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1	Submission Date	11/26/2018	1
2	Accession no. of related data sets		2
3	Investigator-1 name	Catherine E. Cosca	3.1
4	Investigator-1 institution	NOAA/PMEL	3.2
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9	Investigator-1 ID type (ORCID, Researcher ID, etc.)		3.7
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15	Investigator-2 researcher ID		3.6
16	Investigator-2 ID type (ORCID, Researcher ID, etc.)		3.7
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22	Investigator-3 researcher ID		3.6
23	Investigator-3 ID type (ORCID, Researcher ID, etc.)		3.7
24	Data submitter name	Catherine E. Cosca	4.1
25	Data submitter institution	NOAA/PMEL	4.2
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28	Data submitter email	<a href="mailto:Cathy.Cosca@noaa.gov">Cathy.Cosca@noaa.gov</a>	4.5
29	Data submitter researcher ID		4.6
30	Data submitter ID type (ORCID, Researcher ID, etc.)		4.7
31	Title	Partial pressure of carbon dioxide (pCO <sub>2</sub> ), temperature, salinity and other variables collected from surface underway observations using shower head equilibrator, carbon dioxide gas detector and other instruments from 6 trans-Pacific crossings onboard container ship Cap Blanche in the Pacific Ocean from 2017-11-17 to 2018-09-04.	5
32	Abstract	Underway measurements of pCO <sub>2</sub> , salinity, sea surface temperature, and other parameters were collected during 4 trans-Pacific crossings in 2016 and 2017 on the container ship Cap Blanche. Cruise names and expocodes: CB2017_11 (AG5W20171117), CB2018_01 (AG5W20180112), CB2018_03 (AG5W20180309), CB2018_05 (AG5W20180502), CB2018_07 (AG5W20180630), CB2018_09 (AG5W20180827). All cruises were transits between the North American West Coast and New Zealand. This effort was conducted in support of NOAA's Climate Program Office (CPO) and Ocean Acidification Program (OAP). The major objectives of the project were to and to continue a time series documenting the distribution of surface and atmospheric fCO <sub>2</sub> , salinity, temperature, and other parameters, and to characterize and map the key indicators of ocean acidification (OA) across the Pacific Ocean.	6
33	Purpose		7
34	Start date	11/17/2017	8.1
35	End date	9/4/2018	8.2
36	Westbd longitude	179.3752	9.1
37	Eastbd longitude	-123.02	9.2
38	Northbd latitude	37.5938	9.3
39	Southbd latitude	-36.2322	9.4
40	Spatial reference system	WGS 84	10
41	Geographic names	Pacific Ocean, Equatorial Pacific	11
42	Location of organism collection		12
43	Funding agency name	NOAA's Climate Program Office and Ocean Acidification Program	13.1

44	<b>Funding project title</b>	Surface Water pCO2 Measurements from Ships; West Coast Ocean Acidification Monitoring Network: Volunteer Observing Ships	13.2
45	<b>Funding project ID (Grant no.)</b>		13.3
46	<b>Research projects</b>	none	14
47	<b>Platform-1 name</b>	Cap Blanche	15.1
48	<b>Platform-1 ID</b>	C4MZ2	15.2
49	<b>Platform-1 type</b>	Container Ship	15.3
50	<b>Platform-1 owner</b>	Hamburg Sud	15.4
51	<b>Platform-1 country</b>	Germany	15.5
52	<b>EXPOCODE</b>	AG5W20171117, AG5W20180112, AG5W20180309, AG5W20180502, AG5W20180630, AG5W20180827	16
53	<b>Cruise ID</b>	CB2017_11, CB2018_01, CB2018_03, CB2018_05, CB2018_07, CB2018_09	17
54	<b>Section</b>		18
