NATIONAL SECURITY AGENCY
CENTRAL SECURITY SERVICE
FORT GEORGE G. MEADE, MARYLAND 20755-6000

FOIA Case: 83748A
8 May 2017

JOHN GREENEWALD
[redacted]

Dear Mr. Greenewald:

This is our final response to your Freedom of Information Act (FOIA) request of 16 February 2016 for Intellipedia articles on Climate Change. As stated in our initial response letter, dated 22 February 2016, your request has been assigned Case Number 83748. A copy of your request is enclosed. For the purpose of fee assessment, you have been placed into the "all other" category for this request. As such, you are allowed 2 hours of search and 100 pages of duplication at no cost to you. There are no assessable fees for this request.

For your information, NSA provides a service of common concern for the Intelligence Community (IC) by serving as the executive agent for Intelink. As such, NSA provides technical services that enable users to access and share information with peers and stakeholders across the IC and DoD. Intellipedia pages are living documents that may be originated by any user organization, and any user organization may contribute to or edit pages after their origination. Intellipedia pages should not be considered the final, coordinated position of the IC on any particular subject. The views and opinions of authors do not necessarily state or reflect those of the U.S. Government.

Your request has been processed under the provisions of the FOIA. We conducted a search of all three levels of Intellipedia for the requested material, and located one document (15 pages) responsive to your request. This document has been processed in response to an earlier request and is enclosed. Certain information, however, has been deleted from the enclosure.

This Agency is authorized by statute to protect certain information concerning its activities (in this case, internal URLs) as well as the names of its employees. Such information is exempt from disclosure pursuant to the third exemption of the FOIA, which provides for the withholding of information specifically protected from disclosure by statute. The specific statute

applicable in this case is Section 6, Public Law 86-36 (50 U.S. Code 3605). We have determined that such information exists in this record, and we have excised it accordingly.

In addition, personal information regarding individuals has been deleted from the enclosures in accordance with 5 U.S.C. 552 (b)(6). This exemption protects from disclosure information that would constitute a clearly unwarranted invasion of personal privacy. In balancing the public interest for the information you request against the privacy interests involved, we have determined that the privacy interests sufficiently satisfy the requirements for the application of the (b)(6) exemption.

Since these deletions may be construed as a partial denial of your request, you are hereby advised of this Agency's appeal procedures. You may appeal this decision. If you decide to appeal, you should do so in the manner outlined below.

- The appeal must be in writing and addressed to:

  NSA/CSS FOIA/PA Appeal Authority (P132),
  National Security Agency
  9800 Savage Road STE 6932
  Fort George G. Meade, MD 20755-6932

- It must be postmarked no later than 90 calendar days of the date of this letter.
- Please include the case number provided above.
- Please describe with sufficient detail why you believe the denial of requested information was unwarranted.
- NSA will endeavor to respond within 20 working days of receiving your appeal, absent any unusual circumstances.
- Appeals received after 90 days will not be addressed.

You may also contact our FOIA Public Liaison at foialo@nsa.gov for any further assistance and to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows:

FOIA Case: 83748A

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Rd- OGIS
College Park, MD 20740
ogis@nara.gov
(877) 684-6448
(202) 741-5770
Fax (202) 741-5769

Sincerely,

Paul K
for

JOHN R. CHAPMAN
Chief, FOIA/PA Office
NSA Initial Denial Authority

Encls:
a/s

(U) Climate change

UNCLASSIFIED

From Intellipedia

You have new messages (last change).

See also: Climate Change and Energy Technology Team
See also: Climate Change Research Guide

Climate change refers to the variation in the Earth's global climate or in regional climates over time. It describes changes in the variability or average state of the atmosphere over time scales ranging from decades to millions of years. These changes can be caused by processes internal to the Earth, external forces (e.g. variations in sunlight intensity) or, more recently, human activities.

In recent usage,

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especially in the context of environmental policy, the term "climate change" often refers only to changes in modern climate, including the rise in average surface temperature known as global warming. In some cases, the term is also used with a presumption of human causation, as in the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC uses "climate variability" for non-human caused variations.[1] Each year the UN sponsors a major summit meeting of the Council of Parties (COP) to the United Nations Global Climate Change Conference.

U.N. High-Level Panel on Global Sustainability

(U) On 9 August 2010, UN Secretary General Ban Ki Moon announced the creation of a High-Level Panel on Global Sustainability whose appointed members will be asked to study ways of dealing with climate change in a manner that is sustainable and reduces carbon emissions. The panel is expected to present its recommendations at the end of 2011, ahead of the U.N.'s major climate change conference in 2012.

Temperature Record

(U) For information on temperature measurements over various periods, and the data sources available, see "temperature record" on Wikipedia. For attribution of climate change over the past century, see "attribution of recent climate change" on Wikipedia.

