

Ralph F Keeling

List of Publications by Citations

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The third column is the impact factor (IF) of the journal, and the fourth column is the number of citations of the article.

113
papers

9,608
citations

42
h-index

97
g-index

144
ext. papers

11,161
ext. citations

10.6
avg, IF

5.96
L-index

| # | Paper | IF | Citations |
|-----|--|------|-----------|
| 113 | Ocean deoxygenation in a warming world. <i>Annual Review of Marine Science</i> , 2010 , 2, 199-229 | 15.4 | 943 |
| 112 | Global Carbon Budget 2018. <i>Earth System Science Data</i> , 2018 , 10, 2141-2194 | 10.5 | 831 |
| 111 | Global Carbon Budget 2016. <i>Earth System Science Data</i> , 2016 , 8, 605-649 | 10.5 | 730 |
| 110 | Global Carbon Budget 2017. <i>Earth System Science Data</i> , 2018 , 10, 405-448 | 10.5 | 614 |
| 109 | Global and hemispheric CO ₂ sinks deduced from changes in atmospheric O ₂ concentration. <i>Nature</i> , 1996 , 381, 218-221 | 50.4 | 509 |
| 108 | The global carbon budget 1959-2011. <i>Earth System Science Data</i> , 2013 , 5, 165-185 | 10.5 | 436 |
| 107 | The influence of Antarctic sea ice on glacial-interglacial CO ₂ variations. <i>Nature</i> , 2000 , 404, 171-4 | 50.4 | 391 |
| 106 | Global carbon budget 2014. <i>Earth System Science Data</i> , 2015 , 7, 47-85 | 10.5 | 367 |
| 105 | Seasonal and interannual variations in atmospheric oxygen and implications for the global carbon cycle. <i>Nature</i> , 1992 , 358, 723-727 | 50.4 | 344 |
| 104 | Global carbon budget 2013. <i>Earth System Science Data</i> , 2014 , 6, 235-263 | 10.5 | 264 |
| 103 | A multi-decade record of high-quality $\delta^{13}C_{org}$ data in version 3 of the Surface Ocean CO ₂ Atlas (SOCAT). <i>Earth System Science Data</i> , 2016 , 8, 383-413 | 10.5 | 260 |
| 102 | Enhanced seasonal CO ₂ exchange caused by amplified plant productivity in northern ecosystems. <i>Science</i> , 2016 , 351, 696-9 | 33.3 | 240 |
| 101 | The change in oceanic O ₂ inventory associated with recent global warming. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2002 , 99, 7848-53 | 11.5 | 222 |
| 100 | Oceanic ¹³ C/ ¹² C observations: A new window on ocean CO ₂ uptake. <i>Global Biogeochemical Cycles</i> , 1993 , 7, 353-368 | 5.9 | 216 |
| 99 | Global oceanic and land biotic carbon sinks from the Scripps atmospheric oxygen flask sampling network. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2006 , 58, 95-116 | 3.3 | 185 |
| 98 | What atmospheric oxygen measurements can tell us about the global carbon cycle. <i>Global Biogeochemical Cycles</i> , 1993 , 7, 37-67 | 5.9 | 164 |
| 97 | Testing global ocean carbon cycle models using measurements of atmospheric O ₂ and CO ₂ concentration. <i>Global Biogeochemical Cycles</i> , 1998 , 12, 213-230 | 5.9 | 124 |