55	<b>Author list for citation</b>	Cosca, Catherine E.; Alin, Simone R.; Feely, Richard A.; Herndon, Julian; US DOC/NOAA/OAR/PMEL/CO2 Pierrot, D.; Neill, C.; Sullivan, K.; Castle, R.; Wanninkhof, R.; Luger, H.; Johannessen, T.; Olsen, A.; Feely, R.A.; and Cosca, C.E. (2009). Recommendations for autonomous underway pCO2 measuring systems and data-reduction routines. Deep-Sea Res., II, v. 56, pp. 512-522.	19
56	<b>References</b>	Feely, R.A., R. Wanninkhof, H.B. Milburn, C.E. Cosca, M. Stapp, and P.P. Murphy, A new automated underway system for making high precision pCO2 measurements onboard research ships, Analytica Chim. Acta, 377, 185-191, 1998.  Wanninkhof and Thoning, Measurement of fugacity of Carbon Dioxide in surface water and air using continuous sampling methods, Marine Chemistry, 44, 189-205, 1993.	20
57	<b>Supplemental information</b>	<a href="http://www.pmel.noaa.gov/co2/">http://www.pmel.noaa.gov/co2/</a>	21
58	<b>DIC: Variable abbreviation in data files</b>		22.1
59	<b>DIC: Observation type</b>		22.2
60	<b>DIC: In-situ observation / manipulation condition / response variable</b>		22.3
61	<b>DIC: Manipulation method</b>		22.4
62	<b>DIC: Variable unit</b>		22.5
63	<b>DIC: Measured or calculated</b>		22.6
64	<b>DIC: Calculation method and parameters</b>		22.7
65	<b>DIC: Sampling instrument</b>		22.8
66	<b>DIC: Analyzing instrument</b>		22.9
67	<b>DIC: Detailed sampling and analyzing information</b>		22.10
68	<b>DIC: Field replicate information</b>		22.11
69	<b>DIC: Standardization technique description</b>		22.12.1
70	<b>DIC: Frequency of standardization</b>		22.12.2
71	<b>DIC: CRM manufacturer</b>		22.12.3.1
72	<b>DIC: Batch number</b>		22.12.3.2
73	<b>DIC: Poison used to kill the sample</b>		22.13.1
74	<b>DIC: Poison volume</b>		22.13.2
75	<b>DIC Poisoning correction description</b>		22.13.3
76	<b>DIC: Uncertainty</b>		22.14
77	<b>DIC: Data quality flag description</b>		22.15
78	<b>DIC: Method reference (citation)</b>		22.16
79	<b>DIC: Researcher Name</b>		22.17.1
80	<b>DIC: Researcher Institution</b>		22.17.2
81	<b>TA: Variable abbreviation in data files</b>		23.1
82	<b>TA: Observation type</b>		23.2
83	<b>TA: In-situ observation / manipulation condition / response variable</b>		23.3
84	<b>TA: Manipulation method</b>		23.4
85	<b>TA: Variable unit</b>		23.5

86	TA: Measured or calculated		23.6
87	TA: Calculation method and parameters		23.7
88	TA: Sampling instrument		23.8
89	TA: Analyzing instrument		23.9
90	TA: Type of titration		23.10
91	TA: Cell type (open or closed)		23.11
92	TA: Curve fitting method		23.12
93	TA: Detailed sampling and analyzing information		23.13
94	TA: Field replicate information		23.14
95	TA: Standardization technique description		23.15.1
96	TA: Frequency of standardization		23.15.2
97	TA: CRM manufacturer		23.15.3.1
98	TA: Batch Number		23.15.3.2
99	TA: Poison used to kill the sample		23.16.1
100	TA: Poison volume		23.16.2
101	TA: Poisoning correction description		23.16.3
102	TA: Magnitude of blank correction		23.17
103	TA: Uncertainty		23.18
104	TA: Data quality flag description		23.19
105	TA: Method reference (citation)		23.20
106	TA: Researcher Name		23.21.1
107	TA: Researcher Institution		23.21.2
108	pH: Variable abbreviation in data files		24.1
109	pH: Observation type		24.2
110	pH: In-situ observation / manipulation condition / response variable		24.3
111	pH: Manipulation method		24.4
112	pH: Measured or calculated		24.5
113	pH: Calculation method and parameters		24.6
114	pH: Sampling instrument		24.7
115	pH: Analyzing instrument		24.8
116	pH: pH scale		24.9