2010 Warmest Year on Record

(U) The United Nations World Meteorological Organization (the WMO) issued a statement in Geneva on 20 January 2011 saying that 2010 was the warmest year on record — statistically tied with 2005 and 1998 - and confirming a "significant" long-term trend of global warming. WMO Secretary-General Michael Jarraud said, "**The ten warmest years on record have all occurred since 1998.**" In 2010, the global average temperature was 0.53 degrees Celsius (0.95 degrees Fahrenheit above the 1961-to-1990 Mean that is used as a yardstick for climate measurements. Further, the WMO said that Arctic sea ice cover in December 2010 was the lowest on record for that month. The warming trend was especially strong in Africa, parts of Asia, and parts of the Arctic in 2010. The year was also marked "by a high number of extreme weather events" including Russia's summer heatwave and the devastating monsoon floods in Pakistan. The WMO said that the temperature oservations, on their own, **do not pin the cause on man-made greenhouse gases**, although the agency believes this is confirmed separately by other research into carbon emissions in the atmosphere.[2]

(U) Temperature data compiled by three other agencies — the British Meteorological Office and University of East Anglia (UEA); the US National Oceanic and Atmospheric Administration (NOAA); and the US National Air and Space Administration's Goddard Institute for Space Studies (NASA) - all agree

that the **ten warmest years on record** have all occurred since 1998. Each agency assigns a ranking based on the year's average difference, in degrees Celsisus, above long-term arverage temperatures. The specific ranking of each year varies slightly amongst those three agencies because of the different criteria used to establish the long-term "mean". The British Met/UEA compares temperatures against the average for the years 1961-1990, while NOAA's mean is based on the 20th century average, and NASA uses data from 1951-1980.[3]

Climate change factors

Climate changes reflect variations within the Earth's atmosphere, processes in other parts of the Earth such as oceans and ice caps, and the impact of human activity. The external factors that can shape climate are often called climate forcings and include such processes as variations in solar radiation, the Earth's orbit, and greenhouse gas concentrations.

Variations within the Earth's climate

Weather is the day-to-day state of the atmosphere, and is a chaotic non-linear dynamical system. On the other hand, *climate* — the average state of weather — is fairly stable and predictable. Climate includes the average temperature, amount of precipitation, days of sunlight, and other variables that might be measured at any given site. However, there are also changes within the Earth's environment that can affect the climate.

Glaciation

Glaciers are recognized as one of the most sensitive indicators of climate change, advancing substantially during climate cooling (e.g., the Little Ice Age) and retreating during climate warming on moderate time scales. Glaciers grow and collapse, both contributing to natural variability and greatly amplifying externally-forced changes. For the last century, however, glaciers have been unable to regenerate enough ice during the winters to make up for the ice lost during the summer months (see glacier retreat).

The most significant climate processes of the last several million years are the glacial and interglacial cycles of the present ice age. Though shaped by orbital variations, the internal responses involving continental ice sheets and 130 m sea-level change certainly played a key role in deciding what climate response would be observed in most regions. Other changes, including Heinrich events, Dansgaard–Oeschger events and the Younger Dryas show the potential for glacial variations to influence climate even in the absence of specific orbital changes.

- (U) **Greenland Icecap:** Danish researchers from the **National Geological Studies for Denmark and Greenland (GEUS)** - which has been studing Greenland's icecap since 1980 - reported in April 2011 that the icecap shrank at an extreme rate last year. In 2010 Greenland experienced a warm winter, a warm summer, and almost no precipitation. The measurement by one climate station in southern Greenland in 2010 showed a melting of as much as 9 meters of the ice cap, whereas researchers normally only measure an annual melting of 6 meters: that means a 50-percent increase. This is the third year in a single decade in which another "record melting" was established.[4]

Ocean variability

On the scale of decades, climate changes can also result from interaction of the atmosphere and oceans. Many climate fluctuations, the best known being the El Niño Southern oscillation but also including the Pacific decadal oscillation, the North Atlantic oscillation, and the Arctic oscillation, owe their existence at least in part to different ways that heat can be stored in the oceans and move between different reservoirs. On longer time scales ocean processes such as thermohaline circulation play a key role in redistributing heat, and can dramatically affect climate.

