NASA Goddard Institute for Space Studies analysis of global temperature data.

http://svs.gsfc.nasa.gov/vis/a000000/a003600/a003674/index.html

So...

According to the latest data (October 2015) on the prevalence of global warming denial among the US public, 1 in 6 of Americans do not believe that global warming is happening. About 2/3 do believe that global warming is happening, but half of these don’t think this has anything to do with human activities.

Note that these statistics are much better than 2 years ago, where 1 in 4 Americans thought that global warming was not happening - this happened to represent a 6 year high.

http://environment.yale.edu/climate-communication/article/more-americans-perceive-harm-from-global-warming-survey-finds

The projected timing of climate departure from recent variability

Louise M. Giuseffi 1
Camilo Mora 1
The projected timing of climate departure from recent variability is shown in Extended Data Fig. 1. We therefore describe our results on the basis of multi-model averages. We show standard deviations to report the variability between models in the predicted years) was measured as

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SO WHAT DOES THE FUTURE HOLD?

E8: A large fraction of anthropogenic climate change resulting from CO2 emissions is irreversible on a multi-century to millennial time scale, except in the case of a large net removal of CO2 from the atmosphere over a sustained period. Surface temperatures will remain approximately constant at elevated levels for many centuries after a complete cessation of net anthropogenic CO2 emissions. Due to the long time scales of heat transfer from the ocean surface to depth, ocean warming will continue for centuries. Depending on the scenario, about 15 to 40% of emitted CO2 will remain in the atmosphere longer than 1,000 years.
E1: Increase of global mean surface temperatures for 2081–2100 relative to 1986–2005 is projected to likely be in the ranges derived from the concentration-driven CMIP5 model simulations, that is, 0.3°C to 1.7°C (RCP2.6), 1.1°C to 2.6°C (RCP4.5), 1.4°C to 3.1°C (RCP6.0), 2.6°C to 4.8°C (RCP8.5). The Arctic region will warm more rapidly than the global mean, and mean warming over land will be larger than over the ocean (very high confidence).

B2: More than 60% of the net energy increase in the climate system is stored in the upper ocean (0–700 m) during the relatively well-sampled 40-year period from 1971 to 2010, and about 30% is stored in the ocean below 700 m. The increase in upper ocean heat content during this time period estimated from a linear trend is likely 17 [15 to 19] x 10^22 J.

It is about as likely as not that ocean heat content from 0–700 m increased more slowly during 2003 to 2010 than during 1993 to 2002. Ocean heat uptake from 700–2000 m, where interannual variability is smaller, likely continued unabated from 1993 to 2009.

D1: The observed reduction in surface warming trend over the period 1998 to 2012 as compared to the period 1951 to 2012, is due in roughly equal measure to a reduced trend in radiative forcing and a cooling contribution from natural internal variability, which includes a possible redistribution of heat within the ocean (medium confidence). The reduced trend in radiative forcing is primarily due to volcanic eruptions and the timing of the downward phase of the 11-year solar cycle. However, there is low confidence in quantifying the role of changes in radiative forcing in causing the reduced warming trend. There is medium confidence that natural internal decadal variability causes to a substantial degree the difference between observations and the simulations; the latter are not expected to reproduce the timing of natural internal variability. There may also be a contribution from forcing inadequacies and, in some models, an overestimate of the response to increasing greenhouse gas and other anthropogenic forcing (dominated by the effects of aerosols).

Coverage bias in the HadCRUT4 temperature series and its impact on recent temperature trends.

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Incomplete global coverage is a potential source of bias in global temperature reconstructions if the unsampled regions are not uniformly distributed over the planet’s surface. The widely used HadCRUT4 dataset covers on average about 84% of the globe over recent decades, with the unsampled regions being concentrated at the poles and over Africa. These existing reconstructions with near-global coverage are examined, each suggesting that HadCRUT4 is subject
The Anthropocene is functionally and stratigraphically distinct from the Holocene


Human activity is leaving a pervasive and persistent signature on Earth. Vigorous debate continues about whether this warrants recognition as a new geologic time unit known as the Anthropocene. We review anthropogenic markers of functional changes in the Earth system through the stratigraphic record. The appearance of manufactured materials in sediments, including aluminum, plastics, and concrete, coincides with global spikes in fossil fuel combustion. Carbon, nitrogen, and phosphorus cycles have been substantially modified over the past century. Rates of sea-level rise and the extent of human perturbation of the climate system exceed Late Holocene changes. Biotic changes include species invasions worldwide and accelerating rates of extinction. These combined signals render the Anthropocene stratigraphically distinct from the Holocene and earlier epochs.

Ocean acidification is quantified by decreases in pH. The pH of ocean surface water has decreased by 0.1 since the beginning of the industrial era (high confidence), corresponding to a 26% increase in hydrogen ion concentration.

1. A paper examining the albedo effects of the vast sheep population in New Zealand has been previously published. In this paper, it noted the sharp decline in sheep numbers in a 2006 foot and mouth outbreak correlated strongly with noticeably lowered reflection measurements.

