

Rik Wanninkhof

List of Publications by Year in descending order

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114
papers

24,752
citations

29994

54
h-index

20900

115
g-index

122
all docs

122
docs citations

122
times ranked

14633
citing authors

#	ARTICLE	IF	CITATIONS
1	Relationship between wind speed and gas exchange over the ocean. <i>Journal of Geophysical Research</i> , 1992, 97, 7373-7382.	3.3	3,825
2	The Oceanic Sink for Anthropogenic CO ₂ . <i>Science</i> , 2004, 305, 367-371.	6.0	3,371
3	Climatological mean and decadal change in surface ocean pCO ₂ , and net sea-air CO ₂ flux over the global oceans. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , 2009, 56, 554-577.	0.6	1,540
4	Global sea-air CO ₂ flux based on climatological surface ocean pCO ₂ , and seasonal biological and temperature effects. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , 2002, 49, 1601-1622.	0.6	1,506
5	Global Carbon Budget 2020. <i>Earth System Science Data</i> , 2020, 12, 3269-3340.	3.7	1,477
6	A global ocean carbon climatology: Results from Global Data Analysis Project (GLODAP). <i>Global Biogeochemical Cycles</i> , 2004, 18, n/a-n/a.	1.9	1,345
7	Relationship between wind speed and gas exchange over the ocean revisited. <i>Limnology and Oceanography: Methods</i> , 2014, 12, 351-362.	1.0	889
8	Global Carbon Budget 2021. <i>Earth System Science Data</i> , 2022, 14, 1917-2005.	3.7	663
9	A cubic relationship between air-sea CO ₂ exchange and wind speed. <i>Geophysical Research Letters</i> , 1999, 26, 1889-1892.	1.5	590
10	Advances in Quantifying Air-Sea Gas Exchange and Environmental Forcing. <i>Annual Review of Marine Science</i> , 2009, 1, 213-244.	5.1	552
11	The oceanic sink for anthropogenic CO ₂ from 1994 to 2007. <i>Science</i> , 2019, 363, 1193-1199.	6.0	505
12	Constraining global air-sea gas exchange for CO ₂ with recent bomb ¹⁴ C measurements. <i>Global Biogeochemical Cycles</i> , 2007, 21, n/a-n/a.	1.9	442
13	Global relationships of total alkalinity with salinity and temperature in surface waters of the world's oceans. <i>Geophysical Research Letters</i> , 2006, 33, .	1.5	428
14	A multi-decade record of high-quality CO_2 data in version 3 of the Surface Ocean CO_2 Atlas (SOCAT). <i>Earth System Science Data</i> , 2016, 8, 383-413.	3.7	413
15	The reinvigoration of the Southern Ocean carbon sink. <i>Science</i> , 2015, 349, 1221-1224.	6.0	331
16	Gas transfer velocities measured at low wind speed over a lake. <i>Limnology and Oceanography</i> , 2003, 48, 1010-1017.	1.6	289
17	Influence of El Niño on the equatorial Pacific contribution to atmospheric CO ₂ accumulation. <i>Nature</i> , 1999, 398, 597-601.	13.7	277
18	Global ocean carbon uptake: magnitude, variability and trends. <i>Biogeosciences</i> , 2013, 10, 1983-2000.	1.3	276