117	pH: Temperature of measurement		24.10
118	pH: Detailed sampling and analyzing information		24.11
119	pH: Field replicate information		24.12
120	pH: Standardization technique description		24.13.1
121	pH: Frequency of standardization		24.13.2
122	pH: pH values of the standards		24.13.3
123	pH: Temperature of standardization		24.13.4
124	pH: Temperature correction method		24.14
125	pH: at what temperature was pH reported		24.15
126	pH: Uncertainty		24.16
127	pH: Data quality flag description		24.17
128	pH: Method reference (citation)		24.18
129	pH: Researcher Name		24.19.1
130	pH: Researcher Institution		24.19.2
131	pCO2A: Variable abbreviation in data files	fCO2W@SST	25.1
132	pCO2A: Observation type	Surface underway	25.2
133	pCO2A: In-situ observation / manipulation condition / response variable	In-situ observation	25.3
134	pCO2A: Manipulation method		25.4

135	<b>pCO2A: Variable unit</b>	uatm	25.5
136	<b>pCO2A: Measured or calculated</b>	Measured	25.6
137	<b>pCO2A: Calculation method and parameters</b>		25.7
138	<b>pCO2A: Sampling instrument</b>	Seawater pump	25.8
139	<b>pCO2A: Location of seawater intake</b>	Bow	25.9
140	<b>pCO2A: Depth of seawater intake</b>	5 meters	25.10
141	<b>pCO2A: Analyzing instrument</b>	General Oceanics 8050. PMEL system ID: GO7	25.11
142	<b>pCO2A: Detailed sampling and analyzing information</b>	The sampling and analyzing methods of the Neill/General Oceanics Underway pCO2 systems are described in detail in: Pierrot, D.; Neill, C.; Sullivan, K.; Castle, R.; Wanninkhof, R.; Luger, H.; Johannessen, T.; Olsen, A.; Feely, R.A.; and Cosca, C.E. (2009). Recommendations for autonomous underway pCO2 measuring systems and data-reduction routines. Deep-Sea Res., II, v. 56, pp. 512-522.	25.12
143	<b>pCO2A: Equilibrator type</b>	Shower head	25.13.1
144	<b>pCO2A: Equilibrator volume (L)</b>	~0.5 L	25.13.2
145	<b>pCO2A: Vented or not</b>	Vented	25.13.3
146	<b>pCO2A: Water flow rate (L/min)</b>	3 L/min	25.13.4
147	<b>pCO2A: Headspace gas flow rate (L/min)</b>	~0.8 L/m	25.13.5
148	<b>pCO2A: How was temperature inside the equilibrator measured .</b>	Hart Scientific model 1521 digital thermometer, serial number A77488, with an NIST traceable model 5610 thermistor probe, serial number A9B0916. Accurate to $\pm 0.01^{\circ}\text{C}$ .	25.13.6
149	<b>pCO2A: How was pressure inside the equilibrator measured.</b>	Setra 239 differential pressure transducer, accurate to $\pm 0.15$ hPa. The equilibrator was passively vented to a secondary equilibrator, and the Licor sample output was vented to the laboratory when CO2 measurements were made, thus equilibrator headspace pressure was assumed to be laboratory pressure. Pressure in the laboratory was measured with a GE Druck barometer, serial number 3013024, with an accuracy of $\pm 0.01$ %fs.  From Pierrot, et al.: Sample air is dried in a condenser that is cooled to 4-5 oC by a Peltier thermoelectric device. This partially dried air flushes a chamber that is vented and remains at ambient pressure. The dried air inside the chamber is used as the counter flow in the Nafion® tubing. A vacuum pump pulls the dried air from the chamber first through a fixed restrictor and then through the Nafion® tubes, thus creating an absolute pressure and corresponding partial pressure gradient for water vapor across the membrane. When atmospheric air is measured, some of the partially dried air (80-100 ml/min) is pushed through a Nafion® tube, the analyzer and out a vent instead of flushing the chamber.	25.13.7
