
References

- Adams, Jonathan. 2002. *A quick background to the last ice age*. <http://www.esd.ornl.gov/projects/qen/nerc130k.html>.
- Adams, J.M., and H. Faure (eds.). 1997. QEN members. *Review and Atlas of Paleovegetation: Preliminary Land Ecosystem Maps of the World Since the Last Glacial Maximum*. TN, USA: Oak Ridge National Laboratory. <http://www.esd.ornl.gov/projects/qen/adams1.html>.
- Adams, Jonathan, Mark Maslin, and Ellen Thomas. 1999. Sudden climate transitions during the quaternary. *Progress in Physical Geography* 23: 1–36.
- Agee, Ernest M., Kandace Kiefer, and Emily Cornett. 2012. Relationship of lower-troposphere cloud cover and cosmic rays: An updated perspective. Journals online. <https://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-11-00169.1>.
- Alley, Richard B. 2007. Wally was right: Predictive ability of the North Atlantic ‘Conveyor Belt’ hypothesis for abrupt climate change. *Annual Reviews of Earth and Planetary Science* 35: 241–272.
- Alley, Richard B., and Michael L. Bender. 1998. Greenland ice cores: Frozen in time. *Scientific American*, February.
- Andersen, K.K., et al. 1998. Atmospheric dust under glacial and interglacial conditions. *Geophysical Research Letters* 25: 2281–2284.
- Anna, James D., and Julia Catherine Hargreaves. 2013. A new global reconstruction of temperature changes at the Last Glacial Maximum. *Climate of the Past Discussions*, 9: 367–376.
- Archer, David, et al. 2000. What caused the glacial/interglacial atmospheric PCO₂ cycles? *Reviews of Geophysics* 38: 159–189.
- Bakker, J., et al. 1990. *Tectonic and climatic controls on late quaternary sedimentary processes in a Neotectonic Intramontane basin, the Pitalito basin, South Colombia*, 133. Netherlands: Department of Soil Science, University of Wageningen.
- Banerjee, Subir K., and Mike Jackson. 1996. Wind-borne dust holds clues to early climate. *Earth in Space* 8: 12–14. http://www.agu.org/sci_soc/banerjee.html.
- Barker, Stephen, and Gregor Knorr. 2007. Antarctic climate signature in the Greenland ice core record. *PNAS* 104: 17278–17282.
- Bar-Or, Rotem, et al. 2008. The role of dust in glacial–interglacial cycles. *Quaternary Science Reviews* 27: 201–208.
- Barton, Miles, et al. 2002. *Prehistoric America—A Journey Through the Ice Age and Beyond*. BBC Worldwide and Yale University Press.
- Batbatbar, J., et al. 2018. Asynchronous glaciations in arid continental climate. *Quaternary Science Reviews* 182: 1–19.

- Bauer, E., and A. Ganopolski. 2014. Sensitivity simulations with direct shortwave radiative forcing by aeolian dust during glacial cycles. *Climate of the Past* 10: 1333–1348.
- Bell, L.G., and P. Eng. 2007. *Ice Age Mystery: A Proposed Theory for Climate Change*. Bloomington, IN: Author House.
- Behling, H. 1997. Late quaternary vegetation, climate and fire history from the tropical mountain region of Morro de Itapeva, SE Brazil. *Palaeogeography Palaeoclimatology Palaeoecology* 129: 407–422.
- Bender, Michael, et al. 1997. Gases in ice cores. *PNAS*, 16: 8343–8349.
- Benestad, Rasmus E. 2005. *Solar Activity and Earth's Climate*, 2nd ed. Praxis Publishing.
- Berger, A. 2012. A brief history of the astronomical theories of paleoclimates. In *Climate Change Inferences from Paleoclimate and Regional Aspects*. Vienna: Springer. <https://link.springer.com/book/10.1007/978-3-7091-0973-1>.
- Berger, W.H. 1999. The 100 kyr ice age cycle: Internal oscillation or inclinational forcing? *International Journal of Earth Sciences* 88: 305–316.
- Berger, A., and Q. Yin. 2012. *Modeling the Interglacials of the Last 1 Million Years*. http://link.springer.com/chapter/10.1007/978-3-7091-0973-1_4#page-1.
- Berger, A., et al. 2015. Interglacials of the last 800,000 years. *Reviews of Geophysics*.54, 162–219. <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2015RG000482>.
- Bintanja, Richard, et al. 2005. Modeled atmospheric temperatures and global sea levels over the past million years. *Nature* 437: 125–128.
- Biscayne, B.E., et al. 1997. Asian provenance of glacial dust (stage 2) in the Greenland ice sheet project 2 ice core, summit, Greenland. *Journal of Geophysical Research* 102 (26): 765–781.
- Bischof, Jens. 2000. *Ice Drift, Ocean Circulation and Climate Change*. Praxis Publishing.
- Blumele, J.P., J.M. Sabel, and W. Karlen. 2001. Rate and magnitude of past global climate changes. In *Geological Perspectives of Global Climate Change*, ed. L.C. Gerhard, W.E. Harrison, and B.M. Hanson, 35–49.
- Blunier, Thomas, and Edward J. Brook. 2001. Timing of millennial-scale climate change in Antarctica and Greenland during the last glacial period. *Science* 291: 109–113.
- Blunier, T., et al. 1998. Asynchrony of Antarctic and Greenland climate change during the last glacial period. *Nature* 394: 739–783.
- Blunier, T.R., et al. 2007. Synchronization of ice core records via atmospheric gases. *Climate of the Past* 3: 325–330. www.clim-past.net/3/325/2007/.
- Bøggild, Carl Egede, et al. 2010. The ablation zone in northeast Greenland: Ice types, albedos and impurities. *Journal of Glaciology*, 56: 101–113.
- Bol'shakov, V.A. 2008. How long will the 'precession epoch'; last in terms of pleistocene glacial cycles? *Russian Journal of Earth Sciences* 10: ES3004–ES3015.
- Bond, G.C., et al. 2001. Persistent solar influence on North Atlantic climate during the holocene. *Science* 294: 2130–2136.
- Bonnicksen, Thomas M. 2000. *America's Ancient Forests: From the Ice Age to the Age of Discovery*. New York: Wiley.
- Bory, Aloys J.-M. 2014. A 10,000 km dust highway between the Taklamakan desert and Greenland. *Pages Magazine* 22: 72–73.
- Bouttes, N., et al. 2011. Impact of oceanic processes on the carbon cycle during the last termination. *Climate of the Past Discussions* 7: 1887–1934; also: Last glacial maximum CO₂ and δ¹³C successfully reconciled. *Geophysical Research Letters* 38: L02705.
- Broecker, W.S. 2002. *The Glacial World According to Wally*. Eldigo Press.

- Brovkin, Victor, et al. 2007. Lowering of glacial atmospheric CO₂ in response to changes in oceanic circulation and marine biogeochemistry. *Paleoceanography and Paleoclimatology*, 22: PA4202–PA4215. <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2006PA001380>.
- Brovkin, V., A. Ganopolski, D. Archer, and G. Munhoven. 2011. Glacial CO₂ cycle as a succession of key physical and biogeochemical processes. *Climate of the Past Discussions* 7: 1767–1795.
- Budyko, M.I. 1969. Effect of solar radiation variation on climate of Earth. *Tellus* 21: 611–1969.
- Burroughs, William J. 2005. *Climate Change in Prehistory*. Cambridge University Press.
- Bush, A.B.G., et al. 2002. Desert margins near the Chinese Loess Plateau during the mid-holocene and at the last glacial maximum: A model–data intercomparison. *Global and Planetary Change* 32: 361–374.
- Caillon, Nicolas, et al. 2003. Timing of atmospheric CO₂ and Antarctic temperature changes across termination III. *Science* 299: 1728–1747.
- Calder, Nigel. 1974. Arithmetic of ice ages. *Nature* 252: 216–218.
- Calov, Reinhard, et al. 2005. Transient simulation of the last glacial inception. Part I: Glacial inception as a bifurcation in the climate system. *Climate Dynamics* 24: 545–561.
- Carroll, W.D., et al. 2001. Historical overview of the southern forest landscape and associated resources. In *Southern Forest Resource Assessment*, ed. R.C. Biesterfeldt. USDA Forest Service Technical Report. https://www.srs.fs.usda.gov/sustain/report/pdf/chapter_24e.pdf.
- Chalk, Thomas B., et al. 2017. Causes of ice age intensification across the mid-pleistocene transition. *PNAS* 114: 13114–13119.
- Cheng, Hai, et al. 2009. Ice age terminations. *Science* 326: 248–253.
- Chikamoto, M.O., et al. 2011. Glacial marine carbon cycle sensitivities to Atlantic ocean circulation reorganization by coupled climate model simulations. *Climate of the Past Discussions* 7: 1261–1299.
- Claquin, T., et al. 2003. Radiative forcing of climate by ice-age atmospheric dust. *Climate Dynamics* 20: 193–202.
- Clark, Peter U., et al. 1999. Northern hemisphere ice-sheet influences on global climate change. *Science* 286: 1104–1111.
- Clark, Peter U., et al. 2002. The role of the thermohaline circulation in abrupt climate change. *Nature* 415: 863–869.
- Clark, Peter U., et al. 2006. The middle pleistocene transition: Characteristics, mechanisms, and implications for long-term changes in atmospheric pCO₂. *Quaternary Science Reviews* 25: 3150–3184.
- Claussen, M., et al. 2012. Impact of CO₂ and climate on last glacial maximum vegetation—A factor separation. *Biogeosciences Discussions* 10: 3593–3604.
- CLIMAP Project Members, 1976 & 1981. Seasonal Reconstruction of the Earth’s Surface at the Last Glacial Maximum. *Geological Society of America Map and Chart Series MC-36*, Pangaea Data Publisher, Boulder, Colorado. <https://doi.pangaea.de/10.1594/PANGAEA.64426>.
- Colinvaux, Paul. 2007. *Amazon Expeditions—My Quest for the Ice-Age Equator*. Yale University Press.
- Coplen, Tyler B. 2007. Calibration of the calcite–water oxygen-isotope geothermometer at Devils Hole, Nevada, a natural laboratory. *Geochimica et Cosmochimica Acta* 71: 3948–3957.
- Cuffey, Kurt M., and Gary D. Clow. 1997. Temperature, accumulation, and ice sheet elevation in central Greenland through the last deglacial transition. *Journal of Geophysical Research* 102: 26383–26396.
- Cuffey, Kurt M., et al. 1995. Large Arctic temperature change at the Wisconsin-holocene glacial transition. *Science* 270: 455–457.

