

TILclimate ocean sources:

1. "External Forcing Explains Recent Decadal Variability of the Ocean Carbon Sink," [AGU Advances](#), June 3, 2020.
2. "Ocean carbon uptake under aggressive emission mitigation," [Biogeosciences](#), April 30, 2021.
3. "Effect of terrestrial organic matter on ocean acidification and CO₂ flux in an Arctic shelf sea," [Progress in Oceanography](#), June 2020.
4. "Climate Change 2014: Synthesis Report:" [IPCC Fifth Assessment Report](#), 2015. https://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf
5. "ocean acidification," [Encyclopaedia Britannica](#).
6. "Ocean acidification," [NOAA](#).
7. "The carbon cycle: Better understanding carbon-climate feedbacks and reducing future risks," [The Royal Society](#).
8. "Global Carbon Budget 2020," [Earth System Science Data](#), December 2020.
9. "Why is the ocean so important for climate change?" [Ask MIT Climate](#).
10. "Climate Change: Ocean Heat Content," [NOAA Climate.gov](#). August 17, 2020; updated January 12, 2022.
11. "The 20th century global warming signature on the ocean at global and basin scales as depicted from historical reanalyses," [International Journal of Climatology](#), November 15, 2021.
12. "Special Report on the Ocean and Cryosphere in a Changing Climate: Summary for Policymakers," [IPCC](#).
13. "About Us," [Mission Blue](#).
14. "Sylvia Earle," [National Geographic Expeditions](#).
15. "Sylvia Earle: How to protect the oceans (TED Prize winner!)," [TED's YouTube channel](#), February 19, 2009.
16. "Sylvia Earle Ph.D.," [Academy of Achievement](#).
17. "Climate Variability," [NASA Science](#).
18. "Ocean and Climate," [Woods Hole Oceanographic Institution](#).
19. "The Ocean's Role in Climate," [Oceanography](#), The Oceanography Society, November 15, 2018.
20. "How much water is in the ocean?" [NOAA National Ocean Service](#).
21. "How Much Water is There on Earth?" [USGS Water Science School](#).
22. "Planet earth's blue heart," [Marine Biological Association](#).
23. "Portal to the Planet: The Ocean is the Heart of Our Planet," [Santa Barbara Museum of Natural History](#), October 5, 2019.
24. "Oceans: Blue heart of the planet," [BBC Future](#).
25. "The Ocean, origin of life on earth," [Ocean & Climate Platform](#).
26. "Ocean Through Time," [Smithsonian Institution](#).
27. "Life in the Oceans," [Oceans at MIT](#).
28. "Role of Chemistry in Earth's Climate," [Chemical Reviews](#), May 27, 2015.
29. "Non-trophic responses of algal communities to nutrient enrichment: interactions among coralline turfs, ephemeral algae and perennial fucoids," [Marine Ecology Research Progress Series](#), October 28, 2015.

30. "Climate Change Indicators: Oceans," [EPA](#).
31. "Ch 05: Changing Ocean, Marine Ecosystems, and Dependent Communities," in Special Report on the Ocean and Cryosphere in a Changing Climate," [IPCC](#).
32. "[Climate, Atmospheric Chemistry, and Global Air Quality](#)," in "Global Air Quality: An Imperative for Long-Term Observational Strategies," The National Academies of Sciences, Engineering, and Medicine, 2001.
33. "Atmospheric Chemistry and Greenhouse Gases," [IPCC](#).
34. "What is the carbon cycle" [NOAA National Ocean Service](#).
35. "Biogeochemical Cycles," [UCAR Center for Science Education](#).
36. "Impact of human activities on the hydrosphere," [Encyclopaedia Britannica](#).
37. "The Earth System," [USGS](#).
38. Ocean Carbon Uptake," [NOAA PMEL Carbon Program](#).
39. "How do oceans absorb CO2?" [Socratic.org](#).
40. "The Ocean, a carbon pump," Ocean & Climate Platform.
<https://ocean-climate.org/en/awareness/the-ocean-a-carbon-sink/>
41. "The biological carbon pump," [Atlantic BiogeoChemical Fluxes](#).
