DOWNLOAD PDF GLOBAL PROCESS AND LONG-TERM CHANGE

Chapter 1 : Long term Global Land Change (-) | GLAD

Long-term environmental changes, like climate change, can permanently alter an ecosystem, but over time the change may cause some [Genetic variations] to become more favorable or less favorable in the new environment.

Long-term warming, short-term variability: Marc Samson A new study published yesterday suggests that the short-term warming due to increasing greenhouse gases may be less than previously feared. However, when we look at the bigger picture, we still find that climate change is an issue that demands our attention. This differs from many previous studies, which have been based on computer models of the climate system. The sensitivity of our planet to a doubling of the atmospheric carbon dioxide concentration can be expressed using two different measures. One measure, the transient climate response, describes the immediate, short-term warming. This figure is the one that really matters to policy makers. The other measure, the equilibrium climate sensitivity, describes the long-term commitment once the climate system has come into balance with the enhanced level of greenhouse gases. Using observations from the period to , a decade when global warming appeared to slow down, Otto and colleagues obtain a "best estimate" for the transient climate response: This is smaller than the value of 1. We might conclude from this that we need to reduce our estimates of the climate sensitivity. However, natural variability needs to be considered as well. Internal variations within the atmosphere and oceans matter when we look at just ten years of observations. When Otto and colleagues look at the entire period from to , the last decade starts to look less unusual. Their best estimate for the transient climate response is now 1. This suggests that it might be the s that was unusual, rather then the first decade of the 21st century. Indeed, another recent study by Myles Allen and colleagues evaluates a long-term climate model projection made back in That projection turned out to be extremely accurate. However, the real world warmed faster than the model prediction during the s, before returning to the predicted long-term trend during the decade that followed. So natural variability might have caused Earth to warm a little faster than expected during the s. Then, during the following decade, it had the opposite effect, cancelling out some of the warming due to increasing concentrations of greenhouse gases. The period from to may therefore have seen the climate system "pausing for breath" before the long-term warming trend continues in future. Using observations from the past decade, Otto and colleagues derive a best estimate for the long-term equilibrium climate sensitivity of 2. This is consistent with the estimates obtained when they look at observations over longer periods of time, including the whole of the period from to The apparent slow-down in global warming over the past decade has therefore done nothing to change our best estimates of the long-term response. This new work by Otto and colleagues refines our estimates of the climate sensitivity , but the overall picture remains unchanged. Even medium-range climate scenarios suggest that the atmospheric carbon dioxide concentration will have doubled, relative to pre-industrial levels, well before the end of the current century. If our emissions of greenhouse gases continue unabated, we still face an uncomfortable future.

Chapter 2 : How to â€¦ design and implement a strategic plan | Working in development | The Guardian

Long-term structural transformation has four characteristics: scale (the change affects all or most of the organization), magnitude (it involves significant alterations of the status quo), duration (it lasts for months, if not years), and strategic importance.

Link to this page What the science says The El Nino Southern Oscillation shows close correlation to global temperatures over the short term. However, it is unable to explain the long term warming trend over the past few decades. According to this study little or none of the late 20th century global warming and cooling can be attributed to human activity. The close relationship between ENSO and global temperature, as described in the paper, leaves little room for any warming driven by human carbon dioxide emissions. The available data indicate that future global temperatures will continue to change primarily in response to ENSO cycling, volcanic activity and solar changes. How do they arrive at this conclusion? The Southern Oscillation Index shows no long term trend hence the term Oscillation while the temperature record shows a long term warming trend. Consequently, they find only a weak correlation between temperature and SOI. This is done by subtracting the 12 month running average from the same average 1 year later. They do this to "remove the noise" from the data. The implications from this analysis should be readily apparent. In fact, this is a point made repeatedly on this website eg - here and here. This view is confirmed in other analyses. There have been various attempts to filter out the ENSO signal from the temperature record. What remains is a warming trend with less variability: Surface air temperature records with ENSO signal removed. Foster and Rahmstorf used a multiple linear regression approach to filter out the effects of volcanic and solar activity and ENSO. This corresponds to 0. Overall, from to , ENSO can only explain approximately 2. Over the past 4 decades, oceans all over the globe have been accumulating heat Levitus ; Nuccitelli et al. This points to an energy imbalance responsible for the long term trend Wong From Nuccitelli et al. What his paper actually proves is once you remove any long term warming trend from the temperature record, it leaves little room for any warming. Intermediate rebuttal written by dana Update July

Chapter 3 : Long-term warming, short-term variability: Why climate change is still an issue

Taking a small business global is an complex and dynamic process. Gaining a deep understanding of the targeted markets, the competition, current local market trends, and the requirements to.