- Dahl-Jensen, D., et al. 1998. Past temperatures directly from the Greenland ice sheet. *Science* 282: 268–272.
- Dansgaard, Willi. 2005. *Frozen Annals*. Copenhagen, Denmark: Niels Bohr Institute.
- Dawson, Alastair G. 1992. *Ice age earth: Late quaternary geology and climate*. London, UK: Routledge.
- Delmonte, B., et al. 2004. Comparing the Epica and Vostok dust records during the last 220,000 years: Stratigraphical correlation and provenance in glacial periods. *Earth Science Reviews* 66: 63–87.
- Dokken, Trond M., and Eystein Jansen. 1999. Rapid changes in the mechanism of ocean convection during the last glacial period. *Nature* 401: 458–461.
- Dols, Arno. 2015. *The Mid-pleistocene Transition: An Eastern Mediterranean Perspective*. MS Thesis, Utrecht University.
- Dutton, A., and K. Lambeck. 2012. Ice volume and sea level during the last interglacial. *Science* 337: 216–219.
- Dutton, A., et al. 2015. Sea-level rise due to polar ice-sheet mass loss during past warm periods. *Science* 349: aaa4019-2–aaa4019-9.
- Elias, S.A., and J. Brigham-Grette. 2013. Late pleistocene glacial events in Beringia. *Encyclopedia of Quaternary Science*, 191–201.
- Ellis, Ralph, and Michael Palmer. 2016. Modulation of ice ages via precession and dust-albedo feedbacks. *Geoscience Frontiers*. <http://www.sciencedirect.com/science/article/pii/S1674987116300305>.
- Elderfield, Henry, et al. 2012. Interpolated seawater stable oxygen isotope ratios and relative sea level. *PANGAEA*, <https://doi.pangaea.de/10.1594/PANGAEA.786204>
- EPICA Community Members. 2006. One-to-one coupling of glacial climate variability in Greenland and Antarctica. *Nature* 444: 195–198.
- ETOPO1, Global Relief Model NOAA, National Center for Environmental Information. https://www.ngdc.noaa.gov/mgg/image/fig1_global_histogram.png.
- Ewing, M., and W.L. Donn. 1956. A theory of ice ages. *Science* 123: 1061–1066.
- Finlayson, Clive. 2004. *Neanderthals and Modern Humans—An ecological and Evolutionary Perspective*. Cambridge University Press.
- Fischer, H., et al. 1999. Ice core records of atmospheric CO₂ around the last three glacial terminations. *Science* 283: 1712–1714.
- Fischer, H., et al. 2007. Reconstruction of millennial changes in dust emission, transport and regional sea ice coverage using the deep Epica ice cores from the Atlantic and Indian Ocean sector of Antarctica. *Earth and Planetary Science Letters* 260: 340–354.
- Fleitmann, Dominik, et al. 2008. Evidence for a widespread climatic anomaly at around 9.2 ka before present. *Paleoceanography* 23: PA1102.
- Florindo, F., et al. 1999. Magnetic proxy climate results from the Duanjiapo loess section, southernmost extremity of the Chinese Loess plateau. *Journal of Geophysical Research* 104: 645–659.
- Gabrielli, Paolo, et al. 2010. A major glacial-interglacial change in aeolian dust composition inferred from rare earth elements in Antarctic ice. *Quaternary Science Reviews* 29: 265–273.
- Ganopolski, Andrey, and Victor Brovkin. 2015. The last four glacial CO₂ cycles simulated with the CLIMBER-2 model. *Nova Acta Leopoldina* NF 121 (408): 75–79.
- Ganopolski, Andrey, and Reinhard Calov. 2012. *Simulation of Glacial Cycles with an Earth System Model*. http://link.springer.com/chapter/10.1007%2F978-3-7091-0973-1_3.
- Ganopolski, Andrey, et al. 2010. Simulation of the last glacial cycle with a coupled climate ice-sheet model of intermediate complexity. *Climate of the Past* 6: 229–244.

- Ganopolski, Andrey, et al. 2011. The role of orbital forcing, carbon dioxide and regolith in 100 kyr glacial cycles. *Climate of the Past* 7: 1415–1425.
- Gautney, Joanna R. 2018. New world paleoenvironments during the last glacial maximum: Implications for habitable land area and human dispersal. *Journal of Archaeological Science: Reports* 19: 166–176.
- Geike, James. 1894. *The Great Ice Age*; Wright, G. Fredrick. 1920. *The Ice Age in North America*, 6th ed.; Dawson, J. William. 1893. *The Canadian Ice Age*. Montreal.
- Gerhard, L.C., and W.E. Harrison. 2001. Distribution of oceans and continents: A geological constraint on global climate variability. In *Geological Perspectives of Global Climate Change*, ed. L.C. Gerhard, W.E. Harrison, and B.M. Hanson, 35–49.
- Gerhart, L.M., and J.K. Ward. 2010. Plant responses to low [CO₂] of the past. *New Phytologist* 188: 674–695.
- Gest, Lea, et al. 2017. Leads and lags between Antarctic temperature and carbon dioxide during the last deglaciation. *Climate of the Past Discussions*. <https://doi.org/10.5194/cp-2017-71>.
- Gildor, Hezi, and Michael Ghil. 2002. Phase relations between climate proxy records: Potential effect of seasonal precipitation changes. *Geophysical Research Letters* 29: 10.1029.
- Gildor, Hezi, et al. 2014. The role of sea ice in the temperature-precipitation feedback of glacial cycles. *Climate Dynamics* 43: 1001–1010.
- Goelles, T., C.E. Bøggild, and R. Greve. 2015. Ice sheet mass loss caused by dust and black carbon accumulation. *The Cryosphere* 9: 1845–1856.
- Goñi, Maria Fernanda Sanchez, et al. 2018. Pollen from the deep-sea: a breakthrough in the mystery of the Ice Ages. *Frontiers in Plant Science*, 9: 38. DOI: 10.3389/fpls.2018.00038.
- Gough, D.O. 1981. Solar interior structure and luminosity variations. *Solar Physics* 74: 21–34.
- Grootes, P.M., et al. 1993. Comparison of oxygen isotope records from the GISP2 and GRIP Greenland ice cores. *Nature* 366: 552–554.
- Hammer, C.U. 1989. Dating by physical and chemical seasonal variations and reference horizons. In *The Environmental Record in Glaciers and Ice Sheets*, ed. H. Oeschger, and C.C. Langway Jr. New York: Wiley.
- Harland, W.B., and M.J.S. Ruddick. 1964. The great infra-Cambrian glaciation. *Scientific American* 211: 28–36.
- Harlow, R.C., et al. 2004. Derivation of temperature lapse rates in semi-arid south-eastern Arizona. *Hydrology and Earth System Sciences* 8: 1179–1185.
- Harrison, Sandy P., Karen E. Kohfeld, Caroline Roelandt, and Tanguy Claquin. 2001. The role of dust in climate changes today, at the last glacial maximum and in the future. *Earth-Science Reviews* 54: 43–80.
- Hays, J., J. Imbrie, and N. Shackleton. 1976. Variations in the earth's orbit: Pacemaker of the ice ages. *Science* 194: 1121–1132.
- Heinemann, M., et al. 2014. Deglacial ice sheet meltdown: Orbital pacemaking and CO₂ effect. *Climate of the Past* 10: 1567–1579.
- Heinrich, H. 1988. Origin and consequence of ice rafting In Northeast Atlantic ocean during the past 130,000 years. *Quaternary Research* 29: 143–152.
- Herbert, T.D., et al. 2001. Collapse of the California current during glacial maxima linked to climate change on land. *Science* 293: 71–77.
- Hoffman, Paul F., and Daniel P. Schrag. 2002. The snowball earth hypothesis: Testing the limits of global change. *Terra Nova* 14: 129–155. http://www.eps.harvard.edu/people/faculty/hoffman/snowball_paper.html.