- (U) Rapid warming in the Arctic is creating a new, and fast-growing, pool of fresh water in the Arctic Ocean which could "flush" into the North Atlantic (through the Fram Strait between Greenland and Europe). A dramatic freshening of the North Atlantic could disrupt the engine of a global ocean circulation system — the thermohaline circulation, or ocean conveyor, of which the Gulf Stream forms a major part. Some 13,000 years ago, a major freshening of the North Atlantic shut down the circulation and plunged the Earth into a cold snap, known as the **Younger Dryas era**, which lasted for 1,300 years. The monitoring of the freash water from the Arctic is being carried out as part of **Project Clamer**, a 10-nation European project into the impact of climate change on the waters around Europe.[5]

Sunlight and Shrinking Ice Cover

Shrinking ice and snow cover in the Northern Hemisphere is reflecting ever less sunshine back into space in a previously underestimated mechanism that could add to global warming. Satellite data indicate that Arctic sea ice, glaciers, winter snow and Greenland's icesheet were bouncing less energy back to space from 1979 to 2008. The dwindling white sunshade exposes ground or water, both of which are darker and absorb more heat. A study conducted by the (U.S.) University of Michigan and published in January 2011, estimated that ice and snow in the Northern Hemisphere were now reflecting on average 3.3 watts per square meter of solar energy back to the upper atmosphere, a reduction of 0.45 watt per square meter since the late 1970s.[6]

The memory of climate

More generally, most forms of internal variability in the climate system can be recognized as a form of hysteresis, meaning that the current state of climate reflects not only the inputs, but also the history of how it got there. For example, a decade of dry conditions may cause lakes to shrink, plains to dry up and deserts to expand. In turn, these conditions may lead to less rainfall in the following years. In short, climate change can be a self-perpetuating process because different aspects of the environment respond at different rates and in different ways to the fluctuations that inevitably occur.

Non-climate factors driving climate change

Greenhouse gases

Current studies indicate that radiative forcing by greenhouse gases is the primary cause of global warming. Greenhouse gases are also important in understanding Earth's climate history. According to these studies, the greenhouse effect, which is the warming produced as greenhouse gases trap heat, plays a key role in regulating Earth's temperature.

Over the last 600 million years, carbon dioxide concentrations have varied from perhaps >5000 ppm to less than 200 ppm, due primarily to the impact of geological processes and biological innovations. It has been argued by Veizer et al., 1999, that variations in greenhouse gas concentrations over tens of millions of years have not been well correlated to climate change, with plate tectonics perhaps playing a more dominant role. More recently Royer et al. [1] (http://www.nature.com/nature/journal/v446/n7135/full/nature05699.html) have used the CO_2-climate correlation to derive a value for the climate sensitivity.

There are several examples of rapid changes in the concentrations of greenhouse gases in the Earth's atmosphere that do appear to correlate to strong warming, including the Paleocene–Eocene thermal maximum, the Permian–Triassic extinction event, and the end of the Varangian snowball earth event.

During the modern era, rising carbon dioxide levels are implicated as the primary cause of global warming since 1950. According to IPCC (2007) the atmospheric concentration of CO_2 in 2005 was 379ppm[3] compared to the pre-industrial levels of 280ppm[3]. Other scientists disagree such as Dr. Arthur B. Robinson at the Oregon Institute of Science and Medicine.[7]

While there may exist a correlation of atmospheric CO_2 increases with global temperature increases, there is dispute as to whether CO_2 is a *cause* of global warming, or *an effect* in response to rises in global temperatures.[8] Thermodynamics and Le Chatelier's principle explain the characteristics of the dynamic equilibrium of a gas in solution such as the vast amount of $C0_2$ held in solution in the world's oceans moving into and returning from the atmosphere. These principals can be observed as bubbles which rise in a pot of water heated on a stove, or a in a glass of cold beer allowed to sit at room temperature; gases dissolved in liquids are released under certain circumstances.

350 Parts Per Million

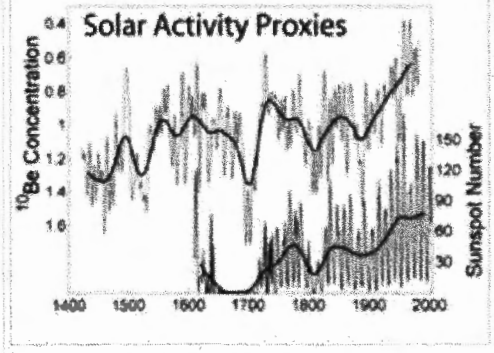
(U) A leading American climatologist, Jim Hansen of NASA, and his team published a paper in January 2008 saying they looked at all the paleoclimate data and they looked at the observational data from the last few years and they were finally **able to say that "any value of carbon in the atmosphere greater than 350 parts per million (ppm) is not compatible with the planet on which civilization developed and to which life on the earth is adapted."** As of summer 2010, carbon measurements are now 390 ppm and is rising 2 parts per million per year. This is why the arctic is melting. That is why the ocean is 30 percent more acid than it used to be. Because warm air holds more water vapor than cold air does, the **earth's atmosphere is about 5 percent moister than it was forty years ago.** Which is an astonishing change in a basic physical parameter in a very short period of time. Because of that, we are seeing not only wicked drought all over the world, but also deluges.[9]

Plate tectonics

On the longest time scales, plate tectonics will reposition continents, shape oceans, build and tear down mountains and generally serve to define the stage upon which climate exists. More recently, plate motions have been implicated in the intensification of the present ice age when, approximately 3 million years ago, the North and South American plates collided to form the Isthmus of Panama and shut off direct mixing between the Atlantic and Pacific Oceans.