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|----|--|------|-----|
| 96 | Antarctic sea ice and the control of Pleistocene climate instability. <i>Paleoceanography</i> , 2001 , 16, 112-131 | | 119 |
| 95 | Atmospheric evidence for a global secular increase in carbon isotopic discrimination of land photosynthesis. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2017 , 114, 10361-10366 | 11.5 | 104 |
| 94 | Seasonal variations in the atmospheric O ₂ /N ₂ ratio in relation to the kinetics of air-sea gas exchange. <i>Global Biogeochemical Cycles</i> , 1998 , 12, 141-163 | 5.9 | 102 |
| 93 | Compiled records of carbon isotopes in atmospheric CO ₂ for historical simulations in CMIP6. <i>Geoscientific Model Development</i> , 2017 , 10, 4405-4417 | 6.3 | 96 |
| 92 | Global surface-ocean air-sea CO ₂ flux variability from an observation-driven ocean mixed-layer scheme. <i>Ocean Science</i> , 2013 , 9, 193-216 | 4 | 94 |
| 91 | Integrating the evidence for a terrestrial carbon sink caused by increasing atmospheric CO ₂ . <i>New Phytologist</i> , 2021 , 229, 2413-2445 | 9.8 | 94 |
| 90 | Interannual sea-air CO ₂ flux variability from an observation-driven ocean mixed-layer scheme. <i>Biogeosciences</i> , 2014 , 11, 4599-4613 | 4.6 | 86 |
| 89 | Mean annual cycle of the air-sea oxygen flux: A global view. <i>Global Biogeochemical Cycles</i> , 2000 , 14, 573-584 | 5.4 | 81 |
| 88 | Carbon dioxide and methane measurements from the Los Angeles Megacity Carbon Project - Part 1: calibration, urban enhancements, and uncertainty estimates. <i>Atmospheric Chemistry and Physics</i> , 2017 , 17, | 6.8 | 73 |
| 87 | Analysis of the mean annual cycle of the dissolved oxygen anomaly in the World Ocean. <i>Journal of Marine Research</i> , 1997 , 55, 117-151 | 1.5 | 73 |
| 86 | Methods for measuring changes in atmospheric O ₂ concentration and their application in southern hemisphere air. <i>Journal of Geophysical Research</i> , 1998 , 103, 3381-3397 | | 72 |
| 85 | Measuring correlations between atmospheric oxygen and carbon dioxide mole fractions: A preliminary study in urban air. <i>Journal of Atmospheric Chemistry</i> , 1988 , 7, 153-176 | 3.2 | 69 |
| 84 | On the long-term stability of reference gases for atmospheric O ₂ /N ₂ and CO ₂ measurements. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2007 , 59, 3-14 | 3.3 | 62 |
| 83 | Atmospheric science. Recording Earth's vital signs. <i>Science</i> , 2008 , 319, 1771-2 | 33.3 | 60 |
| 82 | Global Carbon Budget 2017 | | 60 |
| 81 | Toward consistency between trends in bottom-up CO ₂ emissions and top-down atmospheric measurements in the Los Angeles megacity. <i>Atmospheric Chemistry and Physics</i> , 2016 , 16, 3843-3863 | 6.8 | 57 |
| 80 | Atmospheric potential oxygen: New observations and their implications for some atmospheric and oceanic models. <i>Global Biogeochemical Cycles</i> , 2006 , 20, n/a-n/a | 5.9 | 55 |
| 79 | Observations of radiocarbon in CO ₂ at La Jolla, California, USA 1992-2007: Analysis of the long-term trend. <i>Journal of Geophysical Research</i> , 2012 , 117, n/a-n/a | | 54 |

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|----|--|------|----|
| 78 | Extensive land cover change across Arctic-Boreal Northwestern North America from disturbance and climate forcing. <i>Global Change Biology</i> , 2020 , 26, 807-822 | 11.4 | 53 |
| 77 | Observations of radiocarbon in CO ₂ at seven global sampling sites in the Scripps flask network: Analysis of spatial gradients and seasonal cycles. <i>Journal of Geophysical Research</i> , 2012 , 117, n/a-n/a | | 51 |
| 76 | On the global oxygen anomaly and air-sea flux. <i>Journal of Geophysical Research</i> , 2001 , 106, 31155-31166 | | 51 |
| 75 | Precise atmospheric oxygen measurements with a paramagnetic oxygen analyzer. <i>Global Biogeochemical Cycles</i> , 1999 , 13, 1107-1115 | 5.9 | 51 |
| 74 | Coastal upwelling air-sea fluxes revealed in atmospheric observations of O ₂ /N ₂ , CO ₂ and N ₂ O. <i>Geophysical Research Letters</i> , 2003 , 30, | 4.9 | 45 |
| 73 | . <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2003 , 55, 857-878 | 3.3 | 44 |
| 72 | Evolution of natural and anthropogenic fluxes of atmospheric CO ₂ from 1957 to 2003. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2011 , 63, 1-22 | 3.3 | 37 |
| 71 | Methods for High-Precision ¹⁴ C AMS Measurement of Atmospheric CO ₂ at LLNL. <i>Radiocarbon</i> , 2007 , 49, 349-356 | 4.6 | 37 |
| 70 | Vertical profiles of biospheric and fossil fuel-derived CO ₂ and fossil fuel CO ₂ :CO ratios from airborne measurements of ¹⁴ C, CO ₂ and CO above Colorado, USA. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2009 , 61, 536-546 | 3.3 | 34 |
| 69 | How does the terrestrial carbon exchange respond to inter-annual climatic variations? A quantification based on atmospheric CO ₂ data. <i>Biogeosciences</i> , 2018 , 15, 2481-2498 | 4.6 | 33 |
| 68 | Estimating methane emissions in California's urban and rural regions using multitower observations. <i>Journal of Geophysical Research D: Atmospheres</i> , 2016 , 121, 13,031-13,049 | 4.4 | 32 |
| 67 | Strong sensitivity of Southern Ocean carbon uptake and nutrient cycling to wind stirring. <i>Biogeosciences</i> , 2014 , 11, 4077-4098 | 4.6 | 30 |
| 66 | Climate effects on atmospheric carbon dioxide over the last century. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2009 , 61, 718-731 | 3.3 | 30 |
| 65 | Evaluating transport in the WRF model along the California coast. <i>Atmospheric Chemistry and Physics</i> , 2013 , 13, 1837-1852 | 6.8 | 29 |
| 64 | Palaeoceanography. Antarctic stratification and glacial CO ₂ . <i>Nature</i> , 2001 , 412, 605-6 | 50.4 | 28 |
| 63 | Increasing summer net CO ₂ uptake in high northern ecosystems inferred from atmospheric inversions and comparisons to remote-sensing NDVI. <i>Atmospheric Chemistry and Physics</i> , 2016 , 16, 9047-9066 | 6.8 | 25 |
| 62 | Simulating estimation of California fossil fuel and biosphere carbon dioxide exchanges combining in situ tower and satellite column observations. <i>Journal of Geophysical Research D: Atmospheres</i> , 2017 , 122, 3653-3671 | 4.4 | 25 |
| 61 | Design and performance of a Nafion dryer for continuous operation at CO ₂ and CH ₄ air monitoring sites. <i>Atmospheric Measurement Techniques</i> , 2013 , 6, 1217-1226 | 4.24 | 24 |