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19	Recommendations for autonomous underway pCO ₂ measuring systems and data-reduction routines. Deep-Sea Research Part II: Topical Studies in Oceanography, 2009, 56, 512-522.	0.6	265
20	Gas Exchange-Wind Speed Relation Measured with Sulfur Hexafluoride on a Lake. Science, 1985, 227, 1224-1226.	6.0	238
21	On the Future of Argo: A Global, Full-Depth, Multi-Disciplinary Array. Frontiers in Marine Science, 2019, 6, .	1.2	235
22	Changes in Ocean Heat, Carbon Content, and Ventilation: A Review of the First Decade of GO-SHIP Global Repeat Hydrography. Annual Review of Marine Science, 2016, 8, 185-215.	5.1	183
23	Data-based estimates of the ocean carbon sink variability – first results of the Surface Ocean <i>CO ₂ <td>1.3</td> <td>163</td>	1.3	163
24	Decadal variability of the air-sea CO ₂ fluxes in the equatorial Pacific Ocean. Journal of Geophysical Research, 2006, 111, .	3.3	159
25	Chemical enhancement of CO ₂ exchange in natural waters. Limnology and Oceanography, 1996, 41, 689-697.	1.6	156
26	Measurement of fugacity of CO ₂ in surface water using continuous and discrete sampling methods. Marine Chemistry, 1993, 44, 189-204.	0.9	155
27	Air-sea CO ₂ exchange in the equatorial Pacific. Journal of Geophysical Research, 2004, 109, n/a-n/a.	3.3	143
28	The marine inorganic carbon system along the Gulf of Mexico and Atlantic coasts of the United States: Insights from a transregional coastal carbon study. Limnology and Oceanography, 2013, 58, 325-342.	1.6	141
29	Autonomous Biogeochemical Floats Detect Significant Carbon Dioxide Outgassing in the High-Latitude Southern Ocean. Geophysical Research Letters, 2018, 45, 9049-9057.	1.5	138
30	The effect of bubble-mediated gas transfer on purposeful dual-gaseous tracer experiments. Journal of Geophysical Research, 1998, 103, 10555-10560.	3.3	132
31	Changes in the North Atlantic Oscillation influence CO ₂ uptake in the North Atlantic over the past 2 decades. Global Biogeochemical Cycles, 2008, 22, .	1.9	127
32	Decadal change of the surface water pCO ₂ in the North Pacific: A synthesis of 35 years of observations. Journal of Geophysical Research, 2006, 111, .	3.3	125
33	Gas exchange on Mono Lake and Crowley Lake, California. Journal of Geophysical Research, 1987, 92, 14567-14580.	3.3	122
34	Air-sea CO ₂ fluxes on the U.S. South Atlantic Bight: Spatial and seasonal variability. Journal of Geophysical Research, 2008, 113, .	3.3	119
35	Gas transfer experiment on Georges Bank using two volatile deliberate tracers. Journal of Geophysical Research, 1993, 98, 20237-20248.	3.3	110
36	Toward a universal relationship between wind speed and gas exchange: Gas transfer velocities measured with ³ He/SF ₆ during the Southern Ocean Gas Exchange Experiment. Journal of Geophysical Research, 2011, 116, .	3.3	107

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37	Calculating surface ocean $p\text{CO}_2$ from biogeochemical Argo floats equipped with pH: An uncertainty analysis. <i>Global Biogeochemical Cycles</i> , 2017, 31, 591-604.	1.9	104
38	The recommended dissociation constants for carbonic acid in seawater. <i>Geophysical Research Letters</i> , 2000, 27, 229-232.	1.5	96
39	Ocean acidification along the Gulf Coast and East Coast of the USA. <i>Continental Shelf Research</i> , 2015, 35, 54-71.	0.9	96
40	The optimal carbonate dissociation constants for determining surface water $p\text{CO}_2$ from alkalinity and total inorganic carbon. <i>Marine Chemistry</i> , 1999, 65, 291-301.	0.9	94
41	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> , 2017, 44, 946-956.	1.5	89
42	Ocean acidification of the Greater Caribbean Region 1996-2006. <i>Journal of Geophysical Research</i> , 2008, 113, .	3.3	86
43	A machine learning approach to estimate surface ocean $p\text{CO}_2$ from satellite measurements. <i>Remote Sensing of Environment</i> , 2019, 228, 203-226.	4.6	79
44	Controls on surface water carbonate chemistry along North American ocean margins. <i>Nature Communications</i> , 2020, 11, 2691.	5.8	77
45	Quantification of decadal anthropogenic CO_2 uptake in the ocean based on dissolved inorganic carbon measurements. <i>Nature</i> , 1998, 396, 560-563.	13.7	74
46	Variability of global net sea-air CO_2 fluxes over the last three decades using empirical relationships. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2022, 62, 352.	0.8	73
47	Gas exchange, dispersion, and biological productivity on the West Florida Shelf: Results from a Lagrangian Tracer Study. <i>Geophysical Research Letters</i> , 1997, 24, 1767-1770.	1.5	72
48	Sea-air flux of CO_2 in the Caribbean Sea estimated using in situ and remote sensing data. <i>Remote Sensing of Environment</i> , 2004, 89, 309-325.	4.6	72
49	Detecting anthropogenic CO_2 changes in the interior Atlantic Ocean between 1989 and 2005. <i>Journal of Geophysical Research</i> , 2010, 115, .	3.3	72
50	Simultaneous spectrophotometric flow-through measurements of pH, carbon dioxide fugacity, and total inorganic carbon in seawater. <i>Analytica Chimica Acta</i> , 2007, 596, 23-36.	2.6	68
51	Recent acceleration of the sea surface CO_2 growth rate in the North Atlantic subpolar gyre (1993-2008) revealed by winter observations. <i>Global Biogeochemical Cycles</i> , 2010, 24, .	1.9	67
52	Mapping of the air-sea CO_2 flux in the Arctic Ocean and its adjacent seas: Basin-wide distribution and seasonal to interannual variability. <i>Polar Science</i> , 2016, 10, 323-334.	0.5	67
53	Air-sea gas transfer in the Southern Ocean. <i>Journal of Geophysical Research</i> , 2004, 109, n/a-n/a.	3.3	64
54	Aqueous CO_2 gradients for air-sea flux estimates. <i>Marine Chemistry</i> , 2006, 98, 100-108.	0.9	64