Solar variation

The sun is the ultimate source of essentially all heat in the climate system. The energy output of the sun, which is converted to heat at the Earth's surface, is an integral part of shaping the Earth's climate. On the longest time scales, the sun itself is getting brighter with higher energy output; as it continues its main sequence, this slow change or evolution affects the Earth's atmosphere. Early in Earth's history, it is thought to have been too cold to support liquid water at the Earth's surface, leading to what is known as the Faint young sun paradox.



Variations in solar activity during the last several centuries based on observations of sunspots and beryllium isotopes.

On more modern time scales, there are also a variety of forms of solar variation, including the 11-year solar cycle and longer-term modulations. However, the 11-year sunspot cycle does not manifest itself clearly in the climatological data. Solar intensity variations are considered to have been influential in triggering the Little Ice Age, and for some of the warming observed from 1900 to 1950. The cyclical nature of the sun's energy output is not yet fully understood; it differs from the very slow change that is occurring to the sun as it ages and evolves.

Orbital variations

In their impact on climate, orbital variations are in some sense an extension of solar variability, because slight variations in the Earth's orbit lead to changes in the distribution and abundance of sunlight reaching the Earth's surface. Such orbital variations, known as Milankovitch cycles, are a highly predictable consequence of basic physics due to the mutual interactions of the Earth, its moon, and the other planets. These variations are considered the driving factors underlying the glacial and interglacial cycles of the present ice age. Subtler variations are also present, such as the repeated advance and retreat of the Sahara desert in response to orbital precession.

Volcanism

A single eruption of the kind that occurs several times per century can impact climate, causing cooling for a period of a few years. For example, the eruption of Mount Pinatubo in 1991 is barely visible on the global temperature profile. Huge eruptions, known as large igneous provinces, occur only a few times every hundred million years, but can reshape climate for millions of years and cause mass extinctions. Initially, scientists thought that the dust emitted into the atmosphere from large volcanic eruptions was responsible for the cooling by partially blocking the transmission of solar radiation to the Earth's surface. However, measurements indicate that most of the dust thrown in the atmosphere returns to the Earth's surface within six months.

Volcanos are also part of the extended carbon cycle. Over very long (geological) time periods, they release carbon dioxide from the earth's interior, counteracting the uptake by sedimentary rocks and other geological carbon sinks. However, this contribution is insignificant compared to the current anthropogenic emissons. The US Geological Survey estimates that human activities generate 150 times the amount of carbon dioxide emitted by volcanoes. [2] (http://volcanoes.usgs.gov/Hazards/What/VolGas/volgas.html)

Human influences on climate change

Anthropogenic factors are acts by humans that change the environment and influence climate. Various theories of human-induced climate change have been debated for many years. In the late 1800s, the Rain follows the plow theory had many adherants in the western United States.

The biggest factor of present concern is the increase in CO_2 levels due to emissions from fossil fuel combustion, followed by aerosols (particulate matter in the atmosphere) which exerts a cooling effect. Other factors, including land use, ozone depletion, animal agriculture [3] (http://www.virtualcentre.org /en/library/key_pub/longshad/A0701E00.htm) and deforestation also impact climate.

Fossil fuels

(U) Beginning with the industrial revolution in the 1850s and accelerating ever since, the human consumption of fossil fuels has elevated CO_2 levels from a concentration of ~280 ppm to more than 380 ppm today. These increases are projected to reach more than 560 ppm before the end of the 21st century. It is known that carbon dioxide levels are substantially higher now than at any time in the last 800,000 years [4] (http://news.bbc.co.uk/2/hi/science/nature/5314592.stm)

(U) Along with rising methane levels, these changes are anticipated to cause an increase of 1.4–5.6 °C between 1990 and 2100 (see global warming). A 2009 article in *Nature* proposed that a new concept called climate-change response be used as a measure of the impact of carbon emissions on climate.[10] Models reported by Intergovernmental Panel on Climate Change estimate that for every trillion tons of carbon emitted, the global temperature will rise by 1.0 to 2.1 degrees.[11] According to the Department of Energy's Carbon Dioxide Information Analysis Center (CDIAC), human activity (including land use change) has added more than 500 billion tons of carbon to the atmosphere since 1751.

