DOWNLOAD PDF HOLOCENE CLIMATE AND SOCIETY : CIVILIZATION AND CLIMATE REVISITED

Chapter 1 : Chapter 03 - The Earth as Humanity's Home | CourseNotes

Social responses to climate change are the result of human perceptions of nature and their environment. From the Terminal Pleistocene through to the Late Holocene, Rosen describes various communities' responses to climate change, further exploring the intriguing connections between climate and society.

For once â€" rarely for a climate change story â€" the mainstream media was right to focus attention on this paper. They extend the discussion of global warming beyond the usual narrow focus on greenhouse emissions, incorporating the complex cycles and feedbacks that shape the entire Earth System. Other Earth System processes are played down or omitted entirely. As the Earth warms, positive amplifying feedbacks are becoming stronger: Individual tipping elements are color-coded according to estimated temperature thresholds. Arrows show potential interactions. PNAS Figure 1, above, shows potential tipping cascades identified in this paper. The authors do not say that Hothouse Earth is inevitable, or that any of these tipping points and cascades are certain to happen at any particular time or speed: A simplified representation of complex Earth System dynamics. The Holocene is behind us, and there is little chance of turning back. Indeed, it will take centuries for the full impact of some large-scale Earth System processes to be fully felt. Their concern is that once Earth is committed to the hothouse trajectory, it will be irreversible, and the point of no return may be passed soon. In addressing the fourth question â€" what can be done to stabilize the Earth System? These Earth System scientists have clearly concluded only system change can stop climate change. Earth System Science and an ecosocialist program would be a powerful combination! Its weaknesses should not distract us from recognizing it as an important contribution that should inform all serious efforts to understand and respond to the global crisis. By firmly placing climate change in the context of the Anthropocene and Earth System Science, it breaks from the dominant view that global warming is a linear process that can be solved by market reforms. Cornell, Michel Crucifix, Jonathan F. Donges, Ingo Fetzer, Steven J. Published ahead of print, August 6, Unfortunately it was buried in a page document that the media ignored and the Trump administration did not publicize.

DOWNLOAD PDF HOLOCENE CLIMATE AND SOCIETY : CIVILIZATION AND CLIMATE REVISITED

Chapter 2 : â€˜Back to the Holoceneâ€™: Landmark UN Climate Change Report a Call to Action - Sputnik

Holocene climate and society: civilization and climate revisited --Tools for understanding paleoenvironments in the southern levant: principles of climatic reconstruction in the near east --Land and history: introduction to the modern landscape and historical framework --Paleoenvironments of the near east: the retreat of the pleistocene.