- Hönisch, Bärbel, et al. 2009. Atmospheric carbon dioxide concentration across the mid-pleistocene transition. *Science* 324: 1551–1554.
- Hooghiemstra, H., and Eva T.H. Ran. 1994. Late pleistocene-pliocene high-resolution pollen sequence of Colombia: An overview of climate change. *Quaternary International* 21: 63–80.
- Hooghiemstra, H., and T. Van der Hammen. 2004. Quaternary ice-age dynamics in the Colombian Andes: Developing an understanding of our legacy. *Philosophical Transactions* 359: 173–181.
- Hou, Shugui, et al. 2018. Age ranges of the Tibetan ice cores with emphasis on the Chongce ice cores, western Kunlun Mountains. *The Cryosphere*, 12: 2341–2348.
- Huber, Christof, et al. 2004. Comment on “Greenland-Antarctic phase relations and millennial time-scale climate fluctuations in the Greenland ice-cores”, by C. Wunsch. *Correspondence/Quaternary Science Reviews* 23: 2045–2055.
- Hughes, T. 1987. Ice dynamics and deglaciation models when ice sheets collapsed. In *North America and Adjacent Oceans During the Last Deglaciation*, ed. W.F. Ruddiman, and H.E. Wright Jr., 183–220. Boulder: Geological Society of North America.
- Hughes, T. 1992. Abrupt climatic change related to unstable ice-sheet dynamics: Toward a new paradigm. *Palaeogeography, Palaeoclimatology, Palaeoecology (Global and Planetary Change Section)* 97: 203–234.
- Hughes, Philip D., Philip L. Gibbard, and Jurgen Ehlers. 2013. Timing of glaciation during the last glacial cycle: Evaluating the concept of a global ‘Last Glacial Maximum’ (LGM). *Earth Science Reviews*, 125: 171–198.
- Hughes, Anna L.C., et al. 2015. The last Eurasian ice sheets—A chronological database and time-slice reconstruction, DATED-1. *Boreas* 45: 1–45.
- Huybers, Peter. 2009a. Pleistocene glacial variability as a chaotic response to obliquity forcing. *Climate of the Past* 5: 481–488.
- Huybers, Peter, and Carl Wunsch. 2004. A depth-derived pleistocene age model: Uncertainty estimates, sedimentation variability, and nonlinear climate change. *Paleoceanography* 19: PA1028–PA1051.
- Huybers, Peter, and Carl Wunsch. 2005. Obliquity pacing of the late pleistocene glacial terminations. *Nature* 434: 491–494.
- Ice Cube Collaboration. 2013. South Pole glacial climate reconstruction from multi-borehole laser particulate stratigraphy. *Journal of Glaciology* 59: 1117–1128.
- Imbrie, John, and Nilva G. Kipp. 1971. A new micropaleontological method for quantitative paleoclimatology: Application to a late pleistocene caribbean core. In *The Late Cenozoic Glacial Ages*, ed. Karl K. Turekian, 71–181. New Haven, CT: Yale University Press.
- Imbrie, John, and Katherine Palmer Imbrie. 1979. *Ice Ages*. Harvard University Press.
- Imbrie, John, and John Z. Imbrie. 1980. Modeling the climatic response to orbital variations. *Science* 207: 943–953.
- Imbrie, J., Hays, et al. 1984. The orbital theory of pleistocene climate: Support from a revised chronology of the marine $\delta^{18}\text{O}$ record. In *Milankovitch and Climate (Pt. I)*, ed. A.L. Berger, J. Imbrie, J.D. Hays, G. Kukla, and B. Saltzman, 269–305. Dordrecht (Reidel).
- Imbrie, John, A.C. Mix, and D.G. Martinson. 1993. Milankovitch theory viewed from Devil’s Hole. *Nature* 363: 531–533.
- Jiang, W., et al. 2013. Chinese Loess Plateau vegetation since the last glacial maximum and its implications for vegetation restoration. *Journal of Applied Ecology* 50: 440–448.
- Johnson, M., et al. 2005. Climate-independent paleoaltimetry using stomatal density in fossil leaves as a proxy for CO_2 partial pressure. *Geology* 33: 82–83.

- Jolly, D., and A. Haxeltine. 1997. Effect of low glacial atmospheric CO₂ on tropical African Montane vegetation. *Science* 276: 786–788.
- Joos, Fortunat, and Renato Spahni. 2008. Rates of change in natural and anthropogenic radiative forcing over the past 20,000 years. *PNAS* 105: 1425–1430.
- Jouzel, J., et al. 1997. Validity of the temperature reconstruction from water isotopes in ice cores. *Journal of Geophysical Research* 102: 26471–26487.
- Jouzel, J., et al. 2003. Magnitude of isotope/temperature scaling for interpretation of central Antarctic ice cores. *Journal of Geophysical Research* 108: 4361–4372.
- Jouzel, J., et al. 2007. Orbital and millennial Antarctic climate variability over the last 800,000 years. *Science* 317: 793–796.
- Kasting, James F. 1993. Earth's early atmosphere. *Science* 259: 920–926.
- Kasting, James F. 1997. Warming early earth and mars. *Science* 276: 1213–1215.
- Kasting, James F., and Thomas P. Ackerman. 1986. Climatic consequences of very high carbon dioxide levels in the earth's early atmosphere. *Science* 234: 1383–1385.
- Kawamura, Kenji. 2009. Accurate chronology for Antarctic ice cores on orbital timescales. *Science Highlights* 17. [www.pages-igbp.org/products/1/Kawamura_2009-1\(26-27\).pdf](http://www.pages-igbp.org/products/1/Kawamura_2009-1(26-27).pdf).
- Kawamura, K., et al. 2007. Northern Hemisphere forcing of climatic cycles in Antarctica over the past 360,000 years. *Nature* 448: 912–917.
- Kennett, D.J. 2009. Nanodiamonds in the Younger Dryas boundary sediment layer. *Science* 323: 94.
- Kernthaler, S.C., R. Toumi, and J.D. Haigh. 1999. Some doubts concerning a link between cosmic ray fluxes and global cloudiness. *Geophysical Research Letters* 26: 863–865.
- Kerr, Richard A. 2000. An appealing snowball earth that's still hard to swallow. *Science* 287: 1734–1736.
- Kipp, N.G. 1976. “New transfer function for estimating past sea-surface conditions from sea-bed distribution of planktonic foraminiferal assemblages” in the North Atlantic. In *Investigations of late Quaternary Paleoceanography and Paleoclimatology*, vol. 145, 3–41. Geological Society of America Memoir.
- Kirkby, Jasper. 2008. Cosmic rays and climate. *Surveys in Geophysics* 28: 333–375.
- Kirkby, J., A. Mangini, and R.A. Muller. 2004. “The glacial cycles and cosmic rays,” CERN-PH-EP/2004–027, June 18, 2004. This paper was supposedly submitted for publication in *Earth and Planetary Science Letters*, but does not seem to have been published.
- Kirschvink, J.L. 1992. Late proterozoic low-latitude global glaciation: The snowball earth. In *The Proterozoic Biosphere*, ed. J.W. Schopf, and C. Klein, 51–52. Cambridge: Cambridge University Press.
- Kniveton, Dominic R., and Martin C. Todd. 2001. On the relationship of cosmic ray flux and precipitation. *Geophysical Research Letters* 28: 1527–1530.
- Kohfeld, Karen E., and Sandy P. Harrison. 2001. DIRTMAP: The geological record of dust. *Earth-Science Reviews* 54: 81–114.
- Köhler, Peter. 2017. 156 kyr smoothed history of the atmospheric greenhouse gases CO₂, CH₄, and N₂O and their radiative forcing. *Earth System Science Data* 9: 363–387.
- Köhler, Peter, et al. 2009. What caused earth's temperature variations during the last 800,000 years? Data-based evidence on radiative forcing and constraints on climate sensitivity. *Quaternary Science Reviews* 29: 129–145.
- Kopp, Robert E., et al. 2009. Probabilistic assessment of sea level during the last interglacial stage. *Nature* 462: 863–867.
- Körner, C., and J. Paulsen. 2004. A world-wide study of high altitude tree line temperatures. *Journal of Biogeography* 1: 713–732.

