

The following supplement accompanies the manuscript

# Copepod community response to variable upwelling conditions off central-southern Chile during 2002–2004 and 2010–2012

Pamela Pino-Pinuer, Ruben Escribano\*, Pamela Hidalgo,  
Ramiro Riquelme-Bugueño, Wolfgang Schneider

Instituto Milenio de Oceanografía (IMO), Department of Oceanography, Faculty of Natural and Oceanographic Sciences, University of Concepción, PO Box 160 C, Campus Universitario, Concepción, Chile

\*Corresponding author: rescribano@udec.cl

*Marine Ecology Progress Series 515: 83–95 (2014)*

---

## SUPPLEMENT

Table S1. Copepod species from the upwelling zone off Central/southern Chile at Stn 18 for 2 sampling periods: (1) August 2002 to August 2004 and (2) August 2010 to August 2012. N: total abundance (ind. m<sup>-3</sup>), %: relative abundance (%), StD: standard deviation, Mean size: mean total body length (mm)

---

Species	N	%	Mean	StD	Mean size (mm)
Period 1 (2002–04)					
<i>Paracalanus indicus</i>	17379.77	58.55	755.64	987.19	0.95
<i>Calanoides patagoniensis</i>	5065.43	17.07	230.25	604.69	2.415
<i>Oithona similis</i>	3484.55	11.74	151.50	188.98	0.94
<i>Acartia tonsa</i>	1336.01	4.50	58.09	121.39	1.345
<i>Drepanopus forcipatus</i>	793.54	2.67	36.07	75.42	2.065
<i>Oithona setigera</i>	383.45	1.29	17.43	33.06	1.58
<i>Oncaea media</i>	266.43	0.76	14.15	30.88	0.565
<i>Clausocalanus arcuicornis</i>	166.92	0.56	8.79	27.68	1.36
<i>Microcalanus pygmaeus</i>	160.27	0.54	8.44	10.75	0.86
<i>Centropages brachiatus</i>	102.22	0.34	5.11	5.86	2.25
<i>Calocalanus styliremis</i>	88.59	0.30	4.66	6.59	0.725
<i>Triconia similis</i>	74.53	0.25	14.91	30.06	1.49
<i>Pleuromamma gracilis</i>	69.80	0.24	3.88	6.38	2.025
<i>Rhincalanus nasutus</i>	53.61	0.18	3.57	5.59	5.8
<i>Aetideus armatus</i>	35.98	0.12	2.25	3.38	1.79
<i>Heterorhabdus lobatus</i>	29.61	0.10	1.97	3.24	2.32
<i>Calocalanus tenuis</i>	26.13	0.09	2.90	7.54	1.13
<i>Metridia lucens</i>	25.16	0.08	2.52	4.07	2.95

