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Climate Change in Alaska

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Signs of Climate Change

1. Cutler, Debbie. **Gunther Weller on global warming and Alaska.** *Alaska Business Monthly*, v. 17, no. 9, p. 10, September 2001. (4 pages)

   "All sectors of the Alaska economy will be affected in one way or another. It seems likely that the Alaska fisheries could be the biggest loser if the present climate trends continue and the predicted global warming will occur."

2. Sherwonit, Bill. **Alaskan meltdown: On the frontlines of climate change.** *National Parks*, v. 78, no. 3, p. 24, Summer 2004.

   "Spread across 32 ecoregions, Alaska's 54 million acres of national parklands are being affected by global warming in many ways, some of them obvious, others subtle. As wild landscapes change, plant communities, wildlife populations, and humans dependent on park resources must adapt or lose their niche in the ecosystem."

3. Alexander, Bryan. **Slipping into the sea: Last days of the arctic community Shishmaref.** *World & I*, v. 18, no. 12, p. 172, December 2003. (4 pages)

   "Storms in the Chukchi have battered the coast of Sarichef Island for centuries, but Alaska's mean temperatures have increased by 5 degrees in summer and 10 degrees in winter over the past 30 years. This warming is thawing the permafrost, which used to reinforce the ground on Sarichef's coastline."

4. Cochran, Patricia Longloy and Geiler, Alyson L. **The melting ice cellar.** *American Journal of Public Health*, v. 92, no. 9, p. 1404, September 2002. (6 pages)

   "As far back as the 1970s, Alaska Native communities reported changes we now know to be associated with global warming, such as changing weather patterns, thinning ice, diseased and deformed wildlife, and changes in the look and taste of such subsistence foods as fish and meat."

5. **On thin ice.** *Current Events*, v. 104, no. 14, p. 1, December 17, 2004. (3 pages)

   "Presented recently in Iceland's capital, the Arctic Climate Impact Assessment (ACIA) report states that rising temperatures are melting the polar ice cap at an alarming rate. At least half the summer sea ice in the Arctic is projected to have melted by the end of this century, along with a large portion of the Greenland ice sheet."

6. Rozell, Ned. **Giants in jeopardy.** *Alaska*, v. 70, no. 8, p. 48, October 2004. (8 pages)

   "One model shows the icepack becoming a small disc surrounding the North Pole by 2050 with about 250 miles of open ocean between northern Alaska and the nearest sea ice. That would probably spell doom for the bears even if they retreated with the ice – the water there is too deep to support seals and other high-calorie meals that polar bears require."

7. Yang, Mei-Sun. **Diet changes of Pacific cod (Gadus macrocephalus) in Pavlof Bay associated with climate changes in the Gulf of Alaska between 1980 and 1995.** *Fishery Bulletin*, v. 102, no. 2, p. 400, April 2004. (5 pages)

   "This study suggests that there were substantial differences between the diets of Pacific cod in Pavlof Bay between the early 1980s and 1995. In the 1980s, pandalid shrimp and capelin were the main food of Pacific cod, whereas benthic species (polychaetes, hermit crabs, and eelpouts) were the dominant food in 1995. This change was probably due to the climate shift from cold to warm in the Gulf of Alaska."

8. Wohlforth, Charles. **As the Arctic melts, an ancient culture faces ruin.** *National Wildlife*, v. 43, no. 3, p. 48, April/May 2005. (8 pages)

   "Since the mid-1970s, the floating Arctic ice pack has lost an area the size of Texas and Arizona combined. With a shorter season of sea ice, fall storms batter Alaska's Arctic coast as never before, causing erosion that threatens communities."

9. Wilmking, Martin. **Recent climate warming forces contrasting growth responses of white spruce at treeline in Alaska through temperature thresholds.** *Global Change Biology,* v. 10, no. 10, p. 1724, October 2004. (13 pages)

   "Recent climate warming has intensified the negative growth response of a large proportion of trees at locally productive sites near treeline in Alaska. Trees on less favourable sites may be benefiting from earlier thaw and are now outperforming productive sites, reversing the historical growth relationship."

10. Comiso, Josefino C. and Parkinson, Claire L. **Satellite-Observed Changes in the Arctic.** *Physics Today*, v. 57, no. 8, p. 38, August 2004. (7 pages)

    "The LANDSAT and ASTER data have confirmed a variety of changes in Arctic glaciers—with some growing, some decreasing, some oscillating, and some remaining fairly steady—although the net trend has been towards reduced glacial coverage. In Alaska alone, polar-orbiting satellites are monitoring 15,000 glaciers, most of which appear to be retreating."