- Körner, C., et al. 2010. *Alpine Plant Life: Functional Plant Ecology of High Mountain Ecosystems*. Springer.
- Kotlyakov, V.M. (ed.) 1996. *Variations of Snow and Ice in the Past and at Present on a Global and Regional Scale*, UNESCO, Paris, SC-96/WS-13.
- Krinner, G., and M. Werner. 2003. Impact of precipitation seasonality changes on isotopic signals in polar ice cores: A multi-model analysis. *Earth and Planetary Science Letters* 216: 525–538.
- Krinner, Gerhard, et al. 2006. Ice-free glacial northern Asia due to dust deposition on snow. *Climate Dynamics* 27: 613–625.
- Krumhardt, Kristen M., and Jed O. Kaplan. 2010. A spline fit to atmospheric CO₂ records from Antarctic ice cores and measured concentrations for the last 25,000 years. *ARVE Technical Report #2*. Switzerland: 1ARVE Group, Environmental Engineering Institute, Ecole Polytechnique Fédérale de Lausanne. http://ecospriv4.epfl.ch/pub/ARVE_tech_report2_co2spline.pdf.
- Kucera, M., et al. 2006. *MARGO—Multiproxy Approach for the Reconstruction of the Glacial Ocean surface*, 1st ed. Elsevier Science Books. eBook ISBN: 9780080914077, Hardcover ISBN: 9780080447025.
- Kukla, G.J., et al. 2002. Last interglacial climates. *Quaternary Research* 58: 2–13.
- Lambert, Fabrice. 2015. Dust fluxes and iron fertilization in holocene and last glacial maximum climates. *Geophysical Research Letters* 42: 6014–6023.
- Lambert, F., et al. 2008. Dust-climate couplings over the past 800,000 years from the EPICA Dome C ice core. *Nature* 452: 616–619.
- Lambeck, Kurt, et al. 2014. Sea level and global ice volumes from the last glacial maximum to the holocene. *PNAS* 111: 15296–15303.
- Landwehr, J.M., and I.J. Winograd. 2001. Dating the Vostok ice core record by importing the Devil's Hole chronology. *Journal of Geophysical Research* 106: 31853–31861.
- Lang, N., and E.W. Wolff. 2011. Interglacial and glacial variability from the last 800 ka in marine, ice and terrestrial archives. *Climate of the Past Discussions* 7: 361–380.
- Langebroeck, P.M., and K.H. Nisancioglu. 2016. Moderate Greenland ice sheet melt during the last interglacial constrained by present-day observations and paleo ice core reconstructions. *The Cryosphere Discussions*. <https://doi.org/10.5194/tc-2016-15>.
- Lehman, Scott J., and Lloyd D. Keigwin. 1992. Sudden changes in North Atlantic circulation during the last deglaciation. *Nature* 356: 757–762.
- Lioubimtseva, E., et al. 1998. Impacts of climatic change on carbon storage in the Sahara-Gobi desert belt since the last glacial maximum. *Global and Planetary Change* 16–17: 95–105.
- Lioubimtseva, E., et al. 2004. Climate change in arid environments: revisiting the past to understand the future. *Progress in Physical Geography* 28: 502–530. http://scholarworks.gvsu.edu/gpy_articles/1.
- Lisiecki, Lorraine E. 2010. A benthic $\delta^{13}\text{C}$ based proxy for atmospheric pCO₂ over the last 1.5 Myr. *Geophysical Research Letters* 37: L21708.
- Lisiecki, Lorraine E., and Maureen E. Raymo. 2005. A pliocene-pleistocene stack of 57 globally distributed benthic D¹⁸O records. *Paleoceanography* 20: PA1003–1019.
- Lisiecki, Lorraine E., Maureen E. Raymo, and William B. Curry. 2008. Atlantic overturning responses to late pleistocene climate forcings. *Nature* 456: 85–88.
- Lockwood, Mike, and Claus Frohlich. 2007. Recent oppositely directed trends in solar climate forcings and the global mean surface air temperature. *Proceedings of the Royal Society A* 463: 2447–2460.
- Louergue, L., et al. 2007. New constraints on the gas age-ice age difference along the EPICA ice cores, 0–50 kyr. *Climate of the Past Discussions* 3: 435–467. www.clim-past-discuss.net/3/435/2007/.

- Ludwig, Kenneth R., et al. 1992. Mass-spectrometric ^{230}Th - ^{234}U - ^{238}U dating of the Devils Hole calcite vein. *Science* 258: 284–287.
- Lunt, D.J., and P.J. Valdes. 2002. Dust deposition and provenance at the last glacial maximum and present day. *Geophysical Research Letters* 29: 2085–2088.
- Lüthi, D., et al. 2008. High-resolution carbon dioxide concentration record 650,000–800,000 years before present. *Nature* 453: 379–382.
- Macdonald, Francis A., et al. 2010. Calibrating the Cryogenian. *Science* 327: 1241–1243.
- Maher, B. 2011. The magnetic properties of quaternary aeolian dusts and sediments, and their palaeoclimatic significance. *Aeolian Research* 3: 87–144.
- Maher, Barbara, et al. 2010. Global connections between Aeolian dust, climate and ocean biogeochemistry at the present day and at the last glacial maximum. *Quaternary Science Reviews* 99: 61–97.
- Mahowald, N., et al. 1999. Dust sources and deposition during the last glacial maximum and current climate: A comparison of model results with paleodata from ice cores and marine sediments. *Journal of Geophysical Research Atmospheres* 104: 895e915.
- Mahowald, N., et al. 2014. The size distribution of desert dust aerosols and its impact on the Earth system. *Aeolian Research* 15: 53–71.
- Maqueda, M.A.M., and S. Rahmsdorf. 2002. Did Antarctic sea-ice expansion cause glacial CO_2 ? *Geophysical Research Letters* 29: 1011–1013.
- Marchitto, Thomas M., et al. 2007. Marine radiocarbon evidence for the mechanism of deglacial atmospheric CO_2 rise. *Science* 316: 1456–1471.
- Marcott, Shaun A., et al. 2014. Centennial-scale changes in the global carbon cycle during the last deglaciation. *Nature* 514: 616–619.
- Masson-Delmotte, V., et al. 2010. EPICA Dome C record of glacial and interglacial intensities. *Quaternary Science Reviews* 29: 113–128.
- Masson-Delmotte, et al. 2011. A comparison of the present and last interglacial periods in six Antarctic ice cores. *Climate of the Past* 7: 397–423.
- Martinez-Garcia, Alfredo. 2011. Southern Ocean dust–climate coupling over the past four million years. *Nature* 476: 312–316.
- McElwain, J.C. 2004. Climate-independent paleoaltimetry using stomatal density in fossil leaves as a proxy for CO_2 partial pressure. *Geology* 32: 1017–1020.
- McGee, D., et al. 2010. Gustiness: The driver of glacial dustiness. *Quaternary Science Reviews* 29: 2340.
- Meese, D.A., et al. 1997. The Greenland ice sheet project 2 depth-age scale: Methods and results. *Journal of Geophysical Research* 102: 26411–26423.
- Merz, N., et al. 2013. Greenland accumulation and its connection to the large-scale atmospheric circulation in ERA-Interim and paleoclimate simulations. *Climate of the Past* 9: 2433–2450.
- Miller, G.H., et al. 2010. Temperature and precipitation history of the Arctic. *Quaternary Science Reviews* 29: 1679–1715.
- Miller, Stephen D., et al. 2016. Satellite-based estimation of temporally resolved dust radiative forcing in snow cover. *Journal of Hydrometeorology* 17: 1999–2011.
- Mithen, Steven. 2003. *After the Ice: A Global Human History 20,000–5,000 BC*. Harvard University Press.
- Monnin, E., et al. 2001. Atmospheric CO_2 concentrations over the last glacial termination. *Science* 291: 112–114.
- Montenegro, Alvaro, et al. 2006. Carbon storage on exposed continental shelves during the glacial-interglacial transition. *Geophysical Research Letters* 33: L08703–L08705.

- Moore, J.Keith, et al. 2000. The Southern ocean at the last glacial maximum: A strong sink for atmospheric carbon dioxide. *Global Biogeochemical Cycles* 14: 455–475.
- Moore, R., et al. 1995. *Botany: Plant Diversity*. ISBN 978e0697037756.
- Mudelsee, M. 2001. The phase relations among atmospheric CO₂ content, temperature and global ice volume over the past 420 ka. *Quaternary Science Reviews* 20: 583–589.
- Muhs, D.R., et al. 2014. Identifying sources of Aeolian mineral dust: Present and past. In *Mineral Dust—A Key Player in the Earth system*. Springer.
- North, Gerald R. 1975. Theory of energy balance climate models. *Journal of Atmospheric Sciences* 32: 2033–2043.
- Oard, Michael. 2005. *The Frozen Record: Examining the Ice Core History of the Greenland and Antarctic Ice Sheets*. Institute for Creation Research.
- Ohgaito, Rumi, et al. 2018. The effect of high dust amount on the surface temperature during the last glacial maximum: A modelling study using MIROC-ESM. *Climate of the Past Discussions. Climate of the Past, 14*, 1565–1851. <https://doi.org/10.5194/cp-2018-2>.
- O'Neill, A.D.J. and Don M. Gray. 1973. Solar radiation penetration through snow. http://www.usask.ca/hydrology/papers/ONeill_Gray_1973_2.pdf
- Osborne, C.P., and D.J. Beerling. 2005. Nature's green revolution: The remarkable evolutionary rise of C4 plants. *Philosophical Transactions of the Royal Society of London* 361: 173–194.
- Otto-Bliesner, Bette L., et al. 2018. How warm was the last interglacial? New model–data comparisons. *Philosophical Transactions of the Royal Society A* 371: 1–20.
- Overpeck, J.T., et al. 1996. Possible role of dust-induced regional warming in abrupt climate change during the last glacial period. *Nature* 384: 447–449.
- Paillard, Didier. 1998. The timing of pleistocene glaciations from a simple multiple-state climate model. *Nature* 391: 378–381.
- Paillard, Didier. 2017. Predictable ice ages on a chaotic planet. *Nature* 542: 419–420.
- Parrenin, Frédéric, et al. 2001. Dating the Vostok ice core by an inverse method. *Journal of Geophysical Research* 106: 31837–31851.
- Parrenin, F., et al. 2007a. 1-D-ice flow modeling at EPICA Dome C and Dome Fuji, East Antarctica. *Climate of the Past* 3: 243–259. <http://www.clim-past.net/3/243/2007/>.
- Parrenin, F., et al. 2007b. The EDC3 chronology for the EPICA Dome C ice core. *Climate of the Past* 3: 485–497. <http://www.clim-past.net/3/485/2007/>.
- Patterson, R. Timothy. 2007. *Read the Sunspots*. <http://www.canada.com/nationalpost/financialpost/comment/story.html?id=597d0677-2a05-47b4-b34f-b84068db11f4>.
- Peacock, Synte, et al. 2006. A possible sequence of events for the generalized Glacial-Interglacial cycle. <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2005GB002448>.
- Pederson, Gregory T. 2011. Climatic controls on the snowmelt hydrology of the Northern Rocky Mountains. *Journal of Climate* 24: 1666–1687.
- Pedersen, R.A., et al. 2017. The last interglacial climate: Comparing direct and indirect impacts of insolation changes. *Climate Dynamics* 48: 3391–3407.
- Peltier, W. Richard, and Shawn Marshall. 1995. Coupled energy-balance/ice-sheet model simulations of the glacial cycle: A possible connection between terminations and terrigenous dust. *Journal of Geophysical Research* 100: 14269–14289.
- Petit, J.R., et al. 1990. Paleoclimatological implications of the Vostok core dust record. *Nature* 343: 56–58.
- Petit, J.R., et al. 1999. Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica. *Nature* 399: 429–436.