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| 60 | On the processes controlling the seasonal cycles of the air-sea fluxes of O ₂ and N ₂ O: A modelling study. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2012 , 64, 18429 | 3.3 | 23 |
| 59 | Measurement of changes in atmospheric Ar/N ₂ ratio using a rapid-switching, single-capillary mass spectrometer system | | 23 |
| 58 | The O ₂ /N ₂ Ratio and CO ₂ Airborne Southern Ocean Study. <i>Bulletin of the American Meteorological Society</i> , 2018 , 99, 381-402 | 6.1 | 21 |
| 57 | Measurements and models of the atmospheric Ar/N ₂ ratio. <i>Geophysical Research Letters</i> , 2003 , 30, | 4.9 | 21 |
| 56 | Spatio-temporally Resolved Methane Fluxes From the Los Angeles Megacity. <i>Journal of Geophysical Research D: Atmospheres</i> , 2019 , 124, 5131-5148 | 4.4 | 19 |
| 55 | Ocean ventilation as a driver of interannual variability in atmospheric potential oxygen. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2008 , 60, 706-717 | 3.3 | 19 |
| 54 | The CO ₂ Budget and Rectification Airborne Study: Strategies for Measuring Rectifiers and Regional Fluxes. <i>Geophysical Monograph Series</i> , 2000 , 311-324 | 1.1 | 19 |
| 53 | Precessionally forced productivity variations across the equatorial Pacific. <i>Paleoceanography</i> , 2002 , 17, 9-19-7 | | 18 |
| 52 | A successful prediction of the record CO ₂ rise associated with the 2015/2016 El Niño. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i> , 2018 , 373, | 5.8 | 18 |
| 51 | Impacts of ENSO on air-sea oxygen exchange: Observations and mechanisms. <i>Global Biogeochemical Cycles</i> , 2017 , 31, 901-921 | 5.9 | 17 |
| 50 | Comment on "The ocean sink for anthropogenic CO ₂ ". <i>Science</i> , 2005 , 308, 1743; author reply 1743 | 33.3 | 17 |
| 49 | Designing optimal greenhouse gas observing networks that consider performance and cost. <i>Geoscientific Instrumentation, Methods and Data Systems</i> , 2015 , 4, 121-137 | 1.5 | 16 |
| 48 | El Niño-like Physical and Biogeochemical Ocean Response to Tropical Eruptions. <i>Journal of Climate</i> , 2019 , 32, 2627-2649 | 4.4 | 15 |
| 47 | Initial Results of an Intercomparison of AMS-Based Atmospheric ¹⁴ CO ₂ Measurements. <i>Radiocarbon</i> , 2013 , 55, 1475-1483 | 4.6 | 15 |
| 46 | The atmospheric signature of carbon capture and storage. <i>Philosophical Transactions Series A, Mathematical, Physical, and Engineering Sciences</i> , 2011 , 369, 2113-32 | 3 | 15 |
| 45 | Changes to Carbon Isotopes in Atmospheric CO ₂ Over the Industrial Era and Into the Future. <i>Global Biogeochemical Cycles</i> , 2020 , 34, e2019GB006170 | 5.9 | 15 |
| 44 | Evaluating the ocean biogeochemical components of Earth system models using atmospheric potential oxygen and ocean color data. <i>Biogeosciences</i> , 2015 , 12, 193-208 | 4.6 | 13 |
| 43 | Interpreting the seasonal cycles of atmospheric oxygen and carbon dioxide concentrations at American Samoa Observatory. <i>Geophysical Research Letters</i> , 2003 , 30, | 4.9 | 13 |