<i>Oncaea venusta</i>	24.80	0.08	4.96	9.61	1.27
<i>Clytemnestra rostrata</i>	18.17	0.06	1.51	3.42	1.00
<i>Corycaeus</i> sp.	14.65	0.05	1.63	3.29	-
<i>Oncaea mediterranea</i>	14.41	0.05	7.20	6.07	1.225
<i>Clausocalanus furcatus</i>	12.07	0.04	2.41	3.80	1.275
<i>Triconia conifera</i>	11.27	0.04	0.87	1.20	1.11
<i>Nannocalanus minor</i>	8.68	0.03	0.79	0.73	1.925
<i>Lucicutia flavicornis</i>	8.24	0.03	0.82	1.27	1.88
<i>Ctenocalanus vanus</i>	7.97	0.03	0.80	1.56	1.255
<i>Corycaeus speciosus</i>	7.10	0.02	1.42	0.80	1.96
<i>Eucalanus inermis</i>	6.71	0.02	1.34	2.59	6.09
<i>Farranula</i> sp.	6.12	0.02	6.12	-	-
<i>Vettopia granulosa</i>	5.15	0.02	0.74	1.48	0.765
<i>Scolecithricella bradyi</i>	4.94	0.02	0.99	1.56	1.345
<i>Clausocalanus jobei</i>	4.20	0.01	2.10	2.80	1.285
<i>Microsetella rosea</i>	4.20	0.01	1.05	1.30	0.83
<i>Heterorhabdus</i> sp.	2.33	0.01	2.33	-	-
<i>Corycaeus amazonicus</i>	2.04	0.01	2.04	-	0.97
<i>Temora stylifera</i>	2.04	0.01	2.04	-	1.62
<i>Heterorhabdus spinifrons</i>	1.68	0.01	0.84	0.13	3.05
<i>Oithona plumifera</i>	1.58	0.01	0.79	0.81	1.12
<i>Calanus chilensis</i>	1.52	0.01	0.30	0.30	3.1
<i>Oithona nana</i>	1.44	<0.01	1.44	-	0.685
<i>Pontellina plumata</i>	1.36	<0.01	1.36	-	1.485
<i>Pseudoamallothrix profunda</i>	1.31	<0.01	0.65	0.48	2.00
<i>Mesocalanus tenuicornis</i>	0.91	<0.01	0.18	0.10	2.45
<i>Ctenocalanus citer</i>	0.83	<0.01	0.28	0.23	1.125
<i>Eucalanus hyalinus</i>	0.77	<0.01	0.19	0.16	6.325
<i>Pseudoamallothrix ovata</i>	0.74	<0.01	0.74	-	2.2
<i>Saphirella</i> sp.	0.52	<0.01	0.52	-	-
<i>Pleuromamma abdominalis</i>	0.47	<0.01	0.23	0.15	3.45
<i>Scaphocalanus echinatus</i>	0.45	<0.01	0.23	0.29	2.08
<i>Lubbockia squillimana</i>	0.22	<0.01	0.22	-	1.475
<i>Euchirella pulchra</i>	0.19	<0.01	0.19	-	3.64
<i>Pleuromamma quadrungulata</i>	0.16	<0.01	0.05	0.06	4.00
<i>Haloptilus longicornis</i>	0.16	<0.01	0.16	-	2.175
<i>Subeucalanus crassus</i>	0.08	<0.01	0.04	0.03	3.35
<i>Euchirella</i> sp.	0.06	<0.01	0.06	-	-
<i>Oculosetella gracilis</i>	0.03	<0.01	0.03	-	1.045
<i>Acartia danae</i>	0.02	<0.01	0.02	-	1.12

---

Species Period 2 (2010–12)	N	%	Mean	StD	Mean size (mm)
<i>Drepanopus forcipatus</i>	2903.01	27.88	152.79	422.37	2.07
<i>Oithona similis</i>	2423.19	23.27	134.62	320.90	0.94