Bring fact-checked results to the top of your browser search. Holocene environment and biota In formerly glaciated regions, the Holocene has been a time for the reinstitution of ordinary processes of subaerial erosion and progressive reoccupation by a flora and fauna. The latter expanded rapidly into what was an ecological vacuum, although with a very restricted range of organisms, because the climates were initially cold and the soil was still immature. Floral change The most important biological means of establishing Holocene climate involves palynology , the study of pollen , spores , and other microscopic organic particles. Pollen from trees, shrubs, or grasses is generated annually in large quantities and often is well preserved in fine-grained lake, swamp, or marine sediments. Statistical correlations of modern and fossil assemblages provide a basis for estimating the approximate makeup of the local or regional vegetation through time. Even a crude subdivision into arboreal pollen AP and nonarboreal pollen NAP reflects the former types of climate. The tundra vegetation of the last glacial epoch, for example, provides predominantly NAP, and the transition to forest vegetation shows the climatic amelioration that heralded the beginning of the Holocene. Lennart von Post, in combination with a theory of Holocene climate changes. The so-called Blyttâ€”Sernander system was soon tied to the archaeology and to the varve chronology of Gerard De Geer. It has been closely checked by radiocarbon dating , establishing a very useful standard. Every region has its own standard pollen stratigraphy, but these are now correlated approximately with the Blyttâ€”Sernander framework. To some extent this is even true for remote areas such as Patagonia and East Africa. Particularly important is the fact that the middle Holocene was appreciably warmer than today. In Europe this phase has been called the Climatic Optimum zones Boreal to Atlantic , and in North America it has been called the hypsithermal also altithermal and xerothermic. Like pollen, macrobotanical remains by themselves do not establish chronologies. Absolute dating of these remains does, however, provide a chronology of floral changes throughout the Holocene. Recent discoveries of the dung deposits of Pleistocene animals in dry caves and alcoves on the Colorado Plateau , including those of mammoth , bison, horse, sloth, extinct forms of mountain goats, and shrub oxen, have provided floristic assemblages from which temperature and moisture requirements for such assemblages can be deduced in order to develop paleoenvironmental reconstructions tied to an absolute chronology. Macrobotanical remains found in the digestive tracts of late Pleistocene animals frozen in the permafrost regions of Siberia and Alaska also have made it possible to build paleoenvironmental reconstructions tied to absolute chronologies. Cold-tolerant, water-loving plants e. Detailed studies of late Pleistocene and Holocene alluvium, tied to carbon chronology, have provided evidence of cyclic fluctuations in the aggradation and degradation of Holocene drainage systems. Although it is still too early in the analysis to state with certainty, it appears from the work of several investigators that there is a regional, or semicontinental cycle, of erosion and deposition that occurs every â€”, â€”, 1,â€”1,, and possibly 6, years within the Holocene. Faunal change According to an analysis of multiple carbon-dated sites conducted in by James I. Mead and David J. Meltzer, 75 percent of the larger animals those of more than 40 kilograms live weight that became extinct during the late Pleistocene did so by about 10, to 10, years ago. Whether the cause of this decimation of Pleistocene fauna was climatic or cultural has been debated ever since another American investigator, Paul S. Martin, proposed the overkill hypothesis in the s. Since then, other hypotheses for the late Pleistocene extinctions, such as those involving climatic changes or disease outbreaks, have emerged. Whatever the case, most geologists and paleontologists designate the beginning of a new epochâ€”the Holoceneâ€”at approximately 11, years ago, a time coincident with the sudden ending of the Younger Dryas cool phase. Floral and faunal reconstructions tied to the physical evidence of fluvial, alluvial, and lacustrine sediments and to a radiocarbon

chronology reflect a warming and drying trend as contrasted with the Pleistocene during the last 10, years. Nonmarine Holocene sediments are usually discontinuous, making exact correlations difficult. An absolute chronology provided by radiocarbon dating permits temporal correlation, even if the deposits are discontinuous or physically different. Analysis of Holocene deposits requires chronostratigraphic correlations of discontinuous and dissimilar deposits to allow an interpretation of local, regional, continental, and global conditions. Analysis of microfauna from paleontological and archaeological sites of the late Pleistocene and Holocene of North America has aided in paleoenvironmental reconstructions. Micromammals rodents and insectivores , as well as amphibians and insects, are paleoecologically sensitive. Comparisons of modern habitat and range of species to late Pleistocene and Holocene assemblages and distributions reveal disharmonious associations i. Tentative conclusions from micromammals and other environmental indicators suggest that the late Pleistocene supported an environment in which there coexisted plants and animals that are today separated by hundreds to thousands of kilometres or considerable elevation differences. Stated in another way, the late Pleistocene climate was more equable than that of the present day, one in which seasonal extremes in temperature and effective moisture were reduced. The evolution of a modern biotic community , as opposed to one of the late Pleistocene, appears to be the consequence of intricate biological and biophysical interactions among individual species. Some researchers have theorized that the environmental changes that led to the formation of new biotic communities at the end of the Pleistocene resulted in the extinction of many of the Pleistocene faunal forms. Holocene climatic trends and chronology In the mid-latitudes and the tropics, the end of the last glacial period was marked by a tremendous increase in rainfall. The increased precipitation toward the end of the Pleistocene was marked by a vast proliferation of pluvial lakes in the Great Basin of western North America , notably Lake Bonneville and Lake Lahontan enormous ancestors of present-day Great Salt Lake and Pyramid Lake. Lake Victoria in East Africa exhibits the identical twin oscillation in its terrace levels. In equatorial regions the same evidence of high solar radiation and high rainfall at the end of the Pleistocene and during the early Holocene is apparent in the record of the Nile sediments. An erroneous correlation between glacial phases and pluvial phases in the tropics has been widely accepted in the past, although cold ocean water means less precipitation, not more. The pluvial phases correspond to the high solar radiation states, the last maximum being about 10, years ago. Thus tremendous increases of Nile discharge are determined, by radiocarbon dating, to have occurred about 12, and 9, years ago, separated and followed by alluviation, indicating reduced runoff in the headwaters. The expansion of monsoonal rains during the early Holocene in the tropical latitudes permitted an extensive spread of moist savanna-type vegetation over the Sahara in North Africa and the Kalahari in South Africa and in broad areas of Brazil, India, and Australia. Most of these areas had been dry savanna or arid during the last glacial period. Signs of late Paleolithic and Neolithic people can be seen throughout the Sahara today, and art is representative of the life and hunting scenes of the time. Lake deposits have been dated as young as â€” bp. Lake Chad covered a vast area in the very late Pleistocene and up to bp. The Dead Sea throughout the early Holocene shows a record of sedimentation from humid headwaters; there was a Neolithic settlement at Jericho about â€”10, bp. In the high to mid-latitudes after the early Holocene, with its remnants of ice-age conditions tundra passing to birch forests , there was a transition to the mid-Holocene, marked by a progressive change to pine forest and then oak, beech, or mixed forest. The mean annual temperature reached 2. Neolithic humans pressed forward across Europe and Asia. Navigators started using the seaways to trade between the eastern Mediterranean, the British Isles , and the Baltic. In the mid-latitude continental interiors there was still evidence of hot summers, but the winters were becoming colder and partly drier. There was an expansion of steppe or prairie conditions and their associated fauna and flora. Many lake levels showed a fall. In Europe there was also the beginning of widespread deforestation as Bronze Age human communities started to use charcoal for smelting and extended agriculture to tilling and planting. In the subtropical regions of Mesopotamia and the Nile valley, people had learned to harness water. The stationary settlements, advanced agriculture, and mild climates favoured a great flowering of human culture. It is surmised that, when the normal floods began to fail, human ingenuity rose to