When it comes to strategic planning for your organisation, there is no single winning formula. Sarah Lee for the Guardian Strategic planning helps determine mid- to long- term goals and what areas to focus on. It is harder to do in development sector as there is often a great amount of unmet need, which one intervention alone cannot tackle. Management guru Peter Drucker famously said that in for-profit organisations, success can easily be equated to profit. The plan Many elements of strategic planning are the same across the board, but there is no single formula. Planning can take three weeks or three months, depending on the size, scale and longevity of organisations. But before the planning, do a reality-check, get feedback and meet stakeholders and beneficiaries in your target communities. Also, make the staff do field visits to help them connect with the cause. So who should be involved in the strategic planning process? Usually a director or manager from each functional area of your organisation is needed to consider all aspects of work. Managers should brief their teams about the results of planning, inform them about structural changes and be open to feedback. Key areas During the process, a few things you should decide on are: What is it that you want to achieve? Setting a vision of the future you want to create is crucial to guide everything your organisation does from here on â€" even if you feel you are 10, 20 or even 50 years away from achieving it. What does your organisation believe the problem is that it is trying to tackle? What are its root causes? Encouraging everyone to understand the problem is crucial when coming up with new strategies and solutions. Once your problem and its root causes are defined, decide how you can claim your organisation is changing that. That is, define, your theory of change and set out the stages of your intervention. Many organisations can also have a short-term and long-term theory of change â€" the short one feeding into the long. They will form the culture of your staff. Respect, humility, solution-focused â€" whatever values you feel are crucial for your organisation to flourish should be clarified. Arguably the hardest part of strategic planning is creating shorter term goals and visions for next three or five years. What are your target numbers of beneficiaries for the next three years? Put plan into action Many organisations create a strategic plan, but fail to execute it. Setting goals for your teams are worthless without actually holding yourselves accountable to them. Based on the strategic plan and your three-year goals and vision â€" chart out yearly plans for your organisation. From this, they can create monthly workplans for themselves, and depending on whether management sees fit â€" attach monthly targets to these as well. Programme monitoring frameworks are crucial to start developing or reinvesting in at this stage. At the end of the yearly plan make sure each team has a target and that they know what it is. Ensure you remember that this end-of-year target meets up with the three-year target set in strategic planning. HR for ensuring maximum staff investment creates avenues for the best ideas, your monitoring team for making sure goals and targets will be visible in the future and can be tracked. Ask yourselves what needs to be done now. What big debates are currently taking place that affect your programme? Are you looking to raise field staff salaries? Should you be targeting a more diverse range of communities? You planned timelines, calculated risks, set targets, but it still went wrong. With a strategic plan and a regularly updated programme monitoring framework, it becomes easier to track and identify what the problem was â€" and what to not do next time. Myra Khan is programme officer at Teach for Pakistan. She tweets as myrakhan This content is brought to you by Guardian Professional. To get more articles like this direct to your inbox, sign up free to become a member of the Global Development Professionals Network Topics.

Chapter 4 : Global Warming | calendrierdelascience.com

For this example, the long-term outcome is the long-term employment of domestic violence survivors at a livable wage. To achieve that goal, the program designers identify three preconditions: survivors attain coping skills, survivors have marketable skills in non-traditional jobs and survivors know and have appropriate workplace behavior.