150	<b>pCO2A: Drying method for CO2 gas</b>	The headspace gas, when being measured, is circulated in a closed loop through the analyzer at a rate similar to that of the atmospheric air (80-100 ml/min). It is dried first in the condenser, then in a Nafion® tube prior to entering the analyzer and being returned to the equilibrator. Typically, the water mole fraction (xH2O) in the dried gas is about 2 parts per thousand (ppt), which corresponds to a dew point temperature of about -20 °C. The liquid water condensed out of the sample air streams is removed by peristaltic pumps into the vent equilibrator at intervals determined by the user.	25.14
151	<b>pCO2A: Manufacturer of the gas detector</b>	Licor, Inc	25.15.1
152	<b>pCO2A: Model of the gas detector</b>	Licor 7000, IRG4-0560	25.15.2
153	<b>pCO2A: Resolution of the gas detector</b>	0.2 $\mu\text{atm}$	25.15.3
154	<b>pCO2A: Uncertainty of the gas detector</b>	0.3 $\mu\text{atm}$ for equilibrator measurements, 0.2 $\mu\text{atm}$ for atmospheric measurements	25.15.4
155	<b>pCO2A: Standardization technique description</b>	The system runs a full cycle in approximately 7 hours. The cycle starts with 4 standard gases, then measures three rounds of 6 atmospheric samples followed by 50 surface water samples. Each new gas is flushed through the Licor Analyzer for 2 minutes prior to a stop-flow measurement.	25.16.1
156	<b>pCO2A: Frequency of standardization</b>	Every 7 hours	25.16.2
157	<b>pCO2A: Manufacturer of standard gas</b>	Standard gases are supplied by NOAA's Earth System Research Laboratory, Global Monitoring Division, in Boulder, CO, and are directly traceable to the WMO scale.	25.16.3.1
158	<b>pCO2A: Concentrations of standard gas</b>	LL122869, 304.26 ppm; LL55878, 405.96 ppm; LL122887, 496.84 ppm; LL154680, 867.21 ppm	25.16.3.2
159	<b>pCO2A: Uncertainties of standard gas</b>	0.01 ppm	25.16.3.3
160	<b>pCO2A: Water vapor correction method</b>	Details of the data reduction are described in Pierrot, et.al. (2009).	25.17
161	<b>pCO2A: Temperature correction method</b>	Details of the data reduction are described in Pierrot, et.al. (2009).	25.18
162	<b>pCO2A: at what temperature was pCO2 reported</b>	In situ sea surface temperature	25.19
163	<b>pCO2A: Uncertainty</b>	$\pm 2$ $\mu\text{atm}$	25.20

164	<b>pCO2A: Data quality flag description</b>	WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4 = bad value	25.21
165	<b>pCO2A: Method reference (citation)</b>	Pierrot, D.; Neill, C.; Sullivan, K.; Castle, R.; Wanninkhof, R.; Luger, H.; Johannessen, T.; Olsen, A.; Feely, R.A.; and Cosca, C.E. (2009). Recommendations for autonomous underway pCO2 measuring systems and data-reduction routines. Deep-Sea Res., II, v. 56, pp. 512-522.	25.22
166	<b>pCO2A: Researcher Name</b>	Catherine E. Cosca	25.23.1
167	<b>pCO2A: Researcher Institution</b>	Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration	25.23.2
168	<b>pCO2D: Variable abbreviation in data files</b>		26.1
169	<b>pCO2D: Observation type</b>		26.2
170	<b>pCO2D: In-situ observation / manipulation condition / response variable</b>		26.3
171	<b>pCO2D: Manipulation method</b>		26.4
172	<b>pCO2D: Variable unit</b>		26.5
173	<b>pCO2D: Measured or calculated</b>		26.6
174	<b>pCO2D: Calculation method and parameters</b>		26.7
175	<b>pCO2D: Sampling instrument</b>		26.8
176	<b>pCO2D: Analyzing instrument</b>		26.9
