

Écologie

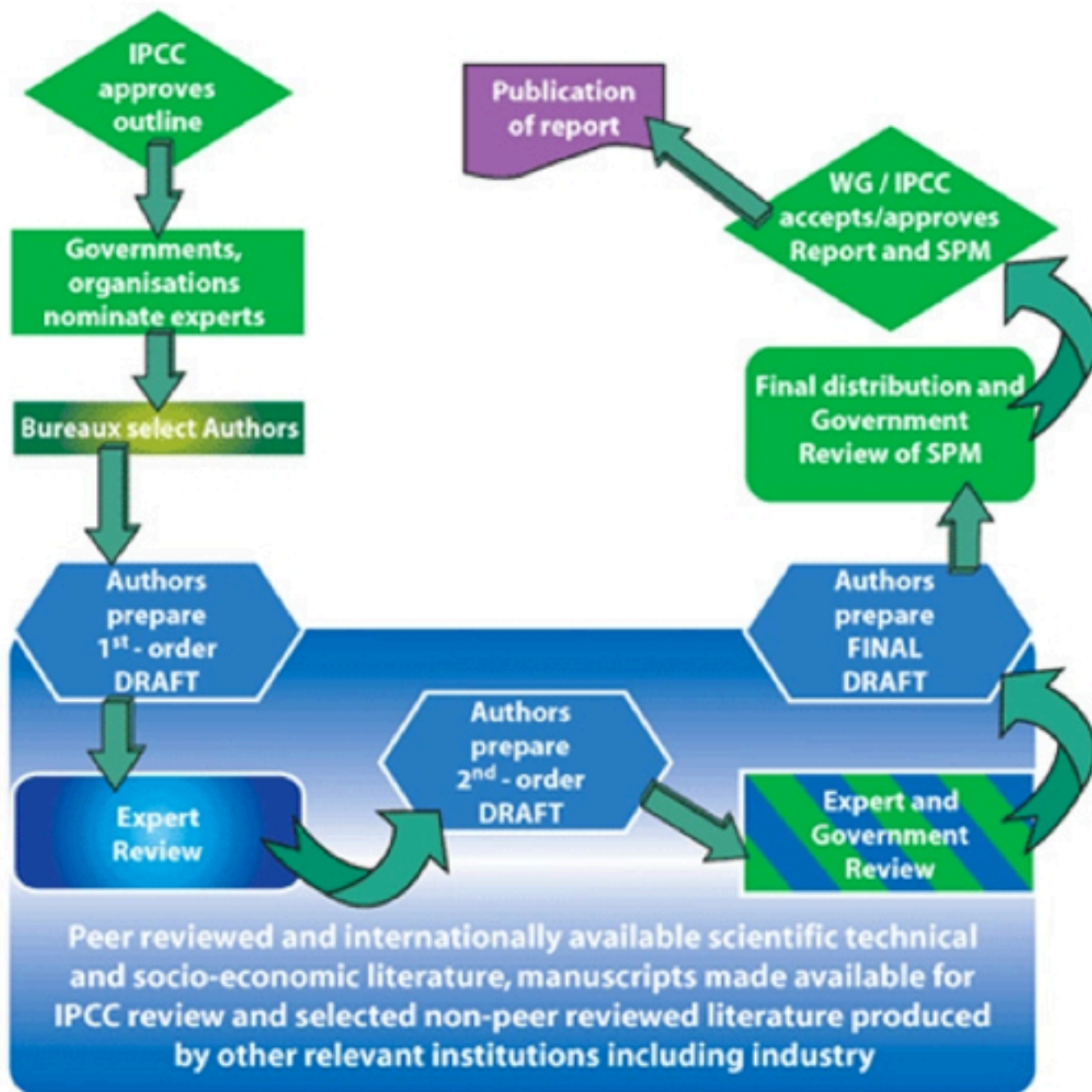
6. Le rapport du GIEC 2013, WG1

Enseignant : David Claessen

Centre de formation s sur l'environnement et la société (CERES)
et Institut de Biologie de l'ENS (IBENS)

École normale supérieure, 24 rue Lhomond, 75005 Paris

25 janvier 2016



Dans quel monde vivrons-nous demain ?
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LES CLÉS DE DEMAIN
Bâtissons une planète plus intelligente



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Pour sa survie, le Vanuatu apprend à lutter contre la montée des eaux



L'archipel développe une agriculture plus résistante aux chaleurs extrêmes. Selon le rapport du GIEC, la température de la Terre pourrait s'élever de 4,8 °C d'ici à 2100.

- L'archipel du Vanuatu tente de s'adapter au réchauffement climatique **PORTFOLIO**
- Réchauffement climatique : les experts du GIEC durcissent leur diagnostic 29
- Quels sont les enjeux du nouveau rapport du GIEC ?
- Climat : une pression supplémentaire sur les négociations internationales

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CHAT EN COURS

Aujourd'hui à 15h30

Quels sont les enjeux du nouveau rapport du GIEC ?

Débat en direct avec Hervé Le Treut, climatologue.

Posez vos questions

En continu

- 14:58 Débat sur le travail dominical
- 13:45 La "tomtato" : tomate-pomme de terre
- 13:41 Six syndicats de la SNCF condamnés
- 13:18 Grèce : Aube dorée menace le Parlement
- 13:07 Sécu : les économies de la gauche
- 13:06 La future zone franche de Shanghai
- 12:47 Une Pussy Riot "privée d'eau en prison"
- 11:57 Roms : Baudis épingle le gouvernement

> Tout le "en continu"

< 1/5 >

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Breaking news: Building collapses in India; dozens

IPCC report 'unequivocal' over man's climate impact

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UN secretary-general Ban Ki-moon urges global response to report, saying 'the heat is on – we must act'

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- Warming 'likely to breach threshold'
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- Why has IPCC legitimised geoengineering?
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"In their starkest warning yet, following nearly seven years of new research on the climate, the [Intergovernmental Panel on Climate Change \(IPCC\)](#) said it was "unequivocal" and that even if the world begins to moderate greenhouse gas emissions, warming is likely to cross the critical threshold of 2C by the end of this century. That would have serious consequences, including sea level rises, heatwaves and changes to rainfall meaning dry regions get less and already wet areas receive more."

“Other key points from the report are:

- Since the 1950's it's "extremely likely" that human activities have been the dominant cause of the temperature rise.
- Concentrations of CO₂ and other greenhouse gases in the atmosphere have increased to levels that are unprecedented in at least 800,000 years. The burning of fossil fuels is the main reason behind a 40% increase in CO₂ concentrations since the industrial revolution.
- Global temperatures are likely to rise by 0.3C to 4.8C, by the end of the century depending on how much governments control carbon emissions.
- Sea levels are expected to rise a further 26-82cm by the end of the century.
- The oceans have acidified as they have absorbed about a third of the carbon dioxide emitted.”

27 September 2013 Last updated less than one minute ago

the guardian

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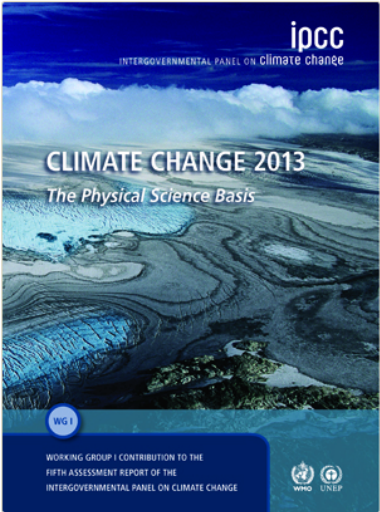
IPCC WGI AR5

Climate Change 2013: The Physical Science Basis

The Twelfth Session of Working Group I (WGI-12) was held from 23 to 26 September 2013 in Stockholm, Sweden. At the Session, the Summary for Policymakers (SPM) of the Working Group I contribution to the IPCC Fifth Assessment Report (WGI AR5) was approved and the underlying scientific and technical assessment accepted.