2. If we were to assume that Spongebob Squarepants is real, various ocean models suggest that he would be in serious trouble in about 50 years or so.

3. Research has shown that cow farts contribute significant positive radiative forcing.

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Permafrost degradation and methane: low risk of biogeochemical climate-warming feedback

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Abstract

Climate change and permafrost thaw have been suggested to increase high latitude methane emissions that could potentially represent a strong feedback to the climate system. Using an integrated earth-system model framework, we examine the degradation of near-surface permafrost, temporal dynamics of inundation (lakes and wetlands) induced by hydro-climate change, enhanced methane emissions, and potential climate feedback. We find that increases in permafrost degradation may not be robust enough to produce robust methane emissions that would otherwise be considered a significant climate feedback.

Introduction

Forest disturbances are major sources of carbon dioxide to the atmosphere, and therefore impact global climate. Biogeochemical attributes, such as surface albedo (reflectivity), further control the climate-regulating properties of forests. Using both tower-based and remotely sensed data sets, we show that natural disturbances from wildfires, beetle outbreaks, and hurricanes can significantly alter surface albedo, and the associated radiative forcing either offsets or enhances the CO₂ forcing caused by increasing ecosystem carbon sequestration over multiple years. In the examined cases, the radiative forcing from albedo change is in the same order of magnitude as the CO₂ forcing. The net radiative forcing resulting from these two factors leads to a local heating offset in a hurricane-damaged mangrove forest in the southern Florida peninsula and a cooling effect following wildfire and mountain pine beetle attack in boreal forests with net radiative forcing resulting from these two factors leads to a local heating effect in a hurricane-damaged mangrove forest in the southern Florida peninsula and a cooling effect following wildfire and mountain pine beetle attack in boreal forests with

Radiative forcing of natural forest disturbances

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Abstract

Forest disturbances are major sources of carbon dioxide to the atmosphere, and therefore impact global climate. Biogeochemical attributes, such as surface albedo (reflectivity), further control the climate-regulating properties of forests. Using both tower-based and remotely sensed data sets, we show that natural disturbances from wildfires, beetle outbreaks, and hurricanes can significantly alter surface albedo, and the associated radiative forcing either offsets or enhances the CO₂ forcing caused by increasing ecosystem carbon sequestration over multiple years. In the examined cases, the radiative forcing from albedo change is in the same order of magnitude as the CO₂ forcing. The net radiative forcing resulting from these two factors leads to a local heating offset in a hurricane-damaged mangrove forest in the southern Florida peninsula and a cooling effect following wildfire and mountain pine beetle attack in boreal forests with net radiative forcing resulting from these two factors leads to a local heating effect in a hurricane-damaged mangrove forest in the southern Florida peninsula and a cooling effect following wildfire and mountain pine beetle attack in boreal forests with net radiative forcing resulting from these two factors leads to a local heating offset in a hurricane-damaged mangrove forest in the southern Florida peninsula and a cooling effect following wildfire and mountain pine beetle attack in boreal forests with

Introduction

Terrestrial disturbances are primary regulators of the global carbon cycle (Greenland, 2000) and can switch
D3: Greenhouse gases contributed a global mean surface warming likely to be in the range of 0.5°C to 1.3°C over the period 1951 to 2010, with the contributions from other anthropogenic forcings, including the cooling effect of aerosols, likely to be in the range of −0.6°C to 0.1°C. The contribution from natural forcings is likely to be in the range of −0.1°C to 0.1°C, and from natural internal variability is likely to be in the range of −0.1°C to 0.1°C. Together these assessed contributions are consistent with the observed warming of approximately 0.6°C to 0.7°C over this period.
AMOC increases due to large natural internal variability. There may be some decades when the AMOC will weaken by about 2050, but there may be some decades when the AMOC will strengthen, i.e., increased by 24% in RCP2.6 and 34% (12 to 54%) in RCP8.5. It is very likely that the Atlantic Meridional Overturning Circulation (AMOC) will weaken over the 21st century. Best estimates and ranges for the reduction are 11% (1 to 24%) in RCP2.6 and 34% (12 to 54%) in RCP8.5. It is likely that there will be some decline in the AMOC by about 2050, but there may be some decades when the AMOC increases due to large natural internal variability.

**WHICH ONE IS FALSE?**

1. One informal study found that only one academic, out of over 9000 published in recent peer reviewed climate change research (all scientific papers published from November 2012 to December 2013), rejected man made global warming.

2. Calculations suggest that on average, each North American wastes approximately 500kcal of food each day - roughly equivalent to a quarter of the total dietary needs of an average woman.

3. The first convincing model of geoengineering effects suggests that use of sulphates in the atmosphere can inadvertently lead to issues of global inequity.

E4: It is very unlikely that the AMOC will undergo an abrupt transition or collapse in the 21st century for the scenarios considered. There is low confidence in assessing the evolution of the AMOC beyond the 21st century because of the limited number of analyses and equivocal results. However, a collapse beyond the 21st century for large sustained warming cannot be excluded.