Aerosols

Anthropogenic aerosols, particularly sulphate aerosols from fossil fuel combustion, are believed to exert a cooling influence; see graph.[12] This, together with natural variability, is believed to account for the relative "plateau" in the graph of 20th century temperatures in the middle of the century.

Land use

Prior to widespread fossil fuel use, humanity's largest impact on local climate is likely to have resulted from land use. Irrigation, deforestation, and agriculture fundamentally change the environment. For example, they change the amount of water going into and out of a given location. They also may change the local albedo by influencing the ground cover and altering the amount of sunlight that is absorbed. For example, there is evidence to suggest that the climate of Greece and other Mediterranean countries was permanently changed by widespread deforestation between 700 BC and 1 AD (the wood being used for ship-building, construction and fuel), with the result that the modern climate in the region is significantly hotter and drier, and the species of trees that were used for ship-building in the ancient world can no longer be found in the area.

A controversial hypothesis by William Ruddiman called the early anthropocene hypothesis [5] (http://www.realclimate.org/index.php/archives/2005/12/early-anthropocene-hyppothesis/) suggests that the rise of agriculture and the accompanying deforestation led to the increases in carbon dioxide and methane during the period 5000–8000 years ago. These increases, which reversed previous declines, may have been responsible for delaying the onset of the next glacial period, according to Ruddimann's overdue-glaciation hypothesis.

In modern times, a 2007 Jet Propulsion Laboratory study [13] found that the average temperature of California has risen about 2 degrees over the past 50 years, with a much higher increase in urban areas. The change was attributed mostly to extensive human development of the landscape.

Livestock

According to a 2006 United Nations report, livestock is responsible for 18% of the world's greenhouse gas emissions as measured in CO_2 equivalents. This however includes land usage change, meaning deforestation in order to create grazing land. In the Amazon, 70% of deforestation is to make way for grazing land, so this is the major factor in the 2006 UN FAO report, which was the first agricultural report to include land usage change into the radiative forcing of livestock. In addition to CO_2 emissions, livestock produces 65% of human-induced nitrous oxide (which has 296 times the global warming potential of CO_2) and 37% of human-induced methane (which has 23 times the global warming potential of CO_2)[6] (http://www.virtualcentre.org/en/library/key_pub/longshad/A0701E00.htm) .

Interplay of factors

If a certain forcing (for example, solar variation) acts to change the climate, then there may be mechanisms that act to amplify or reduce the effects. These are called positive and negative feedbacks. As far as is known, the climate system is generally stable with respect to these feedbacks: positive feedbacks do not "run away". Part of the reason for this is the existence of a powerful negative feedback between temperature and emitted radiation: radiation increases as the fourth power of absolute temperature.

However, a number of important positive feedbacks do exist. The glacial and interglacial cycles of the present ice age provide an important example. It is believed that orbital variations provide the timing for the growth and retreat of ice sheets. However, the ice sheets themselves reflect sunlight back into space and hence promote cooling and their own growth, known as the ice-albedo feedback. Further, falling sea levels and expanding ice decrease plant growth and indirectly lead to declines in carbon dioxide and methane. This leads to further cooling.

Similarly, rising temperatures caused, for example, by anthropogenic emissions of greenhouse gases could lead to retreating snow lines, revealing darker ground underneath, and consequently result in more absorption of sunlight.

Water vapor, methane, and carbon dioxide can also act as significant positive feedbacks, their levels rising in response to a warming trend, thereby accelerating that trend. Water vapor acts strictly as a feedback (excepting small amounts in the stratosphere), unlike the other major greenhouse gases, which can also act as forcings.

More complex feedbacks involve the possibility of changing circulation patterns in the ocean or atmosphere. For example, a significant concern in the modern case is that melting glacial ice from Greenland will interfere with sinking waters in the North Atlantic and inhibit thermohaline circulation. This could affect the Gulf Stream and the distribution of heat to Europe and the east coast of the United States.

Other potential feedbacks are not well understood and may either inhibit or promote warming. For example, it is unclear whether rising temperatures promote or inhibit vegetative growth, which could in turn draw down either more or less carbon dioxide. Similarly, increasing temperatures may lead to either more or less cloud cover.[14] Since on balance cloud cover has a strong cooling effect, any change to the abundance of clouds also impacts climate.[15]

In all, it seems likely that overall climate feedbacks are negative, as systems with overall positive feedback are highly unstable.

Monitoring the current status of climate

Scientists use "Indicator time series" that represent the many aspects of climate and ecosystem status. The time history provides a historical context. Current status of the climate is also monitored with climate indices.[16][17][18][19]

Evidence for climatic change

Evidence for climatic change is taken from a variety of sources that can be used to reconstruct past climates. Most of the evidence is indirect—climatic changes are inferred from changes in indicators that reflect climate, such as vegetation, dendrochronology, ice cores, sea level change, and glacial retreat.