Messenger A new study published today suggests that the short-term warming due to increasing greenhouse gases may be less than previously feared. However, when we look at the bigger picture, we still find that climate change is an issue that demands our attention. This differs from many previous studies, which have been based on computer models of the climate system. The sensitivity of our planet to a doubling of the atmospheric carbon dioxide concentration can be expressed using two different measures. One measure, the transient climate response, describes the immediate, short-term warming. This figure is the one that really matters to policy makers. The other measure, the equilibrium climate sensitivity, describes the long-term commitment once the climate system has come into balance with the enhanced level of greenhouse gases. This is smaller than the value of 1. We might conclude from this that we need to reduce our estimates of the climate sensitivity. However, natural variability needs to be considered as well. Internal variations within the atmosphere and oceans matter when we look at just ten years of observations. When Otto and colleagues look at the entire period from to , the last decade starts to look less unusual. Their best estimate for the transient climate response is now 1. This suggests that it might be the s that was unusual, rather then the first decade of the 21st century. Indeed, another recent study by Myles Allen and colleagues evaluates a long-term climate model projection made back in That projection turned out to be extremely accurate. However, the real world warmed faster than the model prediction during the s, before returning to the predicted long-term trend during the decade that followed. So natural variability might have caused Earth to warm a little faster than expected during the s. Then, during the following decade, it had the opposite effect, cancelling out some of the warming due to increasing concentrations of greenhouse gases. Using observations from the past decade, Otto and colleagues derive a best estimate for the long-term equilibrium climate sensitivity of 2. This is consistent with the estimates obtained when they look at observations over longer periods of time, including the whole of the period from to The apparent slow-down in global warming over the past decade has therefore done nothing to change our best estimates of the long-term response. This new work by Otto and colleagues refines our estimates of the climate sensitivity, but the overall picture remains unchanged. Even medium-range climate scenarios suggest that the atmospheric carbon dioxide concentration will have doubled, relative to pre-industrial levels, well before the end of the current century. If our emissions of greenhouse gases continue unabated, we still face an uncomfortable future.

Chapter 5 : How the U.N. Climate Change Report Could Serve as a Wake-up Call

In the long-term, the "weedy" taxa that became the dominants of the novel conditions imposed by global change should become the progenitors of a series of new species that are progressively less weedy and better adapted to the new conditions.

The theory behind global warming has been understood by climatologists since at least the s, but only in the new millennium, with an apparent tipping point in , has the mounting empirical evidence convinced most doubters, politicians, and the general public as well as growing sections of business that global warming caused by human action is occurring. Emissions of CO2 have been rising at a speed unprecedented in human history, due to accelerating fossil fuel burning that began in the Industrial Revolution. Debate continues about which manifestations are due to long-term climate change and which to normal climate variability. Most authoritative scientific bodies predict that on present trends a point of no return could come within ten years, and that the world needs to cut emissions by 50 percent by mid twenty-first century. It was natural scientists who first discovered and raised global warming as a political problem. This makes many of the global warming concerns unique. Perhaps for this reason, many social scientists, particularly sociologists, wary of trusting the truth claims of natural science but knowing themselves lacking the expertise to judge their validity, have avoided saying much about global warming and its possible consequences. For practical purposes, it can no longer be assumed that nature is a stable, well understood, background constant and thus social scientists do not need direct knowledge about its changes. Any discussion of likely social, economic, and political futures will have to heed what natural scientists say about the likely impacts of climate change. The researchers forecast substantial warming, unambiguously attributable to human activities. Skeptics have been confounded and reduced to a handful, some discredited by revelations of dubious funding from fossil fuel industries. Just before the end of the twentieth century, American researchers released ice-thickness data, gathered by nuclear submarines. The data showed that over the previous forty years the ice depth in all regions of the Arctic Ocean had declined by approximately 40 percent. Five yearly aerial photographs show the ice cover on the Arctic Ocean at a record low, with a loss of 50 cubic kilometers annually and glacier retreat doubling to 12 kilometers a year. In September the National Aeronautics and Space Administration NASA doubled its estimates of the volume of melted fresh water flowing into the North Atlantic, reducing salinity and thus potentially threatening the conveyor that drives the Gulf Stream. Temperate mussels have been found in Arctic waters, and news broadcasts in and have repeatedly shown scenes of Inuit and polar bears recently listed as endangered cut off from their hunting grounds as the ice bridges melt. The massive west Antarctic ice sheet was assumed to be stable. However, in June a British Antarctic survey reported measurements of the glaciers on this ice sheet shrinking. In October glaciologists reported that the edges of the Antarctic ice sheets were crumbling at an unprecedented rate and, in one area, glaciers were discharging ice three times faster than a decade earlier. In an eight-year European study drilling Antarctic ice cores to measure the past composition of the atmosphere reported that CO2 levels were at least 30 percent higher than at any time in the last 65, years. The speed of the rise in CO2 was unprecedented, from parts per million ppm before the Industrial Revolution to ppm in Early in the Norwegian Polar Institute reported acceleration to a new level of ppm. In January a British Antarctic survey, analyzing CO2 in crevasse ice in the Antarctic Peninsula , found levels of CO2 higher than at any time in the previous , years. In April a NASA Goddard Institute oceanic study reported that the earth was holding on to more solar energy than it was emitting into space. The second IPCC report in had predicted a maximum temperature rise of 3. The third report, in , predicted a maximum rise of 5. None of the glaciers contrary to skeptics was growing. Melting glaciers could pose threats to the water supply of major South American cities and is already manifest in the appearance of many new lakes in Bhutan. In January global average land and sea temperatures were the highest ever recorded for this month; in February the IPCC Fourth Report, expressing greater certainty and worse fears than the previous one, made headlines around the world. In few scientists believed the effects of global warming were already manifest, but by few scientists doubted it and in few politicians were willing to appear skeptical. Although rising temperatures; melting