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| 42 | Measurement of changes in atmospheric Ar/N ₂ ratio using a rapid-switching, single-capillary mass spectrometer system. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2004 , 56, 322-338 | 3.3 | 12 |
| 41 | Northern ice discharges and Antarctic warming: could ocean eddies provide the link?. <i>Quaternary Science Reviews</i> , 2005 , 24, 1809-1820 | 3.9 | 11 |
| 40 | Greenhouse gases in the Earth system: setting the agenda to 2030. <i>Philosophical Transactions Series A, Mathematical, Physical, and Engineering Sciences</i> , 2011 , 369, 1885-90 | 3 | 10 |
| 39 | On the freshwater forcing of the thermohaline circulation in the limit of low diapycnal mixing. <i>Journal of Geophysical Research</i> , 2002 , 107, 14-1 | | 10 |
| 38 | The oxygen to carbon dioxide ratios observed in emissions from a wildfire in northern California. <i>Geophysical Research Letters</i> , 2001 , 28, 2413-2416 | 4.9 | 10 |
| 37 | Causes of slowing-down seasonal CO amplitude at Mauna Loa. <i>Global Change Biology</i> , 2020 , 26, 4462-4477 | 7.4 | 9 |
| 36 | On the Linkage between Antarctic Surface Water Stratification and Global Deep-Water Temperature. <i>Journal of Climate</i> , 2011 , 24, 3545-3557 | 4.4 | 8 |
| 35 | The Impact of COVID-19 on CO Emissions in the Los Angeles and Washington DC/Baltimore Metropolitan Areas. <i>Geophysical Research Letters</i> , 2021 , 48, e2021GL092744 | 4.9 | 8 |
| 34 | Gravitational separation of Ar ₂ and age of air in the lowermost stratosphere in airborne observations and a chemical transport model. <i>Atmospheric Chemistry and Physics</i> , 2020 , 20, 12391-12408 | 6.8 | 7 |
| 33 | Overestimate of committed warming. <i>Nature</i> , 2017 , 547, E16-E17 | 50.4 | 6 |
| 32 | An Equilibrator System to Measure Dissolved Oxygen and Its Isotopes. <i>Journal of Atmospheric and Oceanic Technology</i> , 2013 , 30, 361-377 | 2 | 6 |
| 31 | THE NASA ATMOSPHERIC TOMOGRAPHY (ATom) MISSION: Imaging the Chemistry of the Global Atmosphere. <i>Bulletin of the American Meteorological Society</i> , 2021 , 1-53 | 6.1 | 6 |
| 30 | Strong Southern Ocean carbon uptake evident in airborne observations. <i>Science</i> , 2021 , 374, 1275-1280 | 33.3 | 6 |
| 29 | Initial Results of an Intercomparison of AMS-Based Atmospheric ¹⁴ CO ₂ Measurements. <i>Radiocarbon</i> , 2013 , 55, | 4.6 | 6 |
| 28 | A multi-decade record of high-quality fCO ₂ data in version 3 of the Surface Ocean CO ₂ Atlas (SOCAT) | | 6 |
| 27 | Insights from Time Series of Atmospheric Carbon Dioxide and Related Tracers. <i>Annual Review of Environment and Resources</i> , 2021 , 46, 85-110 | 17.2 | 6 |
| 26 | Atmospheric Oxygen Measurements and the Carbon Cycle 2000 , 134-140 | | 6 |
| 25 | Diffusive separation of the lower atmosphere. <i>Science</i> , 2006 , 311, 1429 | 33.3 | 5 |