SUMMARY FOR POLICYMAKERS

PDF - 36 Pages - 2.3MB



- Worldwide Scientific Collaboration -

259	39	54677
AUTHORS	COUNTRIES	COMMENTS

For more details visit the [Background pages](#)



Working Group I Fact Sheet

The Working Group I contribution to the IPCC Fifth Assessment Report (WGI AR5) provides a comprehensive assessment of the physical science basis of climate change. The report was developed by an international team of scientists who were selected in May 2010. It went through a multi-stage review process involving expert reviewers and governments. It will be presented to the IPCC member governments for approval and acceptance in September 2013.

The Report

- **1** Scoping Meeting to outline **14** Chapters
- Over **1000** nominations from **63** countries
- **209** Lead Authors and **50** Review Editors from **39** countries
- Over **600** Contributing Authors from **32** countries
- Over **2 million** gigabytes of numerical data from climate model simulations
- Over **9200** scientific publications cited

The First Order Draft Expert Review

- Nearly **1500** individuals registered
- **21,400** comments from **659** Expert Reviewers from **47** countries

The Second Order Draft Expert and Government Review

- Over **1500** individuals registered
- **31,422** comments from **800** Expert Reviewers from **46** countries and **26** Governments

The Final Government Distribution

- **1855** comments from **32** Governments on the Final Draft Summary for Policymakers

Total Reviews

- **54,677** comments
- **1089** Expert Reviewers from **55** countries
- **38** Governments

The WGI Approval Session

- 23-26 September 2013, Stockholm, Sweden
- The Summary for Policymakers will be approved line-by-line by up to **195** Governments

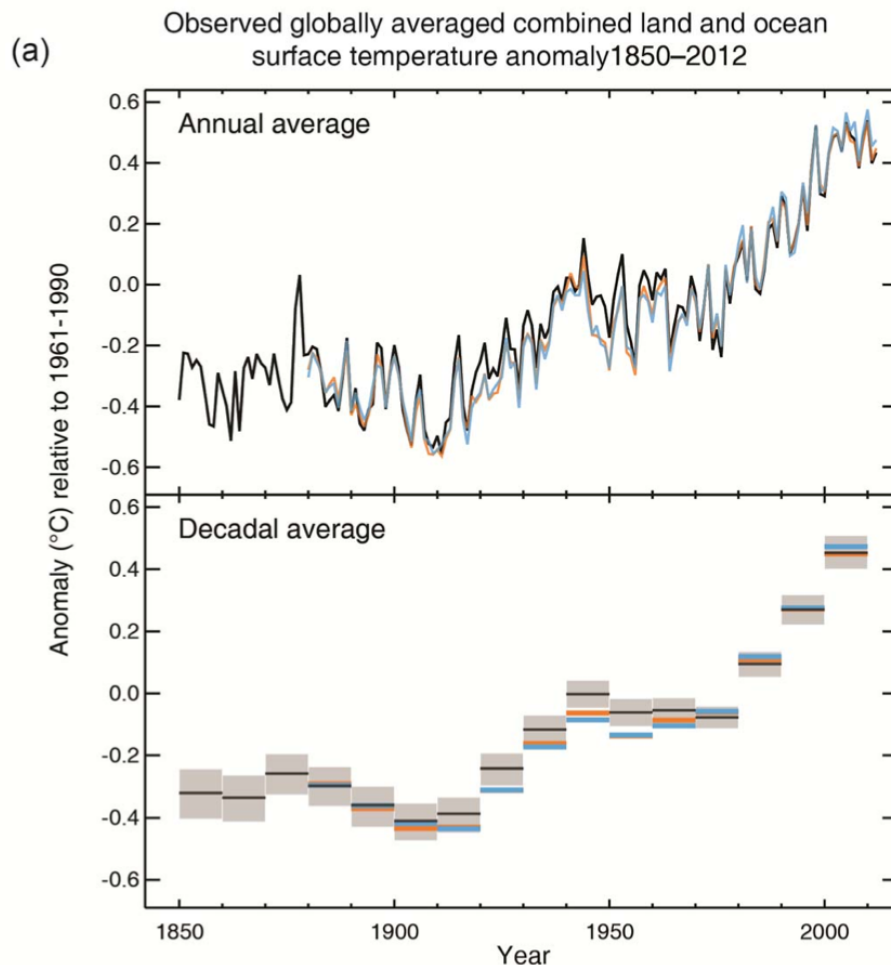
The degree of certainty in key findings in this assessment is based on the author teams' evaluations of underlying scientific understanding and is expressed as a qualitative level of confidence (from *very low* to *very high*) and, when possible, probabilistically with a quantified likelihood (from *exceptionally unlikely* to *virtually certain*). Confidence in the validity of a finding is based on the type, amount, quality, and consistency of evidence (e.g., data, mechanistic understanding, theory, models, expert judgment) and the degree of agreement¹. Probabilistic estimates of quantified measures of uncertainty in a finding are based on statistical analysis of observations or model results, or both, and expert judgment². Where appropriate, findings are also formulated as statements of fact without using uncertainty qualifiers. (See Chapter 1 and Box TS.1 for more details about the specific language the IPCC uses to communicate uncertainty)

¹ In this Summary for Policymakers, the following summary terms are used to describe the available evidence: limited, medium, or robust; and for the degree of agreement: low, medium, or high. A level of confidence is expressed using five qualifiers: very low, low, medium, high, and very high, and typeset in italics, e.g., *medium confidence*. For a given evidence and agreement statement, different confidence levels can be assigned, but increasing levels of evidence and degrees of agreement are correlated with increasing confidence (see Chapter 1 and Box TS.1 for more details).

² In this Summary for Policymakers, the following terms have been used to indicate the assessed likelihood of an outcome or a result: virtually certain 99–100% probability, very likely 90–100%, likely 66–100%, about as likely as not 33–66%, unlikely 0–33%, very unlikely 0–10%, exceptionally unlikely 0–1%. Additional terms (extremely likely: 95–100%, more likely than not >50–100%, and extremely unlikely 0–5%) may also be used when appropriate. Assessed likelihood is typeset in italics, e.g., *very likely* (see Chapter 1 and Box TS.1 for more details).

Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased (see Figures SPM.1, SPM.2, SPM.3 and SPM.4). {2.2, 2.4, 3.2, 3.7, 4.2–4.7, 5.2, 5.3, 5.5–5.6, 6.2, 13.2}

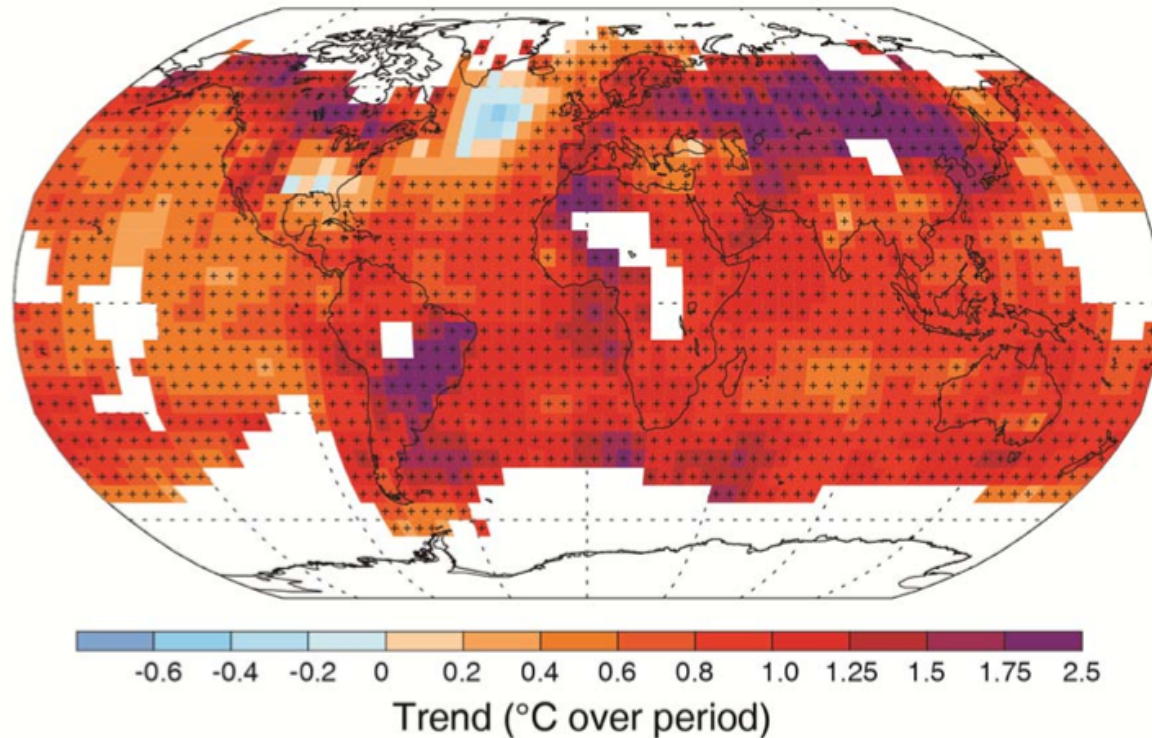
Figure SPM.1 [FIGURE SUBJECT TO FINAL COPYEDIT]



Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850 (see Figure SPM.1). In the Northern Hemisphere, 1983–2012 was *likely* the warmest 30-year period of the last 1400 years (*medium confidence*). {2.4, 5.3}

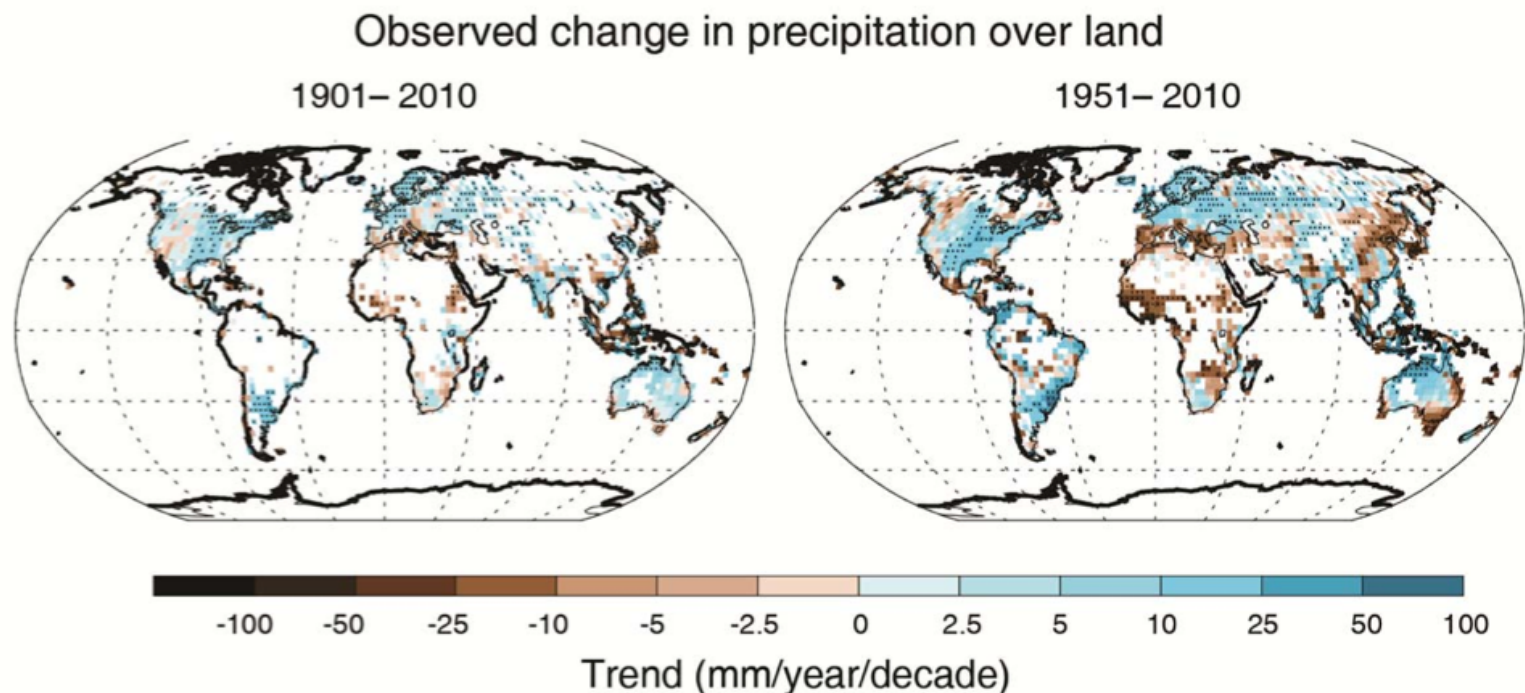
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(b) Observed change in average surface temperature 1901–2012



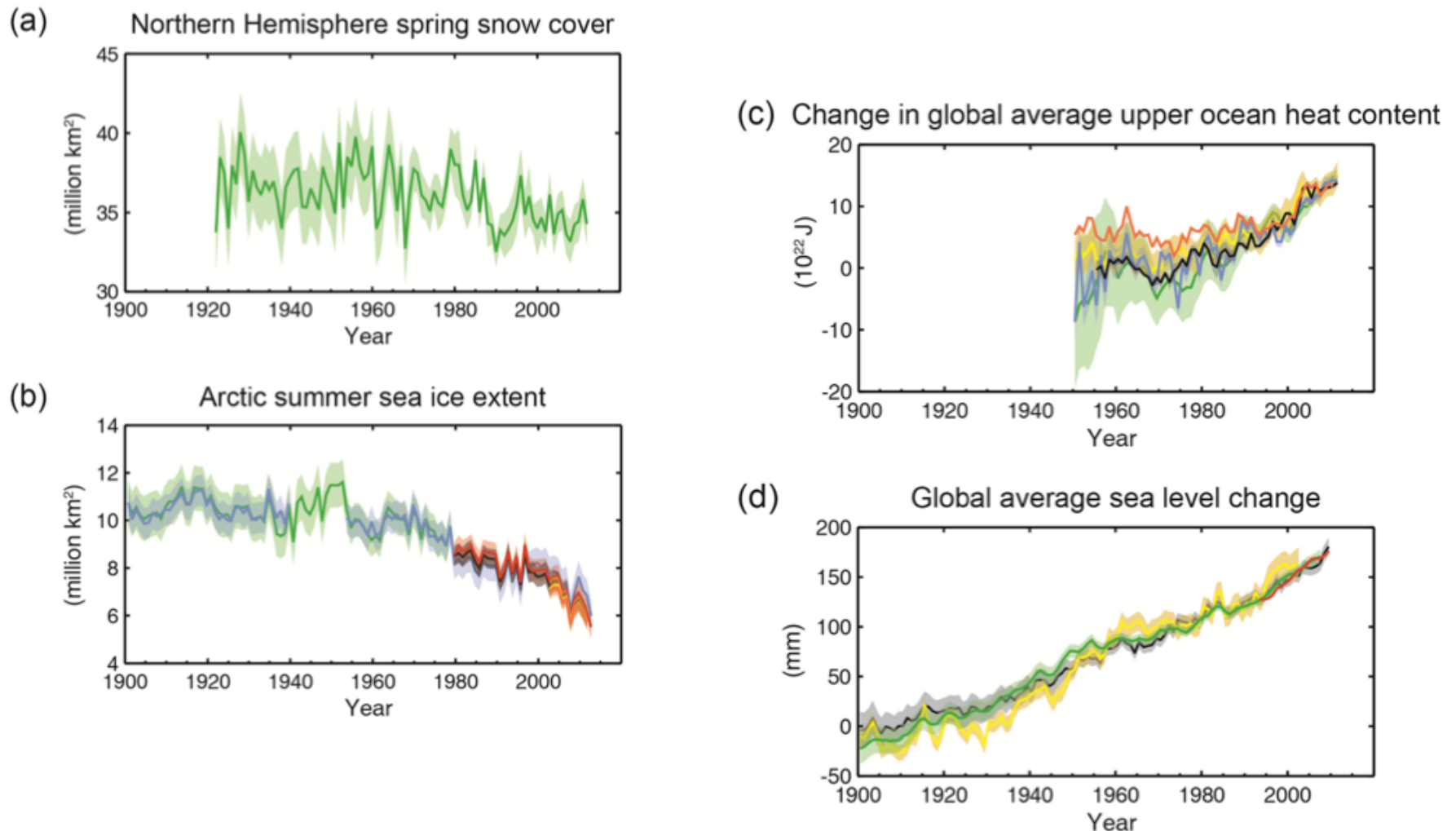
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Figure SPM.2 [FIGURE SUBJECT TO FINAL COPYEDIT]