tundra, ice and glaciers; droughts; extreme storms; stressed coral reefs ; changing geographical range of plants, animals, and diseases; and sinking atolls may conceivably all be results of many temporary climate variations, their cumulative impact is hard to refute. A report in by the U. Measurements from satellites and balloons in the lower troposphere have until recently indicated cooling, which contradicted measurements from the surface and the upper troposphere. These showed that faulty data, which failed to allow for satellite drift, lay behind the apparent anomaly. Another anomaly was that observed temperature rises were in fact less than the modelling of CO2 impacts predicted. This is now explained by evidence on the temporary masking properties of aerosols, from rising pollution and a cyclical upward swing of volcanic eruptions since Critics of global warming have been disarmed and discredited. Media investigations and social research have increasingly highlighted the industry funding of skeptics and their think tanks, and the political pressures on government scientists to keep silent. Estimates of the catastrophic costs of action on emissions have also been contradicted most dramatically by the British Stern Report in October Many companies have been abandoning the skeptical business coalitions. The Australian Business Round Table on Climate Change estimated in that the cost to gross domestic product of strong early action would be minimal and would create jobs. There are many unknowns regarding global warming, particularly those dependent on human choices; yet the consequences for society of either inadequate action or of any effective responses through reduced consumption or enforced and subsidized technological change will be huge. It is, for example, unlikely that the practices and values of free markets, individualism, diversity, and choice will not be significantly modified either by economic and political breakdowns or alternatively by the radical measures needed to preempt them. However, even these targets, which seek to peg back emissions to levels by , are unlikely to be met. World CO2 emissions in continued to rise in all regions of the world, by another 4. A rise of over 2 degrees is considered inevitable if CO2 concentrations pass ppm. At current growing emission rates, the concentration would reach ppm by the end of the twenty-first century. The continuing industrialization of China, recently joined by India, points to the possibility of even faster rises than these projections indicate. If unpredictable, amplifying feedback loops are triggered, improbable catastrophes become more likely. Droughts could wipe out the agriculture of Africa and Australia , as well as Asia , where millions depend on Himalayan melt water and monsoon rains. If the ice caps melt completely over the next centuries, seas could rise by 7 meters, devastating all coastal cities. Social and technical changes with the scale and speed required are not unprecedented. The displacement of horsepower by automobiles, for example, was meteoric. Production of vehicles in the United States increased from 8, in to nearly a million by Substantial regulation or differential taxation and subsidies would be indispensable to overcome short term profit motives and free riding dilemmas where some evade their share of the cost of collective goods from which they benefit. Gains in auto efficiency in the s, for example, were rapidly reversed by a new fashion for sport utility vehicles. The debates that have emerged in the early twenty-first century have been related to responses, with different winners and losers, costs, benefits, dangers, and time scales for each response. Advocates of reduced energy consumption or increased efficiency, or energy generation by solar, wind, tidal, hydro, biomass, geothermal, nuclear, or clean coal and geo-sequestration, argue often cacophonously. Yet it seems probable that all these options are needed. It will be essential for social and natural scientists to learn to cooperate in understanding and preempting the potentially catastrophic collision of nature and society. In order to accomplish this, market mechanisms; technological innovation; international, national, and local regulations; and cultural change will all be needed. Agents of change include governments, nongovernmental organizations, and public opinion, but the most likely front-runner might be sectors of capital seeking profit by retooling the energy and transport systems, while able to mobilize political enforcement. Press release 28, April. What the Future Holds: Insights from Social Science. How Societies Choose to Fail or Survive. Dickens, and August Gijswijt, eds. Mass Balance of Glaciers and Ice Caps: Consensus Estimates for â€” Geophysical Research Letters, Vol. Global Warming and the End of the Oil Era. How to Stop the Planet Burning. National Academy of Sciences. Press release 22, June. Current Sociology 49 1 January: Uncertainty in the Science of Climate Change. In Uncertainty and Climate Change: The Challenge for Policy, Policy Paper 3. Academy of the Social Sciences in Australia. Constance Lever-Tracy Pick a style below, and copy the text for your bibliography.