the occasion, as attested to by the development of irrigation canals and machinery. The Sub-Atlantic stage â€”0 bp is the last major physical division of the geologic record. The record of solar activity is disclosed by documentation of auroras in ancient Chinese court records and later by sunspot numbers. Both phenomena reflect solar activity in general, but correlation with weather records in the higher latitudes is complicated. Other indicators of climate, such as tree-ring analysis and palynology, were previously mentioned, but many documentary indications are also useful: The water levels of closed basins such as the Caspian Sea and particularly the evaporite basin of the Kara-Bogaz-Gol Gulf reflect runoff to the Volga. The Dead Sea bears witness to eastern Mediterranean precipitation. The main trends of the Sub-Atlantic are identifiable as follows: Classical Roman Period This time interval is marked by the Florida or Roman emergence in the eustatic record about the bceâ€”ce boundary and succeeded by a transgression. The solar record is not complete, but indications are for low activity. Records of rainfall kept by the astronomer Ptolemy fl. In northern Europe and in other high latitudes, in contrast, the cool stage at the beginning of the 1st century ce may have been drier and more continental, as evidenced by dune building. Late Roman Period After the 1st century ce there is evidence of a progressive rise in sea level. Roman buildings and peat layers were covered by the marine transgression in the Netherlands , southern England , and parts of the Mediterranean. At the same time, drying and warming trends were associated with alluviation of streams and general desiccation in southern Europe and North Africa. Similar alluviation occurred in the American Southwest. This warming and desiccation trend is evident also in the subtropics of the Southern Hemisphere. The solar activity record indicates a mean intensity comparable to that of the midth century. Post-Roman and Carolingian Period This period extends roughly from to ce. The important invasions of western Europe by the Huns and the Goths may have been generated by deteriorating climatic conditions in central Asia. Radiocarbon dating and studies of the ancient Chinese literature have disclosed that, when the glaciers of central Asia were large, the meltwaters fed springs, rivers, and lakes on the edge of the desert, and human communities flourished. When there was a warm phase, the water supply failed and the deserts encroached. Marco Polo passed this way in Radiocarbon dates of the 8. There were marginal retreats in almost all the mountain glacier regions of the world from the Alps to Patagonia. In the tropical region of Central America there was the unexplained decline of the coastal Mayan people Mexico and Guatemala about the 10th century. The mountain Mayas continued to flourish, however, and it is possible that the high precipitation of this warming period introduced critical ecological limits to continued occupation of the now swampy coastal jungles. During the 8th to 10th centuries the Vikings had extended as far afield as the Crimean Peninsula and exploited coastal salt pans, the existence of which speak for seasonally high evaporation conditions and eustatic stability. In the Arctic regions during the 10th, 11th, and 12th centuries there was widespread navigation by the Vikings. Partly in response to reduced sea-ice conditions and milder climates they were able to establish settlements in Iceland , southern Greenland Erik the Red, c. Eskimos had settled in Ellesmere Island about Records of sea ice off Iceland show negligible severity from to Often the westerly storm tracks must have passed north of Europe altogether. After a brief interval of cold winters in Japan, the cherry blossoms returned to early blooming in the 12th century. In the semiarid southwestern United States there appears to have been increased precipitation, leading to a spread of vegetation and agriculture. Pueblo campsites dated â€” are found on top of the youngest Tsegi Alluvium.