42. "The Ocean's Carbon Balance," [NASA Earth Observatory](#).
43. "What Is Earth?" [NASA](#).
44. "Ocean Warming," [IUCN Issues Brief](#).
45. "3. The Carbon Cycle and Atmospheric Carbon Dioxide," [IPCC](#) (undated).
46. "Observations: Oceans," in: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, [IPCC](#).
47. "How does the ocean affect climate and weather?" [NOAA Ocean Exploration](#).
48. "The Causes of Climate Change," [NASA Global Climate Change](#).
49. "Greenhouse Gases," [EPA](#).
50. "Protecting the 'blue heart of the planet': Strengthening the governance framework for marine protected areas beyond national jurisdiction," [Marine Policy](#), May 2021.
51. "How much of the ocean have we explored?" [NOAA National Ocean Service](#).
52. "Solving the Puzzle: Researching the Impacts of Climate Change Around the World," [National Science Foundation](#).
53. "Climate Variability," [NASA Science](#).
54. "How Does Carbon Dioxide Enter Sea Water?: Earth Science," [eHowEducation's YouTube channel](#), February 10, 2013.
55. "Carbon Dioxide in Sea Water," [Woods Hole Oceanographic institution](#).
56. "Ocean's Carbon Balance," [NOAA Earth Observatory](#).
57. "What is Ocean Acidification?" [NOAA PMEL Carbon Program](#).
58. "The ocean and the carbon cycle," Science Learning Hub, [New Zealand Government](#).
59. "Carbon Dioxide, Shell Building, and Ocean Acidification," [Woods Hole Oceanographic Institution](#).
60. "What are Phytoplankton?" [NASA Earth Observatory](#).
61. "What are phytoplankton," [NOAA National Ocean Service](#).
<https://oceanservice.noaa.gov/facts/phyto.html>
62. "Ocean Science: The power of plankton," [Nature](#), February 29, 2012.
63. "Photosynthesis," [Encyclopaedia Britannica](#).

64. "What is Photosynthesis?" Smithsonian Science Education Center.
65. "Photosynthetic Cells," [Scitable by Nature Education](#).
66. "photosynthesis," National Cancer Institute.
67. "Photosynthesis," [U.S. Energy Information Administration](#).
68. "Photosynthesis," [National Geographic Resource Library](#).
69. "Great Lakes Phytoplankton," [EPA](#).
70. "A novel free-living prochlorophyte abundant in the oceanic euphotic zone," [Nature](#), July 1, 1988.
71. "Sallie (Penny) W. Chisholm," [MIT Biology](#).
72. "Meet the obscure microbe that influences climate, ocean ecosystems, and perhaps even evolution," [Science](#), March 2017.
73. "The Crafoord Prize in Bioscience 2019," [The Crafoord Prize](#).
74. "Microbe generates extraordinarily diverse array of peptides," [MIT News](#), June 22, 2017.
75. "The impact of elevated CO₂ on *Prochlorococcus* and microbial interactions with 'helper' bacterium *Alteromonas*," [The ISME Journal](#), October 31, 2017.
76. "*Prochlorococcus*: Approved for export," [PNAS](#), June 30, 2009.
77. "Partying with *Prochlorococcus*," MIT Technology Review, [August 19, 2008](#).
78. "Dynamics of *Prochlorococcus* Diversity and Photoacclimation During Short-Term Shifts in Water Column Stratification at Station ALOHA," [Frontiers in Marine Science](#), December 21, 2018.
79. "Understanding the Ocean's Smallest Creatures," [MIT Technology Review](#), December 22, 2015.
80. "Marine Microbe Celebrates 20th Anniversary," [NPR](#), June 30, 2008.
81. "Happy Anniversary, *Prochlorococcus*," [MIT News](#), May 21, 2008.
82. "Predatory phytoplankton key to understanding ocean ecosystem," [University of Hawaii School of Ocean and Earth Science and Technology](#), February 14, 2022.
83. "Broad phylogenetic and functional diversity among mixotrophic consumers of *Prochlorococcus*," [The ISME Journal](#), February 10, 2022.