Chapter 6 : Differences Between Short-Term & Long-Term Projects | calendrierdelascience.com

Organizational Change Models: Short-Term and Long-Term Changes Technology has made the world far more connected. Global connectivity has created an environment where changes that occur in one part of the world or one business region can have immediate and far-flung repercussions across the globe.

As organizations work toward reducing their carbon footprints in a measurable, meaningful way, many look for technology solutions to drive and track their efforts. By adopting an enterprise content management ECM platform, for example, employees are able to store, process, manage, and archive documents electronically, enabling a more sustainable office environment while enhancing, rather than sacrificing, the way they do business. Rationalizing and socializing change by emphasizing business benefits Change is often not easy to implement â€" employees often have habits and processes built up over many years. Leaders experience the greatest success implementing change when they can demonstrate a case for improving the status quo. Productivity of professional staff can be improved by 30 percent if they could find internal information and documents as quickly and easily as they find information on the web. Electronic forms save both paper and the costs associated with processing paper forms, which cost anywhere from 20 cents to tens of dollars per form to process. And, an all-electronic filing policy could save nearly 8 percent of office space within five years. Beyond easier access to documents, incorporating an ECM solution means electronic filing and fewer physical filing cabinets â€" and this can mean savings in the form of energy bills, office or warehouse space, and courier costs. It also means that employees can work remotely with less hassle and reduced commuting in cars, which reduces greenhouse gasses. Below are tips to transitioning to a paper-light environment, to help leaders manage change and demonstrate the business benefits of implementing a sustainability program. The decision to move to an ECM solution should include discussions at various team levels about why the organization is making a change. When adopting a large-scale change, employees may initially be overwhelmed by the magnitude of the shift. Setting realistic, attainable goals, such as 15 percent reduction in paper use per quarter â€" or a goal that is reasonable for your business. This will help to maintain employee motivation and keep the project momentum on track. Recycle as much waste as possible. This seems obvious; however there are still companies and building maintenance crews who do not recycle. Make requests to ensure that they recycle paper, plastic, and metal waste. Recycling one ton of paper saves almost gallons of oil, 7, gallons of water, and 3. Regular communication about how the changes are impacting the organization will help ensure success. When team members feel informed and supported when they have questions and adopt changes more readily. Encourage and reward employees for sharing their own experiences. Melinda Stoker is director of global marketing communications for Xerox DocuShare. Through the years, Xerox has developed equipment, inks, recycled papers, processes, and technologies that reduce energy consumption, waste, and toxins such as PBTs throughout the supply chain. Xerox DocuShare enterprise content management is a powerful solution that enables you to achieve your sustainability goals by automating paper-based processes and providing secure access to important content from anywhere in the world. For more information, visit http:

Chapter 7 : Global Warming Natural Cycle â€" OSS Foundation

See also Effects of global calendrierdelascience.com focus of this article is on the effects beyond There are expected to be various long-term effects of global calendrierdelascience.com discussion and research, including that by the Intergovernmental Panel on Climate Change (IPCC) reports, concentrates on the effects of global warming up to , with only an outline of the effects beyond this.