Chapter 3 : Climate Change in the Anthropocene: An Unstoppable Drive to Hothouse Earth? - Resilience

More generally, Adger et al. have pointed out that society's response to global climate change is mediated by culture, and they showed that climate change threatens cultural dimensions of lives and livelihoods that include the material and lived aspects of culture, identity, community cohesion, and sense of place. Equally important, they found.

The Last 10, Years Near the beginning of the current interglacial , global temperatures rose considerably about 10, years ago to usher in a period of time referred to as the Holocene. On the basis of temperature reconstructions derived from studies of latitudinal displacements of terrestrial vegetation Bernabo and Webb, ; Wijmstra, ; Davis et al. A graphical representation of the mean global air temperature that results from the amalgamation of these several records, as prepared by the Intergovernmental Panel on Climate Change Houghton et al. In addition to exhibiting temperatures that were significantly warmer than those of today, the first half of the Holocene also produced several regions of significantly enhanced precipitation. The hyper-arid core of the Sahara, for example, was actually moist at this time and contained many lakes Fabre and Petit-Marie, ; Petit-Marie, , as the summer monsoon migrated northward by some kilometers Ritchie and Haynes, , helping to create the extensive groundwater deposits of that region van Zinderen Bakker and Coetzee, and giving life to ecosystems that supported crocodiles, giraffes, elephants and gazelles Crowley and North, Increased monsoon moisture also extended across Saudi Arabia, Mesopotamia, and the Rajastan Desert of India Bryson and Swain, , drastically altering and enhancing the productivity of those lands as well. Indeed, because of the perception that these many biospheric changes were of a positive nature, this much warmer period than the present is often referred to as the Holocene Climatic Optimum MacCracken et al. And it was during this particular warm interval that the world experienced perhaps the greatest of all anthropogenic advancements - "the rise of human civilization, based on the development of agriculture Whyte, Holocene climatic change in the northern Midwest: Changing patterns in the Holocene pollen record of northeastern North America: Holocene variation of monsoonal rainfall in Rajasthan. Evidence for an early Holocene climatic optimum in the Antarctic deep ice-core record. Climatic changes of the last 18, years: Observations and model simulations. Holocene climate of New England. Palaeogeography, Palaeoclimatology, Palaeoecology The Equatorial Glaciers of New Guinea. July temperatures in Europe from pollen data years before present. Holocene timberline fluctuations in Jasper National Park, Alberta. Detection of Holocene lakes in the Sahara using satellite remote sensing. Climatic optimum during the Holocene and the distribution of warm-water mollusks in the Sea of Japan. Prospects for Future Climate: Lewis Publishers, Chelsea, MI. Geological Society of America Bulletin Glacial concentration during the middle Holocene in the western Italian Alps: Evidence from north-west Canada for an early Holocene Milankovitch thermal maximum. Holocene vegetation zonation in the eastern Sahara. Temperature variation of the "Kuroshio" and crustal movements in eastern and southeastern Asia years B. Palaeoecology of Africa, v. Balkema, Rotterdam, The Netherlands. Climatic zonality of the northern hemisphere 5 or 6 thousand years B. Holocene palynology and climate. Paleoclimate Analysis and Modeling. Climatic change in eastern North America during the past 18, years: Comparisons of pollen data with model results. The Geology of North America, v. Climatic Change and Human Society. Paleobotany and climatic change.