11. Perkins, Sid. **Runaway Heat?** *Science News*, v. 168, no. 20, p. 312, November 12, 2005. (3 pages)

    "Among the effects that scientists have recorded in the Arctic are earlier snowmelt in the spring, the spread of shrubs into tundra areas once hospitable only for grasses, and the dwindling of sea ice coverage in the summer."

Historical Climate Change

12. Harris, Stuart A. **Thermal history of the Arctic Ocean environs adjacent to North America during the last 3.5 Ma and a possible mechanism for the cause of the cold events (major glaciations and permafrost events).** *Progress in Physical Geography*, v. 29, no. 2, p. 218, June 2005. (20 pages)

    "When the first worldwide (Patagonian) cold event occurred at 3.5 Ma (Million years ago), the Arctic Ocean was still open water, and evidence of permafrost is limited to Dawson City, Yukon Territory. Boreal forest was present around the Bering Strait and all along the coasts."

13. Carlson, Lisa J. and Finney, Bruce P. **A 13,000 history of vegetation and environmental change at Jan Lake, east-central Alaska.** *Holocene*, v. 14, no. 6, p. 818, November 2004. (10 pages)

    Article summarizes 13,000 years of climate change in near Jan Lake by analyzing pollen, stomates and macrofossils.

14. Hu, Feng Sheng, et al. **Cyclic variation and solar forcing of Holocene climate in the Alaskan subarctic.** *Science*, v. 301, no. 5641, p. 1890, September 26, 2003. (4 pages)

    "Our data offer support for the notion that Holocene climatic change occurred in a cyclic fashion at frequencies longer than those detectable by instrumental records."

15. Johannessen, Ola M. **Arctic climate change: observed and modeled temperature and sea-ice variability.** *Tellus*, Series A, v. 56, no. 4, p. 328, p. 328, August 2004. (14 pages + errata)

    "First, we theorize that the Arctic warming in the 1920s-1930s and the subsequent cooling until about 1970 are due to natural fluctuations internal to the climate system. Secondly, we believe there are strong indications that neither the warming trend nor the decrease of ice extent and volume over the last two decades can be explained by natural processes alone."

16. Bengtsson, Lennart; Semenov, Vladimir A., Johannessen, Ola M. **The early twentieth-century warming in the Arctic—A possible mechanism.** *Journal of Climate*, v. 17, no. 20, p. 4045, October 2004. (13 pages)

    "Here we have shown that this warming was associated with and presumably initiated by a major increase in the westerly to southwesterly wind north of Norway leading to enhanced atmospheric and ocean heat transport from the comparatively warm North Atlantic Current through the passage between northern Norway and Spitsbergen into the Barents Sea."

Baseline Studies and Directions for Future Research

17. Lenart, Elizabeth A., et al. **Climate change and caribou: effects of summer weather on forage.** *Canadian Journal of Zoology*, v. 80, no. 4, p. 664, April 2002. (15 pages)

    "Indeed, Bowyer et al (1998) argued that climate change would likely affect populations of arctic ungulates long before it brought about changes in the composition of plant communities. Our data support that contention and suggest that more research on the relationship between climate change and population dynamics of large mammals is needed."

18. Frohn, Robert C.; Hinkel, Kenneth M. and Eisner, Wendy R. **Satellite remote sensing classification of thaw lakes and drained thaw lake basins on the North Slope of Alaska.** *Remote Sensing of the Environment*, v. 97, no. 1, p. 116, July 2005. (11 pages)

    "To date, field sampling to assess soil carbon stocks have been confined to the Barrow Peninsula. Future studies will focus on lake and DTLB development with respect to different physiographic regions on the North Slope of Alaska. The methodology in this study could also be applied to other areas with thaw lakes such as Northern Canada and Western Siberia."

19. Wang, Xuanji and Key, Jeffrey R. **Arctic surface, cloud and radiation properties based on the AVHRR Polar Pathfinder dataset. Part I: Spatial and temporal characteristics.** *Journal of Climate*, v. 18, no. 14, p. 2558, July 2005. (17 pages)

    "The purpose of this paper is to draw a more complete picture of Arctic climate by describing the temporal and spatial distributions of the climate components. First- and second-order statistics will be given for the surface, cloud, and radiation properties for the Arctic as a whole and for 18 subregions, by season and in the annual mean."