**Environmental Problems**

The modern science of climatology gives no answers sufficiently accurate and reliable for practical applications to the question of what the main cause of the current climate warming is and of how this process will develop in the near future. To date, the main difficulty has been to assess the role of variations in solar activity. As a rule, all attempts to account for the contribution of solar–cosmic factors to the external impact on the weather–climate system are reduced to considering variations in the flux of solar radiation energy or cosmic rays. However, the changes in both are very insignificant.

**The Role of Solar Activity in Global Warming**

S. V. Avakyan

More than 40 years ago, in the fall of 1972, the first Ali-Union conference "Solar–Atmospheric Correlations in Climate Theory and Weather Forecasts" was held in Moscow. It adopted a resolution that formulated general problems and objectives. The conference stated [1, p. 483].

Studies on the Sun–atmosphere problem, which have been performed in the Soviet Union and abroad since then, have provided the existence of a considerable influence of solar activity and other cosmic and geophysical factors on atmospheric processes. Consequently, studies on this problem are of high practical significance...

In May 1973, the Hydrometeorological Service Headquarters organized the Scientific Council on Solar–Atmospheric Correlations in Weather Forecasts; before this, the Laboratory of Solar–Terrestrial Correlations at the Hydrometeorological Center was opened. However, it is becoming obvious that the then natural science was short of the necessary data about the environment. Moreover, meteorologists and climatologists were not prepared for taking into account solar activity.

Today the scientific world enjoys a significantly larger reserve of knowledge about the nature and intensity of solar–geomagnetic disturbances and their manifestations in the environment, including the biosphere and human beings. On the other hand, the problem of the global increase in the mean surface and then to carbon-free energy within the framework of the Kyoto Protocol may lead to economic collapse for Russia as a consequence of the reduction and, probably, even loss of the possibility to sell oil and natural gas on the world market. The basis for this concern is that our most important industries (defence, aerospace, heavy engineering) have been in crisis for decades.

**IONOSPHERE AS A CURRENT SOLAR ACTIVITY SIGNAL GENERATOR**

The role of solar activity in global warming is of how this process will develop in the near future. To date, the main difficulty has been to assess the role of variations in solar activity. As a rule, all attempts to account for the contribution of solar–cosmic factors to the external impact on the weather–climate system are reduced to considering variations in the flux of solar radiation energy or cosmic rays. However, the changes in both are very insignificant.

It is worth recalling in this respect the constant value of the main part of the Sun’s radiant energy flux (this value is called the solar constant) coming to the lower atmosphere, the troposphere. This flux is now 1342 W m⁻² with account for the Earth's albedo.
Weakened tropical circulation and reduced precipitation in response to geoengineering

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E8: Methods that aim to deliberately alter the climate system to counter climate change, termed geoengineering, have been proposed. Limited evidence precludes a comprehensive quantitative assessment of both Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR) and their impact on the climate system. CDR methods have biogeochemical and technological limitations to their potential on a global scale. There is insufficient knowledge to quantify how much CO2 emissions could be partially offset by CDR on a century timescale. Modelling indicates that if SRM were terminated for any reason, there is high confidence that global surface temperatures would rise very rapidly to values consistent with the greenhouse gas forcing. CDR and SRM methods carry side effects and long-term consequences on a global scale.

Q: Do you think human activity is a significant contributing factor in changing mean global temperatures?

D3: It is extremely likely that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in greenhouse gas concentrations and other anthropogenic forcings together. The best estimate of the human-induced contribution to warming is similar to the observed warming over this period.

We very wasteful.
E8: Limiting the warming caused by anthropogenic CO₂ emissions alone with a probability of >33%, >50%, and >66% to less than 2°C since the period 1861–1880, will require cumulative CO₂ emissions from all anthropogenic sources to stay between 0 and about 1570 GtC (5760 GtCO₂), 0 and about 1210 GtC (4440 GtCO₂), and 0 and about 1000 GtC (3670 GtCO₂) since that period, respectively. These upper amounts are reduced to about 900 GtC (3300 GtCO₂), 820 GtC (3010 GtCO₂), and 790 GtC (2900 GtCO₂), respectively, when accounting for non-CO₂ forcings as in RCP2.6. An amount of 515 [445 to 585] GtC (1690 [1630 to 2150] GtCO₂), was already emitted by 2011.
IF YOU THINK ABOUT IT

SCIENCE, IN A WAY, HAS ALREADY PROVIDED US WITH THE KNOWLEDGE TO “FIX” CLIMATE CHANGE.

WE KNOW WHAT IS “AT FAULT.”

WE KNOW WHAT SHOULD BE “CHANGED.”

WE KNOW WHAT “MIGHT HAPPEN” IF WE DON’T CHANGE.

WE EVEN HAVE BENCHMARKS OF CHANGE TO AIM FOR.

SO WHY IS THIS SO DIFFICULT?