Chapter 4 : Why Did Civilization Rise in the Holocene and Not the Eemian Epoch? | Sf-Fandom's History B

The Holocene has been a good time for human civilization to emerge and thrive. The seasons have been pretty regular, moving between relatively mild boundaries of hot-ish and cold-ish.

Scientists have been arguing for over a decade about the validity of comparing climate changes in the current geological period the Holocene-Anthropocene epochs with climate changes in the Eemian epoch, which lasted from about , years ago to about , years ago. These comparative models are used to predict where current global warming trends may lead. Global Warming is A Natural Phenomenon Geologically speaking, global warming and climate change are nothing new. In fact, climate change is a self-sustaining dynamic; each change in the climate contributes to the next change in the climate. We know that climate change is occurring all the time, and we have known this for over years. The political debate over climate change has more to do with how much mankind is influencing the climate through industrial and technological activity. Political recognition of human influence on the climate change process entails accepting responsibility for making changes in how humans interact with the environment. In the United States political conservatives barely recognize that air pollution is a problem. They are reluctant to admit that rising ocean levels and changing weather patterns are being driven by the melting of polar and glacier ice. These changes are affecting everything from the jet stream to where rain clouds form. The warming climate will grow warmer even if mankind stops burning fossil fuels, cutting down forests, and sucking fresh water out of river systems. We cannot halt the process but we do appear to be accelerating it. But enough about politics and the climate. All we need to understand for this discussion is that mankind has done something in the Holocene-Anthropocene interglacial that we did not do in the Eemian: We know that our ancestors were using sophisticated stone tools, traveling great distances, even crossing water, and exchanging valuable goods with each other as much as , years ago. But nowhere during the 15, years of the Eemian interglacial period did agriculture or animal husbandry arise. For example, people had to learn how to construct durable shelters and how to manage natural resources in an area. Our understanding of how much of these things humans living during the Eemian period possessed is limited by our ability to find traces of their lives in the dirt. And in the past decade or two we have supplemented our archaeological knowledge with DNA analysis of both human and non-human species. All of the data we have collected so far points to civilization arising only after the Earth began warming again nearly 12, years ago. So far we have found no evidence of large, long-term communities from the Eemian period. It would be a remarkable discovery, and one that opens science to a whole new world of exploration, if we could find even one permanent village from , years ago. But scientists are not holding out much hope for such a discovery. The record so far lacks any trace of a pre-Holocene civilization. But Human Advances Began Earlier Than Previously Believed One of the great mysteries of science is when our ancestors first domesticated dogs, and why. Up until recently the domestication of dogs was believed to have occurred within the Holocene itself, and that it may have contributed to the rise of Neolithic cultures the precursors of the earliest civilizations. Neolithic cultures marked the onset of permanent and semi-permanent habitations. They coincided with the introduction of agriculture and animal husbandry, or so we have thought until now. One recent DNA study suggests that dogs separated from wolves somewhere between 27, to 40, years ago. That pushes dog domestication back into the Pleistocene, indeed into the last glacial period known as the Wisconsinan, Weichselian, Devensian, Llanquihue, or Otiran glacial period. That glacial period lasted from about , years ago to about 12, years ago. In other words, we traded 15, years of warm climate for , years of cold climate. If we assume that dog domestication occurred around 40, years ago that would be about 30, years after the Toba Event, a massive supervolcanic eruption that made the Earth even colder and which almost led to the extinction of the human race and many other species. In addition to domesticating dogs, modern humans reached Europe around 45, years ago. Neanderthals vanished from Europe over the next 10, years. Denisovans, another human species about as closely related to us as the Neanderthals, also vanished from Asia