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55	Global relationships of total inorganic carbon with temperature and nitrate in surface seawater. <i>Global Biogeochemical Cycles</i> , 2000, 14, 979-994.	1.9	63
56	The Global Ocean Ship-Based Hydrographic Investigations Program (GO-SHIP): A Platform for Integrated Multidisciplinary Ocean Science. <i>Frontiers in Marine Science</i> , 2019, 6, .	1.2	60
57	Consistency and synthesis of Pacific Ocean CO ₂ survey data. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , 2001, 49, 21-58.	0.6	59
58	A new automated underway system for making high precision pCO ₂ measurements onboard research ships. <i>Analytica Chimica Acta</i> , 1998, 377, 185-191.	2.6	57
59	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> , 2004, 109, n/a-n/a.	3.3	56
60	Arctic Ocean CO ₂ uptake: an improved multiyear estimate of the air-sea CO ₂ flux incorporating chlorophyll <i>a</i> concentrations. <i>Biogeosciences</i> , 2018, 15, 1643-1661.	1.3	56
61	Rapid anthropogenic changes in CO ₂ and pH in the Atlantic Ocean: 2003-2014. <i>Global Biogeochemical Cycles</i> , 2016, 30, 70-90.	1.9	55
62	Variability and trends in surface seawater CO ₂ and CO ₂ flux in the Pacific Ocean. <i>Geophysical Research Letters</i> , 2017, 44, 5627-5636.	1.5	55
63	The effect of rain on air-water gas exchange. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2022, 49, 149.	0.8	53
64	The effect of rain on air-water gas exchange. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 1997, 49, 149-158.	0.8	53
65	A comparison of CO ₂ dynamics and air-water fluxes in a river-dominated estuary and a mangrove-dominated marine estuary. <i>Geophysical Research Letters</i> , 2016, 43, 11,726.	1.5	52
66	Gas exchange rates in the tidal Hudson river using a dual tracer technique. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2022, 46, 274.	0.8	49
67	Empirical algorithms to estimate water column pH in the Southern Ocean. <i>Geophysical Research Letters</i> , 2016, 43, 3415-3422.	1.5	48
68	Internal consistency of marine carbonate system measurements and assessments of aragonite saturation state: Insights from two U.S. coastal cruises. <i>Marine Chemistry</i> , 2015, 176, 9-20.	0.9	47
69	Gas transfer velocities for SF ₆ and ³ He in a small pond at low wind speeds. <i>Geophysical Research Letters</i> , 1995, 22, 93-96.	1.5	46
70	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> , 2003, 50, 3041-3064.	0.6	42
71	Increase of anthropogenic CO ₂ in the Pacific Ocean over the last two decades. <i>Deep-Sea Research Part II: Topical Studies in Oceanography</i> , 2003, 50, 3065-3082.	0.6	41
72	Impact of ocean carbon system variability on the detection of temporal increases in anthropogenic CO ₂ . <i>Journal of Geophysical Research</i> , 2008, 113, .	3.3	41