Pollen analysis

Also known as palynology, is based on the notion that the geographical distributions of plant species varies due to particular climate requirements, and that these requirements are the same today as they have been in the past (Uniformitarianism). Each plant species has a distinctively shaped pollen grain, and if these fall into oxygen-free environments (depositional environments), such as peat bogs, they resist decay. Changes in the pollen found in different levels of the bog indicate, by implication, changes in climate.

One limitation of this method is the fact that pollen can be transported considerable distances by wind, wildlife and in some cases running water. Certain depositional sites such as mires may also have been effected by humans through peat cutting for fuel. This has to be taken into consideration when interpretation the pollen record.

Beetles

Remains of beetles are common in freshwater and land sediments. Different species of beetles tend to be found under different climatic conditions. Knowledge of the present climatic range of the different species, and the age of the sediments in which remains are found, allows past climatic conditions to be inferred.

[redacted]

(b)(3) - P.L. 86-36

Glacial geology

Advancing glaciers leave behind moraines and other features that often have datable material in them, recording the time when a glacier advanced and deposited a feature. Similarly, the lack of glacier cover can be identified by the presence of datable soil or volcanic tephra horizons. Glaciers are considered one of the most sensitive climate indicators by the IPCC, and their recent observed variations provide a global signal of climate change. See Retreat of glaciers since 1850.

Historical records

Historical records include cave paintings, depth of grave digging in Greenland, diaries, documentary evidence of events (such as 'frost fairs' on the Thames) and evidence of areas of vine cultivation. Daily weather reports have been kept since 1873, and the Royal Society has encouraged the collection of data since the seventeenth century. Parish records are often a good source of climate data.

Climate change and economics

There has been a debate about how climate change could affect the world economy. An October 29, 2006 report by former Chief Economis and Senior Vice-President of the World Bank Nicholas Stern states that climate change could affect growth, which could be cut by one-fifth unless drastic action is taken. (*Report's stark warning on climate*) (http://news.bbc.co.uk/1/hi/business/6096594.stm)

Political advisor Frank Luntz recommended the Bush Administration adopt the term "Climate Change" in preference to global warming, while it worked to discredit the idea of global warming science.

(U) Climate Change, Rising Sea Levels and Disappearing Islands?

(U) It is not clear whether there ever was an actual kingdom of **Atlantis** that disappeared into the sea. [Atlantis is a legendary Greek kingdom, which is said to have existed around 10,000 B.C., and allegedly sank into the sea in the aftermath of a devastating earthquake and torrential deluge. It first finds mention in Plato's *Timaeus*, written *circa* 360 B.C.] But a substantially similar fate seems likely to befall several low-lying, small island states in the Indian and Pacific Oceans. In the next fifty to one hundred years (2060 - 2110) it is possible that the entire territory of low-lying, small island states like the Maldives, Tuvalu, and Nauru will be submerged as a result of increasing sea levels caused by climate change. While this is currently a mere possibility which will hopefully never become a reality, this possibility raises an interesting question. International law stipulates that territory is a necessary prerequisite for statehood. Given that requirement, will these states cease to be states when they lose their territory? In light of the negligible contribution of the Maldives and similar states to climate change, if they were to lose their statehood and international legal personality on account of climate change, serious questions would arise as to the legitimacy and efficacy of international law. This issue is considered in a lengthy legal article, **"The 21st Century Atlantis: The International Law of Statehood and Climate Change-Induced Loss of Territory"**, published in the January 2014 issue of the ***Stanford Journal of International Law*** (Volume 50, issue 1; pp. 1-52). Acessed 8 September 2014 using EBSCOhost search with JWICS online Discovery Tool database.

(U) Climate change is a major concern for many Pacific Island nations. The people living on small islands surrounded by water depend heavily on the ocean and marine resources for their livelihoods. Therefore protecting biodiversity and in particular marine biodiversity is critical to the survival of millions of people that live on small islands. In addition, in many Small Island Developing States, freshwater resources are being negatively affected by pollution, saline intrusion (from rising sea levels as well as from the increased frequency and ferocity of storms), land degradation, and inappropriate water and wastewater management practices. See related topics:

- African, Caribbean and Pacific Group of States (the ACP) - with 80 member countries (as of 2014)'
- Small Island Developing States (SIDS) - with 36 members (as of 2014)
- Alliance of Small Island States (AOSIS) - with 44 members (as of 2013)