- Pinto, H., et al. 2014. Photosynthesis of C₃, C₃-C₄, and C₄ grasses at glacial CO₂. *Journal of Experimental Botany* 65: 271e278.
- Pisias, N.G., and N.J. Shackleton. 1984. Modeling the global climate response to orbital forcing and atmospheric carbon dioxide changes. *Nature* 310: 757–759.
- Pollard, David. 1978. An investigation of the astronomical theory of ice ages using a simple climate-ice model. *Nature* 272: 233–235.
- Porter, S.C. 2000. Snowline depression in the tropics during the last glaciation. *Quaternary Science Reviews* 20: 1067–1091.
- Purdy, Mindi. 2003. *The Role of Carbon in a Snowball Earth*. Internet article for download.
- Rahmstorf, Stefan. 2002. Ocean circulation and climate during the past 120,000 years. *Nature* 419: 207–214.
- Rampino, Michael R., and Stephen Self. 1992. Volcanic winter and accelerated glaciation following the Toba super-eruption. *Nature* 359: 50–52; Rampino, Michael R., and Stephen Self. 1993. Climate-volcanism feedback and the Toba eruption of ~74,000 years ago. *Quaternary Research* 40: 269–280.
- Rapp, D. 2012. *Ice Ages and Interglacials*, 2nd ed. Heidelberg: Praxis-Springer.
- Rapp, D. 2016. *Assessing Climate Change*, 3rd ed. Heidelberg: Praxis-Springer.
- Rasmussen, S.O., et al. 2006. A new Greenland ice core chronology for the last glacial termination. *Journal of Geophysical Research* 111: D06102.
- Raymo, M.E. 1992. Global climate change: A three million year perspective. In *Start of a Glacial*, vol. I3, ed. G.J. Kukla and E. Went. Heidelberg: Springer.
- Raymo, M.E. 1997. The timing of major climate terminations. *Paleoceanography* 12: 577–585.
- Raymo, M.E., et al. 2006. Plio-pleistocene ice volume, Antarctic climate, and the global δ¹⁸O record. *Science* 313: 492–495.
- Reeh, N. 1989. Dating by ice flow modeling: A useful tool or an exercise in applied mathematics? In *The Environmental Record in Glaciers and Ice Sheets*, ed. H. Oeschger and C.C. Langway Jr. New York: Wiley.
- Reeh, N., et al. 2002. Comparison between Greenland ice-margin and ice-core oxygen-18 records. *Annals of Glaciology* 35: 136–144.
- Renseen, H., et al. 2012. Global characterization of the Holocene Thermal Maximum. *Quaternary Science Reviews* 48: 7–19.
- Rhines, Andrew, and Peter J. Huybers. 2014. Sea ice and dynamical controls on preindustrial and last glacial maximum accumulation in central Greenland. *Journal of Climate* 27: 8902–8917.
- Rind, D., and D. Peteet. 1985. Terrestrial conditions at the last glacial maximum and climap sea-surface temperature estimates: Are they consistent? *Quaternary Research* 24: 1–22.
- Roberts, Andrew, et al. 2011. Atmospheric dust variability from Arabia and China over the last 500,000 years. *Quaternary Science Reviews* 30: 3537–3541.
- Robock, Alan. 2000. Volcanic eruptions and climate. *Reviews of Geophysics* 38: 191–219.
- Robock, Alan, Caspar M. Ammann, Luke Oman, Drew Shindell, Samuel Levis, and Georgiy Stenichkov. 2009. Did the Toba volcanic eruption of 74 ka B.P. produce widespread glaciation? *Journal of Geophysical Research* 114: D10107.
- Roche, Didier M., et al. 2012. A spatial view on temperature change and variability during the last deglaciation: A model analysis. In *Climate Change: Inferences from Paleoclimate and Regional Aspects*, ed. A. Berger, F. Mesinger, and D. Šijački, 79–92.
- Roe, Gerard. 2006. In defense of Milankovitch. *Geophysical Research Letters* 33: L24703.

- Rohling, E.J. 2009. Antarctic temperature and global sea level closely coupled over the past five glacial cycles. *Nature Geoscience* 2: 500–504.
- Roper, L. David. 2006. *Relationship of Antarctica Temperature to Atmospheric Carbon Dioxide and Methane*. http://www.roperld.com/science/CO2_Temp.pdf.
- Rothlisberger, R., et al. 2008. The southern hemisphere at glacial terminations: Insights from the Dome C ice core. *Climate of the Past Discussions* 4: 761–789.
- Rousseau, D.-D., et al. 2013. Major dust events in Europe during marine isotope stage 5 (130–74 ka): A climatic interpretation of the ‘markers’. *Climate of the Past* 9: 2213–2230.
- Ruth, Urs, et al. 2007. Ice core evidence for a very tight link between North Atlantic and east Asian glacial climate. *Geophysical Research Letters* 34. <http://onlinelibrary.wiley.com/doi/10.1029/2006GL027876/full>.
- Rybin, E., et al. 2016. The impact of the LGM on the development of the upper paleolithic in Mongolia. *Quaternary International* 425: 69–87.
- Sagan, C., and C. Chyba. 1997. The early faint sun paradox: Organic shielding of ultraviolet-labile greenhouse gases. *Science* 276: 1217.
- Sagan, Carl, and G. Mullen. 1972. Earth and mars: Evolution of atmospheres and surface temperatures. *Science* 177: 52–56.
- Schaefer, H. et al. 2009. Ice stratigraphy at the Pakitsoq ice margin, West Greenland, derived from gas records. *Journal of Glaciology* 55: 411–421.
- Schmidt, Gavin. 1999. *Cold Climates, Warm Climates: How Can We Tell Past Temperatures?* http://www.giss.nasa.gov/research/briefs/schmidt_01/.
- Schneider von Deimling, Thomas, et al. 2006. How cold was the last glacial maximum? *Geophysical Research Letters* 33: L14709.
- Schneider, R., et al. 2013. A reconstruction of atmospheric carbon dioxide and its stable carbon isotopic composition from the penultimate glacial maximum to the last glacial inception. *Climate of the Past* 9: 2507–2523.
- Schrag, Daniel P., Robert A. Berner, Paul F. Hoffman, and Galen P. Halverson. 2002. On the initiation of a snowball earth. *Geochemistry, Geophysics, and Geosystems* 3: 1036.
- Schulz, K.G., and R.E. Zeebe. 2006. Pleistocene glacial terminations triggered by synchronous changes in Southern and Northern Hemisphere insolation: The insolation canon hypothesis. *Earth and Planetary Science Letters* 249: 326–336.
- Schwarzschild, Bertram M. 2012. Carbon dioxide drove the ending of the last glacial epoch. *Physics Today* 65: 16–18.
- Serno, S., et al. 2015. Comparing dust flux records from the subarctic north Pacific and Greenland: Implications for atmospheric transport to Greenland and for the application of dust as a chronostratigraphic tool. *Paleoceanography* 30: 681–688.
- Severinghaus, Jeffrey P. 2009. Monsoons and meltdowns. *Science* 326: 240–241.
- Shakun, J.D., and A.E. Carlson. 2010. A global perspective on last glacial maximum to holocene climate change. *Quaternary Science Reviews* 29: 1801–1816.
- Shakun, J.D., et al. 2012. Global warming preceded by increasing carbon dioxide concentrations during the last deglaciation. *Nature* 484: 49–55.
- Shaw, D.M., and W.L. Donn. 1968. Milankovitch radiation variations: A quantitative evaluation. *Science* 162: 1270.
- Shuman, C.A., et al. 2001. Multiyear accumulation and temperature history near the north Greenland ice core project site, north central Greenland. *Journal of Geophysical Research* 106: 33853–33866.