Long-term projects take months or even years to finish. Typically, companies require more documentation and infrastructure for longer-term efforts. Decisions about project governance usually depend on budget, resources required, business impact, and the scope the project. Effective project managers start by assessing the project need and determining how much time is needed to meet the desired outcomes. Budget Short-term projects typically require less money to complete than long-term efforts. An exception might occur for a short-term disaster recovery effort or other unplanned event that requires immediate, all-out attention. Because short-term projects typically cost less, they usually require fewer approvals to get started and completed. Short-term project leaders may simply keep track of expenditures in a spreadsheet, while larger, more complex projects might require the use of more sophisticated accounting software packages to track and monitor forecasting and spending. Resources The number of resources required for a short-term project typically depends on the type of product or service being developed. Short-term projects usually require specialized expertise. For example, you might institute a short-term project to analyze a recurring product problem and devise a solution. Large, complicated product development projects typically require numerous resources over the course of the project life cycle to initiate, plan, execute, control, and close the project. Impact Short-term projects typically have a limited impact. You may initiate a project to handle a specific problem or react to a situation. Once the problem is solved, the project team disbands. Longer-term projects tend to have a larger impact on the business, community or employees. For example, you might institute a long-term project to analyze complex problems and make sweeping changes that affect your entire company. Project team members typically commit to working on the project for the duration of the effort. This ensures consistency and continuity. Scope Long-term projects tend to be complex. Project plans describe multiple objectives, business needs and interdependent requirements. Long-term projects may be divided into smaller projects to make them more manageable and to produce more immediate results. Short-term projects typically focus on a single goal. Evaluating short-term projects requires less effort and analysis than larger projects. Your company may require a formal scope statement for projects that last more than a month. Establishing this type of governance ensures that the number of features and requirements of the project is documented early on to prevent miscommunication, misunderstandings and cost overruns later.

Chapter 8 : Global warming - Wikipedia

Long term Global Land Change (-) Changes in land cover and land use significantly affect earth system processes including the carbon cycle, the water cycle, species diversity, and socioeconomic development.

Subsequent scientific investigations soon led to what is now the most widely accepted explanation of what was happening. Chlorine compounds derived mostly from chlorinated fluorocarbon gases CFCs , mass-produced by industrial societies for a variety of purposes, reacted in the stratospheric clouds over Antarctica during the cold, dark, winter months to produce forms of chlorine that rapidly deplete stratospheric ozone when the first rays of the Antarctic spring sunlight arrive Solomon, Until almost the end of the nineteenth century, refrigeration was a limited technology, based almost entirely on natural sources of supply. Urban Americans who could afford to drink chilled beverages relied on metropolitan ice markets, which cut ice from local ponds in the winter and stored it in warehouses for use during the warm months of the year. Breweries and restaurants were the heaviest users of this stored winter ice, which was sometimes shipped hundreds of miles to provide refrigeration. Boston ice merchants, for instance, were regularly delivering ice to consumers in Charleston, South Carolina, and even the Caribbean by the fourth decade of the nineteenth century Hall, ; Cummings, ; Lawrence, Page 55 Share Cite Suggested Citation: Understanding the Human Dimensions. The National Academies Press. In the United States, pork was the most popular form of preserved meat because of the ease with which its decay could be arrested by salt. Beef was much less popular in preserved form, so those who ate it preferred to purchase it freshly slaughtered from local butchers. Then, in the s, meatpackers began experimenting with ice-refrigerated railroad cars that could deliver dressed beef, slaughtered and chilled in Chicago, to consumers hundreds of miles away. Dressed beef, which was cheaper than fresh beef for a variety of reasons, soon took the country by storm, driving many wholesale butchers out of business and giving the Chicago packing companies immense economic power. The packers initially relied on complicated ice storage and delivery networks, cutting and storing millions of tons of winter ice along the railroad routes that delivered beef from Chicago to urban customers throughout the East. Their investment in ice storage technology contributed to dramatic shifts in the American food supply and was soon affecting foods other than meat. Fruits and vegetables from California and Florida and dairy products from metropolitan hinterlands throughout the East, were among the most important to benefit from the new ice delivery system Cronon, ; Yeager, ; Kujovich, ; Giedion, ; Clemen, ; Swift and Van Vlissingen, ; Neyhart, ; Unfer, ; Fowler, But natural ice was unreliable: Although the principle of mechanical refrigeration, in which compressed gas was made to expand rapidly and so lower temperatures, had been known since the middle of the eighteenth century, its first application on a large commercial scale was not found until the second half of the nineteenth century Anderson, Urban brewers, especially in the warm climates of the South, were the first to make wide use of it. As the meatpackers sought to solve their problems with erratic winter ice supply, they too adopted mechanical refrigeration on a large scale after By the first quarter of the twentieth century, the delivery of perishable foods throughout the United Statesâ€”and international food shipments as wellâ€”had come to depend on mechanical refrigeration. By drastically lowering the rate at which food decayed and hence making perishable crops available to consum- Page 56 Share Cite Suggested Citation: The most widespread early refrigeration technology depended on compressed ammonia gas, which easily produced desired drops in temperature for effective food storage. But ammonia like other refrigerant gases such as sulfur dioxide and methyl chloride had serious problems. For maximum efficiency, it had to attain high pressures before being released, which increased the likelihood that the compression equipment might fail. Accidental explosions were frequent, and the toxic nature of the gas caused a number of fatalities. Toxicity and the need for large expensive compressors kept mechanical refrigeration from making headway with retail customers, who represented an immense potential demand. That is why Thomas Midgely Jr. Midgely, working at the request of the General Motors Frigidaire division, developed the new chlorinated fluorocarbon as the perfect alternative to all other refrigerant gases then on the market. Nonflammable, nonexplosive, noncorrosive, and nontoxic, the various forms of Freon gas seemed the perfect technical solution to a host of environmental and

