APPENDIX

APPENDIX: DATA STRUCTURE AND PROGRAMS USED

A. Data structure

The data of the temperature, salinity, transparency, alkalinity, oxygen, pH, nitrite, nitrate, phosphate and silicate collected by the Pattani Coastal Aquaculture Station in 1995-1996 for 14 stations are called *fodata.num* and consists of 13 columns (stationID, datID, timeID, temperature(degree cencieus), salinity(ppt.), transparency(cm.), alkalinity(mg/l), oxygen(mg/l), pH, nitrite(mg/l), nitrate(mg/l), phosphate(ppm.) and silicate(ppm.), as follows

1	88	26	30	30	60	119	nan	8.68	nan	nan	nan	0.024	nan
1	151	nan	32	26	40	105	4.2	8.71	0.005	nan	nan	0.0028	nan
1	201	32	nan	18	35	95	4	8.66	0.027	0.025	nan	0.006	0.337
1	213	40	30	10	35	93	9	8.18	0.017	0.037	nan	0.024	0.556
1	229	23	30	12	40	83	10.5	8.58	0.007	0.006	nan	0.051	0.717
1	241	31	28	9	40	61	6.4	8.09	0.048	0.062	nan	0.047	1.244
1	263	29	31	5	15	60	8.5	7.72	0.023	0.0194	nan	0.06011	0.52704
1	303	7	30	12	55	64	8.8	8.33	0.004	0.065	0.065	0.023	1.776
1	321	23	27	0	30	22	7.1	7.2	0.008	0.0325	0.006	0.025	0.129
1	333	19	31	2	55	32	5.86	8	0.029	0.034	0.0126	0.0329	0.175
1	348	42	27	10	55	55	9.2	8.6	0.008	0.016	0.001	0.007	0.516
1	369	40	28	3	35	nan	5	nan	0.0074	0.011	nan	0.00108	0.0143
1	382	38	29	14	45	70	8	8.16	0.002	0.0155	0.0023	0.006	0.74568
1	402	10	25	32	80	101	6.4	8.56	0.001	0.0155	0.055	0.0192	0.3585
1	431	7	29	30	100	150	5.8	8.68	0.0009	0.022	0.056	0.012	1.319
1	445	10	32	32	65	113	6.4	8.74	0.0008	0.024	nan	0.005	1.19
1	472	nan	nan	30	110	93	5.6	8.68	0.0009	0.0023	nan	0.003	1.304
1	485	nan	nan	30	85	104	7	8.3	0.0001	0.0118	0.007	0.0174	0.4582
1	493	nan	nan	37	65	95	6	8.22	0.002	0.0115	0.0099	0.0042	0.25812
1	507	15	28	24	90	87	nan	8.54	0.001	0.035	0.048	0.043	0.445
2	76	nan	nan	32	nan	80	6.2	8.34	0.0001	nan	nan	0.0005	nan
2	88	26	29	27	80	105	nan	8.28	nan	nan	nan	0.044	nan
2	108	42	32	30	90	112	6	8.4	0.009	nan	nan	nan	nan
2	122	10	30	30	95	108	5	8.36	nan	nan	nan	nan	nan
2	151	nan	30	20	75	117	6.6	8.66	0.007	nan	nan	0.00143	nan
2	165	10	29	26	50	99	6.4	8.43	0.003	nan	nan	0.144	nan
2	178	9	29	14	75	99	5	8.39	0.009	nan	nan	0.018	0.8198
2	201	31	nan	10	70	80	5	8.92	0.018	0.23	nan	0.029	1.039
2	213	39	30	18	50	101	10.5	8.34	0.024	0.049	nan	0.03	0.6
2	229	34	30	10	30	72	7.7	8.27	0.066	0.176	nan	0.041	0.927
2	241	32	28	3	65	37	7.8	8.12	nan	nan	nan	0.091	1.625
2	263	28	31	4	35	56	10.1	8.69	0.017	0.0192	nan	0.02576	0.4392
2	303	10	30	3	40	43	4.9	7.4	0.013	nan	0.133	0.045	1.838
2	321	25	27	0	30	15	6.4	6.77	0.012	0.314	0.015	0.011	0.114
2	333	19	27	1	60	23	3.8	nan	0.016	nan	0.0146	0.0143	0.204
2	348	40	27	6	60	42	10	8.46	nan	0.005	0.002	0.017	0.516
2	369	38	28	0	50	22	6.8	nan	0.02	0.0176	0.0171	0.001	0.0573
2	382	37	29	8	85	52	7	7.68	0.003	0.0092	0.047	0.009	0.889
2	402	11	25	26	80	92	6.6	7.93	0.002	0.0192	0.0012	0.006	0.5604
2	431	9	29	28	65	nan	5	8.39	0.0001	0.019	0.01	0.009	1.104
2	445	11	31	30	80	106	5.7	8.61	0.0006	0.054	nan	0.009	1.018
2	472	nan	nan	28	110	97	5.8	8.65	0.0007	0.0019	nan	0.0012	1.075
2	485	nan	nan	29	80	100	8.3	8.2	0.001	0.0168	0.0033	0.0048	0.5604
2	493	nan	nan	35	70	93	9	8.17	0.001	0.012	0.0033	0.018	0.2
2	507	16	28	22	95	64	7.2	8.32	0.001	0.0125	0.015	0.042	0.473
3	76	nan	nan	31	nan	87	6	8.16	0.0001	nan	nan	0.0005	nan
3	88	12	29	29	75	108	nan	8.38	nan	nan	nan	0.041	nan
3	108	15	31	29	95	112	5.6	8.2	0.013	nan	nan	nan	nan
3	303	21	30	26	25	84	6.7	8.19	0.001	0.042	0.011	0.044	2.16
3	321	14	26	0	50	50	6.7	7.05	0.014	0.0309	0.01	0.041	0.358