84. Webster's New World College Dictionary, Fifth Edition.
85. "What are plankton?" [NOAA National Ocean Service](#).
86. "Jellyfish & Other Zooplankton," [Woods Hole National Oceanographic Institution](#).
87. "Animals of the Ice: Antarctica," [NOAA Ocean Today](#).
88. "Creature Feature: Krill," [Woods Hole Oceanographic Institution's Ocean Twilight Zone](#).
89. "Tiny Krill: Giants in Marine Food Chain," [NOAA National Marine Sanctuaries](#).
90. "Krill," [Encyclopaedia Britannica](#).
91. "Puget Sound Foodweb," Washington Department of Fish and Wildlife. https://wdfw.wa.gov/sites/default/files/2020-04/puget_sound_foodweb_cards.pdf
92. "Aquatic food webs," [NOAA](#).
93. "Food Chains and Food Webs," [EPA Fish Smart](#).
94. "Phytoplankton," [Woods Hole Oceanographic Institution](#).
95. "Importance of phytoplankton," [NASA Earth Observatory](#).
96. "What is marine snow?" [NOAA National Ocean Service](#).
97. "Getting to the bottom of ocean carbon export," [NOAA Climate.gov](#), April 18, 2021.
98. "Effects of Changing the Carbon Cycle," [NASA Earth Observatory](#).
99. "The Carbon Cycle," [NASA Earth Observatory](#).

100. "The Slow Carbon Cycle," [NASA Earth Observatory](#).
101. "Oceanic crustal carbon cycle drives 26-million-year atmospheric carbon dioxide periodicities," [Science Advances](#), February 14, 2018.
102. "The Oceanic Crust and Seafloor," [Exploring Our Fluid Earth](#), University of Hawaii.
103. "Rocks and minerals," [British Geological Survey](#).
104. "Ocean floor features," [NOAA](#).
105. "Seafloor Minerals," [U.S. Geological Survey](#).
106. Lesson 15: Sediments," [NOAA](#).
107. "Marine Sediments Lab" [Mira Costa College](#).
108. "Exploration of the seafloor and Earth's crust," [Encyclopaedia Britannica](#).
109. "Keeping Up with Carbon," [NASA Scientific Visualization Studio](#).
110. "How Plankton Blooms Absorb CO₂," [Science for the Public](#).
111. "Carbon Dioxide, Shell Building and Ocean Acidification," [Woods Hole Oceanographic Institution](#).
112. "Tiny Air Particles Change How Much Carbon Plants Absorb," [NASA](#), December 16, 2004.
113. "Ocean Science: The power of plankton," [Nature](#), February 29, 2012.
114. "Lesson #3: Phytoplankton and Ocean Color," [NOAA Coral Reef Watch](#).
115. "Prochlorococcus," [Current Biology](#), June 5, 2017.
116. "Food Web," [Virginia Institute of Marine Science](#).
117. "Green-biochemistry: applying survival strategies of deep-sea microorganisms adapted to extreme biosphere," [Japan Agency for Marine-Earth Science and Technology](#).
118. "Progress Made in Study of Ocean's Calcium Carbonate Budget," [Eos](#), August 20, 2002.
119. "Teacher Background: Carbon Dioxide and the Carbon Cycle," [NOAA Global Monitoring Laboratory](#).
120. "These tiny plants and giant animals are helping to store vast amounts of CO₂ in our Oceans," [World Economic Forum](#), May 19, 2021.
121. "Phytoplankton responding to climate change," [Nature](#), April 17, 2008.
122. "Ocean acidification," [NOAA](#).
123. "A model of carbon dioxide dissolution and mineral carbonation kinetics," [Proceeding of the Royal Society A](#), December 11, 2009.
124. "Ocean acidification could boost shell growth in snails and sea urchins," [Science](#), July 23, 2019
125. "5 Sensational Sea Snails," [Ocean Conservancy](#), November 9, 2020.
126. "Ocean Acidification: A Risky Shell Game: How will climate change affect the shells and skeletons of sea life?" [Woods Hole's Oceanus](#), December 4, 2009.