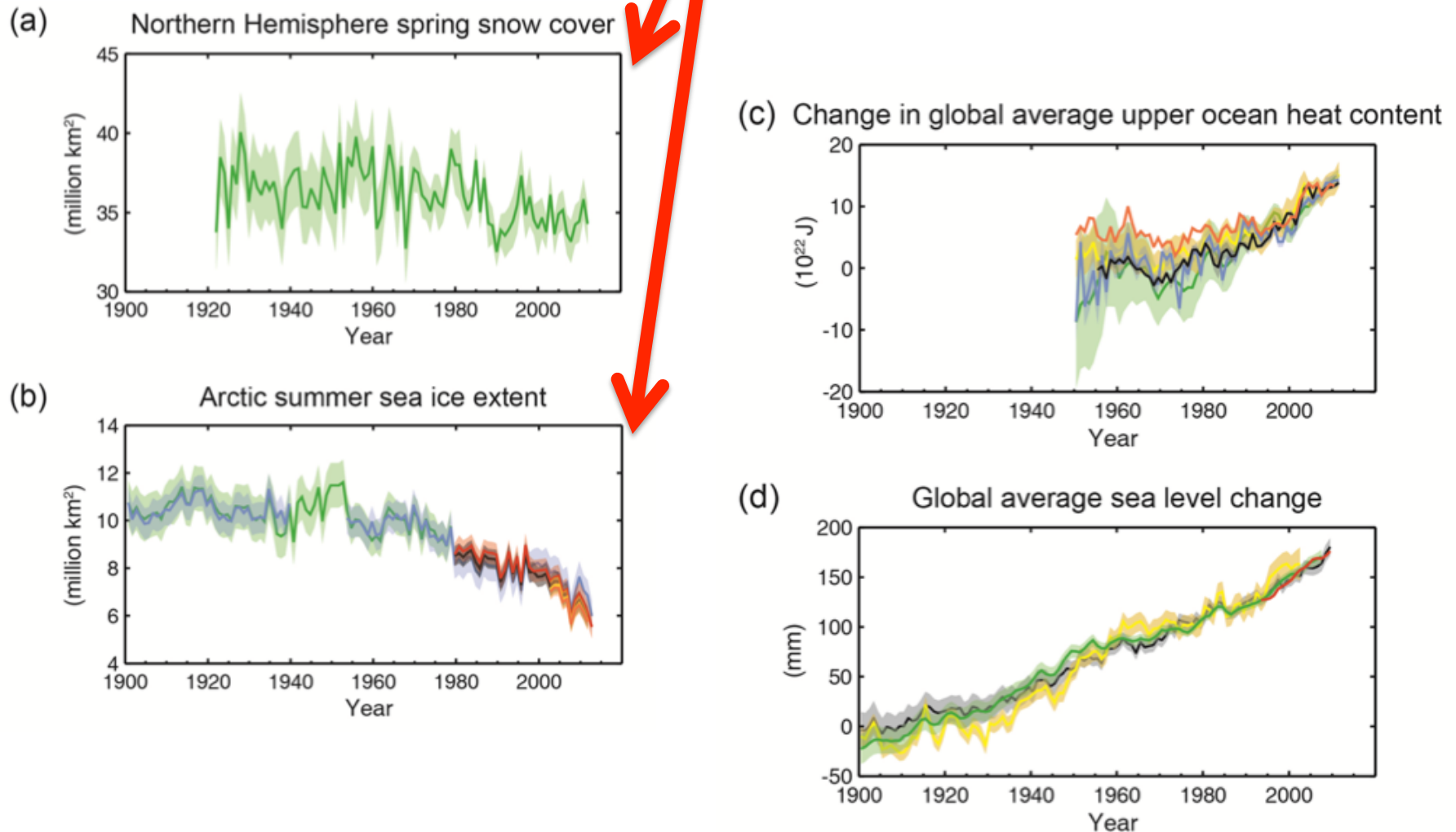
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Figure SPM.3 [FIGURE SUBJECT TO FINAL COPYEDIT]



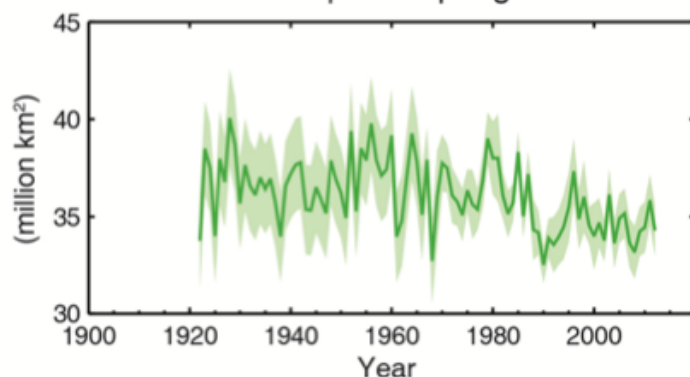
Over the last two decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent (*high confidence*) (see Figure SPM.3). {4.2–4.7}

Figure SPM.3 [FIGURE SUBJECT TO FINAL COPYEDIT]

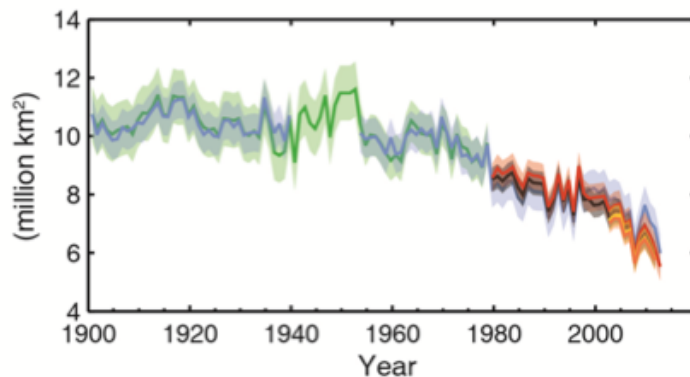


Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 (*high confidence*). It is *virtually certain* that the upper ocean (0–700 m) warmed from 1971 to 2010 (see Figure SPM.3), and it *likely* warmed between the 1870s and 1971. {3.2, Box 3.1}

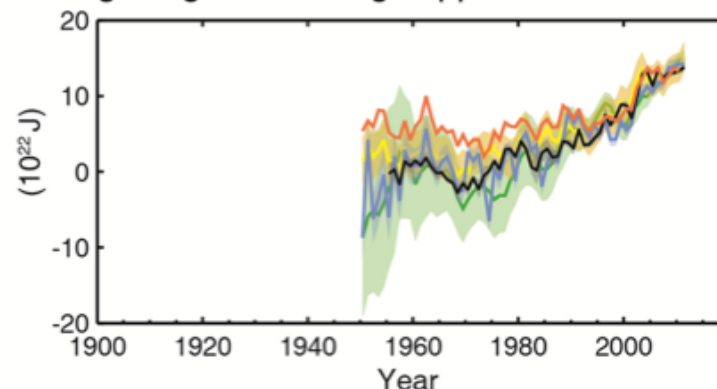
(a) Northern Hemisphere spring snow cover