3	333	7	27	8	40	43	5.3	8.15	0.031	0.049	0.0205	0.0271	0.285
3	348	8	26	14	120	78	7.8	8.36	0.004	0.007	0.002	0.002	0.564
3	369	12	26	21	90	97	7.4	8.36	0.005	0.0197	0.01	0.0006	0.1864
3	382	15	27	28	120	115	6.4	8.08	0.001	0.0167	0.0005	0.0036	0.3728
3	402	20	25	30	nan	109	6.6	8.14	0.006	0.0414	0.0084	0.0072	0.473
3	431	33	29	32	120	120	6.2	8.53	0.001	0.021	0.0005	0.003	1.001
3	445	39	32	32	70	110	6.2	8.57	0.0004	0.023	nan	0.0006	nan
3	472	nan	nan	28	70	115	7.2	8.6	0.0007	0.0019	nan	0.0012	1.175
3	485	nan	nan	28	120	100	7.8	8.21	0.0005	0.0069	0.0011	0.0042	0.4589
3	493	nan	nan	38	80	119	6.3	8.52	0.0001	0.009	0.0005	0.006	0.272
3	507	33	30	20	75	75	9	8.57	0.002	0.0439	0.012	0.0468	0.8604
4	178	10	29	20	60	129	4.8	8.62	0.004	nan	nan	0.022	1.1016
4	213	28	30	14	65	102	10.2	8.25	0.008	0.018	nan	0.044	0.849
4	229	30	30	14	40	81	8	8.4	0.008	0.007	nan	0.044	0.439
4	241	28	27	14	45	87	10.3	8.97	0.034	0.034	nan	0.05	1.566
4	263	22	31	10	15	71	6.4	8.52	0.006	0.0072	nan	0.02576	0.19032
4	321	18	27	2	25	37	5.7	7.34	0.024	0.0506	0.019	0.091	0.143
4	348	38	27	9	75	53	10.6	9	0.006	0.005	0.002	0.008	0.86
4	369	35	28	3	35	47	8.2	7.96	0.0006	0.0079	0.0085	0.0002	0.0717
4	382	33	29	20	40	79	9	8.47	0.002	0.0142	0.0011	0.009	0.4445
4	402	12	25	28	65	100	7.3	8.02	0.002	0.0163	0.073	nan	0.473
4	431	10	29	30	70	110	6	8.47	0.0009	0.023	0.007	0.009	0.989
4	445	13	32	30	55	125	4.6	8.5	0.001	0.01	nan	0.006	1.218
4	472	nan	nan	32	52	100	6.2	8.38	0.001	0.0026	nan	0.0036	1.419
4	485	nan	nan	28	30	112	8.9	8	0.001	0.0214	0.0168	0.0192	0.587
4	493	nan	nan	36	65	113	9.8	8.58	0.0001	0.0095	0.0016	0.006	0.5879
4	507	18	30	22	80	77	6.8	8.45	0.002	0.041	0.0319	0.0468	0.76
5	76	nan	nan	32	nan	110	6.4	8.4	0.0001	nan	nan	nan	nan
5	88	nan	29	27	90	nan	nan	8.4	nan	nan	nan	nan	nan
5	108	nan	30	20	60	97	5.8	8.86	nan	nan	nan	nan	nan
5	122	9	30	30	85	107	5.3	8.07	nan	nan	nan	nan	nan
5	151	nan	31	28	75	129	6	8.74	0.006	nan	nan	0.00429	nan
5	165	36	31	nan	45	113	nan	8.39	0.009	0.008	nan	0.2	nan
5	201	22	30	18	45	86	4.2	8.62	0.013	0.025	nan	0.004	0.615
5	213	37	30	16	30	83	nan	8.68	0.002	0.006	nan	0.024	0.658
5	229	33	30	14	45	75	7.2	8.15	0.007	0.008	nan	0.042	0.439
5	241	31	28	3	45	45	8.5	8.19	0.112	0.166	nan	0.065	1.61
5	303	23	30	25	50	64	3.9	7.91	0.004	0.039	0.094	0.055	1.696
5	333	19	27	0	40	25	4.4	nan	0.025	0.04	0.002	0.0215	0.034
5	348	38	27	10	80	60	9.2	8.65	0.003	0.008	0.002	0.005	0.2
5	369	37	28	10	35	50	6.9	8.52	0.005	0.0066	0.0042	0.001	0.0573
5	382	35	29	16	nan	72	8.6	8.32	0.001	0.0268	0.0017	0.0036	0.2868
5	402	12	25	28	65	93	7	8.09	0.002	0.0175	0.003	0.0096	0.2437
5	431	12	29	30	70	108	5.4	8.66	0.001	0.027	0.015	0.01	1.147
5	445	12	32	31	80	115	5.9	8.71	0.0008	0.014	nan	0.006	1.118
5	472	nan	nan	28	75	96	6.6	8.62	0.0008	0.0023	nan	0.0012	1.147
5	485	nan	nan	28	50	96	7	8.17	0.001	0.0135	0.017	0.006	0.6453
5	493	nan	nan	36	65	102	7.6	8.18	0.001	0.0115	0.0016	0.0018	0.445
5	507	18	28	22	75	80	7.2	8.18	0.002	0.034	0.013	0.042	0.516
6	76	nan	nan	30	nan	63	6.8	8.36	0.005	nan	nan	nan	nan
6	88	12	29	29	70	118	nan	8.47	nan	nan	nan	nan	nan
6	108	41	32	31	25	113	5.4	8.49	0.061	nan	nan	nan	nan
6	122	11	30	30	75	106	4.8	8.35	nan	nan	nan	nan	nan
6	151	nan	30	27	35	112	4.6	8.42	0.005	nan	nan	0.0071	nan
6	165	25	29	22	55	98	5.2	8.7	0.003	nan	nan	0.034	nan
6	178	11	29	24	60	97	4.6	8.3	0.004	nan	nan	0.014	0.6734
6	201	22	31	20	60	91	4	8.75	0.01	0.011	nan	0.006	0.439
6	213	27	30	29	60	100	13	8.16	0.005	0.009	nan	0.042	0.673
6	229	34	30	10	35	72	7.5	8.27	0.008	0.009	nan	0.045	0.307
6	241	30	27	13	40	67	7	8.5	0.029	0.054	nan	0.04	1.177
6	263	21	30	16	15	76	8.5	7.95	0.014	0.0072	nan	0.02719	0.4392
6	303	13	30	14	40	74	7.8	8.35	0.003	0.017	0.024	0.034	1.299
6	321	18	26	6	40	45	6.7	7.76	0.025	0.0545	0.009	0.094	0.215
6	333	16	30	2	30	35	6.6	8.08	0.042	0.042	0.0103	0.0286	0.144
6	348	38	27	14	100	68	8.4	8.42	0.001	0.006	0.002	0.002	0.502
6	369	33	28	10	25	60	9	8.16	0.004	0.0084	0.008	0.0003	0.1003
6	382	31	29	24	70	85	8.5	8.34	0.001	0.0264	0.00091	0.0066	0.2151
6	402	8	25	26	80	103	6.9	8.04	0.003	0.0259	0.0138	0.0096	0.2437
6	431	15	29	32	80	110	6.4	8.75	0.0008	0.009	0.0135	0.007	1.104
6	445	13	31	32	60	110	5	8.59	0.0009	0.01	nan	0.009	1.1902
6	472	nan	nan	30	55	103	5.4	8.44	0.001	0.0033	nan	0.0072	1.218