127. "Scientists Pinpoint How Ocean Acidification Weakens Coral Skeletons," Woods Hole Oceanographic Institution.
<https://www.whoi.edu/press-room/news-release/scientists-identify-how-ocean-acidification-weakens-coral-skeletons/>
128. "Climate Change: Atmospheric Carbon Dioxide," [NOAA Climate.gov](#), August 14, 2020.
129. "Impacts of 1.5°C Global Warming on Natural and Human Systems," in Global Warming of 1.5°C, [IPCC Special Report](#) 2018.
130. "Climate Change Indicators: Ocean Heat," [EPA](#).

131. "Temperature trackers watch waxings and wanings of our watery world," [NASA Global Climate Change](#), February 22, 2010.
132. "Sand or Rock," PUMAS, NASA (Word document downloaded from the internet.
133. "Heating and cooling of the Earth's surface," [Understanding Science Lessons](#), University of California Berkeley.
134. "Classroom activity: Differential Heating and Cooling of Land and Ocean," Earth: A Dynamic Structure, UC Museum of Paleontology.
https://ucmp.berkeley.edu/education/dynamic/session4/sess4_act3.htm
135. "Specific Heat Capacity and Water," [USGS Water Science School](#), June 6, 2018.
136. "Lab Activity: Radiative Heating of Land and Water," [NOAA Global Monitoring Laboratory](#).
137. How does the temperature of ocean water vary?" [NOAA Ocean Exploration](#).
138. "Ocean warming," [International Union for Conservation of Nature \(IUCN\) Issues Brief](#).
139. "Guest post: Why does land warm up faster than the oceans?" [Carbon Brief](#), September 1, 2020.
140. "Sea Surface Temperature," [NASA Earth Observatory](#).
141. "How Does Climate Change Affect the Ocean?" [NASA Climate Kids](#).
142. "What's Causing Sea-Level Rise? Land Ice Vs. Sea Ice," [NASA Jet Propulsion Laboratory](#).
143. "Understanding Sea Level," [NASA Sea Level Change](#).
144. "How does sea ice affect global climate?" [NOAA National Ocean Service](#).
145. "What Do Coral Reefs Need to Survive?" [Coral Reef Alliance](#).
146. "What is coral bleaching?" [NOAA National Ocean Service](#).
147. "Coral reefs and climate change," [IUCN Issues Brief](#).
148. "Bleaching Impacts," [Reef Resilience Network](#).
149. "How do coral reefs protect lives and property?" [NOAA National Ocean Service](#).
150. "Role of Reefs in Coastal Protection," [USGS](#).
151. "The Importance of Coral Reefs," [NOAA National Ocean Service](#).
152. "Mass coral bleaching causes biotic homogenization of reef fish assemblages," [Global Change Biology](#), April 6, 2018 (abstract).
153. "Mapping the global value and distribution of coral reef tourism," [Marine Policy](#), August 2017.
154. GOOS, [The Global Ocean Observing System](#).
155. "The Global Ocean Observing System," [NOAA National Centers for Environmental Information](#).
156. "How do floats work," [Argo](#).
157. "Telecommunications systems: Data transmission systems," [Argo](#)."
158. "Challenges and Opportunities for Ocean Data to Advance Conservation and Management," [Ocean Conservancy/Center for Open Data Enterprise \(CODE\)](#).
159. "The Real-Time Data Management System of Argo Profiling Float Observations," [Journal of Atmospheric and Oceanic Technology](#), September 1, 2007.
160. "History," [GOOS](#).
161. "A Global Ocean Observing System (GOOS), Delivered Through Enhanced Collaboration Across Regions, Communities, and New Technologies," [Frontiers in Marine Science](#), June 28, 2019.

162. "The Argo Program: Two Decades of Ocean Observations," [NOAA's Atlantic Oceanographic and Meteorological Laboratory](#), October 14, 2020.
163. "Argo Data 1999-2019: Two Million Temperature-Salinity Profiles and Subsurface Velocity Observations From a Global Array of Profiling Floats," *Frontiers in Marine Science*, September 15, 2020. <https://www.frontiersin.org/articles/10.3389/fmars.2020.00700/full>
164. "Argo float data and metadata from Global Data Assembly Centre (Argo GDAC)," [SEANOE](#).
