

# Rik Wanninkhof

## List of Publications by Citations

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117  
papers

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122  
ext. papers

21,439  
ext. citations

7.3  
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6.73  
L-index

#	Paper	IF	Citations
117	Relationship between wind speed and gas exchange over the ocean. <i>Journal of Geophysical Research</i> , <b>1992</b> , 97, 7373		3234
116	The oceanic sink for anthropogenic CO <sub>2</sub> . <i>Science</i> , <b>2004</b> , 305, 367-71	33.3	2745
115	Global sea-air CO <sub>2</sub> flux based on climatological surface ocean pCO <sub>2</sub> , and seasonal biological and temperature effects. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , <b>2002</b> , 49, 1601-1622	2.3	1234
114	Climatological mean and decadal change in surface ocean pCO <sub>2</sub> , and net sea-air CO <sub>2</sub> flux over the global oceans. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , <b>2009</b> , 56, 554-577	2.3	1200
113	A global ocean carbon climatology: Results from Global Data Analysis Project (GLODAP). <i>Global Biogeochemical Cycles</i> , <b>2004</b> , 18, n/a-n/a	5.9	1144
112	Relationship between wind speed and gas exchange over the ocean revisited. <i>Limnology and Oceanography: Methods</i> , <b>2014</b> , 12, 351-362	2.6	567
111	Global Carbon Budget 2020. <i>Earth System Science Data</i> , <b>2020</b> , 12, 3269-3340	10.5	533
110	A cubic relationship between air-sea CO <sub>2</sub> exchange and wind speed. <i>Geophysical Research Letters</i> , <b>1999</b> , 26, 1889-1892	4.9	514
109	Advances in quantifying air-sea gas exchange and environmental forcing. <i>Annual Review of Marine Science</i> , <b>2009</b> , 1, 213-44	15.4	446
108	Constraining global air-sea gas exchange for CO <sub>2</sub> with recent bomb 14C measurements. <i>Global Biogeochemical Cycles</i> , <b>2007</b> , 21, n/a-n/a	5.9	372
107	Global relationships of total alkalinity with salinity and temperature in surface waters of the world's oceans. <i>Geophysical Research Letters</i> , <b>2006</b> , 33,	4.9	338
106	The oceanic sink for anthropogenic CO from 1994 to 2007. <i>Science</i> , <b>2019</b> , 363, 1193-1199	33.3	268
105	A multi-decade record of high-quality air-sea CO <sub>2</sub> exchange data in version 3 of the Surface Ocean CO <sub>2</sub> Atlas (SOCAT). <i>Earth System Science Data</i> , <b>2016</b> , 8, 383-413	10.5	260
104	Influence of El Niño on the equatorial Pacific contribution to atmospheric CO <sub>2</sub> accumulation. <i>Nature</i> , <b>1999</b> , 398, 597-601	50.4	241
103	The reinvigoration of the Southern Ocean carbon sink. <i>Science</i> , <b>2015</b> , 349, 1221-4	33.3	235
102	Global ocean carbon uptake: magnitude, variability and trends. <i>Biogeosciences</i> , <b>2013</b> , 10, 1983-2000	4.6	229
101	Gas exchange-wind speed relation measured with sulfur hexafluoride on a lake. <i>Science</i> , <b>1985</b> , 227, 1224-6	39.3	218