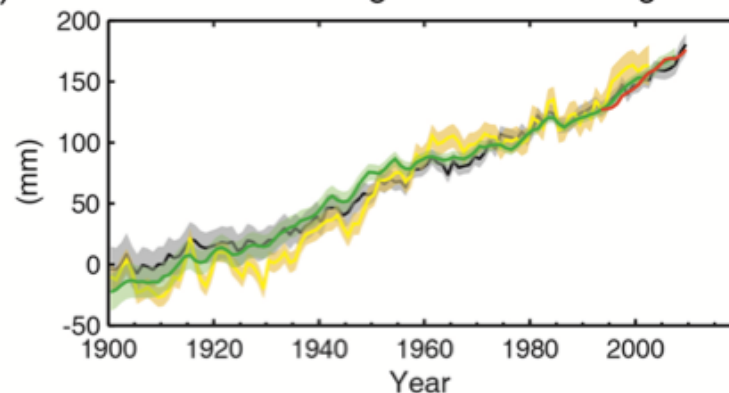
(b) Arctic summer sea ice extent



(c) Change in global average upper ocean heat content

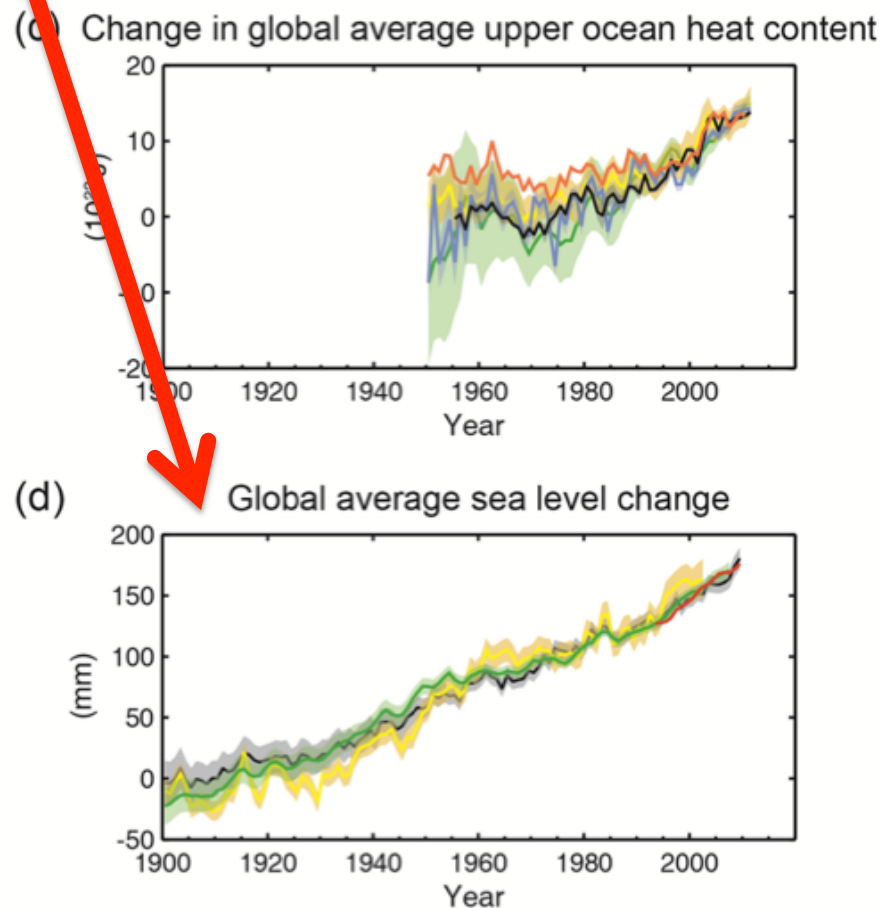
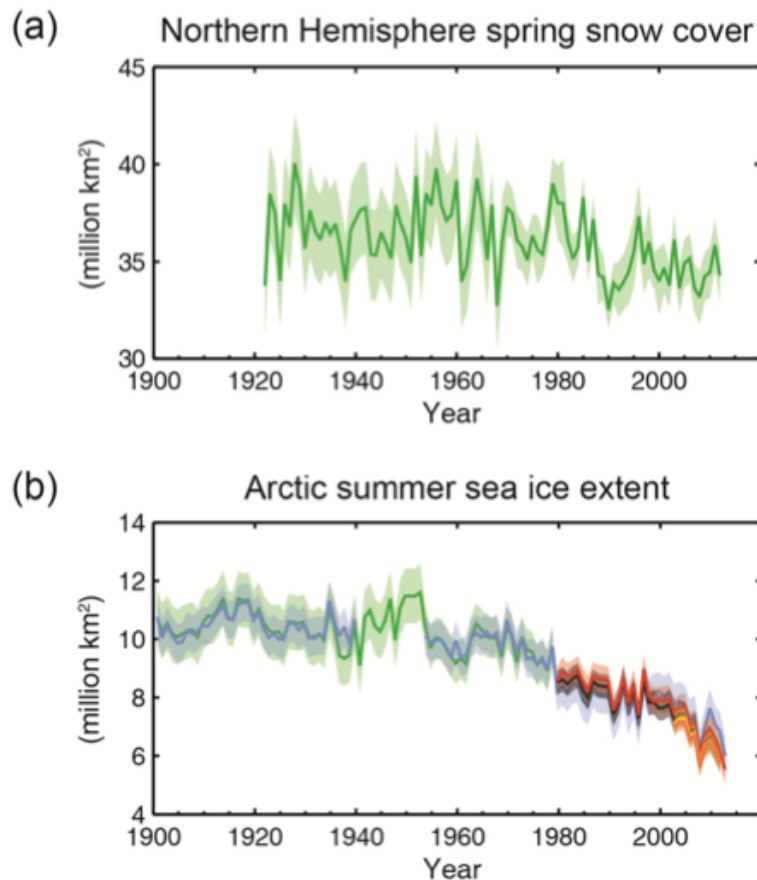