- Shi, Z., et al. 2015. Growth habit and leaf economics determine gas exchange responses to high elevation in an evergreen tree, a deciduous shrub and a herbaceous annual. *AoB Plants* 7.
- Sigman, Daniel M., and Edward A. Boyle. 2000. Glacial/interglacial variations in atmospheric carbon dioxide. *Nature* 407: 859–869.
- Skinner, L.C. 2006. Glacial–interglacial atmospheric CO₂ change: A simple “hypsometric effect” on deep-ocean carbon sequestration? *Climate of the Past Discussions* 2: 711–743. <http://www.clim-past-discuss.net/2/711/2006/>.
- Skinner, L.C., et al. 2010. Ventilation of the deep southern ocean and deglacial CO₂ rise. *Science* 328: 1147–1151.
- Soon, Willie, et al. 2003. Reconstructing climatic and environmental changes of the past 1000 years: A reappraisal. *Energy and Environment* 14, 233–298.
- Sowers, T., and M. Bender. 1995. Climate records covering the last deglaciation. *Science* 269: 210–214.
- Stap, L.B., et al. 2014. Interaction of ice sheets and climate during the past 800,000 years. *Climate of the Past* 10: 2135–2152.
- Steffensen, J.P. 1997. The size distribution of microparticles from selected segments of the Greenland ice core project ice core representing different climatic periods. *Journal of Geophysical Research* 102: 26755–26763.
- Stephens, B. B., and R. F. Keeling 2000. The influence of Antarctic sea ice on glacial/interglacial CO₂ variations. *Nature* 404: 171–174.
- Still, C.J., et al. 2003. Global distribution of C₃, and C₄, vegetation: Carbon cycle implications. *Global Biogeochemical Cycles* 17: 1006.
- Stott, Lowell. 2008. *Personal Communication*, November 2008.
- Stott, Lowell, and Axel Timmermann. 2011. Hypothesized link between glacial/interglacial atmospheric CO₂ cycles and storage/release CO₂-rich fluids from deep sea sediments. Draft paper to be submitted.
- Svensmark, H. 2000. Cosmic rays and earth’s climate. *Space Science Reviews* 93: 155–166. <http://www.junkscience.com/Greenhouse/influence-of-cosmic-rays-on-the-earth.pdf>.
- Svensmark, H., and E. Friis-Christensen. 1997. Variation of cosmic ray flux and global cloud coverage—A missing link in solar-climate relationships. *Journal of Atmospheric and Solar-Terrestrial Physics* 59: 1225–1232.
- Svensmark, H., and E. Friis-Christensen. 2007. Reply to Lockwood and Fröhlich—The persistent role of the sun in climate forcing. *Danish National Space Center Scientific Report*, March 2007. http://www.spacecenter.dk/publications/scientific-report-series/Scient_No._3.pdf/view.
- Svensson, A., et al. 2005. Visual stratigraphy of the North Greenland ice core project (North GRIP) ice core during the last glacial period. *Journal of Geophysical Research* 110: D02108–D02118.
- Tao, et al. 2013. Last glacial maximum sea surface temperatures: A model-data comparison. *Atmospheric and Oceanic Science Letters*. <https://doi.org/10.3878/j.issn.1674-2834.13.0019>.
- Tarasov, P.E., et al. 1999. Last glacial maximum climate of the former Soviet Union and Mongolia reconstructed from pollen and plant macrofossil data. *Climate Dynamics* 15: 227–240.
- Terashima, I., and Y. Yokoi. 1995. Is photosynthesis suppressed at higher elevations due to low CO₂, pressure? *Ecology* 76: 2663–2668.
- Thompson, Lonnie G., et al. 2005. Tropical ice core records: Evidence for asynchronous glaciation on Milankovitch timescales. *Journal of Quaternary Science* 20: 723–733.
- Thompson, Lonnie G., et al. 2006. Ice core evidence for asynchronous glaciation on the Tibetan Plateau. *Quaternary International* 154–155: 3–10.

- Thornalley, David J.R., Stephen Barker, Wallace S. Broecker, Henry Elderfield, and I. Nick McCave. 2011. The deglacial evolution of North Atlantic deep convection. *Science* 331: 202–205.
- Thouveny, N., J.-L. de Beaulieu, E. Bonifay, K.M. Creer, J. Gulot, M. Icole, S. Johnsen, J. Jouzel, M. Reille, T. Williams, and D. Williamson. 1994. Climate variations in Europe over the past 140 kyr deduced from rock magnetism. *Nature* 371: 503–506.
- Timmermann, A., O. Timm, L. Stott, and L. Menviel. 2009. The roles of CO₂ and orbital forcing in driving southern hemispheric temperature variations during the last 21,000 years. *Journal of Climate* 22: 1626–1640.
- Toggweiler, J.R., and David W. Lea. 2010. Temperature differences between the hemispheres and ice age climate variability. *Paleoceanography* 25: PA2212.
- Tzedakis, P.C., et al. 2009. Interglacial diversity. *Nature Geoscience* 2: 751–755.
- Tzedakis, P.C. 2012. Can we predict the duration of an interglacial? *Climate of the Past* 8: 1473–1485.
- Tzedakis, P.C., et al. 2017. A simple rule to determine which insolation cycles lead to interglacials. *Nature* 542: 427–432.
- Ujvari, Gabor, et al. 2015. Two possible source regions for central Greenland last glacial dust. *Geophysical Research Letters* 42: 10399–10408.
- Vallelonga, Paul, and Anders Svensson. 2014. Ice core archives of mineral dust. In *Mineral Dust*, 463–485.
- Varga, György. 2015. Changing nature of pleistocene interglacials—Is it recorded by paleosoils in Hungary (Central Europe)? *Hungarian Geographical Bulletin* 64: 317–326. https://www.researchgate.net/publication/290459423_Changing_nature_of_Pleistocene_interglacials_-_is_it_recorded_by_paleosoils_in_Hungary_Central_Europe.
- Veizer, Jan. 2005. Celestial climate driver: A perspective from four billion years of the carbon cycle. *Geoscience Canada* 32: 13–28.
- Velichko, A.A., et al. 1997. The last glaciation of earth: Size and volume of ice-sheets. *Quaternary International* 41: 43–51.
- Waelbroeck, C., et al. 1995. A comparison of the Vostok ice deuterium record and series from southern ocean core MD 88-770 over the last two glacial-interglacial cycles. *Climate Dynamics* 12: 113–114.
- WAIS. 2013. Onset of deglacial warming in West Antarctica driven by local orbital forcing. *Nature* 500: 440–446.
- Walker, Gabrielle. 2003. *Snowball Earth*. New York: Three Rivers Press.
- Ward, W.R. 1974. Climatic variations on mars, 1. Astronomical theory of insolation. *Journal of Geophysical Research* 79: 3375–3386.
- Ward, J.K., et al. 2005. Carbon starvation in glacial trees recovered from the La Brea tar pits, Southern California. *PNAS* 102: 690–694.
- Warren, Stephen G. 1982. Optical properties of snow. *Reviews of Geophysics and Space Physics* 20: 67–89.
- Warren, Stephen G., and Tom Grenfell. 2009. *Black Carbon in Arctic Snow and Its Effect on Surface Albedo*. http://www.atmos.washington.edu/sootinsnow/PDF_Presentations/TCG_Colloq_July2007_V2.pdf.
- Watanabe, O., et al. 2003. Dome Fuji vs. Vostok: Homogeneous climate variability across East Antarctica over the past three glacial cycles. *Nature* 422: 509–512.