100	Recommendations for autonomous underway pCO <sub>2</sub> measuring systems and data-reduction routines. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , <b>2009</b> , 56, 512-522	2.3	217
99	Gas transfer velocities measured at low wind speed over a lake. <i>Limnology and Oceanography</i> , <b>2003</b> , 48, 1010-1017	4.8	208
98	Measurement of fugacity of CO <sub>2</sub> in surface water using continuous and discrete sampling methods. <i>Marine Chemistry</i> , <b>1993</b> , 44, 189-204	3.7	142
97	Decadal variability of the air-sea CO <sub>2</sub> fluxes in the equatorial Pacific Ocean. <i>Journal of Geophysical Research</i> , <b>2006</b> , 111,		135
96	Air-sea CO <sub>2</sub> exchange in the equatorial Pacific. <i>Journal of Geophysical Research</i> , <b>2004</b> , 109, n/a-n/a		127
95	Chemical enhancement of CO <sub>2</sub> exchange in natural waters. <i>Limnology and Oceanography</i> , <b>1996</b> , 41, 689-697		125
94	Data-based estimates of the ocean carbon sink variability [First results of the Surface Ocean &lt;i>p</i>&lt;i>CO</i>&lt;sub>2</sub>/sub> Mapping intercomparison (SOCOM)]. <i>Biogeosciences</i> , <b>2015</b> , 12, 7251-7278	4.6	122
93	Changes in Ocean Heat, Carbon Content, and Ventilation: A Review of the First Decade of GO-SHIP Global Repeat Hydrography. <i>Annual Review of Marine Science</i> , <b>2016</b> , 8, 185-215	15.4	118
92	On the Future of Argo: A Global, Full-Depth, Multi-Disciplinary Array. <i>Frontiers in Marine Science</i> , <b>2019</b> , 6,	4.5	116
91	The effect of bubble-mediated gas transfer on purposeful dual-gaseous tracer experiments. <i>Journal of Geophysical Research</i> , <b>1998</b> , 103, 10555-10560		108
90	Changes in the North Atlantic Oscillation influence CO <sub>2</sub> uptake in the North Atlantic over the past 2 decades. <i>Global Biogeochemical Cycles</i> , <b>2008</b> , 22, n/a-n/a	5.9	106
89	Gas exchange on Mono Lake and Crowley Lake, California. <i>Journal of Geophysical Research</i> , <b>1987</b> , 92, 14567		106
88	Decadal change of the surface water pCO <sub>2</sub> in the North Pacific: A synthesis of 35 years of observations. <i>Journal of Geophysical Research</i> , <b>2006</b> , 111,		99
87	The marine inorganic carbon system along the Gulf of Mexico and Atlantic coasts of the United States: Insights from a transregional coastal carbon study. <i>Limnology and Oceanography</i> , <b>2013</b> , 58, 325-342	4.8	98
86	Gas transfer experiment on Georges Bank using two volatile deliberate tracers. <i>Journal of Geophysical Research</i> , <b>1993</b> , 98, 20237		94
85	Toward a universal relationship between wind speed and gas exchange: Gas transfer velocities measured with <sup>3</sup> He/SF <sub>6</sub> during the Southern Ocean Gas Exchange Experiment. <i>Journal of Geophysical Research</i> , <b>2011</b> , 116,		91
84	Air-sea CO <sub>2</sub> fluxes on the U.S. South Atlantic Bight: Spatial and seasonal variability. <i>Journal of Geophysical Research</i> , <b>2008</b> , 113,		90
83	The optimal carbonate dissociation constants for determining surface water pCO <sub>2</sub> from alkalinity and total inorganic carbon. <i>Marine Chemistry</i> , <b>1999</b> , 65, 291-301	3.7	86