Climate change in popular culture

The issue of climate change has entered popular culture since the late 20th century. Science historian Naomi Oreskes has noted that "there's a huge disconnect between what professional scientists have studied and learned in the last 30 years, and what is out there in the popular culture."[7] (http://seattletimes.nwsource.com/html/nationworld/2002549346_globewarm11.html) An academic study contrasts the relatively rapid acceptance of ozone depletion as reflected in popular culture with the much slower acceptance of the scientific consensus on global warming.[8] (http://pus.sagepub.com/cgi/content/abstract/9/3/297)

Climate Change and biodiversity

Some of the most immediate effects of recent climate change are becoming apparent through impacts on biodiversity. The life cycles of many wild plants and animals are closely linked to the passing of the seasons; climatic changes can lead to interdependent pairs of species (e.g. a wild flower and its pollinating insect) losing synchronization, if, for example, one has a cycle dependent on day length and the other on temperature or precipitation. In principle, at least, this could lead to extinctions or changes in the distribution and abundance of species. One phenomenon is the movement of species northwards in Europe. A recent study by Butterfly Conservation in the UK (viewable here on the outside) has shown that relative common species with a southerly distribution have moved north, whilst scarce upland species have become rarer and lost territory towards the south. This picture has been mirrored across several invertebrate groups. Drier summers could lead to more periods of drought, potentially affecting many species of animal and plant. For example, in the UK during the drought year of 2006 significant numbers of trees dies or showed dieback on light sandy soils. Wetter, milder winters might impact on temperate mammals or insects by preventing them hibernating or entering torpor during periods when food is scarce. One predicted change is the ascendance of 'weedy' or opportunistic species at the expense of scarcer species with narrower or more specialized ecological requirements. One example could be the expanses of bluebell seen in many woodlands in the UK. These have an early growing and flowering season before competing weeds can develop and the tree canopy closes. Milder winters can allow weeds to overwinter as adult plants or germinate sooner, whilst trees leaf earlier, reducing the length of the window for bluebells to complete their life cycle. Organizations such as Wildlife Trust, World Wide Fund for Nature, Birdlife International

and the Audubon Society are actively monitoring and research the effects of climate change on biodiversity. They also advance policies in areas such as landscape scale conservation to promote adaptation to climate change. A more detailed review of these issues can be found here (http://www.unep-wcmc.org/climate/home.htm) (outside link)

Humanitarian impact of climate change

Loss of Life: Events of high intensity would have an impact in terms of human loss. The rise of the sea level would also endanger coastal cities, such as Lagos.
Global Health: the increase of temperatures is conducive to a rise of epidemics and does not facilitate sanitary conditions. Therefore it is likely that epidemics such as cholera, malaria, dengue fever will increase in some areas.

- In the Andes, mosquitoes that can carry dengue and yellow fever viruses were previously limited to 3,300 feet (1,006 m) but have recently appeared at 7,200 feet (2,195 m).
- In Mexico, dengue fever has spread above its former elevation limit of 3,300 feet (1,006 m) and has appeared at 5,600 feet (1,707 m).

Food Security and Access to Potable Water: Climate change may increasingly affect crop yields. Whether the net effect is positive or negative remains to be seen. Indeed, the decrease of agricultural productivity in tropical and sub-tropical zones will endanger. The warming of oceans may also affect communities who rely on fishing.
Political Stability: scarcity of resources leads to competition and could exacerbate existing tensions between different ethnic groups, countries, etc.
Shipping and Trade: Increased melting of the arctic sea ice may open new shipping routes and expand the seasonal availability of existing routes through the arctic, increasing the volume of trade and reducing overall shipping costs.
Migration: Environment-related migration has been most acute in sub-Saharan Africa, but also affects millions of people in Asia and India. Europe and the US face increased pressure from people driven from North Africa and Latin America by deteriorating soil and water conditions.

- Small island states like Tuvalu are facing the immediate consequences of climate change. New Zealand has already agreed to accept the 11,600 inhabitants of the low-lying Pacific island state if rising sea levels swamp the country.
- As many as 100 million people live in areas that are below sea level or liable to storm surge. A total of 213 communities in Alaska are threatened by tides that creep three metres further inland each year.