6	485	nan	nan	28	30	97	8.1	8	0.002	0.016	0.0291	0.021	0.6322
6	493	nan	nan	36	70	119	8.9	8.52	0.001	0.0205	0.0022	0.0042	0.545
6	507	19	30	20	65	70	7.1	8.3	0.002	0.033	0.024	0.0426	0.573
7	76	nan	nan	30	nan	58	6.5	8.31	0.0001	nan	nan	0.0005	nan
7	88	15	30	30	30	112	nan	8.42	nan	nan	nan	0.032	nan
7	108	34	nan	30	85	104	6.2	8.5	0.006	nan	nan	nan	nan
7	165	34	30	32	30	115	5	8.58	0.001	0.001	nan	0.085	nan
7	178	16	31	28	10	107	4.4	8.05	0.017	nan	nan	0.04	0.527
7	201	19	30	35	15	108	3.8	8.19	0.013	0.027	nan	0.004	0.527
7	213	20	28	28	30	100	7.6	7.95	0.004	0.005	nan	0.034	0.629
7	229	19	27	28	15	94	6.2	7.94	0.016	0.098	nan	0.058	0.761
7	241	18	28	29	10	99	5.3	7.88	0.015	0.015	nan	0.031	0.688
7	263	14	30	29	10	100	6.4	7.93	0.012	0.0062	nan	0.037	0.454
7	303	20	30	25	30	89	6.6	8.22	0.004	0.022	nan	0.066	1.61
7	333	13	27	20	75	67	7.6	8.79	0.004	0.021	0.0005	0.01	0.018
7	348	10	26	20	55	90	6.2	8.25	0.008	0.007	0.001	0.012	0.645
7	369	29	27	23	25	92	6.8	8.15	0.01	0.0309	0.0314	0.005	0.229
7	382	16	27	30	45	109	7.5	8.07	0.002	0.0322	0.0005	0.003	0.1
7	431	30	29	22	50	97	6.4	8.35	0.003	0.032	0.001	0.009	1.347
7	445	31	32	30	60	114	6	8.54	0.001	0.099	nan	0.004	1.247
7	472	nan	nan	38	60	99	7.2	8.58	0.003	0.0089	nan	0.01	1.763
7	485	nan	nan	24	30	96	7.2	7.96	0.002	0.0231	0.0162	0.008	0.746
7	493	nan	nan	37	45	135	7.2	8.5	0.001	0.0175	0.0022	0.002	0.2151
7	507	25	30	28	60	116	6.8	8.44	0.001	0.023	0.014	0.043	0.559
8	76	nan	nan	30	nan	80	5.8	8	0.0001	nan	nan	0.0005	nan
8	88	19	30	30	80	122	nan	8.54	nan	nan	nan	0.06	nan
8	108	7	30	32	70	136	5.4	8.63	0.003	nan	nan	nan	nan
8	122	28	31	32	80	140	4.8	8.48	nan	nan	nan	nan	nan
8	151	nan	31	27	85	130	4.4	8.64	0.0001	0.004	nan	0.002	nan
8	165	17	30	26	40	121	4.4	8.43	0.0001	0.0005	nan	0.075	nan
8	178	29	31	22	35	140	4.5	8.5	0.006	nan	nan	0.024	0.307
8	213	13	29	12	40	107	12.6	8.08	0.009	0.008	nan	0.017	0.366
8	229	10	27	12	30	98	8.9	8.59	0.006	0.008	nan	0.047	0.615
8	241	10	27	9	40	85	7.93	8.1	0.024	0.022	nan	0.025	1.068
8	321	12	26	0	60	40	7.4	7.32	0.012	0.035	0.01	0.042	0.172
8	333	8	31	6	35	50	6.2	8.42	0.009	0.045	0.0251	0.0372	0.349
8	369	8	26	10	40	56	7	8.15	0.007	0.0407	0.0114	0.0031	0.4015
8	382	12	27	26	60	79	7.4	8.13	0.002	0.031	0.004	0.0036	0.401
8	402	17	25	32	45	95	7.6	8.18	0.003	0.0092	0.003	0.0048	0.2581
8	431	35	29	28	60	110	7	8.63	0.0004	0.072	0.018	0.007	1.003
8	445	42	32	30	55	126	6.4	8.82	0.0006	0.072	nan	0.0066	1.0202
8	472	nan	nan	30	60	111	7.8	8.85	0.008	0.0023	nan	0.0042	1.261
8	485	nan	nan	30	35	71	9.4	8.49	0.0007	0.0108	0.005	0.006	0.5305
8	493	nan	nan	38	45	108	8	8.66	0.001	0.007	0.0027	0.0024	0.25812
8	507	35	30	24	85	100	7.6	8.64	0.001	0.0284	0.0308	0.042	0.3298
9	108	37	32	30	20	123	5.6	8.33	0.008	nan	nan	nan	nan
9	263	19	31	14	20	38	8	7.99	0.004	0.0456	nan	0.0271	0.7173
9	303	17	30	21	40	80	6.8	8.1	0.015	0.091	0.194	0.054	2.068
9	321	16	26	14	45	62	6.8	7.95	0.018	0.023	0.017	0.064	0.329
9	333	16	30	10	50	55	9	8.93	0.044	0.039	0.0028	0.02	0.339
9	369	32	28	17	20	70	6.6	8.34	0.006	0.0097	0.0243	0.001	0.17208
9	382	29	29	26	45	100	8.8	8.23	0.002	0.0075	0.0035	0.012	0.3011
9	402	9	25	30	70	107	6.2	8.06	0.002	0.0251	0.08	0.0186	0.9464
9	431	25	29	32	45	109	6	8.5	0.003	0.027	0.025	0.015	1.218
9	445	18	32	18	60	80	6	8.52	0.003	0.037	nan	0.011	2.136
9	472	nan	nan	28	56	99	6	8.49	0.002	0.0046	nan	0.0066	1.218
9	485	nan	nan	30	45	94	5.3	7.87	0.004	0.0267	0.0991	0.018	0.5748
9	493	nan	nan	32	35	98	8	8.1	0.002	0.015	0.0016	0.0092	0.4732
9	507	23	30	20	45	73	6.8	8.25	0.002	0.0234	0.195	0.0432	0.731
10	88	8	nan	26	80	102	nan	8.31	nan	nan	nan	0.047	nan
10	108	36	32	26	10	108	3.8	8.16	0.085	nan	nan	nan	nan
10	122	14	31	24	70	95	4.4	8.19	nan	nan	nan	nan	nan
10	151	nan	31	29	35	80	4	7.87	0.019	nan	nan	0.0143	nan
10	165	27	29	30	60	90	5	8.61	0.007	nan	nan	0.084	nan
10	178	12	30	16	30	85	4	7.73	0.004	nan	nan	0.047	1.4347
10	201	21	30	21	35	80	4	8.14	0.04	nan	nan	0.047	1.098
10	213	26	30	28	40	95	5.6	7.62	0.021	0.069	nan	0.081	1.054
10	229	22	29	16	15	40	5.75	7.43	0.046	nan	nan	0.107	0.185
10	241	25	28	18	40	89	5.7	7.69	0.075	0.096	nan	nan	1.434
10	263	18	30	14	15	76	5.1	7.4	0.056	0.0545	nan	0.12308	0.9676
10	303	18	30	9	50	50	6.6	7.7	0.013	0.185	nan	0.051	1.957