safety problems. They also required less pressure to produce the desired cooling effect, so compressors could be smaller and less expensive. Freon soon came to dominate the market for refrigeration and opened up new retail markets because of its diminished capital requirements. Previously, consumers had bought their refrigerated food at the store just before eating it, since efficient and reliable household refrigeration was not generally available. Now American households could own their own refrigerators, making it possible for the food industry to shift much of its marketing apparatus toward selling chilled food in retail-sized packages. Frozen foods burst onto the American marketplace in the s, as did fresh vegetables, dairy products, and other foods that are today accepted as ordinary parts of the national diet. Although European countries were slower to adopt these technologies, they too eventually followed suit. No less importantly, the nontoxicity of Freon made it possible for refrigeration technology to be applied to the ambient cooling of buildings, so that air conditioning came to be an ever more important market for the gas. Air conditioning had been used in specialized industrial applications ever since Willis H. The introduction of Freon meant that air conditioning suddenly became much cheaper and safer in a way that allowed it to Page 57 Share Cite Suggested Citation:

Chapter 9 : Long-term warming, short-term variability: why climate change is still an issue

A useful accounting system for the human causes of global change has a tree structure in which properties of the global environment are linked to the major human activities that alter them, and in which the activities are divided in turn into their constituent parts or influences.

Two millennia of mean surface temperatures according to different reconstructions from climate proxies , each smoothed on a decadal scale, with the instrumental temperature record overlaid in black. Multiple independently produced datasets confirm that from to the global average land and ocean surface temperature increased by 0. The rest has melted ice and warmed the continents and the atmosphere. Regional effects of global warming and Cold blob North Atlantic Difference between average temperature in â€" compared to the period, showing strong arctic amplification. Global warming refers to global averages. It is not uniform around the world: Although more greenhouse gases are emitted in the Northern than in the Southern Hemisphere, this does not contribute to the difference in warming because the major greenhouse gases persist long enough to diffuse within and between the two hemispheres. One climate commitment study concluded that if greenhouse gases were stabilized at year levels, surface temperatures would still increase by about 0. Some of this surface warming would be driven by past natural forcings which have not yet reached equilibrium in the climate system. Some climatologists have criticized the attention that the popular press gives to "warmest year" statistics. Attribution of recent climate change By itself, the climate system may generate random changes in global temperatures for years to decades at a time, but long-term changes emanate only from so-called external forcings. It was proposed by Joseph Fourier in , discovered in by John Tyndall , [63] was first investigated quantitatively by Svante Arrhenius in , [64] and the hypothesis was reported in the popular press as early as The rest of this increase is caused mostly by changes in land-use, particularly deforestation. According to professor Brian Hoskins , this is likely the first time CO2 levels have been this high for about 4. Attributions of emissions due to land-use change are subject to considerable uncertainty. Atmospheric particles from these and other sources could have a large effect on climate through the aerosol indirect effect. They exert a cooling effect by increasing the reflection of incoming sunlight. Removal by clouds and precipitation gives tropospheric aerosols an atmospheric lifetime of only about a week, while stratospheric aerosols can remain for a few years. Carbon dioxide has a lifetime of a century or more, and as such, changes in aerosols will only delay climate changes due to carbon dioxide. Sulfate aerosols act as cloud condensation nuclei and thus lead to clouds that have more and smaller cloud droplets. These