- Webster, Peter J., and N.A. Stretten. 1978. Late quaternary ice age climates of tropical Australasia: Interpretations and reconstructions. *Quaternary Research* 10: 279–309.
- Weertman, Johannes. 1976. Milankovitch solar radiation variations and ice age ice sheet sizes. *Nature* 261: 17–20.
- Werner, M., et al. 2000. Borehole versus isotope temperatures on Greenland: Seasonality does matter. *Geophysical Research Letters* 27: 723–726.
- Willie, M., et al. 2000. Paleoenvironmental history of the Popayán area since 27 000 yr BP at Timbio. *Review of Palaeobotany and Palynology* 109: 45–63.
- Willie, M., et al. 2001. Environmental change in the Colombian subandean forest belt from 8 pollen records: The last 50 kyr. *Vegetation History and Archaeobotany* 10: 61–77.
- Wilson, R.C.L., S.A. Drury, and J.L. Chapman. 2000. *The great ice age: Climate change and life*. London, UK: The Open University, Routledge.
- Winckler, Gisela, et al. 2017. Covariant glacial-interglacial dust fluxes in the equatorial Pacific and Antarctica. *Science* 320: 93–97.
- Winograd, I.J. 2001. The California current, Devils Hole, and pleistocene climate. *Science* 293: 78–79.
- Winograd, I.J., and J.M. Landwehr. 1993. A response to ‘Milankovitch theory viewed from Devil’s Hole’ by J. Imbrie, A.C. Mix, and D.G. Martinson. *USGS Open File Report* 93-357.
- Winograd, Isaac J., Tyler B. Coplen, Jurate M. Landwehr, Alan C. Riggs, Kenneth R. Ludwig, Barney J. Szabo, Peter T. Kolesar, and Kinga M. Revesz. 1992. Continuous 500,000-year climate record from vein calcite in Devils Hole, Nevada. *Science* 258: 255–260.
- Wouillez, M.-N., et al. 2011. Impact of CO₂ and climate on the last glacial maximum vegetation. *Climate of the Past Discussions* 7: 1–46.
- Wolff, E.W., et al. 2010. Millennial-scale variability during the last glacial: The ice core record. *Quaternary Science Reviews* 29: 2828–2838.
- Wolff, E.W., et al. 2016. “Interglacials of the past 800,000 years” Past interglacials working group of interglacials of the last 800,000 years. *Reviews of Geophysics* 54: 162–219.
- Woodward, Jamie. 2014. *The Ice Age: A Very Short Introduction*. Oxford University Press.
- Wright, G. Fredrick. 1920. *The Ice Age in North America*, 6th ed.
- Wright, James D. 2013. *Global Climate Change in Marine Stable Isotope Records*. http://geology.rutgers.edu/~jdwright/JDWWeb/1999/JDWright_NUREG.pdf.
- Wright, G. Frederick, and Warren Upham. 1896. *Greenland Ice Fields and Life in the North Atlantic*. New York: D. Appleton & Co.
- Wu, Di. 2015. Modeling the dust cycle on mars with the global mars multiscale model gem-mars. *Dissertation*, York University.
- Wu, H.B., et al. 2007. Dominant factors controlling glacial and interglacial variations in the treeline elevation in tropical Africa. *PNAS* 104: 9720–9724.
- Wunsch, Carl. 1999. The interpretation of short climate records, with comments on the North Atlantic and southern oscillations. *Bulletin of the American Meteorological Society* 80: 245–255.
- Wunsch, Carl. 2002. What is thermohaline circulation? *Science* 298: 1179–1180. www.rsnz.org/education/alpha/Alpha120.pdf.
- Wunsch, Carl. 2003. Greenland—Antarctic phase relations and millennial time-scale climate fluctuations in the Greenland ice-cores. *Quaternary Science Reviews* 22: 1631–1646.
- Wunsch, Carl. 2005. The total meridional heat flux and its oceanic and atmospheric partition. *Journal of Climate* 18: 4374–4380.
- Wunsch, Carl. 2006. Abrupt climate change: An alternative view. *Quaternary Research* 65: 191–203.

- Xie, Xiaoning, et al. 2018. Radiative feedbacks of dust-in-snow over East Asia in CAM4-BAM. *Atmospheric Chemistry and Physics Discussions, Atmospheric Chemistry and Physics*, 18, 12683–12698. <https://doi.org/10.5194/acp-2018-350>.
- Yu, G., et al. 2000. Palaeovegetation of china: A pollen data-based synthesis for the mid-Holocene and Last Glacial Maximum. *Angewandte Chemie*, 27: 635–664.
- Yu, G., et al. 2003. LGM lake records from china and an analysis of climate dynamics using a modelling approach. *Global & Planetary Change* 38: 223–256.
- Yuan, Daoxian, et al. 2004. Timing, duration, and transitions of the last interglacial Asian monsoon. *Science* 304: 575–578. <http://www.ncdc.noaa.gov/paleo/pubs/yuan2004/yuan2004.html>.
- Zazula, Grant D., et al. 2003. Ice-age steppe vegetation in east Beringia. *Nature* 423: 603.
- Zhang, Yulan, et al. 2018. Black carbon and mineral dust in snow cover on the Tibetan Plateau. *The Cryosphere* 12: 413–431.
- Zielinski, G.A., et al. 1994. Record of volcanism since 7000 B.C. from the GISP2 Greenland ice core and implications for the volcano-climate system. *Science* 264: 948–952.
- Ziemen, F.A., C.B. Rodehacke, and U. Mikolajewicz. 2014. Coupled ice sheet–climate modeling under glacial and pre-industrial boundary conditions. *Climate of the Past* 10: 1817–1836.
- Zweck, C., and Philippe Huybrechts. 2005. Modeling of the northern hemisphere ice sheets during the last glacial cycle and glaciological sensitivity. *Journal of Geophysical Research* 110: D07103–D07126.

Index

- A**
Ablation, 65, 66, 203, 204, 279, 281, 284, 300, 302, 305, 306, 308–310
Age markers, 58, 59, 67
Air bubbles in ice, 53
Albedo, 12, 22, 32, 39, 40, 42–46, 97, 112, 118, 155, 157, 159, 163, 165, 168, 171, 177, 179, 182–184, 188, 192, 202, 217, 221, 222, 233, 259–262, 266, 277, 279–281, 284, 285, 288, 289, 297, 300, 304, 305, 307–310, 313, 317, 320, 321, 326
Antarctica, 11, 22, 33, 34, 37, 38, 49, 53, 55–60, 68, 69, 71, 72, 76, 81, 83, 84, 89–91, 95–100, 103, 104, 112, 135, 140, 167, 169–171, 173, 176, 183, 184, 204, 263, 268, 277, 278, 285, 287, 290, 292, 293, 296, 297, 300, 305, 314, 315, 320, 322, 324
Antarctica ice core data, 90
 correlation with terminations, 109, 173
Antarctica ice core sites, 90
Antarctic dust data, 34, 284, 289
Astronomical theory
 calculation of solar intensities, 192
 comparison with data, 68, 89, 104, 158, 180
 connection between solar variability and glaciation/deglaciation cycles, 199, 204
 historical solar irradiance at higher latitudes, 197
 Imbries' model, 127, 128, 210, 226, 246
 importance of each orbital parameter, 194
 models for ice volume, 201, 204
 variability of the Earth's orbit, 186, 323
- B**
Benthic forams, 122, 132
Beringia, 16–18
- Bipolar seesaw, 100, 101, 183, 278
Borehole models, 77
- C**
Chronology, 57, 58, 67–69, 89, 90, 100, 125–128, 131, 141, 142, 144–147, 159, 180, 201, 230, 237, 244, 246, 263, 267, 274, 276, 299
Climap, 28, 135, 136
CO₂
 effect on plants, 13
 in ice cores, 54, 117, 263, 289, 321
 in the atmosphere, 22, 40, 41, 46, 47, 55, 92, 104, 108, 110, 114, 156, 188, 212, 265, 278, 279, 285, 313, 321
Continental drift, 41–43, 46, 320
Coral terraces, 127, 151
Cosmic rays, 110, 178–181
Counting layers, 59
Croll, 185, 221
- D**
Dansgaard, 51–53, 55, 63, 64, 73, 95, 97, 169
Dansgaard-Oeschger (D-O) events, 95, 97
Dating of ice cores, 69
Dating of ocean sediments, 276
Devil's Hole, 139–146
Devil's Hole vs. SPECMAP, 140, 141, 143
Dome C, 36, 56, 67, 89, 91–93, 135
Dome Fuji, 67, 68, 89, 94, 104
Dust
 in ice cores, 116, 267, 299
 levels on ice sheets, 236, 281, 284, 296, 297, 305, 313, 326
 optical properties, 301, 303

- source of LGM dust, 30, 36–38, 115, 147, 280, 288, 304, 309
- Dye 3, 55, 85
- E**
- Earth climate, 39, 42, 142, 155, 168, 169, 179, 181, 182, 222, 264
- Earth Radiation Budget Experiment (ERBE), 174, 175, 177
- Earth's heat balance, 40, 260
- Earth's orbit, 22, 158, 159, 178, 186–191, 193, 196, 199, 223, 262, 278, 323
- Eccentricity, 155, 157, 186, 187, 189–197, 205, 220–222, 225, 241, 243–246, 264, 275
- Electro-Conductivity Measurements (ECM), 63–66, 70
- EPICA Dome C, 36, 76, 89, 93, 104
- European Project for Ice Coring in Antarctica (EPICA), 34, 56, 89, 92, 99, 104, 114, 135, 183, 245, 296
- F**
- Firm, 53–55, 77, 81, 104
- Flora, 14, 18, 25, 30, 31, 34, 48
- Foraminifera, 110, 120, 121, 123, 124, 132, 135, 140, 152, 153, 201
- Forams, 120–122, 129, 130
- Forests, 20, 21, 25, 27, 29–31, 98, 99, 149, 169, 289
- G**
- GISP2, 36, 37, 56, 60, 62, 63, 70, 71, 75, 77, 78, 84–88, 96, 146
- Glacial maximum, 11, 19, 20, 24, 25, 27, 30, 35, 61, 67, 76, 89, 105, 122, 124, 137, 151, 152, 173, 207, 213, 216, 217, 236, 276, 289, 302, 304, 312, 322
- Greenhouse gases, 39–41, 43–45, 54, 55, 57, 81, 99, 100, 112, 155, 157, 164, 168, 222, 320
- Greenland, 8, 10, 11, 22, 32–34, 36–38, 44, 49, 53, 55–60, 64, 69, 70, 72, 73, 75–77, 79, 83–85, 87–90, 95–101, 117, 127, 132, 144, 146, 148, 149, 159, 161–163, 167–169, 172, 173, 175, 176, 183, 184, 204, 263, 275, 278, 296–302, 304–308, 314–316, 322, 324, 325
- Greenland and Antarctica
comparison, 11, 37, 55, 69, 90, 95, 183, 297, 300, 315, 325
- Greenland ice core data, 172
- Greenland Ice Core Project (GRIP), 37, 38, 56, 65, 75, 77, 84, 85, 87, 88, 127, 149
- Greenland ice core sites, 172
- Greenland Ice Sheet Project (GISP), 56, 77
- Gulf stream, 165, 169, 170, 172, 173, 175, 184
- H**
- Heinrich events, 98, 99, 150, 168
- High-elevation ice cores, 101, 102
- Hockey stick, 142, 175
- Holocene, 24, 27, 28, 32, 33, 36, 37, 49, 60–62, 66, 70, 76, 78, 79, 99, 110, 137, 169, 175, 299, 300, 306, 307, 310
- Hothouse earth, 45, 320
- Humidity, 12, 28, 41, 146, 205
- I**
- Ice Age forests, 20
- Ice ages
change from 41kyr to 100 kyr spacing, 271
geological evidence, 1, 5, 9, 45, 187
history of discovery, 1, 66, 149, 206, 223
physical signs, 208
- Ice ball Earth, 45, 46, 48, 320
- Ice core chronology, 127, 263, 267
- Ice core data, 11, 34, 55, 57, 72, 83, 84, 89, 90, 92, 93, 96, 101, 132–134, 146, 225, 245, 246, 274, 285, 286, 314, 324
- Ice core dating, 57, 71
- Ice core layers, 63
- Ice core methodology, 51
- Ice cores, 9, 22, 30, 37, 38, 51, 53, 55–59, 61, 69, 71, 80, 81, 84, 88, 89, 98, 100, 101, 103, 104, 114, 116, 123, 128, 132, 141, 147, 163, 172, 201, 263, 274, 279, 290, 296, 297, 300, 306, 322
- Ice core temperature estimates, 69, 229, 325
- Ice field, 7, 14, 16, 17, 102, 152
- Ice flow modeling, 65, 67
- Ice fafted debris, 98, 136, 137, 180, 181
- Ice sheet margins, 306
- Ice sheets
description, 1, 5, 7, 13, 20, 46, 98, 148, 188, 209, 263, 310
extent of, 8
- Ice sheet volume, 132, 200, 202, 205, 206, 230, 231, 233, 288, 325
- Ice volume
models for, 228, 229
- Imbrie, John, 126
- Imbries' model for ice volume, 127, 128, 209, 212, 225, 228, 229, 246, 324, 325