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| 24 | Airborne measurements of oxygen concentration from the surface to the lower stratosphere and pole to pole. <i>Atmospheric Measurement Techniques</i> , 2021 , 14, 2543-2574 | 4 | 5 |
| 23 | Shipboard measurements of atmospheric oxygen using a vacuum-ultraviolet absorption technique. <i>Tellus, Series B: Chemical and Physical Meteorology</i> , 2011 , 55, 857-878 | 3.3 | 4 |
| 22 | Atmosphere. Deglaciation mysteries. <i>Science</i> , 2007 , 316, 1440-1 | 33.3 | 4 |
| 21 | Global Carbon Budget 2018 | | 4 |
| 20 | Carbon Dioxide and Methane Measurements from the Los Angeles Megacity Carbon Project: 1. Calibration, Urban Enhancements, and Uncertainty Estimates 2016 , | | 4 |
| 19 | Achieving atmospheric verification of CO ₂ emissions. <i>Nature Climate Change</i> , 2020 , 10, 416-417 | 21.4 | 3 |
| 18 | Southern Annular Mode Influence on Wintertime Ventilation of the Southern Ocean Detected in Atmospheric O ₂ and CO ₂ Measurements. <i>Geophysical Research Letters</i> , 2020 , 47, e2019GL085667 | 4.9 | 3 |
| 17 | A Multiplatform Inversion Estimation of Statewide and Regional Methane Emissions in California during 2014-2016. <i>Environmental Science & Technology</i> , 2019 , 53, 9636-9645 | 10.3 | 3 |
| 16 | The Mauna Loa carbon dioxide record: Lessons for long-term Earth observations. <i>Geophysical Monograph Series</i> , 2009 , 27-35 | 1.1 | 3 |
| 15 | Global Carbon Budget 2016 | | 3 |
| 14 | Novel approaches to improve estimates of short-lived halocarbon emissions during summer from the Southern Ocean using airborne observations. <i>Atmospheric Chemistry and Physics</i> , 2019 , 19, 14071-14090 | 6.8 | 3 |
| 13 | Net Community Production in the Southern Ocean: Insights From Comparing Atmospheric Potential Oxygen to Satellite Ocean Color Algorithms and Ocean Models. <i>Geophysical Research Letters</i> , 2018 , 45, 10,549-10,559 | 4.9 | 3 |
| 12 | Airborne measurements of oxygen concentration from the surface to the lower stratosphere and pole to pole | | 2 |
| 11 | Summertime Atmospheric Boundary Layer Gradients of O ₂ and CO ₂ over the Southern Ocean. <i>Journal of Geophysical Research D: Atmospheres</i> , 2019 , 124, 13439-13456 | 4.4 | 2 |
| 10 | A mass-weighted isentropic coordinate for mapping chemical tracers and computing atmospheric inventories. <i>Atmospheric Chemistry and Physics</i> , 2021 , 21, 217-238 | 6.8 | 2 |
| 9 | Intercomparison of O ₂ and N ₂ ratio scales among AIST, NIES, TU, and SIO based on a round-robin exercise using gravimetric standard mixtures. <i>Atmospheric Measurement Techniques</i> , 2021 , 14, 6181-6193 | 4 | 2 |
| 8 | A method for resolving changes in atmospheric He as an indicator of fossil fuel extraction and stratospheric circulation. <i>Atmospheric Measurement Techniques</i> , 2021 , 14, 2515-2527 | 4 | 1 |
| 7 | Impacts of Changes in Atmospheric O ₂ on Human Physiology. Is There a Basis for Concern?. <i>Frontiers in Physiology</i> , 2021 , 12, 571137 | 4.6 | 1 |

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|---|--|------|---|
| 6 | Unusual characteristics of the carbon cycle during the 2015-2016 El Niño. <i>Global Change Biology</i> , 2021 , 27, 3798-3809 | 11.4 | 1 |
| 5 | On the Detection of COVID-Driven Changes in Atmospheric Carbon Dioxide.. <i>Geophysical Research Letters</i> , 2021 , 48, e2021GL095396 | 4.9 | 0 |
| 4 | An Atmospheric Constraint on the Seasonal Air-Sea Exchange of Oxygen and Heat in the Extratropics. <i>Journal of Geophysical Research: Oceans</i> , 2021 , 126, e2021JC017510 | 3.3 | 0 |
| 3 | Increasing atmospheric helium due to fossil fuel exploitation. <i>Nature Geoscience</i> , 2022 , 15, 346-348 | 18.3 | 0 |
| 2 | Comment on "World Atmospheric CO ₂ , Its 14C Specific Activity, Non-fossil Component, Anthropogenic Fossil Component, and Emissions (1750-2018)," by Kenneth Skrabble, George Chabot, and Clayton French.. <i>Health Physics</i> , 2022 , 122, 717-719 | 2.3 | 0 |
| 1 | Data-based estimates of interannual sea-air CO ₂ flux variations 1957-2020 and their relation to environmental drivers. <i>Biogeosciences</i> , 2022 , 19, 2627-2652 | 4.6 | 0 |