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73	Southern Ocean Gas Exchange Experiment: Setting the stage. <i>Journal of Geophysical Research</i> , 2011, 116, .	3.3	36
74	The impact of changing wind speeds on gas transfer and its effect on global air-sea CO ₂ fluxes. <i>Global Biogeochemical Cycles</i> , 2017, 31, 961-974.	1.9	36
75	Pacific Anthropogenic Carbon Between 1991 and 2017. <i>Global Biogeochemical Cycles</i> , 2019, 33, 597-617.	1.9	35
76	Air-sea CO ₂ fluxes in the Caribbean Sea from 2002-2004. <i>Journal of Marine Systems</i> , 2007, 66, 272-284.	0.9	34
77	Strong sensitivity of Southern Ocean carbon uptake and nutrient cycling to wind stirring. <i>Biogeosciences</i> , 2014, 11, 4077-4098.	1.3	34
78	The impact of the North Atlantic Oscillation on the uptake and accumulation of anthropogenic CO ₂ by North Atlantic Ocean mode waters. <i>Global Biogeochemical Cycles</i> , 2011, 25, n/a-n/a.	1.9	30
79	CO ₂ fluxes in the subtropical and subarctic North Atlantic based on measurements from a volunteer observing ship. <i>Journal of Geophysical Research</i> , 2006, 111, .	3.3	29
80	Metrics for the Evaluation of the Southern Ocean in Coupled Climate Models and Earth System Models. <i>Journal of Geophysical Research: Oceans</i> , 2018, 123, 3120-3143.	1.0	29
81	The effect of wind speed products and wind speed-gas exchange relationships on interannual variability of the air-sea CO ₂ gas transfer velocity. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2005, 57, 95-106.	0.8	28
82	Climatic variability in upper ocean ventilation rates diagnosed using chlorofluorocarbons. <i>Geophysical Research Letters</i> , 1998, 25, 1399-1402.	1.5	26
83	A Surface Ocean CO ₂ Reference Network, SOCONET and Associated Marine Boundary Layer CO ₂ Measurements. <i>Frontiers in Marine Science</i> , 2019, 6, .	1.2	26
84	Increase in anthropogenic CO ₂ in the Atlantic Ocean in the last two decades. <i>Deep-Sea Research Part I: Oceanographic Research Papers</i> , 2010, 57, 755-770.	0.6	24
85	A large increase of the CO ₂ sink in the western tropical North Atlantic from 2002 to 2009. <i>Journal of Geophysical Research</i> , 2012, 117, .	3.3	24
86	Carbon dynamics of the Weddell Gyre, Southern Ocean. <i>Global Biogeochemical Cycles</i> , 2015, 29, 288-306.	1.9	24
87	Short-term variability of aragonite saturation state in the central Atlantic. <i>Journal of Geophysical Research: Oceans</i> , 2017, 122, 4274-4290.	1.0	24
88	Empirical temperature-based estimates of variability in the oceanic uptake of CO ₂ over the past 2 decades. <i>Journal of Geophysical Research</i> , 2006, 111, .	3.3	22
89	Impacts of temporal CO ₂ and climate trends on the detection of ocean anthropogenic CO ₂ accumulation. <i>Global Biogeochemical Cycles</i> , 2011, 25, n/a-n/a.	1.9	22
90	Long-Term Changes of Carbonate Chemistry Variables Along the North American East Coast. <i>Journal of Geophysical Research: Oceans</i> , 2020, 125, e2019JC015982.	1.0	22