82	The recommended dissociation constants for carbonic acid in seawater. <i>Geophysical Research Letters</i> , <b>2000</b> , 27, 229-232	4.9	82
81	Autonomous Biogeochemical Floats Detect Significant Carbon Dioxide Outgassing in the High-Latitude Southern Ocean. <i>Geophysical Research Letters</i> , <b>2018</b> , 45, 9049-9057	4.9	76
80	Ocean acidification along the Gulf Coast and East Coast of the USA. <i>Continental Shelf Research</i> , <b>2015</b> , 98, 54-71	2.4	70
79	Calculating surface ocean pCO <sub>2</sub> from biogeochemical Argo floats equipped with pH: An uncertainty analysis. <i>Global Biogeochemical Cycles</i> , <b>2017</b> , 31, 591-604	5.9	67
78	Ocean acidification of the Greater Caribbean Region 1996–2006. <i>Journal of Geophysical Research</i> , <b>2008</b> , 113,		64
77	Variability of global net sea-air CO <sub>2</sub> fluxes over the last three decades using empirical relationships. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , <b>2010</b> , 62, 352-368	3.3	62
76	Gas exchange, dispersion, and biological productivity on the West Florida Shelf: Results from a Lagrangian Tracer Study. <i>Geophysical Research Letters</i> , <b>1997</b> , 24, 1767-1770	4.9	61
75	Simultaneous spectrophotometric flow-through measurements of pH, carbon dioxide fugacity, and total inorganic carbon in seawater. <i>Analytica Chimica Acta</i> , <b>2007</b> , 596, 23-36	6.6	61
74	Detecting anthropogenic CO <sub>2</sub> changes in the interior Atlantic Ocean between 1989 and 2005. <i>Journal of Geophysical Research</i> , <b>2010</b> , 115,		60
73	Quantification of decadal anthropogenic CO <sub>2</sub> uptake in the ocean based on dissolved inorganic carbon measurements. <i>Nature</i> , <b>1998</b> , 396, 560-563	50.4	60
72	Air-sea gas transfer in the Southern Ocean. <i>Journal of Geophysical Research</i> , <b>2004</b> , 109, n/a-n/a		58
71	Sea-air flux of CO <sub>2</sub> in the Caribbean Sea estimated using in situ and remote sensing data. <i>Remote Sensing of Environment</i> , <b>2004</b> , 89, 309-325	13.2	57
70	Eutrophication-induced acidification of coastal waters in the northern Gulf of Mexico: Insights into origin and processes from a coupled physical-biogeochemical model. <i>Geophysical Research Letters</i> , <b>2017</b> , 44, 946-956	4.9	56
69	Recent acceleration of the sea surface fCO <sub>2</sub> growth rate in the North Atlantic subpolar gyre (1993–2008) revealed by winter observations. <i>Global Biogeochemical Cycles</i> , <b>2010</b> , 24, n/a-n/a	5.9	55
68	Global relationships of total inorganic carbon with temperature and nitrate in surface seawater. <i>Global Biogeochemical Cycles</i> , <b>2000</b> , 14, 979-994	5.9	55
67	Consistency and synthesis of Pacific Ocean CO <sub>2</sub> survey data. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , <b>2001</b> , 49, 21-58	2.3	55
66	Aqueous CO <sub>2</sub> gradients for air-sea flux estimates. <i>Marine Chemistry</i> , <b>2006</b> , 98, 100-108	3.7	54
65	A new automated underway system for making high precision pCO <sub>2</sub> measurements onboard research ships. <i>Analytica Chimica Acta</i> , <b>1998</b> , 377, 185-191	6.6	53