in the same time period. Did dogs give our ancestors an advantage over Neanderthals and Denisovans? But we can also be sure that our ancestors interbred with the other humans on Earth; we have inherited some of their DNA. But something else happened prior to 12, years ago. Humans in the Middle East began domesticating plants around 23, years ago. This recent discovery is forcing us to change how we think civilization began, because in order to domesticate plants people have to claim territory; they have to hold it in a way that wandering hunter-gatherers do not. This is not a farming village. It is more like a semi-permanent encampment with gardens. Designated the Ohalo II People, these hunter-gatherers also sustained themselves on fish in their sedentary lifestyle. This early clan raised plants, including cereals like wild emmer, barley, and oats. And this camp was not the birthplace of cultivation. Other sites may be discovered in the years to come. Gobekli Tepe is the oldest known human town , but we know that human culture evolved over many thousands of years. The founders of Gobekli Tepe brought skills and knowledge with them, just as the clan who built the camp by the Sea of Galilee brought skills and knowledge with them. Gobekli Tepe is not a city but it is more than the mere temple that some people have made it out to be. The people who used these sites for whatever purposes in fact lived near them in dwellings that have been at least documented if not fully excavated. Whatever the purpose of ancient sites like Gobekli Tepe, they were built and used by people who had to eat and sleep and who dwelt within walking distance of the sites. The houses are usually buried outside the great structures but still close by. The existence of Gobekli Tepe, dating from almost the very edge of the Holocene-Pleistocene boundary, tells us that modern humans had been building in stone for quite some time, possibly thousands of years, by the time they cut the first bedrock at Gobekli Tepe. Although not as structurally sophisticated as architecture that was built thousands of years later, Gobekli Tepe does not represent a first generation project. It was planned and built with skill and tools. What we know so far is that the period from 23, to 12, years ago was a time of great transitions. Modern humans migrated across Asia into North America. The glaciers began to melt and sea levels rose. The ancestors of modern Berbers migrated to what is now Tunisia around 20, years ago. Within a few thousand years one last cold phase brought the glacial period to an end and true warming began. It is doubtful that mammoths ever comprised a substantial part of the modern human diet in areas that gave rise to agriculture and domestication of animals. The theory that dogs may have been bred by mammoth hunters in Asia who captured wolf pups is intriguing but requires more study. We think humans were hunting mammoths as much as 1 million years ago, so why would they start sharing the hunt with wolves around 30, years ago? Something changed significantly enough to compel modern humans to form relationships with dogs, to begin the systematic cultivation of plants, and to learn how to build large permanent settlements. It may be that our theories of human expansion from southeast Africa after the Toba Event around 70, years ago explain what happened: As few as ten thousand modern humans survived the cooling after the Toba Event, almost certainly because they lived in Africa. But how many Neanderthals and Denisovans survived? For more than years scientists believed that Neanderthals had evolved to survive in cold climates, but that makes little sense given the immense time scale of their history. Recent research also suggests that many of the features once believed to indicate cold climate adaptation have no such significance. In other words, Neanderthals and likely Denisovans were probably no better adapted to the cold climate than we are. So if the Toba Event triggered a decline among all large mammal species we can look for signs that modern humans collaborated better with other species than other humans. Neanderthals and Denisovans may have survived longer thanks to modern humans and dogs, not in spite of them. Cultural experimentation could be a direct result of surviving the Toba Event. Maybe modern humans had to develop an entirely new way of working together because pre-Toba food sources began vanishing. Modern humans began leaving Africa around 60, years ago. Instead of competing for dwindling resources families may have undertaken the decision to go look for new resources. The families that stayed behind eventually learned new survival skills. However, if there were other humans already present in newly discovered lands then learning how Neanderthals and Denisovans survived would have given the wandering Homo sapiens an advantage. And yet at some point whatever they could do for themselves, whatever they gained by cooperating with dogs

and perhaps other humans groups was not enough. Modern humans began experimenting with the cultivation of plants. They may also have begun experimenting with animals in ways we have yet to determine. There is, in fact, a very recent example that illustrates how our ideas about domestication can be completely wrong. For generations scientists and teachers have taught us that horses were first domesticated about 5, years ago. Now new research shows that horses were domesticated on the Arabian peninsula about 9, years ago. Ruling Out the Eemian Paradox But if we can attribute the development of these new food and sheltering skills to climate change, why did they happen after the Eemian and not during or before? New research suggests that the Eemian epoch did not proceed as smoothly as the Holocene in terms of warming the Earth. The climactic differences may have been enough to preserve the food chain across the ecosystem in a status quo that did not demand significant change. In other words, climactic changes prior to the Toba Event may have been gradual enough that the ecosystem was able to adapt without substantial loss of species. But after the Toba Event things become less certain. In fact, new data suggests that the Arctic regions cooled more than previously believed over the past few thousand years, and that as the Earth warms up current climate models may underestimate just how much warmer things will get. What we see over the last 70, years is a pattern of climactic shock. The anomalous three Dryas periods that interrupted the gradual warming of the Earth which began around 22, years ago are perfect examples of climactic shock. The three cool Dryas periods occurred from about 18, years ago to about 11, years ago ranging over 6, years. Another climactic shock designated the 8. And very recent research now suggests that the area of northwest Iran was dry prior to 9, years ago and after 6, years ago, allowing for a 3,year wet-and-warm period. The frequent and rapid fluctuations in global climate that began around 22, years ago are not replicated in our Eemian data. This is not conclusive proof that the Eemian did not experience similar climactic shocks but we already have data to show that the Eemian period did not proceed in the same way the Holocene did. Furthermore a recent study in the application of Dynamic Systems Theory to the archaeological record of where and how early agriculture and domestication occurred suggests that sudden changes in resource availability may have contributed to the rise of civilizations around the world.