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91	Wind-driven ocean dynamics impact on the contrasting sea-ice trends around West Antarctica. <i>Journal of Geophysical Research: Oceans</i> , 2017, 122, 4413-4430.	1.0	19
92	Time series pCO ₂ at a coastal mooring: Internal consistency, seasonal cycles, and interannual variability. <i>Continental Shelf Research</i> , 2017, 145, 95-108.	0.9	18
93	New and updated global empirical seawater property estimation routines. <i>Limnology and Oceanography: Methods</i> , 2021, 19, 785-809.	1.0	18
94	Climatic modulation of surface acidification rates through summertime wind forcing in the Southern Ocean. <i>Nature Communications</i> , 2018, 9, 3240.	5.8	17
95	How Can Present and Future Satellite Missions Support Scientific Studies that Address Ocean Acidification?. <i>Oceanography</i> , 2015, 25, 108-121.	0.5	16
96	Spatial and Temporal Variability of pCO ₂ , Carbon Fluxes, and Saturation State on the West Florida Shelf. <i>Journal of Geophysical Research: Oceans</i> , 2018, 123, 6174-6188.	1.0	16
97	Procedures for direct spectrophotometric determination of carbonate ion concentrations: Measurements in US Gulf of Mexico and East Coast waters. <i>Marine Chemistry</i> , 2015, 168, 80-85.	0.9	15
98	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> , 2020, 17, 1685-1700.	1.3	15
99	Circulation-driven variability of Atlantic anthropogenic carbon transports and uptake. <i>Nature Geoscience</i> , 2021, 14, 571-577.	5.4	15
100	Large Decadal Changes in Air-Sea CO ₂ Fluxes in the Caribbean Sea. <i>Journal of Geophysical Research: Oceans</i> , 2019, 124, 6960-6982.	1.0	14
101	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> , 2021, 13, 2777-2799.	3.7	14
102	Farfield Tracing of a Point Source Discharge Plume in the Coastal Ocean Using Sulfur Hexafluoride. <i>Environmental Science & Technology</i> , 2005, 39, 8883-8890.	4.6	13
103	Importance of water mass formation regions for the air-sea CO ₂ flux estimate in the Southern Ocean. <i>Global Biogeochemical Cycles</i> , 2011, 25, n/a-n/a.	1.9	13
104	Spectrophotometric Determination of Carbonate Ion Concentrations: Elimination of Instrument-Dependent Offsets and Calculation of In Situ Saturation States. <i>Environmental Science & Technology</i> , 2017, 51, 9127-9136.	4.6	13
105	Seasonal Variations in Dissolved Carbon Inventory and Fluxes in a Mangrove-Dominated Estuary. <i>Global Biogeochemical Cycles</i> , 2020, 34, e2019GB006515.	1.9	13
106	Increasing River Alkalinity Slows Ocean Acidification in the Northern Gulf of Mexico. <i>Geophysical Research Letters</i> , 2021, 48, .	1.5	13
107	Subannual variability of total alkalinity distributions in the northeastern Gulf of Mexico. <i>Journal of Geophysical Research: Oceans</i> , 2015, 120, 3805-3816.	1.0	12
108	Wintertime process study of the North Brazil Current rings reveals the region as a larger sink for CO ₂ than expected. <i>Biogeosciences</i> , 2022, 19, 2969-2988.	1.3	12

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109	Variability of USA East Coast surface total alkalinity distributions revealed by automated instrument measurements. <i>Marine Chemistry</i> , 2021, 232, 103960.	0.9	9
110	Repeat hydrography cruises reveal chemical changes in the North Atlantic. <i>Eos</i> , 2005, 86, 399.	0.1	7
111	The Impact of Different Gas Exchange Formulations and Wind Speed Products on Global Air-Sea CO ₂ Fluxes. <i>Environmental Science and Engineering</i> , 2007, , 1-23.	0.1	7
112	Air-Water Flux Reconciliation Between the Atmospheric CO ₂ Profile and Mass Balance Techniques. <i>Environmental Science and Engineering</i> , 2007, , 181-192.	0.1	7
113	Variability of bottom carbonate chemistry over the deep coral reefs in the Florida Straits and the impacts of mesoscale processes. <i>Ocean Modelling</i> , 2020, 147, 101555.	1.0	3
114	A 17-year dataset of surface water fugacity of CO ₂ along with calculated pH, aragonite saturation state and air-sea CO ₂ fluxes in the northern Caribbean Sea. <i>Earth System Science Data</i> , 2020, 12, 1489-1509.	3.7	3