3.3 OPC processing — Raymond Pollard

An Optical Plankton Counter was mounted on the SeaSoar on all deployments, summarized in Table 3.1. The raw data consist of millions of data cycles, one for each particle that passes through the OPC giving a count which converts to Equivalent Spherical Diameter (ESD). Extra data cycles every half second give time stamp and attenuance readings. Processing is greatly simplified using Penguin. Penguin provides its own time stamp for every data cycle, so the OPC's own time stamp can be discarded. Thus the raw data are in ascii. A simple grep (see exec opc1) extracts only the ESD count data cycles, with jday and count. These are read into pstar using pascin, jday is converted to time in seconds, merged on time with pressure (from the SeaSoar full resolution file) and distrun (from the SeaSoar ss file or the navigation file), then binned and gridded using gropc4. We chose 8m bins in the vertical (6,398,8) for uniformity with SeaSoar CTD data, 4 km bins in the horizontal, and size classes defined by class count boundaries 5,17,63,230,874,1651/ which provide ESD boundaries at 0.25, 0.5, 1, 2, 4 and 8 mm (to convert to copepod length multiply by about 2-2.5). The only wrinkle to the processing occurred at New Year, as Penguin gives only jday, not year. Thus the file had to be split at the year boundary, and the start date in the header (YYMMDD) set to 040101 or 050101 as appropriate.

The OPC failed about halfway through two 15536, during the triangular run from M8E to M8W. It was fixed prior to the next run 15541.

3.4 Fast Repetition Rate fluorometer on SeaSoar — Mark Moore

A Chelsea Scientific instruments FAST*tracka*™ FRRf was flown on the SeaSoar instrument package. Data collection from this instrument was handled using the PENGUIN control and data acquisition system as performed previously on D253 (FISHES) and JR98. Instrument setup was identical to that used during D253. Saturation of variable chlorophyll fluorescence was performed using 100 flashlets of 1.1μs duration with a 2.3μs repetition rate, no relaxation protocol was employed as it is suspected that accurate estimates of downstream electron transport cannot be obtained *in situ* due to the speed of the instrument through the water. The instrument gain setting was fixed at the lowest value.

Processing of the data was performed in Matlab™ using custom codes written during D253 and D285. ASCII data files were transferred to the directory /data61/frrf/seasoar then processed using the routine: SSFRRFproc executed as a function:

SSFRRFproc('filename.extension')

Outputs from this routine were then merged with the depth record from the minipack using the routine: Merge_minipack_frrf, which requires editing each time to change the minipack and FRRf files loaded and merged.

Future re-processing using an updated physiological model is likely to be necessary, however initial quality checks indicated no significant problems with the deployment

strategy other than those inherent to the current generation of the FRRf instrument and well documented elsewhere (e.g. Laney, 2003; Moore et al. 2004).

Data were processed from all tows where significant periods of flight were obtained with SeaSoar (Table 3.2)

Table 3.2 SeaSoar FRRf files

Deployment	15497	15514	15519	15530	15536	15541
FRRf file nos.	1,2,3,4,5a,5b,6, 7,8,9,10,11a,11b	1,2,3	1	1	1,2,3,4	1,2,3

Initial results from the first extensive SeaSoar survey are presented in Fig. 3.6. Variability in PSII physiology in terms of both F_q'/F_m' and σ_{PSII}' was apparent throughout the survey region and was associated with gradients in water masses and bloom distribution. Interpretation of the variability in PSII physiology will require appreciation of the effects of nutrient stress, light and species composition. As is frequently the case, quantitative assessment of any of these individual factors is likely to be difficult using the mapped FRRf data alone, due to the complex interactions occurring between them.

Data from D286 will be processed by Mark Moore at NOC on return from sea.

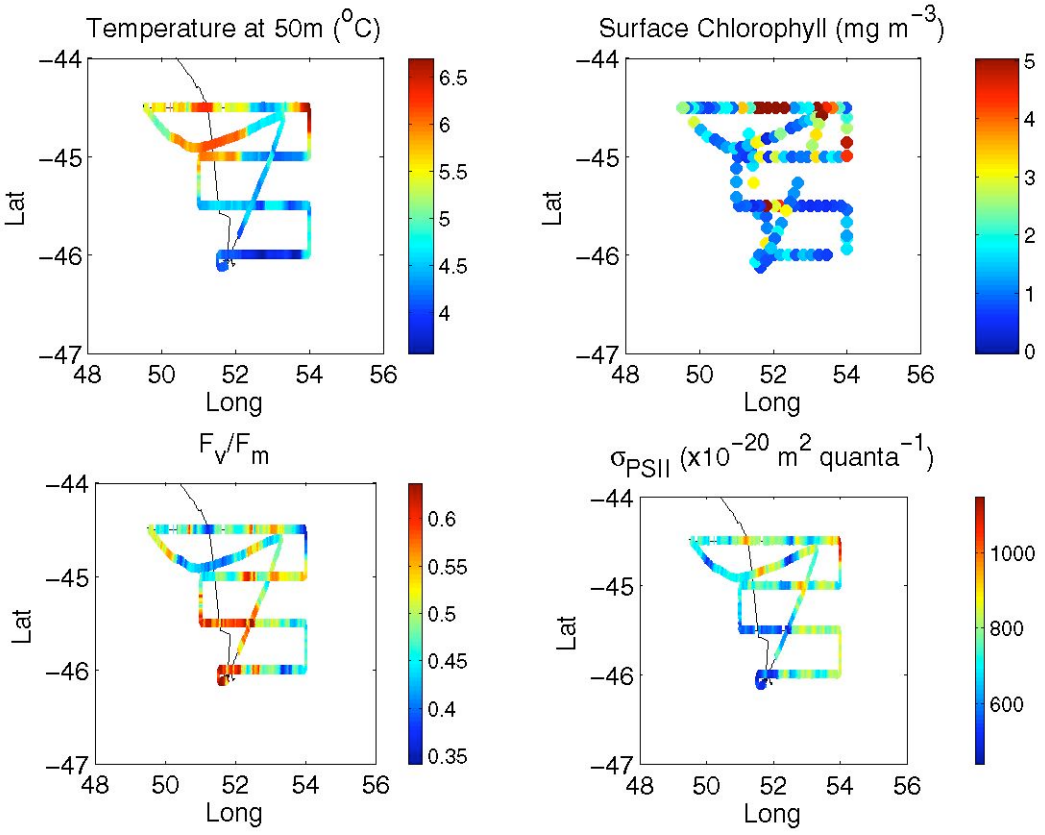

Fig.3.6 Initial map of FRRf data from SS15497. Temperature and PSII characteristics are mapped at 50m depth. Underway surface chlorophyll concentration is also provided for comparison.