Chapter 5 : NPR Choice page

Paleoclimatologists have discovered abundant evidence that droughts coincided with collapse of the Lowland Classic Maya civilization, and some argue that climate change contributed to societal disintegration.

Global effects[edit] Temperature variations during the Holocene from a collection of different reconstructions and their average. The most recent period is on the right, but the recent warming is not shown on the graph. At 16 sites, where quantitative estimates have been obtained, local HTM temperatures were on average 1. Northwestern North America had peak warmth first, from 11, to 9, years ago, and the Laurentide ice sheet still chilled the continent. Northeastern North America experienced peak warming 4, years later. The " Green Sahara " was dotted with numerous lakes, containing typical African lake crocodile and hippopotamus fauna. A curious discovery from the marine sediments is that the transitions into and out of the wet period occurred within decades, not the previously-thought extended periods. This introduction contributed to the rapid transition to the arid conditions found in many locations in the Sahara. However, some authors have used the term "Holocene Climatic Optimum" to describe the earlier southern warm period, as well. Comparison of ice cores[edit] A comparison of the delta profiles at Byrd Station , West Antarctica m ice core recovered, and Camp Century , Northwest Greenland, shows the post glacial climatic optimum. A similar comparison is evident between the Dye 3 and Camp Century cores regarding this period. The ice core contained distinct melt layers all the way to bedrock indicating that Hans Tausen Iskappe contains no ice from the last glaciation; i. The Renland ice core is m long. The calculated Milankovitch Forcing would have provided 0. There seems to have been the predicted southward shift in the global band of thunderstorms, the Intertropical Convergence Zone. However, orbital forcing would predict maximum climate response several thousand years earlier than those observed in the Northern Hemisphere. The delay may be a result of the continuing changes in climate as the Earth emerged from the last glacial period and related to ice-albedo feedback. It should also be noted that different sites often show climate changes at somewhat different times and lasting for different durations. At some locations, climate changes may have begun as early as 11, years ago or persisted until 4, years ago. As noted above, the warmest interval in the far south significantly preceded warming in the north. Other changes[edit] While significant temperature changes do not appear to have been at most low latitude sites, other climate changes have been reported, such as significantly wetter conditions in Africa , Australia and Japan and desert-like conditions in the Midwestern United States. Areas around the Amazon show temperature increases and drier conditions.

Chapter 6 : Project MUSE - Civilization, Climate, and Malthus: The Rough Course of Global History

The Holocene was once thought to have been climatically stable, but detailed and well-dated paleoclimate records now show that Holocene climate was punctuated by several widespread cooling events, which persisted for many centuries and recurred roughly every Â± years.