165. "US Argo Data Assembly Center Operations," [NOAA Atlantic Oceanographic and Meteorological Laboratory](#).
166. "Argo Center," [NOAA](#).
167. "argo floats," google image search. https://www.google.com/search?q=argo+floats&client=firefox-b-1-d&source=lnms&tbn=isch&sa=X&ved=2ahUKewjv46Osdv2AhXbCTQIHR8aAgAQ_AUoAnoECAEQBA&biw=1259&bih=675&dpr=2
168. "The Argo revolution," [NOAA Climate.gov](#).
169. "Argo floats help monitor ocean acidity," [NOAA PMEL Carbon Program](#).
170. "Dissolved Oxygen and Water," [USGS Water Science School](#), June 5, 2018.
171. "Temperature and Water," [USGS Water Science School](#).
172. "Does temperature control atmospheric carbon dioxide concentrations?" [Columbia Climate School State of the Planet](#), July 7, 2010.
173. "Is the Arctic Ocean a carbon sink?" National Snow & Ice Data Center, July 15, 2014. <https://nsidc.org/cryosphere/icelights/2014/07/arctic-ocean-carbon-sink>
174. "New Study Shows a Vicious Circle of Climate Change Building on Thickening Layers of Warm Ocean Water," [Inside Climate News](#), September 28, 2020.
175. "OceanGliders: A component of the Integrated GOOS," [Frontiers in Marine Science](#), October 2, 2019.
176. "OceanGliders in brief," [OceanGliders](#).
177. "Dead zones: growing areas of aquatic hypoxia are threatening our oceans and rivers," [OUPblog](#), from Oxford University Press, February 7, 2022.
178. "Does temperature control atmospheric carbon dioxide concentrations?" [Columbia Climate School's State of the Planet](#), July 7, 2010.
179. "Sensing the ocean biological pump from space: A review of the capabilities, concepts, research gaps and future developments," [Earth-Science Reviews](#), June 2021.
180. "Undersea processes could superheat the planet," [University of Southern California/Science Daily](#), February 13, 2019.
181. "How Will the Ocean Carbon Cycle Evolve in the Future? New Project Aims to Find Out," [Columbia Climate School 's State of the Planet](#), September 28, 2020.
182. "Ocean Heat Content: OHC reaches its highest level in recorded history," [NOAA National Centers for Environmental Information](#), January 22, 2020.
183. "How Long Can Oceans Continue To Absorb Earth's Excess Heat?" [Yale Environment 360](#), March 30, 2015.
184. "Ocean Acidification," [Smithsonian Ocean](#).
185. "Climate Change is Weakening The Ocean's Currents. Here's Why That Matters," [Florida Museum Thompson Earth Systems Institute](#), May 7, 2019.
186. "Ocean Warming," [Woods Hole Oceanographic Institution](#).

187. "Increasing stability decreases ocean productivity, reduces carbon burial," [Penn State/Science Daily](#), September 28, 2020.
188. "Introduction to Oceanography," [Roger Williams University](#).
189. "Biogenic Fish-Gut Calcium Carbonate is a Stable Amorphous Phase in the Gilt-head Seabream, Sparus aurata," [Scientific Reports](#), April 23, 2013.
190. "Fish Bone as a Source of Raw Material for Synthesis of Calcium Phosphate," [Materials Research](#), 2019.
191. "How do you recognize limestone and marble," [USGS](#).
192. "Discourses: Biological & Geological," [Biodiversity Heritage Library](#).
193. "Discourses: Biological & Geological," [Project Gutenberg](#).
194. "Discourses: Biological & Geological," [Project Gutenberg EBook](#).
195. "What is chalk?" [National Trust](#).
196. "Florida's Phosphate Mines," [Florida Department of Environmental Protection](#).
197. "Phosphate and How Florida Was Formed," [Florida Polytechnic University](#).
198. "Micronutrient Facts," [CDC Nutrition](#).
199. "Fertilizing the Ocean with Iron," [Woods Hole's Oceanus](#), November 13, 2007.