(d) Global average sea level change



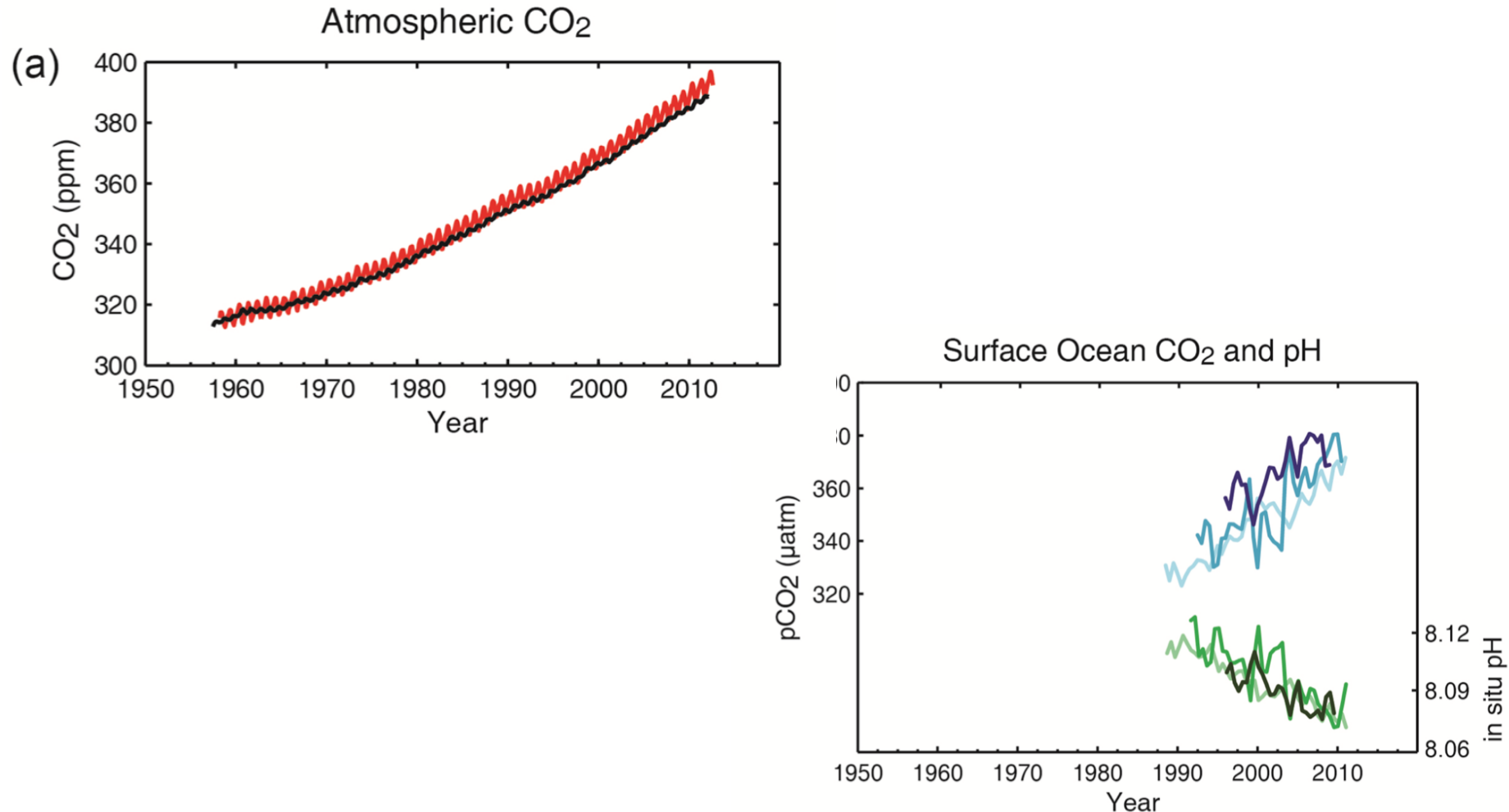
The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia (*high confidence*). Over the period 1901–2010, global mean sea level rose by 0.19 [0.17 to 0.21] m (see Figure SPM.3). {3.7, 5.6, 13.2}

Figure SPM.3 [FIGURE SUBJECT TO FINAL COPYEDIT]



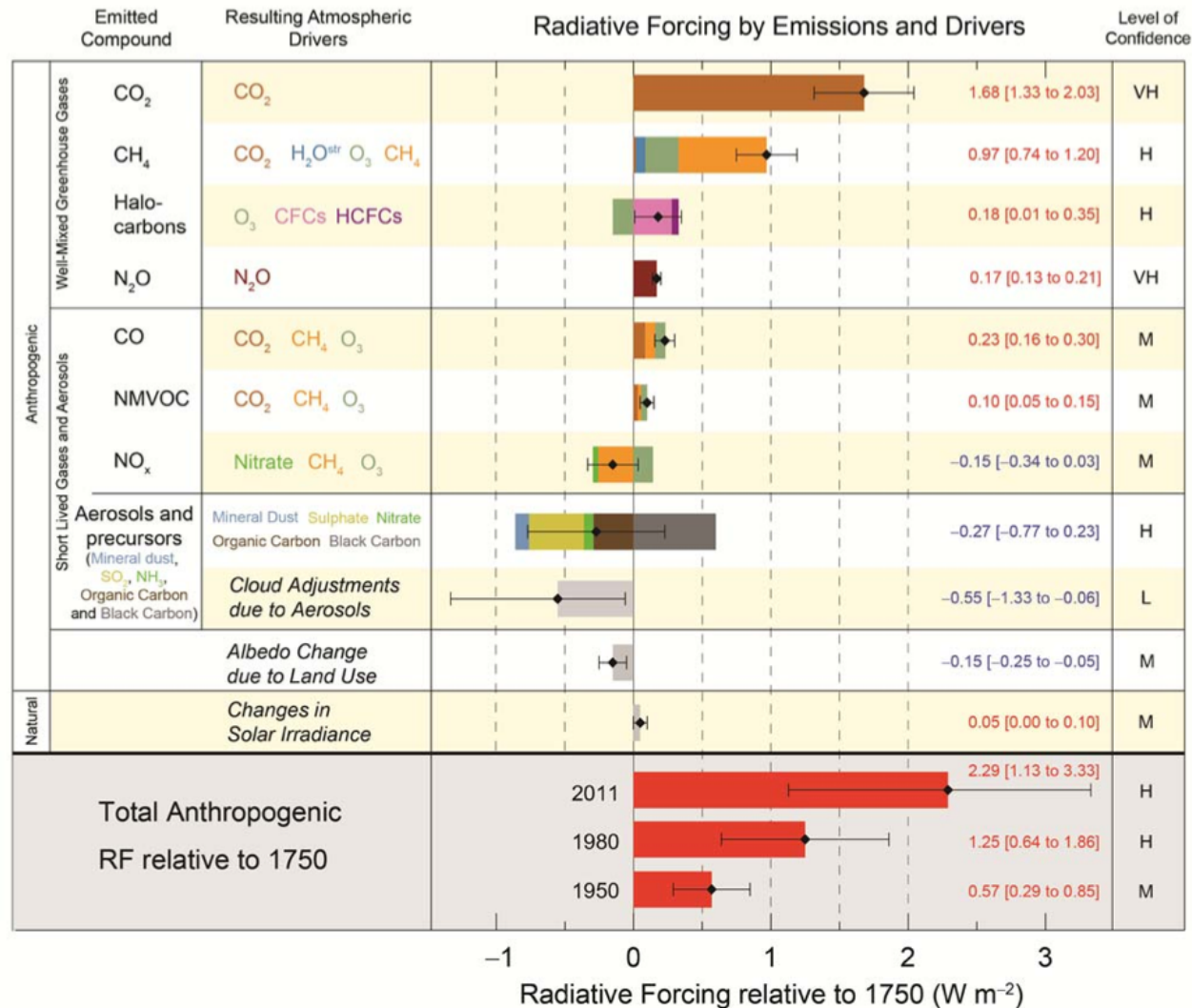
The atmospheric concentrations of carbon dioxide (CO₂), methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. CO₂ concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification (see Figure SPM.4). {2.2, 3.8, 5.2, 6.2, 6.3}

Figure SPM.4 [FIGURE SUBJECT TO FINAL COPYEDIT]



Total radiative forcing is positive, and has led to an uptake of energy by the climate system. The largest contribution to total radiative forcing is caused by the increase in the atmospheric concentration of CO₂ since 1750 (see Figure SPM.5). {3.2, Box 3.1, 8.3, 8.5}

Figure SPM.5 [FIGURE SUBJECT TO FINAL COPYEDIT]



Human influence on the climate system is clear. This is evident from the increasing greenhouse gas concentrations in the atmosphere, positive radiative forcing, observed warming, and understanding of the climate system. {2–14}

Climate models have improved since the AR4. Models reproduce observed continental-scale surface temperature patterns and trends over many decades, including the more rapid warming since the mid-20th century and the cooling immediately following large volcanic eruptions (*very high confidence*). {9.4, 9.6, 9.8}

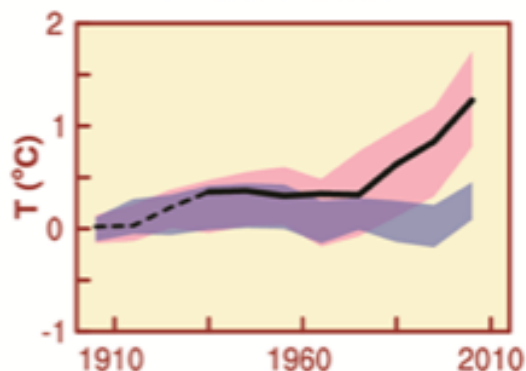
Observational and model studies of temperature change, climate feedbacks and changes in the Earth's energy budget together provide confidence in the magnitude of global warming in response to past and future forcing. {Box 12.2, Box 13.1}