20. Wang, Xuanji and Key, Jeffrey R. **Arctic surface, cloud and radiation properties based on the AVHRR Polar Pathfinder dataset. Part II: Recent Trends.** *Journal of Climate*, v. 18, no. 14, p. 2575, July 2005. (19 pages)

    "In this paper, we present recent Arctic climate trends in surface, cloud, and radiation properties over the period 1982-99 based on the Advanced Very High Resolution Radiometer (AVHRR Polar Pathfinder (APP) dataset. Possible linkages with global climate change are investigated."

21. Kaeriyama, M., et al. **Change in feeding ecology and trophic dynamics of Pacific salmon (Oncorhynchus spp.) in the central Gulf of Alaska in relation to climate events.** *Fisheries Oceanography*, v. 13, no. 3, p. 197, May 2004 (11 pages).

    "Future monitoring of the ocean feeding ecology of Pacific salmon could help us better understand inter- and intra-specific interactions that occur in this region, and how climate change affects those interactions."

22. Stow, Douglas A., et al. **Remote sensing of vegetation and land-cover change in Arctic tundra ecosystems.** *Remote Sensing of the Environment*, v. 89, no. 3, p. 281, February 2004. (28 pages)

    "The objective of this paper is to synthesize results of research conducted over the past decade on the application of multi-temporal remote sensing for monitoring changes Arctic tundra lands."

23. Stow, Douglas A., et al. **Variability of the Seasonally Integrated Normalized Difference Vegetation Index [SINDVI] across the North Slope of Alaska in the 1990s.** *International Journal of Remote Sensing*, v. 24, no. 6, p. 1111, March 10, 2003. (7 pages)

    "The objective of this letter is to present initial results from a study of a SINDVI time series derived from AVHRR local area coverage (LAC) imagery captured between 1990-1999. The goal is examine greenness trends across the North Slope of Alaska, at a finer spatial resolution than has been achieved with previous studies based on AVHRR GAC datasets."

24. Rupp, T. S., et. al. **Modeling the impact of black spruce on the fire regime of Alaskan boreal forest.** *Climatic Change*, v. 55, no. ½, p. 13, October 2002. (21 pages)

    "The uncertainty of future disturbance rates in the boreal forest and their effects on energy partitioning and carbon exchange demand ecological models that accurately portray transient ecosystem dynamics."

25. Welker, J.M., et al. **Leaf mineral nutrition of Arctic plants in response to warming and deeper snow in northern Alaska.** *Oikos*, v. 109, no. 1, p. 167, April 2005. (11 pages)

    "Consequently, accurate depiction and projections of how Arctic tundra plants and ecosystems will respond to global warming require measurements of leaf mineral nutrition under independent and combined climate change scenarios involving both winter and summer conditions."

Suggested Internet Resources (Accessed December 16, 2005)

Barrow Arctic Science Consortium (BASC)

<http://www.sfos.uaf.edu/basc>

Home page for facility that provides logistical support for Arctic research and facilitates the exchange between scientific researchers and the people of the North Slope. Site provides summaries of current Arctic research.

Public Congressional Research Reports on Global Climate Change (2003 – present)

<http://digital.library.unt.edu/govdocs/crs/search.tkl?q=climate+change&search_crit=title&search=Search&date1=2003&date2=2006&type=form OR http://tinyurl.com/cabpj>

Set of 31 Congressional Research Service reports on climate change that have been released since 2003. Most reports consider global issues.

Science.gov Climate Change Page

<http://www.science.gov/browse/w_123E.htm>

List of federal resources addressing the topic of climate change.

Arctic Climate Impact Assessment (ACIA)

<http://www.acia.uaf.edu>

Reports and background materials for the ACIA project, which attempts to evaluate and synthesize knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences.

Center for Global Change & Arctic System Research

<http://www.cgc.uaf.edu>

"The Center for Global Change and Arctic System Research was established in March 1990 to serve as the focal point at the University of Alaska Fairbanks for developing, coordinating and implementing interdisciplinary research and education related to the role of the Arctic and sub-Arctic in the Earth system, and to stimulate and facilitate global change research in this region."

Climate Change Project Jukebox Home Page

<http://uaf-db.uaf.edu/Jukebox/ClimateChange/home.html>

Oral history project featuring Alaska Native elders and scientists speaking about the climate and environmental changes they have observed over the years. Project was developed as a collaborative effort between the Oral History Program and the "Observing Locally, Connecting Globally" (OLCG) teacher education project (http://www.uaf.edu/olcg).

World Climate Report

<http://www.worldclimatereport.com>

Blog (Web Log) on current climate change issues written by Dr. Patrick J. Michael, the Virginia State Climatologist. This site presents alternative views on climate change.

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