<i>Calanoides patagoniensis</i>	1436.99	13.80	89.81	250.91	2.42
<i>Paracalanus indicus</i>	876.39	8.42	43.82	70.02	0.95
<i>Clausocalanus arcuicornis</i>	621.19	5.97	41.41	111.25	1.36
<i>Acartia tonsa</i>	522.18	5.01	29.01	37.27	1.35
<i>Microsetella norvegica</i>	445.34	4.28	89.07	198.20	0.56
<i>Microcalanus pygmaeus</i>	340.34	3.27	24.31	44.14	0.86
<i>Oithona setigera</i>	160.97	1.55	9.47	18.50	1.58
<i>Pleuromamma gracilis</i>	135.16	1.30	9.01	22.17	2.03
<i>Corycaeus amazonicus</i>	122.48	1.18	13.61	35.45	0.97
<i>Metridia lucens</i>	78.74	0.76	6.06	14.10	2.95
<i>Oithona nana</i>	78.16	0.75	13.03	9.97	0.69
<i>Triconia similis</i>	63.98	0.61	4.57	11.34	1.49
<i>Rhincalanus nasutus</i>	40.66	0.39	2.71	5.16	5.80
<i>Nannocalanus minor</i>	24.39	0.23	2.03	4.03	1.93
<i>Triconia conifera</i>	22.95	0.22	1.27	2.59	1.11
<i>Pleuromamma xiphias</i>	21.53	0.21	7.18	11.97	4.69
<i>Centropages brachiatus</i>	18.42	0.18	1.23	1.62	2.25
<i>Aetideus armatus</i>	14.76	0.14	1.23	2.17	1.79
<i>Oncaea mediterranea</i>	14.07	0.14	2.81	2.23	1.23
<i>Calocalanus tenuis</i>	11.34	0.11	1.03	1.67	1.13
<i>Triconia minuta</i>	5.67	0.05	1.89	2.79	0.61
<i>Oncaea media</i>	4.97	0.05	1.24	1.75	0.57
<i>Lucicutia flavicornis</i>	4.80	0.05	0.69	1.11	1.88
<i>Mesocalanus tenuicornis</i>	4.59	0.04	0.66	0.80	2.45
<i>Heterorhabdus papilliger</i>	4.23	0.04	0.35	0.62	2.14
<i>Clytemnestra rostrata</i>	3.04	0.03	0.28	0.40	1.00
<i>Oncaea venusta</i>	1.79	0.02	0.45	0.68	1.27
<i>Subeucalanus crassus</i>	1.48	0.01	1.48	-	3.35
<i>Scolecithricella bradyi</i>	1.26	0.01	0.25	0.27	1.35
<i>VetTORIA granulosa</i>	0.70	0.01	0.10	0.15	0.77
<i>Scaphocalanus echinatus</i>	0.65	0.01	0.22	0.16	2.08
<i>Aetideus bradyi</i>	0.55	0.01	0.18	0.27	1.61
<i>Pleuromamma abdominalis</i>	0.51	<0.01	0.26	0.31	3.45
<i>Calanus chilensis</i>	0.38	<0.01	0.10	0.14	3.10
<i>Oculosetella gracilis</i>	0.38	<0.01	0.13	0.11	1.05
<i>Clausocalanus pergens</i>	0.31	<0.01	0.31	-	0.90
<i>Scolecithricella minor</i>	0.26	<0.01	0.13	0.09	1.39
<i>Scaphocalanus curtus</i>	0.26	<0.01	0.13	0.16	1.35
<i>Macrosetella gracilis</i>	0.22	<0.01	0.22	-	1.34
<i>Euterpina acutifrons</i>	0.15	<0.01	0.03	0.01	0.64
<i>Candacia pachydactyla</i>	0.14	<0.01	0.07	0.04	2.60