- Interglacials, 22, 30, 39, 49, 105, 137, 147, 150, 183, 205, 218, 249, 255, 259, 261, 262, 265, 277, 289, 300, 305, 310, 313, 318
- Isotope ratio, 58, 71, 73, 76, 79, 123, 134, 135, 202, 322, 324
- Isotopes of hydrogen, 53
- Isotopes of oxygen, 54
- Isthmus of panama, 42, 321
- L**
- Lake sediments, 2, 19, 85, 148, 149
- Land area
distribution vs. latitude, 14, 34, 35, 321
- Landmasses, 19, 41, 43, 45, 83, 165, 204, 320
- Laschamp geomagnetic excursion, 59
- Laser Light Scattering (LLS), 62, 70
- Last Glacial Maximum (LGM), 8–11, 13, 14, 22, 25, 27–38, 62, 67, 79, 100, 101, 103, 104, 106, 109, 110, 112–118, 135, 136, 152, 214, 218, 261, 263, 276, 280, 285, 296–302, 304–307
- Little Ice Age (LIA), 137, 179, 218
- Loess, 16, 32–37, 147, 148, 300, 305
- Longitude of perihelion, 189–191, 195, 196, 241, 243, 244
- M**
- Magnetism in lake sediments, 148
- Magnetism in loess, 147
- Medieval Warm Period (MWP), 86, 137, 179
- Middle-Pleistocene Transition (MPT), 219, 222–226, 323, 324
- Milankovitch, 22, 126, 141, 185, 187, 188, 228, 233, 236, 257, 262, 263, 265, 266, 274, 275, 288, 305, 310, 313–316
- M&M, 86, 88, 123, 124, 126, 127, 129–131, 177–179, 186, 192, 228, 229, 237–239, 241, 243–247, 287, 288, 315, 323
- Mountain glaciers, 10, 18, 20, 40, 151
- N**
- Next ice age, 237
- NH vs. SH, 90, 136, 183, 263, 267, 271, 277, 323
- Non-polar ice caps, 101
- North Atlantic Deep Water (NADW), 100, 110, 166, 167, 184
- North Greenland Ice Core Project (NGRIP), 34, 56, 66, 99, 183, 297
- North-south synchrony, 90
- O**
- Obliquity, 126, 155, 157, 186, 187, 189–194, 196, 197, 205, 207, 219, 220, 222–224, 226, 241, 243–246, 264, 272, 275, 276, 310, 324
- Ocean-atmosphere model, 182
- Ocean currents, 41, 42, 96, 99, 136, 159, 165, 166, 174, 183, 188, 200, 278, 320
- Oceans
role of, 143, 166, 170, 176
- Ocean sediment data, 72, 90, 120, 132, 134, 135, 137, 141, 167, 170, 208, 213, 227, 230, 246, 322
- Ocean sediments
universality, 130
- Ocean sediments chronology, 126, 128, 131, 142, 145, 237, 274
- Orbital parameters, 157, 186, 194, 205, 221, 222, 322
- Orbital tuning, 58, 68, 69, 71, 89, 123, 125–128, 144, 230, 322
- Orbit of the earth, 188, 189, 192, 234
- P**
- Paillard's model
modified, 167, 207, 213
- Paillard's model for ice volume, 167, 213
- Planktic forams, 122
- Pollen records, 13, 98, 148, 150
- Precession, 126, 150, 155, 157, 159, 186, 187, 190–192, 194, 195, 197, 205, 207, 209, 211, 213–215, 217–219, 221, 223, 224, 226, 228, 230, 234–237, 242–246, 257, 258, 260–262, 264, 275, 278, 310, 324
- Precipitation, 7, 8, 12–14, 21, 28, 29, 32–34, 53–55, 57, 59, 63, 68, 74–77, 79, 80, 84, 101, 102, 106, 121, 124, 140, 141, 144, 146, 150, 152, 156, 159, 162, 168, 169, 180, 268, 274, 297, 302, 312, 313
- R**
- Red sea sediments, 152, 153
- Refuges, 19, 150
- S**
- Scandinavia, 49
- Sea ice, 19, 40, 47, 48, 99, 106, 108, 110–112, 124, 136, 137, 162, 165, 168–170, 184, 186, 188, 266, 275–277, 321, 322
- Sea level, 9, 13, 14, 19, 27, 28, 30, 34, 35, 53, 66, 80, 83, 84, 89, 108, 109, 123, 124,

- 132, 134, 151–153, 169, 218, 219, 233, 249, 259, 281, 282, 299
- Sea salt, 114, 116, 169, 266
- Sea surface temperatures, 111, 122, 135, 136, 143, 150, 276
- Sedimentation rate, 126, 129–131, 141
- Snowball earth, 45–48, 320
- Solar intensity
calculation of, 77, 125, 178
- Solar irradiance at higher latitudes, 196, 197
- Solar variability, 70, 180, 188, 196, 199–201, 204, 224, 227–229, 237, 246, 266, 323
- Southern hemisphere, 56, 111, 112, 183, 184, 189, 265, 275, 276
- South Pole
glaciation, 74
- SPECMAP, 72, 125, 130, 131, 140–142, 144, 210, 213, 229–231, 234, 235, 246, 287, 315, 325
- Spectral analysis
methodology, 142, 186, 187, 227, 237, 240, 241, 245, 322
- Spectral analysis of paleoclimatic data, 141, 186, 227, 244, 245
- Spectral analysis of solar data, 241
- Speleothem, 146
- Stack, 104, 123–127, 130, 132, 133, 141, 234, 235
- Stages
marine isotope, 131
- Standard Mean Ocean Water, 52, 123
- Sudden climate change, 98, 168, 170
- Sunspots, 158
- Sun (variability), 157, 158, 178, 186
- background, 22, 118, 121, 216, 222, 247, 281, 284
- correlation with dust data, 173
- dust as driver for terminations, 288
- model based on solar thresholds, 310
- models based on CO₂, 276
- models based on solar amplitudes, 158, 177, 183
- The next ice age, 237
- Thermohaline circulation, 100, 108, 155, 157, 165, 169, 184, 186
- Trapped gases, 59, 80
- Tropics, 12, 13, 18, 19, 25, 26, 31, 41, 43, 46, 121, 136, 151, 182, 188, 200, 299, 321
- Tuning, 58, 70, 72, 125–127, 131, 143, 146, 159, 173, 180, 200, 201, 204, 206, 213, 230, 234, 237, 244, 246
- V**
- Vegetation, 7, 11–16, 18, 22, 23, 28–31, 33, 34, 36, 40, 99, 149, 150, 152, 163, 171, 188, 221, 260, 298, 299
- Visual stratigraphy, 60, 62, 66, 70
- Volcanism, 43, 155, 157, 160
- Vostok data, 89, 143, 144, 244
- W**
- Wally Broecker (WB), 142, 169, 175
- Water vapor, 39–41, 45, 46, 48, 52, 54, 55, 76, 121, 123, 146, 159, 164, 165, 169, 170, 175, 183, 320, 321
- West Antarctica Ice Sheet divide (WAIS), 89
- Y**
- Younger dryas, 38, 61, 62, 86, 99, 168, 170, 171, 307
- T**
- Temperature vs. Isotope ratio, 37, 57, 74, 75, 120
- Termination of ice ages