10	321	16	26	nan	45	77	5.7	7.94	0.059	0.0491	0.035	0.143	0.387
10	333	15	30	8	30	50	4.6	7.93	0.042	0.079	0.035	0.0415	0.489
10	348	35	28	14	60	69	5.8	8.32	nan	0.013	0.002	0.008	0.889
10	369	31	28	18	20	72	6.8	8	0.012	0.0092	0.02	0.0012	0.17208
10	382	28	29	24	25	117	8.6	8.19	0.005	0.0284	0.0125	0.012	0.3298
10	402	18	25	30	35	90	6.4	8.1	0.005	0.0083	0.0414	0.0054	0.63
10	431	29	29	24	10	90	6	8.55	0.004	nan	0.06	0.023	1.39
10	445	29	32	28	55	103	4.9	8.47	0.002	0.057	nan	0.01	1.681
10	472	nan	nan	26	65	111	6.4	8.58	0.003	0.0072	nan	0.0078	1.448
10	485	nan	nan	26	25	103	5.5	7.88	0.006	0.0481	0.18	0.0174	0.6753
10	493	nan	nan	nan	85	64	4	8.12	0.004	0.0785	0.1567	0.0115	1.5057
10	507	24	30	18	35	75	9.2	8.47	0.003	0.062	0.046	0.0456	0.918
11	76	nan	nan	32	nan	49	5.4	8.22	0.0001	nan	nan	0.0005	nan
11	88	18	30	30	100	128	nan	8.47	nan	nan	nan	0.054	nan
11	122	25	31	30	95	107	4.8	8.24	nan	nan	nan	nan	nan
11	165	33	31	28	60	95	4.2	8.46	0.0001	nan	nan	0.041	nan
11	178	25	30	24	75	92	4.2	7.97	0.014	nan	nan	0.047	0.8198
11	201	14	30	24	50	93	4	8.12	0.03	0.074	nan	0.013	0.439
11	213	15	29	21	65	91	6.4	7.73	0.012	0.023	nan	0.103	0.5709
11	229	12	28	24	20	87	6	7.99	0.016	0.013	nan	0.051	0.395
11	241	12	28	20	65	84	6.8	8.08	0.012	0.013	nan	0.015	0.805
11	263	7	29	4	50	75	7.7	8.69	0.091	0.033	nan	0.01717	0.7612
11	303	10	30	26	60	75	10.7	8.1	0.013	0.083	0.104	0.033	1.748
11	321	13	26	0	70	44	7.3	7.5	0.02	0.067	0.011	0.054	0.286
11	333	12	27	10	80	50	5	8.39	0.044	0.049	0.0005	0.02	0.094
11	348	14	27	11	135	63	7.8	8.54	0.002	0.01	0.0005	0.002	0.717
11	369	10	26	19	65	75	6.2	8.78	0.003	0.0171	0.0186	0.002	0.2151
11	382	13	27	24	55	77	6.2	8.04	0.003	0.0188	0.01	0.0054	0.387
11	431	31	29	30	40	110	6.6	8.76	0.002	0.017	0.018	0.003	1.032
11	445	40	32	30	80	114	6	8.62	0.001	0.018	nan	0.0078	1.3623
11	472	nan	nan	28	50	96	8	8.69	0.001	0.0026	nan	0.0036	1.147
11	485	nan	nan	28	80	92	8.5	8.31	0.0006	0.0069	0.1036	0.0054	0.5879
11	493	nan	nan	34	70	108	8.2	8.54	0.001	0.0145	0.0056	0.0038	0.6596
12	76	nan	nan	34	nan	nan	5.8	8.43	0.0001	nan	nan	0.0005	nan
12	88	20	30	30	75	128	nan	8.58	nan	nan	nan	0.045	nan
12	108	8	31	30	75	129	5.8	8.62	0.006	nan	nan	nan	nan
12	122	27	31	32	85	125	4.4	8.45	nan	nan	nan	nan	nan
12	151	nan	31	27	85	106	4.2	8.47	0.001	nan	nan	0.0028	nan
12	165	34	31	26	40	118	4.4	8.67	0.001	0.001	nan	0.061	nan
12	178	26	31	24	30	100	4.6	8.11	0.02	nan	nan	0.015	0.17568
12	201	6	30	20	30	96	4.8	8.65	0.006	0.013	nan	0.012	0.659
12	213	15	29	16	45	100	7.4	7.82	0.014	0.024	nan	0.034	0.62952
12	229	11	27	20	20	94	4.55	7.78	0.026	0.028	nan	0.074	0.52
12	241	10	27	8	55	80	5.2	7.54	0.041	0.038	nan	0.032	0.893
12	263	15	30	14	25	77	5.8	7.6	0.052	0.0087	nan	nan	0.5563
12	303	10	30	24	45	45	5.4	7.98	0.023	0.14	0.187	0.054	1.489
12	321	13	26	4	35	40	7.2	7.52	0.038	0.18	0.027	0.121	0.215
12	333	11	31	6	40	47	5	7.99	0.005	0.067	0.0385	0.0357	0.536
12	348	6	27	13	35	67	4.3	7.85	0.01	0.006	0.0005	0.008	0.717
12	369	9	26	11	65	50	4.4	7.84	0.009	0.003	0.0071	0.0004	0.2151
12	382	13	27	26	70	87	7	7.89	0.003	0.0175	0.025	0.009	0.429
12	402	13	25	32	45	95	6.6	8.16	0.002	0.0356	0.0732	0.0072	0.3728
12	431	34	29	27	40	120	6	8.55	0.0001	0.019	0.018	0.009	1.063
12	445	41	32	30	60	118	7	8.7	0.002	0.022	nan	0.015	1.419
12	472	nan	nan	30	58	96	6.2	8.78	0.001	0.0033	nan	0.0132	1.304
12	485	nan	nan	30	45	83	9.4	8.42	0.002	0.0148	0.008	0.0162	0.717
12	493	nan	nan	38	50	104	8	8.5	0.002	0.0035	0.0033	0.00385	0.3298
12	507	34	30	24	80	79	7.6	8.55	0.003	0.023	0.0286	0.0402	0.5736
13	76	nan	nan	31	nan	82	6.8	8.18	0.0001	nan	nan	0.0005	nan
13	88	14	29	22	45	71	nan	8.08	nan	nan	nan	0.07	nan
13	108	34	32	20	55	85	3.4	8.09	0.011	nan	nan	nan	nan
13	122	23	31	21	40	84	4.6	nan	nan	nan	nan	nan	nan
13	151	nan	31	28	nan	111	4.2	8.46	0.019	nan	nan	0.014	nan
13	165	33	29	14	50	88	4.4	8.45	0.01	nan	nan	0.107	nan
13	178	19	31	26	10	98	4.4	7.98	0.013	nan	nan	0.05	0.52704
13	201	21	30	30	10	102	4.2	8.12	0.022	0.008	nan	0.006	0.0498
13	213	26	29	28	15	97	nan	7.7	0.036	0.039	nan	0.03	0.717
13	229	13	28	28	50	86	6.35	7.88	0.003	0.008	nan	0.113	0.278
13	241	13	28	nan	15	119	7.8	8.03	0.007	0.007	nan	0.018	0.79
13	263	16	30	nan	10	91	6.4	7.8	0.018	0.0179	nan	0.0244	0.4684
13	333	13	30	6	20	48	8	8.33	0.008	0.066	0.005	0.02	0.073