<i>Calocalanus plumulosus</i>	0.06	<0.01	0.06	-	1.11
<i>Pseudoamallothrix profunda</i>	0.06	<0.01	0.06	0.06	2.00
<i>Scaphocalanus brevicornis</i>	0.05	<0.01	0.05	-	2.28
<i>Euchaeta marina</i>	0.05	<0.01	0.02	0.02	3.08
<i>Microsetella rosea</i>	0.04	<0.01	0.02	0.00	0.83
<i>Sapphirina gemma</i>	0.03	<0.01	0.03	-	2.46
<i>Pleuromamma quadrangulata</i>	0.02	<0.01	0.02	-	4.00
<i>Ctenocalanus vanus</i>	0.02	<0.01	0.02	-	1.26
<i>Acartia danae</i>	0.02	<0.01	0.02	-	1.12
<i>Scolecithrix danae</i>	0.02	<0.01	0.02	-	2.16
<i>Scolecithricella abyssalis</i>	0.01	<0.01	0.01	-	1.96
<i>Calocalanus styliremis</i>	0.01	<0.01	0.01	-	0.73

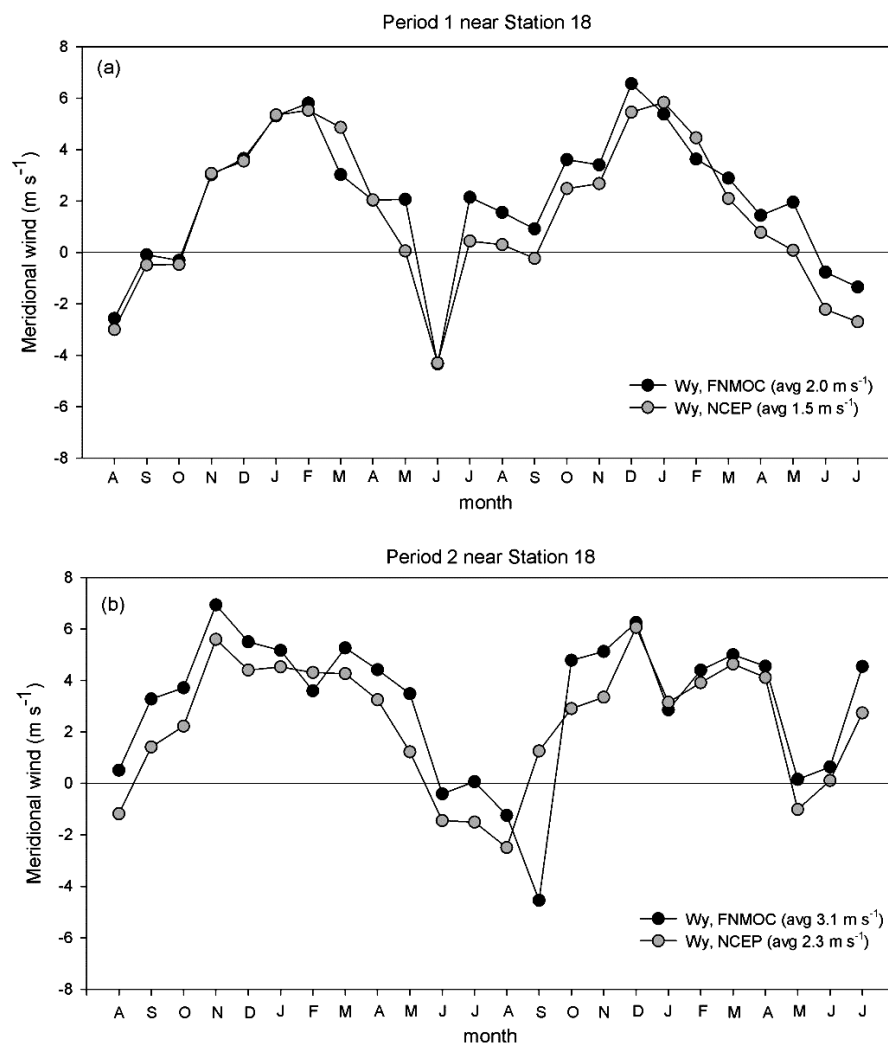


Fig. S1. Meridional winds at two points near Stn 18 in the coastal upwelling zone off central/southern Chile for two comparative periods: Period 1 (2002–2004) and Period 2 (2010–2012). Data are from monthly values of FNMOC and NCEP forecasting models of NOAA

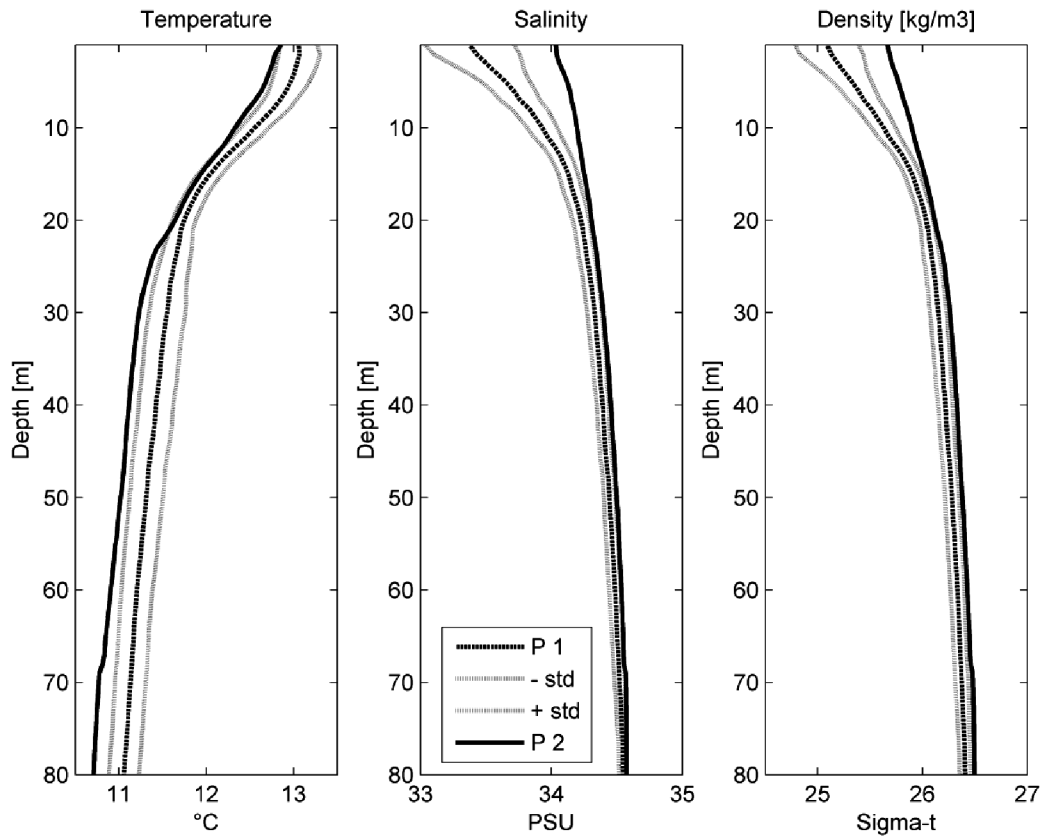


Fig. S2. Annual means of water-column conditions after 3 mo moving averages of vertical profiles of temperature, salinity and density at Stn 18 in the Central/southern upwelling region off Chile for two sampling periods: Period 1 (2002–2004) and Period 2 (2010–2012). Data are from monthly CTD casts. std: standard deviation