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1	Submission Date	12/29/2017	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
5	Investigator-1 address	7600 Sand Point Way NE	3.3
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8	Investigator-1 researcher ID		3.6
9	Investigator-1 ID type (ORCID, Researcher ID, etc.)		3.7
10	Investigator-2 name	Simone R. Alin	3.1
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13	Investigator-2 phone	206-526-6819	3.4
14	Investigator-2 email	<a href="mailto:simone.r.alin@noaa.gov">simone.r.alin@noaa.gov</a>	3.5
15	Investigator-2 researcher ID		3.6
16	Investigator-2 ID type (ORCID, Researcher ID, etc.)		3.7
17	Investigator-3 name	Richard A. Feely	3.1
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19	Investigator-3 address	7600 Sand Point Way NE, Building 3, Seattle, WA 98115	3.3
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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
26	Data submitter address	7600 Sand Point Way NE	4.3
27	Data submitter phone	206-526-6183	4.4
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 4 trans-Pacific crossings onboard container ship Cap Blanche in the Pacific Ocean from 2016-10-19 to 2017-05-24.	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: CB2016_10 (AG5W20161019), CB2017_01 (AG5W20170115), CB2017_03 (AG5W20170312), CB2017_05 (AG5W20170507). 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).	6
33	Purpose	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.	7
34	Start date	10/19/2016	8.1
35	End date	5/24/2017	8.2
36	Westbd longitude	174.9563	9.1
37	Eastbd longitude	-124.6551	9.2
38	Northbd latitude	47.9145	9.3
39	Southbd latitude	-36.422	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>EXPCODE</b>	AG5W20161019, AG5W20170115, AG5W20170312, AG5W20170507	16
53	<b>Cruise ID</b>	CB2016_10, CB2017_01, CB2017_03, CB2017_05	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	<b>TA: Measured or calculated</b>		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	25.1
132	pCO2A: Observation type	25.2
133	pCO2A: In-situ observation / manipulation condition / response variable	25.3
134	pCO2A: Manipulation method	25.4
135	pCO2A: Variable unit	25.5
136	pCO2A: Measured or calculated	25.6

137	pCO2A: Calculation method and parameters		25.7
138	pCO2A: Sampling instrument	Seawater pump	25.8
139	pCO2A: Location of seawater intake	Bow	25.9
140	pCO2A: Depth of seawater intake	5 meters	25.10
141	pCO2A: Analyzing instrument	General Oceanics 8050. PMEL system ID: GO7	25.11
142	pCO2A: Detailed sampling and analyzing information	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	pCO2A: Equilibrator type	Shower head	25.13.1
144	pCO2A: Equilibrator volume (L)	~0.5 L	25.13.2
145	pCO2A: Vented or not	Vented	25.13.3
146	pCO2A: Water flow rate (L/min)	3 L/min	25.13.4
147	pCO2A: Headspace gas flow rate (L/min)	~0.8 L/m	25.13.5
148	pCO2A: How was temperature inside the equilibrator measured .	Hart Scientific model 1521 digital thermometer, serial number A77488, with an NIST traceable model 5610 thermistor probe, serial number A690613. Accurate to $\pm 0.01^{\circ}\text{C}$ .	25.13.6
149	pCO2A: How was pressure inside the equilibrator measured.	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	pCO2A: Drying method for CO2 gas	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	pCO2A: Manufacturer of the gas detector	Licor, Inc	25.15.1
152	pCO2A: Model of the gas detector	Licor 7000, IRG4-0560	25.15.2
153	pCO2A: Resolution of the gas detector	0.2 $\mu\text{atm}$	25.15.3
154	pCO2A: Uncertainty of the gas detector	0.3 $\mu\text{atm}$ for equilibrator measurements, 0.2 $\mu\text{atm}$ for atmospheric measurements	25.15.4
155	pCO2A: Standardization technique description	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	pCO2A: Frequency of standardization	Every 7 hours	25.16.2
157	pCO2A: Manufacturer of standard gas	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	pCO2A: Concentrations of standard gas	LL83535, 246.77 ppm; LL108050, 399.22 ppm; LL108059, 496.103 ppm; LL154371, 628.59 ppm	25.16.3.2
159	pCO2A: Uncertainties of standard gas	0.01 ppm	25.16.3.3
160	pCO2A: Water vapor correction method	Details of the data reduction are described in Pierrot, et.al. (2009).	25.17
161	pCO2A: Temperature correction method	Details of the data reduction are described in Pierrot, et.al. (2009).	25.18
162	pCO2A: at what temperature was pCO2 reported	In situ sea surface temperature	25.19
163	pCO2A: Uncertainty	$\pm 0.01^{\circ}\text{C}$	25.20
164	pCO2A: Data quality flag description	WOCE quality control flags are used: 2 = good value, 3 = questionable value, 4 = bad value	25.21

165	pCO2A: Method reference (citation)	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	pCO2A: Researcher Name	Catherine E. Cosca	25.23.1
167	pCO2A: Researcher Institution	Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration	25.23.2
168	pCO2D: Variable abbreviation in data files		26.1
169	pCO2D: Observation type		26.2
170	pCO2D: In-situ observation / manipulation condition / response variable		26.3
171	pCO2D: Manipulation method		26.4
172	pCO2D: Variable unit		26.5
173	pCO2D: Measured or calculated		26.6
174	pCO2D: Calculation method and parameters		26.7
175	pCO2D: Sampling instrument		26.8
176	pCO2D: Analyzing instrument		26.9
177	pCO2D: Storage method		26.10
178	pCO2D: Seawater volume (mL)		26.11
179	pCO2D: Headspace volume (mL)		26.12
180	pCO2D: Temperature of measurement		26.13
181	pCO2D: Detailed sampling and analyzing information		26.14
182	pCO2D: Field replicate information		26.15
183	pCO2D: Manufacturer of the gas detector		26.16.1
184	pCO2D: Model of the gas detector		26.16.2
185	pCO2D: Resolution of the gas detector		26.16.3
186	pCO2D: Uncertainty of the gas detector		26.16.4
187	pCO2D: Standardization technique description		26.17.1
188	pCO2D: Frequency of standardization		26.17.2
189	pCO2D: Temperature of standardization		26.17.3
190	pCO2D: Manufacturer of standard gas		26.17.4.1
191	pCO2D: Concentrations of standard gas		26.17.4.2
192	pCO2D: Uncertainties of standard gas		26.17.4.3
193	pCO2D: Water vapor correction method		26.18
194	pCO2D: Temperature correction method		26.19
195	pCO2D: at what temperature was pCO2 reported		26.20
196	pCO2D: Uncertainty		26.21
197	pCO2D: Data quality flag description		26.22
198	pCO2D: Method reference (citation)		26.23
199	pCO2D: Researcher Name		26.24.1
200	pCO2D: Researcher Institution		26.24.2
201	Var1: Variable abbreviation in data files	SST(TSG)_C	27.1
202	Var1: Full variable name	Sea Surface Temperature	27.2
203	Var1: Observation type	Surface Underway	27.4
204	Var1: In-situ observation / manipulation condition / response variable	In-situ observation	27.5
205	Var1: Variable unit	Degree Celcius	27.7
206	Var1: Measured or calculated	Measured	27.8
207	Var1: Calculation method and parameters		27.9
208	Var1: Sampling instrument	Seabird 38, serial number 3848581-0383	27.10
209	Var1: Analyzing instrument		27.11
210	Var1: Duration (for settlement/colonization methods)		27.12
211	Var1: Detailed sampling and analyzing information		27.13
212	Var1: Field replicate information		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