64	. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , <b>1997</b> , 49, 149-158	3.3	51
63	Evaluation of the National Oceanic and Atmospheric Administration/Coupled-Ocean Atmospheric Response Experiment (NOAA/COARE) air-sea gas transfer parameterization using GasEx data. <i>Journal of Geophysical Research</i> , <b>2004</b> , 109, n/a-n/a		49
62	Global Carbon Budget 2021. <i>Earth System Science Data</i> , <b>2022</b> , 14, 1917-2005	10.5	47
61	Rapid anthropogenic changes in CO <sub>2</sub> and pH in the Atlantic Ocean: 2003–2014. <i>Global Biogeochemical Cycles</i> , <b>2016</b> , 30, 70-90	5.9	45
60	Mapping of the air–sea CO <sub>2</sub> flux in the Arctic Ocean and its adjacent seas: Basin-wide distribution and seasonal to interannual variability. <i>Polar Science</i> , <b>2016</b> , 10, 323-334	2.3	37
59	Variability and trends in surface seawater pCO <sub>2</sub> and CO <sub>2</sub> flux in the Pacific Ocean. <i>Geophysical Research Letters</i> , <b>2017</b> , 44, 5627-5636	4.9	36
58	Increase of anthropogenic CO <sub>2</sub> in the Pacific Ocean over the last two decades. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , <b>2003</b> , 50, 3065-3082	2.3	36
57	Impact of ocean carbon system variability on the detection of temporal increases in anthropogenic CO <sub>2</sub> . <i>Journal of Geophysical Research</i> , <b>2008</b> , 113,		35
56	A machine learning approach to estimate surface ocean pCO <sub>2</sub> from satellite measurements. <i>Remote Sensing of Environment</i> , <b>2019</b> , 228, 203-226	13.2	34
55	Internal consistency of marine carbonate system measurements and assessments of aragonite saturation state: Insights from two U.S. coastal cruises. <i>Marine Chemistry</i> , <b>2015</b> , 176, 9-20	3.7	33
54	A comparison of CO <sub>2</sub> dynamics and air-water fluxes in a river-dominated estuary and a mangrove-dominated marine estuary. <i>Geophysical Research Letters</i> , <b>2016</b> , 43, 11,726	4.9	33
53	A 1998–1992 comparison of inorganic carbon and its transport across 24.5°N in the Atlantic. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , <b>2003</b> , 50, 3041-3064	2.3	33
52	Gas transfer velocities for SF <sub>6</sub> and <sup>3</sup> He in a small pond at low wind speeds. <i>Geophysical Research Letters</i> , <b>1995</b> , 22, 93-96	4.9	33
51	Empirical algorithms to estimate water column pH in the Southern Ocean. <i>Geophysical Research Letters</i> , <b>2016</b> , 43, 3415-3422	4.9	32
50	Southern Ocean Gas Exchange Experiment: Setting the stage. <i>Journal of Geophysical Research</i> , <b>2011</b> , 116,		31
49	Strong sensitivity of Southern Ocean carbon uptake and nutrient cycling to wind stirring. <i>Biogeosciences</i> , <b>2014</b> , 11, 4077-4098	4.6	30
48	The effect of rain on air-water gas exchange. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , <b>1997</b> , 49, 149-158	3.3	29
47	Arctic Ocean CO <sub>2</sub> uptake: an improved multiyear estimate of the air–sea CO <sub>2</sub> flux incorporating chlorophyll <i>a</i> concentrations. <i>Biogeosciences</i> , <b>2018</b> , 15, 1643-1661	4.6	29