13	348	19	27	20	45	90	10	8.36	0.01	0.014	0.001	0.01	0.559
13	369	13	26	10	35	61	6.6	8	0.009	0.0035	0.0085	0.0004	0.2151
13	382	19	29	24	75	105	9.4	8.14	0.002	0.0364	0.0022	0.0036	0.03154
13	431	31	29	24	15	95	6.8	8.55	0.002	0.056	0.031	0.108	0.79
13	445	32	32	28	40	125	7	8.61	0.002	0.05	nan	0.006	1.577
13	472	nan	nan	35	55	86	6.8	8.58	0.003	0.0069	nan	0.0072	2.007
13	485	nan	nan	20	20	120	5.7	7.84	0.002	0.028	0.0739	0.009	1.0059
13	493	nan	nan	30	60	98	8	8.55	0.002	0.013	0.0022	0.0044	0.7887
13	507	31	30	18	50	77	7.9	8.51	0.001	0.0226	0.11	0.0438	0.8604
14	88	11	29	29	45	122	nan	8.33	nan	nan	nan	0.037	nan
14	108	39	32	32	15	136	3.6	8.4	0.008	nan	nan	nan	nan
14	122	12	30	31	75	122	5	8.34	nan	nan	nan	nan	nan
14	151	nan	30	26	35	112	5	8.52	0.008	nan	nan	0.0071	nan
14	165	25	29	20	60	99	5	8.79	0.001	nan	nan	0.038	nan
14	178	11	29	28	50	115	4.4	8.83	0.015	nan	nan	0.0214	0.7466
14	201	22	31	22	30	107	4.2	9	0.012	0.008	nan	0.008	0.732
14	213	27	30	21	45	107	nan	8.25	0.013	0.015	nan	0.02	0.644
14	229	32	30	20	45	94	10.5	8.57	0.009	0.021	nan	0.027	0.409
14	241	27	28	12	55	nan	9.5	8.5	0.023	0.023	nan	0.032	0.922
14	263	20	31	15	15	82	8.2	8.05	0.004	0.032	nan	0.02289	0.5563
14	303	17	30	20	50	77	8.5	8.39	0.009	0.055	0.054	0.032	1.75
14	321	17	26	6	50	47	6.6	7.93	0.026	0.0302	0.017	0.074	0.243
14	333	18	30	10	50	72	6.4	9.28	0.007	0.014	0.0005	0.0214	0.013
14	348	37	27	11	55	65	7.8	8.52	0.003	0.009	0.0005	0.004	0.243
14	369	33	28	17	55	75	8	8.55	0.003	0.0097	0.0128	0.0041	0.1147
14	382	30	29	24	30	96	8.2	8.27	0.002	0.0356	0.007	0.0762	0.30114
14	402	15	25	32	45	108	7.1	8.27	0.004	0.0163	0.0012	0.0072	nan
14	431	16	29	32	60	109	6.6	8.69	0.0001	0.015	0.008	0.009	0.989
14	445	16	32	31	65	112	6.2	8.6	0.0008	0.082	nan	0.006	1.175
14	472	nan	nan	28	40	104	6.2	8.62	0.001	0.0029	nan	0.0048	1.104
14	485	nan	nan	29	25	90	6	8.02	0.002	0.0174	0.033	0.0102	0.5736
14	493	nan	nan	36	60	101	10.8	8.21	0.001	0.0655	0.0005	0.0038	0.459
14	507	16	30	24	95	73	7.4	8.27	0.002	0.023	nan	0.0438	0.918