This research project will reconstruct Holocene climatic conditions to better understand human adaptation and response to past environmental variability. Greater Yellowstone Area ice patches, northwestern Wyoming Credit: The investigators will use an array of archaeological materials and climate proxies from Northern Rocky Mountain ice cores to better understand human use of alpine environments during periods of environmental change. This project will provide new insights into what the large-scale environmental changes were, how such changes impacted humans, and what strategies humans used to respond and adapt to these changes. The project will involve a collaboration among tribal communities, universities, agencies, and land managers, with students from tribal colleges and universities being educated and trained to help constitute the next generation of researchers, natural resource managers, and educators. Tribal elders, tribal community members, and students will be brought together to discuss the significance and meaning of the archaeological artifacts from the context of tribal oral traditions and histories and to document and share the findings. The diverse assemblages of plant, animal, geologic, and archaeological material rapidly emerging from melting ice patches in higher-elevation areas can provide a wealth of information about past environmental conditions and human use of alpine resources. Coupling biological and geochemical records preserved in ice patches with evidence from archaeological sites presents a rare opportunity to document and evaluate human response and adaptation to large-scale climate patterns and pronounced climate events. Researchers retrieving ice cores from an ice patch located on the Beartooth Plateau, Wyoming. Research Questions and Objectives The research focuses on four core questions: What is the long-term climate history of high-elevation regions, and how do they reflect large-scale patterns in the climate system? How did changes in climate and environmental conditions influence human and animal use of the alpine zone? What were the long-term strategies of indigenous North Americans in response to extreme droughts and cold, wet periods? What do the array of materials exposed from melting ice patches reveal about human capacity for change? These questions will be addressed by evaluating archaeological artifacts, ancient wood, and environmental and climatic proxies e. The ice-core reconstructions will be compared with records of past hydroclimatic changes from adjacent lake-sediment sites. Integrating the paleoecological and archaeological ice-patch record into a regional archaeological record will include both examination of the surface record associated with alpine ice and with previously excavated collections from archaeological sites; a artifact-based documentation of surface stone tools; b associations of surface stone tools with changes in ice-patch area and ancient organics provides context for use intensity evaluation; and c stratigraphic sequence from site 48PA Mummy Cave , which contains a key sequence of both stone and organics spanning over 10, years. The importance of exploring past human activity with tribal communities is paramount. We intend to integrate tribal students and communities throughout all phases of the research project; providing educational, field and laboratory technical opportunities for tribal students. Additionally, we will host elder culture workshops led by Native American elders from regional tribes including Crow and Eastern Shoshone. Shane Doyle, who is a Crow tribal member, will act as tribal liaison and will help facilitate outreach efforts focused on showcasing the breadth and diversity of artifacts emerging from melting ice patches. We will work to bring tribal elders, tribal community members and students to the field to discuss the ice-patch archive and to place this in the context of tribal oral traditions and histories. Tribal elders from the local communities will be invited to interpret and comment on the research findings from their perspective, providing guidance and wisdom for young scholars and researchers alike. An important part of this research is to directly involve tribal communities in how the ice-patch archive lives on in cultural pathways and livelihoods. The exhibit was purposefully opened on the

Wind River Indian Reservation, Wyoming, since most of the archaeological material recovered at receding ice patches in the GYA is culturally relatedâ€”ancestralâ€”to Native American peoples. Thereafter, the exhibit will go to the Utah State University Museum in Logan for the month of September , with the content being continually updated and enhanced. Senior personnel Shane Doyle Executive Director of Native Nexus Consulting and Co-PI Craig Lee visited area tribes to discuss ice-patch research and found strong interest among the Crow, Eastern Shoshone and the Shoshone-Bannock tribes in the information on cultural histories that ice-patch artifacts reveal. Doyle will facilitate contact with tribal cultural committees who are interested in documenting and sharing information with tribal members about the artifacts revealed by retreating ice patches. Investigator presentations will illustrate the relevance of the ice-patch record to understanding human environment interactions in alpine ecosystems worldwide. Presented at Frozen Pasts: Chellman, N, Pederson, G.

Chapter 7 : Reconstructing Ancient Human and Ecosystem Responses to Holocene Climate Conditions

The Holocene Climate Optimum (HCO) was a warm period during roughly the interval 9, to 5, years BP. It has also been known by many other names, such as Altithermal, Climatic Optimum, Holocene Megathermal, Holocene Optimum, Holocene Thermal Maximum, Hypsithermal, and Mid-Holocene Warm Period.

Chapter 8 : Holocene climatic optimum - Wikipedia

Â© American Meteorological Society The increase in high-resolution proxy records over expanding areas of the globe helps deepen understanding of the unusual climate patternsâ€”and the forcing mechanisms.

Chapter 9 : Anthropocene - Wikipedia

Complex human society is an artifact of the Holoceneâ€”the exceptionally warm, wet, and stable period of the last 12, years. "Without the warming of the earth with the end of the Pleistocene.