46	Air-sea CO <sub>2</sub> fluxes in the Caribbean Sea from 2002-2004. <i>Journal of Marine Systems</i> , <b>2007</b> , 66, 272-284	2.7	28
45	The Global Ocean Ship-Based Hydrographic Investigations Program (GO-SHIP): A Platform for Integrated Multidisciplinary Ocean Science. <i>Frontiers in Marine Science</i> , <b>2019</b> , 6,	4.5	27
44	CO <sub>2</sub> fluxes in the subtropical and subarctic North Atlantic based on measurements from a volunteer observing ship. <i>Journal of Geophysical Research</i> , <b>2006</b> , 111,		27
43	Gas exchange rates in the tidal Hudson river using a dual tracer technique. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , <b>1994</b> , 46, 274-285	3.3	27
42	Controls on surface water carbonate chemistry along North American ocean margins. <i>Nature Communications</i> , <b>2020</b> , 11, 2691	17.4	26
41	The impact of changing wind speeds on gas transfer and its effect on global air-sea CO <sub>2</sub> fluxes. <i>Global Biogeochemical Cycles</i> , <b>2017</b> , 31, 961-974	5.9	23
40	The impact of the North Atlantic Oscillation on the uptake and accumulation of anthropogenic CO <sub>2</sub> by North Atlantic Ocean mode waters. <i>Global Biogeochemical Cycles</i> , <b>2011</b> , 25, n/a-n/a	5.9	23
39	Climatic variability in upper ocean ventilation rates diagnosed using chlorofluorocarbons. <i>Geophysical Research Letters</i> , <b>1998</b> , 25, 1399-1402	4.9	23
38	. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , <b>2005</b> , 57, 95-106	3.3	22
37	Comparison of Inorganic Carbon System Parameters Measured in the Atlantic Ocean from 1990 to 1998 and Recommended Adjustments		20
36	Metrics for the Evaluation of the Southern Ocean in Coupled Climate Models and Earth System Models. <i>Journal of Geophysical Research: Oceans</i> , <b>2018</b> , 123, 3120-3143	3.3	19
35	A large increase of the CO <sub>2</sub> sink in the western tropical North Atlantic from 2002 to 2009. <i>Journal of Geophysical Research</i> , <b>2012</b> , 117, n/a-n/a		19
34	Increase in anthropogenic CO <sub>2</sub> in the Atlantic Ocean in the last two decades. <i>Deep-Sea Research Part I: Oceanographic Research Papers</i> , <b>2010</b> , 57, 755-770	2.5	18
33	Empirical temperature-based estimates of variability in the oceanic uptake of CO <sub>2</sub> over the past 2 decades. <i>Journal of Geophysical Research</i> , <b>2006</b> , 111,		18
32	A Surface Ocean CO <sub>2</sub> Reference Network, SOCONET and Associated Marine Boundary Layer CO <sub>2</sub> Measurements. <i>Frontiers in Marine Science</i> , <b>2019</b> , 6,	4.5	17
31	Impacts of temporal CO <sub>2</sub> and climate trends on the detection of ocean anthropogenic CO <sub>2</sub> accumulation. <i>Global Biogeochemical Cycles</i> , <b>2011</b> , 25, n/a-n/a	5.9	16
30	Short-term variability of aragonite saturation state in the central Mid-Atlantic Bight. <i>Journal of Geophysical Research: Oceans</i> , <b>2017</b> , 122, 4274-4290	3.3	15
29	Pacific Anthropogenic Carbon Between 1991 and 2017. <i>Global Biogeochemical Cycles</i> , <b>2019</b> , 33, 597-617	5.9	14