B. Programming using

From file *fodata.num*, as shown histograms and statistics of raw data for all variables for selected variables after transformation using logarithms and square roots on Figure 3 and Figure 4 respectively, using matlab together with functions (getfile, getnum, putnum, describe) in the ASP (McNeil et al 1997) package. This program listing is as follows.

```
getfile fodata.num
num=getnum;
num1=num(:,1:11);
num2=num(:,13:14);
data=[num1 num2];
putnum(data);
describe hist=1 type=2
y = getnum;
nitri = y(:,10);
small = nitri<0.0002;
```

```
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13)=sqrt(y(:,13));
putnum(y)
describe hist=1 type=2
```

Figure 5 to Figure 14, graph of time series plot which shows the variation in each variable, by using matlab together with functions (getfile, getnum, putnum, putfn, setvar, track) in ASP (McNeil et al 1997) package, the follwing program are used.

Figure 5 to Figure 9

```
system_dependent(14,'on')
getfile fodata.num
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=4 'x=2 1'
setvar y=5 'x=2 1'
setvar y=6 'x=2 1'
setvar y=7 'x=2 1'
setvar y=8 'x=2 1'
track font=9 size=10 new=0
```

Figure 10 to Figure 14

```
system_dependent(14,'on')
getfile fodata.num
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=9 'x=2 1'
setvar y=10 'x=2 1'
setvar y=11 'x=2 1'
setvar y=12 'x=2 1'
setvar y=13 'x=2 1'
track font=9 size=10 new=0
```

Figure 15 - 24, graph of two way analysis of variance of each variables, by using matlab together with functions (getfile, getnum, putnum, putfn, setvar, compar) in ASP (McNeil et al 1997) package, the follwing program are used.

Figure 15 to Figure 19

```
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
```

```
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat('station adjusted for day',fn(2:9,:),'log2(nitrite)','log2(nitrate)','log2
(phosp)','sqrt(silic)');
putfn(fn)
setvar y=4 'x=1 2'
setvar y=5 'x=1 2'
setvar y=6 'x=1 2'
setvar y=7 'x=1 2'
setvar y=8 'x=1 2'
compar font=9 type=2 test=1 new=0
```

Figure 20 to Figure 24

```
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat('station adjusted for day',fn(2:9,:),'log2(nitrite)','log2(nitrate)','log2
(phosp)','sqrt(silic)');
putfn(fn)
setvar y=9 'x=1 2'
setvar y=10 'x=1 2'
```

```
setvar y=11 'x=1 2'
setvar y=12 'x=1 2'
setvar y=13 'x=1 2'
compar font=9 type=2 test=1 new=0
```

Figure 25 - 34, show the linear regression analyses of each variable, by using matlab together with functions (getfile, getnum, putnum, putfn, putlab, setvar, adjust) in ASP (McNeil et al 1997) package, the follwing program are used.

Figure 25 to Figure 26

```
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=4 'x=1 2'
ok = finite(y(:,4)); y = y(ok,:);
[lab,codeID] = getlab;
lab2='2,88 88,108 108,122 122,151 151,165 165,178 178,201 201,213 213,229
229,241 241,263 263,303 303,321 321,333 333,348 348,369 369,382 382,402
402,431 431,445 445,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
```

```
residual = yadjusted(:,1)-mean(y(:,4));
z = residual/std(residual);
z(z>=2.4)
z(z<=-3)
ok = z<2.4 & z>-3;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
setvar y=5 'x=1 2'
ok = finite(y(:,5)); y = y(ok,:);
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res-1');
residual = yadjusted(:,1)-mean(y(:,5));
z = residual/std(residual);
z(z>=3)
z(z<=-3.6)
ok = z<3 & z>-3.6;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
```

Figure 27 to Figure 28

```
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
```

```
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=6 'x=1 2'
ok = finite(y(:,6)); y = y(ok,:);
[lab,codeID] = getlab;
lab2='2,88 88,108 108,122 122,151 151,165 165,178 178,201 201,213 213,229
229,241 241,263 263,303 303,321 321,333 333,348 348,369 369,382 382,402
402,431 431,445 445,472 472,485 485, 493 493,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,6));
z = residual/std(residual);
z(z>=4)
z(z<=-3)
ok = z<4 & z>-3;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
setvar y=7 'x=1 2'
ok = finite(y(:,7)); y = y(ok,:);
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,7));
z = residual/std(residual);
z(z>=4.9)
ok = z<4.9 & z>-3.6;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
```

