 bb' 1.45×10^{-4}

Ground Hog Day!

0332 ~~on stn 8~~~~-39.8320 x 034.19157~~~~bb' = 1.48e-3~~

404 -40.439 034.1934 bb' = 1.15e-3

0601 -40.1636 034.2021 bb' = 1.2e-3

0720 on stn 009.01 -40.0006 x 34.19952

0830 off stn 009.01 slip during 8VTS, on two small generators

0838 -39.9953 x 034.19819E bb' = 1.19e-3

0950 -39.8320 x 034.19905E bb' = 1.12e-3

1020 -39.76572 x 034.20170 bb' = 9.92e-4

1211 2/2/20 (-39.47518, 34.19964)

Aerosol 6

1218 U/W off for PSW run
033-1221.5AT for 10 SIDR
bb' = 1.80e-3

033-1231.5AT for ac9

1238 Back on for regular WARM

033-1238.1AT

2/2/20

1900 ARGOS after Asensyeld
#137

and put out on fantail

-39.358 x 34.199

2339 Re-start U/W

FSW Calibration

bb' = 1.5 e-3

2/3

034-0010.0AT Restart U/W

2000

VPR deployed

0048 -38.49575 34.20882E

bb' = 8.85e-5

0200 UW 171

Lat -38.61906

Long 34.35790

bb' = 9.05e-5

0305 Incubators uncovered

-38.7449 34.52189 bb' = 8.61e-5

0400 UW 177

Lat -38.85095

Long 34.66099

bb' = 8.86e-5

2/9/20

1015 Re-Starting U/W w/ FSW
090-1014 .dat $b_b = 1.48e^{-3}$

1017 SPS off, Aerosol sampler off
-32.8666 033.9735

1030 U/W Shutting down

1306 MQ dirty Cal
090-1306 .dat

Temp = 24.91 $b_b = 1.29e^{-3}$

Cs good ground 1318
As good ground 1320-21

1017 End Aerosol 13 (-32.8666, 33.9735)

2/11/20

AK9 clean and dry Air CAC

11Feb20 AR296 .dat

As an order of magnitude higher than CS
 ≈ 0.1 ≈ 0.02

2/13/20

Checking VSF Pinks before
re-assembly

Dry	169	171	166
Wet	176	177	174

2/14/20

PH Cal $y = 57.7x - 0.27$

4 = 1.822 V
7 = 2.565 V

2000 U/W with MQ - Clean

045-2002 .dat

$b_b = 1.20e^{-3}$

Temp 20.85

2045 System Full / Clean

U/W restarted

045-2048 .dat

2/26/20

0040 On stn 50 doing TM cont

0052 still on stn 50 TM $b_b' = 1.21e-3$ 0235 on stn 51
-39.5002 x 33.83820329 off stn 51 incubators discovered
-39.50380 033.83861
 $b_b' = 1.55e-3$ 0419 on stn 52 $b_b' = 1.49e-3$ -39.50 x 34.0
0525 off stn 52 $b_b' = 1.49e-3$
-39.50580 039.00188E0615 OUT OF IT $b_b' = 4.7E-4$

0732 STOPPING V/W FOR FSW RUN

052-0737 DAT

 $b_b' = 1.62E-3$

NOT SURV 1 BATTERY ACS FSW #5

0756 BACK ON

052-0756 DAT

1156 Aerosol 20 start
(-38.4136, 34.6799)

2/22/20

0127 -36.779 35.678E $b_b' = 9.72e-5$

0416 Start VPR tow east at final feature

-36.78701 x 35.93813

0500 UW 579 W → E transverse final feature

Lat -36.30003

Long 36.04437

 $b_b' = 2.15e-4$ 0632 -36.2995 036.33756 $b_b' = 7.9e-4$

0705 UW 580

Lat -36.29873

Long 36.42464

 $b_b' = 2.47e-4$

0900 UW 581

Lat -36.30081

Long 36.81561

 $b_b' = 4.38e-4$

1100 UW 582

Lat -36.30445

Long 37.19171

 $b_b' = 7.67e-5$ 1204 Aerosol 21 start
(-36.2855, 37.3697)

2/24/2020

0244 Arrived Eddy N final feature

-35.38452 x 36.38150

bb' $2.85e^{-4}$ start CTD line N $\rightarrow$ S

0409 finished CTD #62

-35.39908 x 36.387 bb' = $8.86e^{-5}$

0656 down with #63

-35.7481 x 36.3815

1036 on stn 65

-36.1623 x 36.3733

1143 off stn 65

1303 Aerosol (-36.2943, 36.3940)

2136 Underway 653

(-36.4438, 36.37920)

would have been 67

bb' = $2.9e^{-4}$

2240 SC3 Interruption - GPS

2/25/2020

0009 UW 654

Lat -36.5427

Long 36.37932

bb' $2.75e^{-4}$

0320 Drift recovery successful

-36.68185 x 36.13804

0948 pH NACKY - ~~ROBERTS~~ STARTING

NOW NO GPS

Loose connection @ HUB

0601 BACK ON

0815 1st OFF STN

0857 ON STN #69 TNF

bb' = $3.8e^{-4}$

-36.4420 x 36.3810

1153

Aerosol (-36.3099, 36.3928)

2003 UW #697

-37.028 x 36.379

bb' = $3.1e^{-4}$

2/25

2330 Re-Start U/W w/ FSW

056-2333 det

 1.8×10^{-3}

Temp = 20.94

ACF values higher, especially Cs

2359 Under way

-36.74589, 36.37842

bb prime -3.13×10^{-5}

Chl = 0.4

2/26/20

0052

Acid pump not turned on after restart
Inst. hours turned on

-36.54311 036.38317

0200 U/W 699

lat -36.42626

long 36.37955

bb 2.14×10^{-4}

0400 U/W 700

lat -36.12179

long 36.37787

bb' 3.31×10^{-4}

2/26/20

0600 U/W 701

lat -35.83501

long 36.38180

bb' 2.11×10^{-4}

0800 Start EAT2

0950 VPR recovered - underway

11:55 Aerosol -35.1357, 36.8170

1801 h Stopped for deep cast

CTD str 072.01.

Dave catches (almost) big squid!

2/27/20

0012 -34.19810 38.44627 bb' 1.31×10^{-4} 0847 -33.19013 40.12148 bb' 1.31×10^{-4}
but recently got up to 2×10^{-4} 1106 -32.93136 40.60019 bb' 2×10^{-4} 1227 bb' 5×10^{-4} -32.794 x 040.851
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