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Notes

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1. ↑ http://www.grida.no/climate/ipcc_tar/wg1/518.htm
2. ↑ (U) **Report EUP20110120085010; OSC** [redacted] **/WIRe** [redacted]; 201613Z JAN 11; UN Weather Agency Confirms Significant Long-Term Global Warning (*sic*) Trend; Source is 20 January 11 news article from French news agency *AFP*.
3. ↑ (U) REUTERS, 191541Z JAN 11; FACTBOX-2010 Second Hottest Year Record Data.
4. ↑ (U)**Report EUP20110408340007: OSC** [redacted] **/WIRe** [redacted]; **"Danish Geologist Finds Greenland Icecap Melting at Record Speed"**; Source is website of Greenland weekly newspaper *Sermitsiaq* news report on 8 April 2011.
5. ↑ ***New Scientist*** magazine, 9 April 2011, "Gulf Stream Threatened By Arctic Flush"
6. ↑ (U) REUTERS, 162040Z JAN 11; Thaw of Earth's Icy Sunshade May Stroke Warming.
7. ↑ Global Warming Lecture, *http://www.oism.org/oism/s32p686.htm* VIDEO.
8. ↑ paleontologist professor Ian Clark of the University of Ottawa, says that global warming could be caused by increased activity on the sun, such as massive sun spot eruptions, and that ice-core samples from Antarctica show that, in fact, warmer periods in Earth's history have come about 800 years before rises in carbon dioxide levels. *http://wpherald.com/articles/3658/1/Global-warming-condemned-as-scam/Warming-preceded-rises-in-carbon-dioxide-levels.html*
9. ↑ *Tikkun* magazine, 1 September 2010, Vol. 25 issue 5, "What It Will Take to Return the Globe to 350", by Bill McKibben; accessed on *Discovery* 4 May 2011.
10. ↑ Nature, May 2009 -- need cite
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13. ↑ California Warming Attributed to Growth (http://www.npr.org/templates/story /story.php?storyId=9242114) by Mandalit del Barco. *Day to Day*, National Public Radio. 30 Mar

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14. ↑ http://www.grida.no/climate/ipcc_tar/wg1/271.htm
15. ↑ For additional discussion of feedbacks relevant to ongoing climate change, see http://www.grida.no/climate/ipcc_tar/wg1/260.htm
16. ↑ Arctic Change Indicators (http://www.arctic.noaa.gov/detect)
17. ↑ Bering Sea Climate and Ecosystem Indicators (http://www.beringclimate.noaa.gov)
18. ↑ How scientists study climate change (http://www.arctic.noaa.gov/essay_bond.html) : Some important research concepts used by scientists to study climate variations
19. ↑ UK Marine Climate Change Impacts Partnership, Annual Report Card of current knowledge (http://www.mccip.org.uk/arc/)

(U) See also

- (U) CIA/DI Climate Change and Energy Technology Team (formerly CIA Center on Climate Change and National Security)
- (U) NIA National Security Impacts of Global Climate Change
- (U//FOUO) Chatham House Conference held in June 2007
- (U) Climate
- (U) Scientific opinion on climate change
- (U) Climate change tipping points
- (U) Global warming controversy
- (U) Climate change denial
- (U) Adaptation to global warming
- (U) Mitigation of global warming
- (U) Economics of global warming
- (U) Politics of global warming
- (U) Business action on climate change
- (U) Climate model
- (U) Global climate model
- (U) Geoengineering
- (U) Climate Change Research Guide

(U) External links

- US EPA climate change and global warming website (http://www.epa.gov/climatechange/)
- Congressional Research Service (CRS) Reports regarding Climate change (http://digital.library.unt.edu/govdocs/crs/search.tkl?q=climate&search_crit=title&search=Search&date1=Anytime&date2=Anytime&type=form)
- The Pew Center on Global Climate Change (http://www.pewclimate.org/)
- NAS : National Academy of Sciences: Understanding and Responding to Climate change, Overview.
- Summary of the Impacts of Climate Change (http://www.nature.org/initiatives/climatechange/issues/) from The Nature Conservancy
- Climate change and global warming (http://www.panda.org/climate) - WWF (conservation organization).

- United Nations Environmental Program (UNEP) (http://www.unep.org/themes/climatechange/) : Climate Change Page
- Global Change (http://globalchange.org/) by the Pacific Institute
- The UN Climate Change Secretariat (http://unfccc.int/essential_background/feeling_the_heat/items/2907.php)
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- Nov 2006: Carbon emissions show sharp rise (http://news.bbc.co.uk/1/hi/sci/tech/6189600.stm)
- Oct 2006: Guide to Climate Change (http://news.bbc.co.uk/2/hi/in_depth/sci_tech/2004/climate_change/)
- Nov 2005: 'Gas muzzlers' challenge Bush (http://news.bbc.co.uk/1/hi/world/americas/4400534.stm)
- Oct 2005: Earth - melting in the heat? (http://news.bbc.co.uk/1/hi/sci/tech/4315968.stm)
- Oct 2005: Europe study shows climate risks (http://news.bbc.co.uk/1/hi/sci/tech/4381960.stm)
- Feb 2005: Greenhouse gases 'do warm oceans' (http://news.bbc.co.uk/1/hi/sci/tech/4275729.stm)
- Ongoing: BBC Climate Change Experiment (http://www.bbc.co.uk/sn/hottopics/climatechange/)

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