177	<b>pCO2D: Storage method</b>		26.10
178	<b>pCO2D: Seawater volume (mL)</b>		26.11
179	<b>pCO2D: Headspace volume (mL)</b>		26.12
180	<b>pCO2D: Temperature of measurement</b>		26.13
181	<b>pCO2D: Detailed sampling and analyzing information</b>		26.14
182	<b>pCO2D: Field replicate information</b>		26.15
183	<b>pCO2D: Manufacturer of the gas detector</b>		26.16.1
184	<b>pCO2D: Model of the gas detector</b>		26.16.2
185	<b>pCO2D: Resolution of the gas detector</b>		26.16.3
186	<b>pCO2D: Uncertainty of the gas detector</b>		26.16.4
187	<b>pCO2D: Standardization technique description</b>		26.17.1
188	<b>pCO2D: Frequency of standardization</b>		26.17.2
189	<b>pCO2D: Temperature of standardization</b>		26.17.3
190	<b>pCO2D: Manufacturer of standard gas</b>		26.17.4.1
191	<b>pCO2D: Concentrations of standard gas</b>		26.17.4.2
192	<b>pCO2D: Uncertainties of standard gas</b>		26.17.4.3
193	<b>pCO2D: Water vapor correction method</b>		26.18
194	<b>pCO2D: Temperature correction method</b>		26.19
195	<b>pCO2D: at what temperature was pCO2 reported</b>		26.20
196	<b>pCO2D: Uncertainty</b>		26.21
197	<b>pCO2D: Data quality flag description</b>		26.22
198	<b>pCO2D: Method reference (citation)</b>		26.23
199	<b>pCO2D: Researcher Name</b>		26.24.1
200	<b>pCO2D: Researcher Institution</b>		26.24.2
201	<b>Var1: Variable abbreviation in data files</b>	SST(TSG)_C	27.1
202	<b>Var1: Full variable name</b>	Sea Surface Temperature	27.2
203	<b>Var1: Observation type</b>	Surface Underway	27.4
204	<b>Var1: In-situ observation / manipulation condition / response variable</b>	In-situ observation	27.5
205	<b>Var1: Variable unit</b>	Degree Celcius	27.7
206	<b>Var1: Measured or calculated</b>	Measured	27.8
207	<b>Var1: Calculation method and parameters</b>		27.9
208	<b>Var1: Sampling instrument</b>	Seabird 38, serial number 3848581-0383	27.10
209	<b>Var1: Analyzing instrument</b>		27.11
210	<b>Var1: Duration (for settlement/colonization methods)</b>		27.12
211	<b>Var1: Detailed sampling and analyzing information</b>		27.13
212	<b>Var1: Field replicate information</b>		27.14



213	Var1: Uncertainty	0.0025°C	27.15
214	Var1: Data quality flag description		27.16
215	Var1: Method reference (citation)		27.17
216	Var1: Biological subject		27.18
217	Var1: Species Identification code		27.19
218	Var1: Life stage of the biological subject		27.20
219	Var1: Researcher Name		27.21.1
220	Var1: Researcher Institution		27.21.2
221	Var2: Variable abbreviation in data files	SAL(TSG)_PERMIL	27.1
222	Var2: Full variable name	Salinity	27.2
223	Var2: Observation type	Surface Underway	27.4
224	Var2: In-situ observation / manipulation condition / response variable	In-situ observation	27.5
225	Var2: Variable unit	permil	27.7
226	Var2: Measured or calculated	Measured	27.8
227	Var2: Calculation method and parameters		27.9
228	Var2: Sampling instrument	Seabird 45, serial number 4539646-0143	27.10
229	Var2: Analyzing instrument		27.11
230	Var2: Duration (for settlement/colonization methods)		27.12
231	Var2: Detailed sampling and analyzing information		27.13
232	Var2: Field replicate information		27.14
233	Var2: Uncertainty	0.005 PSU	27.15
234	Var2: Data quality flag description		27.16
235	Var2: Method reference (citation)		27.17
236	Var2: Biological subject		27.18
237	Var2: Species Identification code		27.19
238	Var2: Life stage of the biological subject		27.20
239	Var2: Researcher Name		27.21.1
240	Var2: Researcher Institution		27.21.2