Figure 29 to Figure 30

```
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=8 'x=1 2'
ok = finite(y(:,8)); y = y(ok,:);
[lab,codeID] = getlab;
lab2='2,76 76,108 108,122 122,151 151,165 165,178 178,201 201,213 213,229
229,241 241,263 263,303 303,321 321,333 333,348 348,369 369,382 382,402
402,431 431,445 445,472 472,485 485, 493 493,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,8));
z = residual/std(residual);
z(z>=4)
z(z<=-4.3)
ok = z<2.4 & z>-3;
y = y(ok,:);
putnum(y)
```

```
adjust ncat=25 font=7 show=3 new=0
setvar y=9 'x=1 2'
ok = finite(y(:,9)); y = y(ok,:);
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,9));
z = residual/std(residual);
z(z>=3.4)
z(z<=-3.5)
ok = z<3.4 & z>-3.5;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
```

Figure 31 to Figure 32

```
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=10 'x=1 2'
ok = finite(y(:,10)); y = y(ok,:);
[lab,codeID] = getlab;
```

```
lab2='2,76 76,108 108,151 151,165 165,178 178,201 201,213 213,229 229,241
241,263 263,303 303,321 321,333 333,348 348,369 369,382 382,402 402,431
431,445 445,472 472,485 485, 493 493,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=1 new=0
yadjusted = getnum('res=1')
residual = yadjusted(:,1)-mean(y(:,10));
z = residual/std(residual);
z(z>=3)
z(z<=-3.6)
ok = z<3 & z>-3.6;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
setvar y=11 'x=1 2'
ok = finite(y(:,11)); y = y(ok,:);
[lab,codeID] = getlab;
lab2='2,151 151,165 165,178 178,213 213,229 229,241 241,263 263,303 303,321
321,333 333,348 348,369 369,382 382,402 402,431 431,445 445,472 472,485 485,
493 493,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=1 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,11));
z = residual/std(residual);
z(z>=3)
z(z<=-2.8)
ok = z<3 & z>-2.8;
y = y(ok,:);
putnum(y)
```

```
adjust ncat=25 font=7 show=3 new=0
Figure 33 to Figure 34
system_dependent(14,'on')
getfile fodata.nun
y = getnum;
y = y(:,[1:11 13:14]);
fn = getfn;
nitri = y(:,10);
small = nitri<0.0002;
nitri(small) = nitri(small)./0;
y(:,10) = nitri;
y(:,10:12) = log(y(:,10:12))./log(2);
y(:,13) = sqrt(y(:,13));
putnum(y)
fn = str2mat(fn(1:9,:),'log2(nitrite)','log2(nitrate)','log2(phosp)','sqrt(silic)');
putfn(fn)
setvar y=12 'x=1 2'
ok = finite(y(:,12)); y = y(ok,:);
[lab,codeID] = getlab;
lab2='2,76 76,88 88,151 151,165 165,178 178,201 201,213 213,229 229,241 241,263
263,303 303,321 321,333 333,348 348,369 369,382 382,402 402,431 431,445
445,472 472,485 485, 493 493,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,12));
z = residual/std(residual);
z(z>=4.1)
z(z<=-3)
ok = z<4.1 & z>-3;
y = y(ok,:);
```

```
putnum(y)
adjust ncat=25 font=7 show=3 new=0
setvar y=13 'x=1 2'
ok = finite(y(:,13)); y = y(ok,:);
[lab,codeID] = getlab;
lab2='2,178 178,201 201,213 213,229 229,241 241,263 263,303 303,321 321,333
333,348 348,369 369,382 382,402 402,431 431,445 445,472 472,485 485, 493
493,507 507';
lab = str2mat(lab(1,:),lab2);
putlab(lab,codeID)
adjust ncat=25 out=1 font=9 show=0 new=0
yadjusted = getnum('res=1');
residual = yadjusted(:,1)-mean(y(:,13));
z = residual/std(residual);
z(z>=3)
z(z<=-3.6)
ok = z<3 & z>-3.6;
y = y(ok,:);
putnum(y)
adjust ncat=25 font=7 show=3 new=0
```

Figure 35 – 44, show the variation of each variable, by using matlab together with functions (getfile, getnum) in ASP (McNeil et al 1997) package, the follwing program are used.

Figure 35

```
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
```

```
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
% temperature
xmax = dayeff(:,1);
xmin = xmax-range(1);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('Temperature in degrees Celsius')
%text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Bay Centre) and maximum (Dato)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('       Dato',' Yaring River','  Bay Centre','      Parae','  Cockle Bed','
T Lulo','       PSU','   T Samilae');
```

```
fn = str2mat(fn,'    Laem Nok','    Industry','    Barn Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
% temperature
xmax = steff(:,1);
xmin = xmax-range(1);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('Temperature in degrees Celsius')
title('Minimum (6 Feb) and maximum (21 March)')
Figure 36
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
```

```
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%salinity
xmax = dayeff(:,2);
xmin = xmax-range(2);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('Salinity')
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Yaring River) and maximum (PSU)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
```

```
y = getnum;
fn = str2mat('      Dato',' Yaring River',' Bay Centre','      Parae',' Cockle Bed','
T Lulo','      PSU',' T Samilae');
fn = str2mat(fn,'   Laem Nok','   Industry','   Bam Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
% salinity
xmax = steff(:,2);
xmin = xmax-range(2);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('Salinity in part per thousand (ppt.)')
title('Minimum (17 November) and maximum (18 May)')
Figure 37
system_dependent(14,'on')
```

```
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%transparency
xmax = dayeff(:,3);
xmin = xmax-range(3);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('Transparency')
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Pattani River) and maximum (Bay Centre)')
```

```
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('   Dato','Yaring R',' Bay C',' Parae',' Cockle',' T Lulo',' PSU','
Samila');
fn = str2mat(fn,'Laem Nok','Industry', 'Ban Num',' Budi','PattaniR',' Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
% transparency
xmax = steff(:,3);
xmin = xmax-range(3);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('Transparency in centimetre (cm.)')
title('Minimum (17 August) and maximum (2 May)')
```