clouds reflect solar radiation more efficiently than clouds with fewer and larger droplets, a phenomenon known as the Twomey effect. Indirect effects of aerosols represent the largest uncertainty in radiative forcing. Atmospheric soot directly absorbs solar radiation, which heats the atmosphere and cools the surface. Contribution of natural factors and human activities to radiative forcing of climate change. Climate change feedback , Climate sensitivity , and Arctic amplification The dark ocean surface reflects only 6 percent of incoming solar radiation, whereas sea ice reflects 50 to 70 percent. Positive feedbacks increase the response of the climate system to an initial forcing, while negative feedbacks reduce it. Other factors being equal, a higher climate sensitivity means that more warming will occur for a given increase in greenhouse gas forcing. More research is needed to understand the role of clouds [] and carbon cycle feedbacks in climate projections. Another study conducted by Harvard researchers suggests that increased water vapor injected into the stratosphere , due to rising temperatures, increases ozone depletion , subsequently raising the odds of skin cancer and damaging crops. Projected change in annual mean surface air temperature from the late 20th century to the middle 21st century, based on a medium emissions scenario SRES A1B. Global climate model A climate model is a representation of the physical, chemical and biological processes that affect the climate system. Instead the models predict how greenhouse gases will interact with radiative transfer and other physical processes. Warming or cooling is thus a result, not an assumption, of the models. Although these models do not unambiguously attribute the warming that occurred from approximately to to either natural variation or human effects, they do indicate that the warming since is dominated by anthropogenic greenhouse gas emissions. Observed Arctic shrinkage has been faster than that predicted.

Effects of global warming Projections of global mean sea level rise by Parris and others. Map of the Earth with a six-meter sea level rise represented in red. Sparse records indicate that glaciers have been retreating since the early s. Biosphere Overall, it is expected that climate change will result in the extinction of many species and reduced diversity of ecosystems. Geological Survey projects that two-thirds of polar bears will disappear by Physical impacts of climate change and Climate change and ecosystems The environmental effects of global warming are broad and far reaching. They include the following diverse effects: Arctic sea ice decline , sea level rise , retreat of glaciers: Global warming has led to decades of shrinking and thinning in a warm climate that has put the Arctic sea ice in a precarious position, it is now vulnerable to atmospheric anomalies. Additionally, sea level rise has accelerated from to Data analysis of extreme events from until suggests that droughts and heat waves appear simultaneously with increased frequency. In terrestrial ecosystems , the earlier timing of spring events, as well as poleward and upward shifts in plant and animal ranges, have been linked with high confidence to recent warming. On the timescale of centuries to millennia, the magnitude of global warming will be determined primarily by anthropogenic CO2 emissions. This could lead to landslides and increased seismic and volcanic activities. Tsunamis could be generated by submarine landslides caused by warmer ocean water thawing ocean-floor permafrost or releasing gas hydrates. Climate change could result in global, large-scale changes in natural and social systems. Examples of abrupt climate change are the rapid release of methane and carbon dioxide from permafrost , which would lead to amplified global warming. Another example is the possibility for the Atlantic Meridional Overturning Circulation to slow- or shutdown see also shutdown of thermohaline circulation. Effects of global warming on humans , Effects of global warming on human health , Climate change and national security , Climate refugee , Climate change adaptation , and Economics of global warming The effects of climate change on human systems , mostly due to warming or shifts in precipitation patterns, or both, have been detected worldwide. The future social impacts of climate change will be uneven across the world.