28	Global ocean carbon uptake: magnitude, variability and trends		14
27	Importance of water mass formation regions for the air-sea CO <sub>2</sub> flux estimate in the Southern Ocean. <i>Global Biogeochemical Cycles</i> , <b>2011</b> , 25, n/a-n/a	5.9	13
26	Procedures for direct spectrophotometric determination of carbonate ion concentrations: Measurements in US Gulf of Mexico and East Coast waters. <i>Marine Chemistry</i> , <b>2015</b> , 168, 80-85	3.7	12
25	Spatial and Temporal Variability of pCO <sub>2</sub> , Carbon Fluxes, and Saturation State on the West Florida Shelf. <i>Journal of Geophysical Research: Oceans</i> , <b>2018</b> , 123, 6174-6188	3.3	12
24	Carbon dynamics of the Weddell Gyre, Southern Ocean. <i>Global Biogeochemical Cycles</i> , <b>2015</b> , 29, 288-306	5.9	11
23	Climatic modulation of surface acidification rates through summertime wind forcing in the Southern Ocean. <i>Nature Communications</i> , <b>2018</b> , 9, 3240	17.4	11
22	Time series pCO <sub>2</sub> at a coastal mooring: Internal consistency, seasonal cycles, and interannual variability. <i>Continental Shelf Research</i> , <b>2017</b> , 145, 95-108	2.4	11
21	Farfield tracing of a point source discharge plume in the coastal ocean using sulfur hexafluoride. <i>Environmental Science &amp; Technology</i> , <b>2005</b> , 39, 8883-90	10.3	11
20	Wind-driven ocean dynamics impact on the contrasting sea-ice trends around West Antarctica. <i>Journal of Geophysical Research: Oceans</i> , <b>2017</b> , 122, 4413-4430	3.3	10
19	How Can Present and Future Satellite Missions Support Scientific Studies that Address Ocean Acidification?. <i>Oceanography</i> , <b>2015</b> , 25, 108-121	2.3	10
18	Long-Term Changes of Carbonate Chemistry Variables Along the North American East Coast. <i>Journal of Geophysical Research: Oceans</i> , <b>2020</b> , 125, e2019JC015982	3.3	9
17	Seasonal patterns of surface inorganic carbon system variables in the Gulf of Mexico inferred from a regional high-resolution ocean biogeochemical model. <i>Biogeosciences</i> , <b>2020</b> , 17, 1685-1700	4.6	9
16	Spectrophotometric Determination of Carbonate Ion Concentrations: Elimination of Instrument-Dependent Offsets and Calculation of In Situ Saturation States. <i>Environmental Science &amp; Technology</i> , <b>2017</b> , 51, 9127-9136	10.3	8
15	Large Decadal Changes in Air-Sea CO <sub>2</sub> Fluxes in the Caribbean Sea. <i>Journal of Geophysical Research: Oceans</i> , <b>2019</b> , 124, 6960-6982	3.3	7
14	Subannual variability of total alkalinity distributions in the northeastern Gulf of Mexico. <i>Journal of Geophysical Research: Oceans</i> , <b>2015</b> , 120, 3805-3816	3.3	7
13	A multi-decade record of high-quality fCO <sub>2</sub> data in version 3 of the Surface Ocean CO <sub>2</sub> Atlas (SOCAT)		6
12	Seasonal Variations in Dissolved Carbon Inventory and Fluxes in a Mangrove-Dominated Estuary. <i>Global Biogeochemical Cycles</i> , <b>2020</b> , 34, e2019GB006515	5.9	6
11	Repeat hydrography cruises reveal chemical changes in the North Atlantic. <i>Eos</i> , <b>2005</b> , 86, 399	1.5	5



10	Data-based estimates of the ocean carbon sink variability [First results of the Surface Ocean CO <sub>2</sub> Mapping intercomparison (SOCOM)]		5
9	The Impact of Different Gas Exchange Formulations and Wind Speed Products on Global Air-Sea CO <sub>2</sub> Fluxes. <i>Environmental Science and Engineering</i> , <b>2007</b> , 1-23	0.2	5
8	Air-Water Flux Reconciliation Between the Atmospheric CO <sub>2</sub> Profile and Mass Balance Techniques. <i>Environmental Science and Engineering</i> , <b>2007</b> , 181-192	0.2	4
7	Variability of bottom carbonate chemistry over the deep coral reefs in the Florida Straits and the impacts of mesoscale processes. <i>Ocean Modelling</i> , <b>2020</b> , 147, 101555	3	2
6	Circulation-driven variability of Atlantic anthropogenic carbon transports and uptake. <i>Nature Geoscience</i> , <b>2021</b> , 14, 571-577	18.3	2
5	A 17-year dataset of surface water fugacity of CO <sub>2</sub> along with calculated pH, aragonite saturation state and air-sea CO <sub>2</sub> fluxes in the northern Caribbean Sea. <i>Earth System Science Data</i> , <b>2020</b> , 12, 1489-1509	10.5	1
4	Strong sensitivity of Southern Ocean carbon uptake and nutrient cycling to wind stirring		1
3	Variability of USA East Coast surface total alkalinity distributions revealed by automated instrument measurements. <i>Marine Chemistry</i> , <b>2021</b> , 232, 103960	3.7	1
2	Coastal Ocean Data Analysis Product in North America (CODAP-NA) [an internally consistent data product for discrete inorganic carbon, oxygen, and nutrients on the North American ocean margins. <i>Earth System Science Data</i> , <b>2021</b> , 13, 2777-2799	10.5	1
1	Increasing River Alkalinity Slows Ocean Acidification in the Northern Gulf of Mexico. <i>Geophysical Research Letters</i> , <b>2021</b> , 48,	4.9	0