Figure 38

```
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%alkalinity
xmax = dayeff(:,4);
xmin = xmax-range(4);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('Alkalinity')
```

```
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Yaring River) and maximum (Bay Centre)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('      Dato',' Yaring River',' Bay Centre','      Parac',' Cockle Bed','
T Lulo','      PSU',' T Samilae');
fn = str2mat(fn,'   Laem Nok','   Industry','   Barn Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
%alkalinity
xmax = steff(:,4);
xmin = xmax-range(4);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
```

```
axis([minx maxx 0.1 14.9])
xlabel('Alkalinity')
title('Minimum (17 November) and maximum (9 May)')
Figure 39
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%oxygen
xmax = dayeff(:,5);
xmin = xmax-range(5);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
```

```
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('Oxygen')
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Industry) and maximum (Parae)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('      Dato',' Yaring River',' Bay Centre','      Parae',' Cockle Bed','
T Lulo','      PSU',' T Samilae');
fn = str2mat(fn,'  Laem Nok','  Industry','  Barn Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
% Oxygen
xmax = steff(:,5);
xmin = xmax-range(5);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
```

```
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('Oxygen')
title('Minimum (20 July) and maximum (11 December)')
Figure 40
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%pH
xmax = dayeff(:,6);
xmin = xmax-range(6);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
```

```
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('pH')
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Industry) and maximum (Ban Na)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('      Dato',' Yaring River',' Bay Centre','      Parae',' Cockle Bed','
T Lulo','      PSU',' T Samilae');
fn = str2mat(fn,'  Laem Nok','  Industry','  Barn Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
%pH
xmax = steff(:,6);
xmin = xmax-range(6);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
```

```
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('pH')
title('Minimum (17 November) and maximum (14 June)')
Figure 41
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%log2(nitrite)
xmax = dayeff(:,7);
xmin = xmax-range(7);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
```

```
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('log2(Nitrite)')
text(minx-1.26.4,'Day after 1 Jan 1995')
title('Minimum (Parae) and maximum (Industry)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('      Dato',' Yaring River',' Bay Centre','      Parae',' Cockle Bed','
T Lulo','      PSU',' T Samilae');
fn = str2mat(fn,'   Laem Nok','   Industry','   Barn Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
%Nitrite
xmax = steff(:,7);
xmin = xmax-range(7);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
```

```
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('log2(Nitrite) (mg/l,)')
title('Minimum (31 March) and maximum (29 August)')
Figure 42
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%log2(nitrate)
xmax = dayeff(:,8);
xmin = xmax-range(8);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
```

```
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('log2(Nitrate)')
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Parae) and maximum (Industry)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('      Dato',' Yaring River',' Bay Centre','      Parae',' Cockle Bed','
T Lulo','      PSU',' T Samilae');
fn = str2mat(fn,'    Laem Nok','    Industry','    Barn Num','      Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
% Nitrate
xmax = steff(:,8);
xmin = xmax-range(8);
y = (1:14)';
y = flipud(y);
```

```
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('log2(Nitrate) (mg/l)')
title('Minimum (14 June) and maximum (30 October)')
Figure 43
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
%log2(phosphate)
xmax = dayeff(:,9);
xmin = xmax-range(9);
```

```
y – 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20:
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('log2(phosphate)')
text(minx-1.26.4,'Day after 1 Jan 1995')
title('Minimum (Bay Centre) and maximum (Industry)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('       Dato',' Yaring River','  Bay Centre','       Parae','  Cockle Bed','
T Lulo','       PSU','  T Samilae');
fn = str2mat(fn,'    Laem Nok','    Industry','    Barn Num','       Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
daymax = y(17,:);
% Phosphate
xmax = steff(:,9);
```

```
xmin = xmax-range(9);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('log2(Phosphate) in part per million (ppm.)')
title('Minimum (4 January) and maximum (14 June)')
Figure 44
system_dependent(14,'on')
% plot station effects
getfile dayseff.num
y = getnum;
fn = str2mat('76','88','108','122','151','165','178','201');
fn = str2mat(fn,'213','229','241','263','303','321');
fn = str2mat(fn,'333','348','369','382','402','431');
fn = str2mat(fn,'445','472','485','493','507');
dayeff = y(1:25,:);
dayeff = flipud(dayeff);
range = y(26,:);
statmin = y(27,:);
statmax = y(28,:);
```

```
%sqrt(Silicate)
xmax = dayeff(:,10);
xmin = xmax-range(10);
y = 26-(1:25)';
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin(finite(xmin)));
maxx = max(xmax(finite(xmax)));
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:25
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 25.9])
xlabel('sqrt(Silicate)')
text(minx-1,26.4,'Day after 1 Jan 1995')
title('Minimum (Cockle Bed) and maximum (Industry)')
system_dependent(14,'on')
% plot station effects
getfile stateff.num
y = getnum;
fn = str2mat('       Dato',' Yaring River','  Bay Centre','       Parae','  Cockle Bed','
T Lulo','        PSU','   T Samilae');
fn = str2mat(fn,'    Laem Nok','    Industry','    Barn Num','       Budi','Pattani River','
Ban Na');
steff = y(1:14,:);
steff = flipud(steff);
range = y(15,:);
daymin = y(16,:);
```

```
daymax = y(17,:);
% Silicate
xmax = steff(:,10);
xmin = xmax-range(10);
y = (1:14)';
y = flipud(y);
axes('Position',[0.16,0.12,0.8,0.8])
minx = min(xmin);
maxx = max(xmax);
xr = maxx-minx;
minx = minx-xr/20;
maxx = maxx+xr/20;
for j=1:14
  h = plot([xmin(j),xmax(j)],[j,j],'m-');
  set(h,'LineWidth',1.5)
  hold on
end
set(gca,'YTickLabels',fn,'YTick',y,'XGrid','on')
axis([minx maxx 0.1 14.9])
xlabel('sqrt(Silicate) in part per million (ppm.)')
title('Minimum (4 January) and maximum (30 October)')
```