- The net feedback from the combined effect of changes in water vapour, and differences between atmospheric and surface warming is *extremely likely* positive and therefore amplifies changes in climate. The net radiative feedback due to all cloud types combined is *likely* positive. Uncertainty in the sign and magnitude of the cloud feedback is due primarily to continuing uncertainty in the impact of warming on low clouds. {7.2}

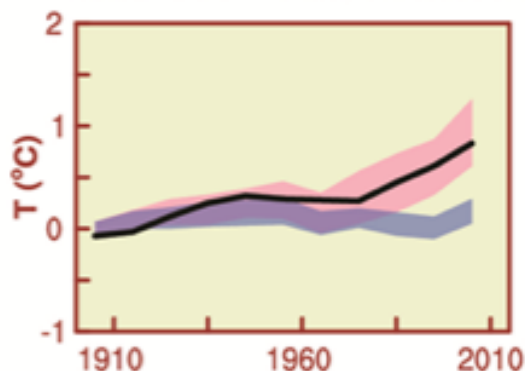
Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes (Figure SPM.6 and Table SPM.1). This evidence for human influence has grown since AR4. It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century. {10.3–10.6, 10.9}

Global Averages

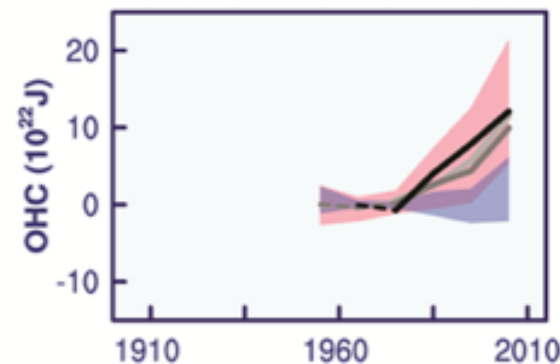
Land Surface



Land and Ocean Surface



Ocean Heat Content



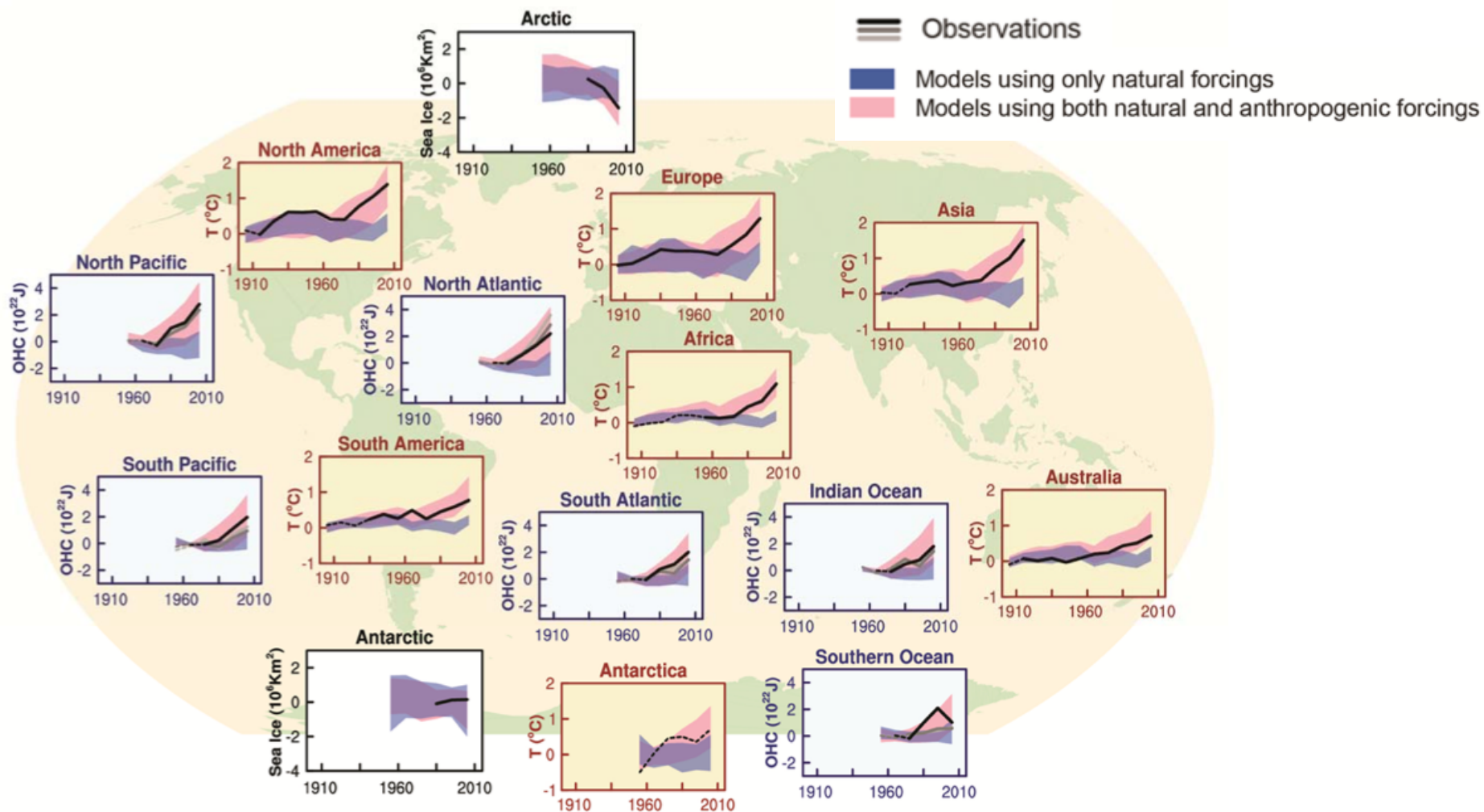
— Observations

Models using only natural forcings

Models using both natural and anthropogenic forcings

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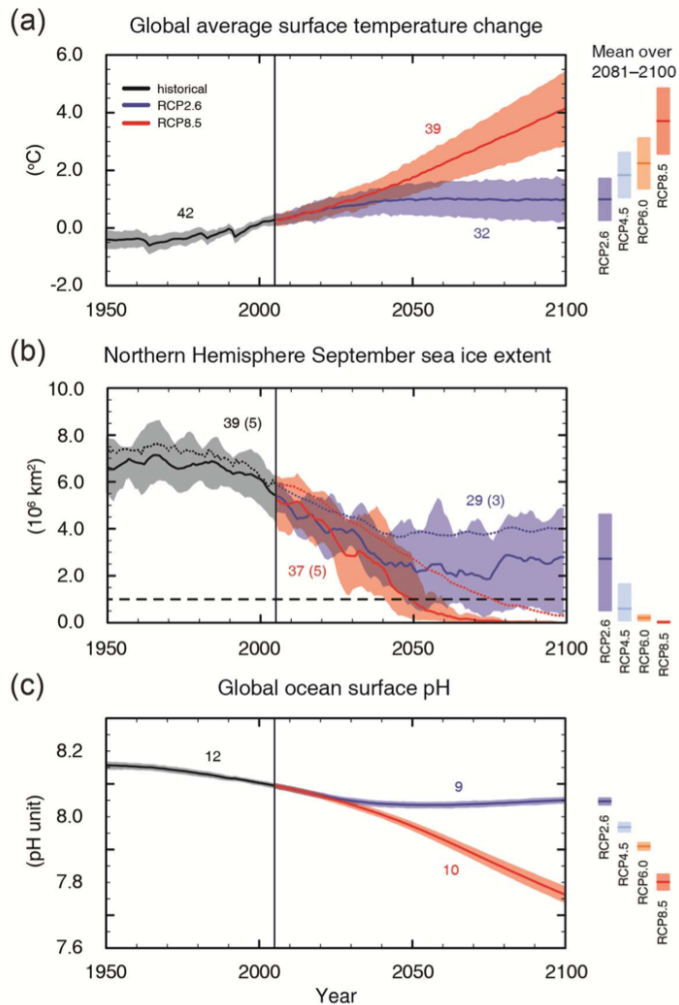
Figure SPM.6 [FIGURE SUBJECT TO FINAL COPYEDIT]



Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions. {Chapters 6, 11, 12, 13, 14}

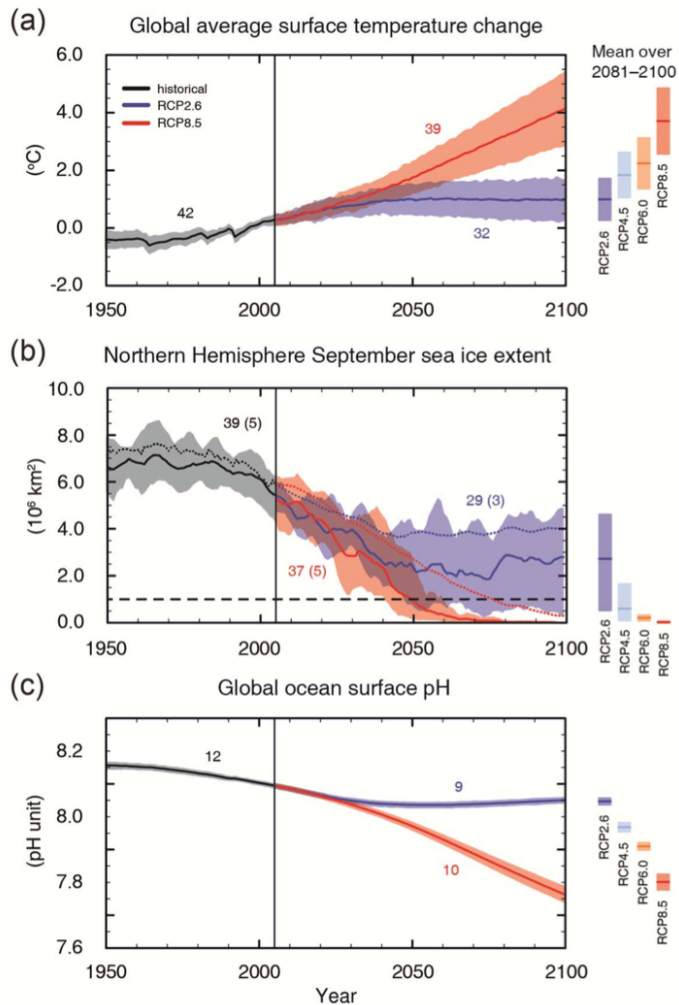
Global surface temperature change for the end of the 21st century is *likely* to exceed 1.5°C relative to 1850 to 1900 for all RCP scenarios except RCP2.6. It is *likely* to exceed 2°C for RCP6.0 and RCP8.5, and *more likely than not* to exceed 2°C for RCP4.5. Warming will continue beyond 2100 under all RCP scenarios except RCP2.6. Warming will continue to exhibit interannual-to-decadal variability and will not be regionally uniform (see Figures SPM.7 and SPM.8). {11.3, 12.3, 12.4, 14.8}

Figure SPM.7 [FIGURE SUBJECT TO FINAL COPYEDIT]



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Figure SPM.7 [FIGURE SUBJECT TO FINAL COPYEDIT]



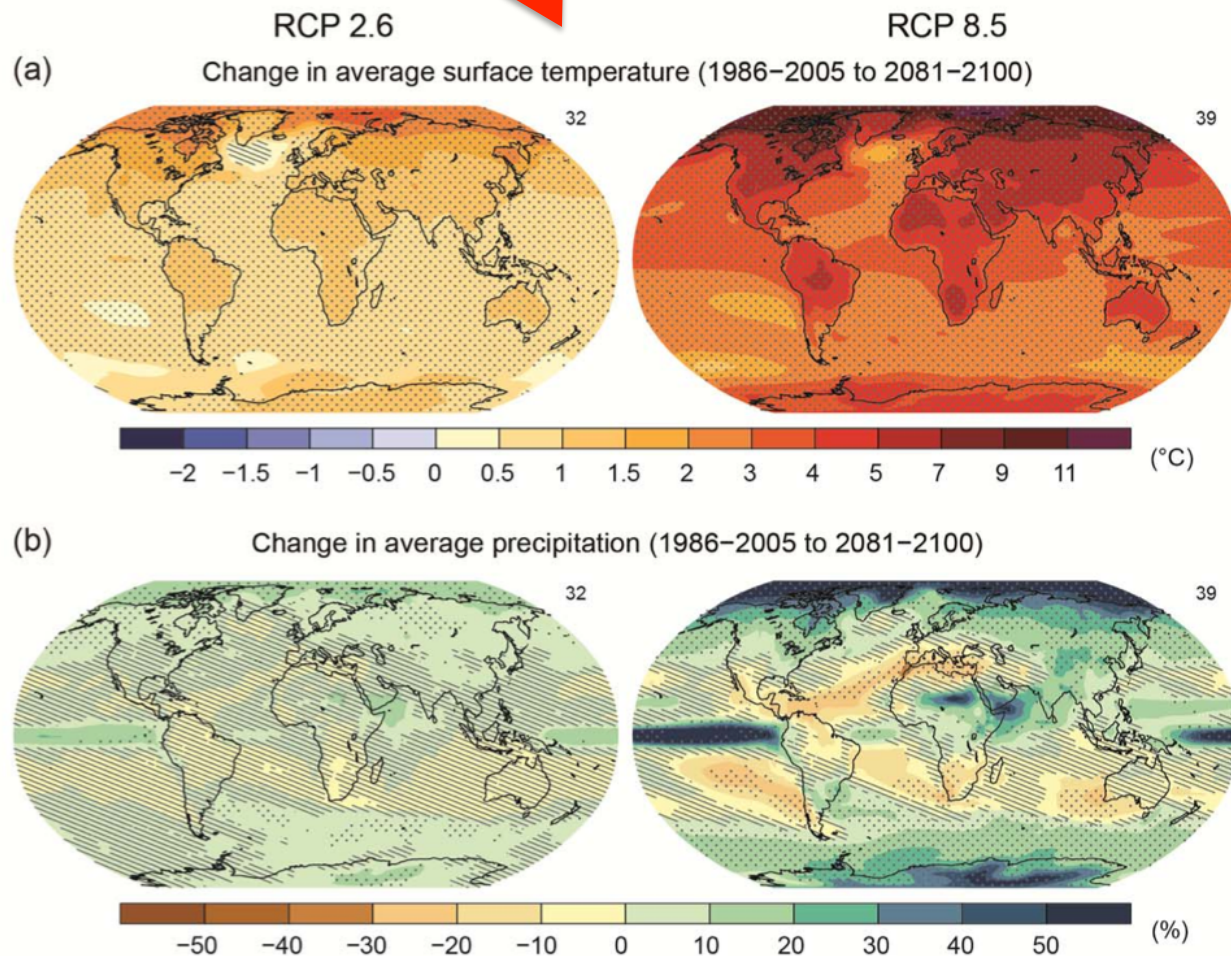
Les scénarios RCP (Representative Concentration Pathway)

sont quatre scénarios relatifs à l'évolution de la concentration en gaz à effet de serre au cours du XXI^e siècle, établis par le Groupe d'experts intergouvernemental sur l'évolution du climat (GIEC) pour son cinquième rapport, AR5

- Un scénario RCP permet de modéliser le climat futur
- chaque scénario RCP donne une variante jugée probable du climat qui résultera du niveau d'émission choisi comme hypothèse de travail.
- Les quatre scénarios sont nommés d'après la gamme de forçage radiatif ainsi obtenue pour l'année 2100 :
 - le scénario RCP2.6 correspond à un forçage de $+2,6 \text{ W/m}^2$,
 - le scénario RCP4.5 à $+4,5 \text{ W/m}^2$,
 - et de même pour les scénarios RCP6 et RCP8.52.

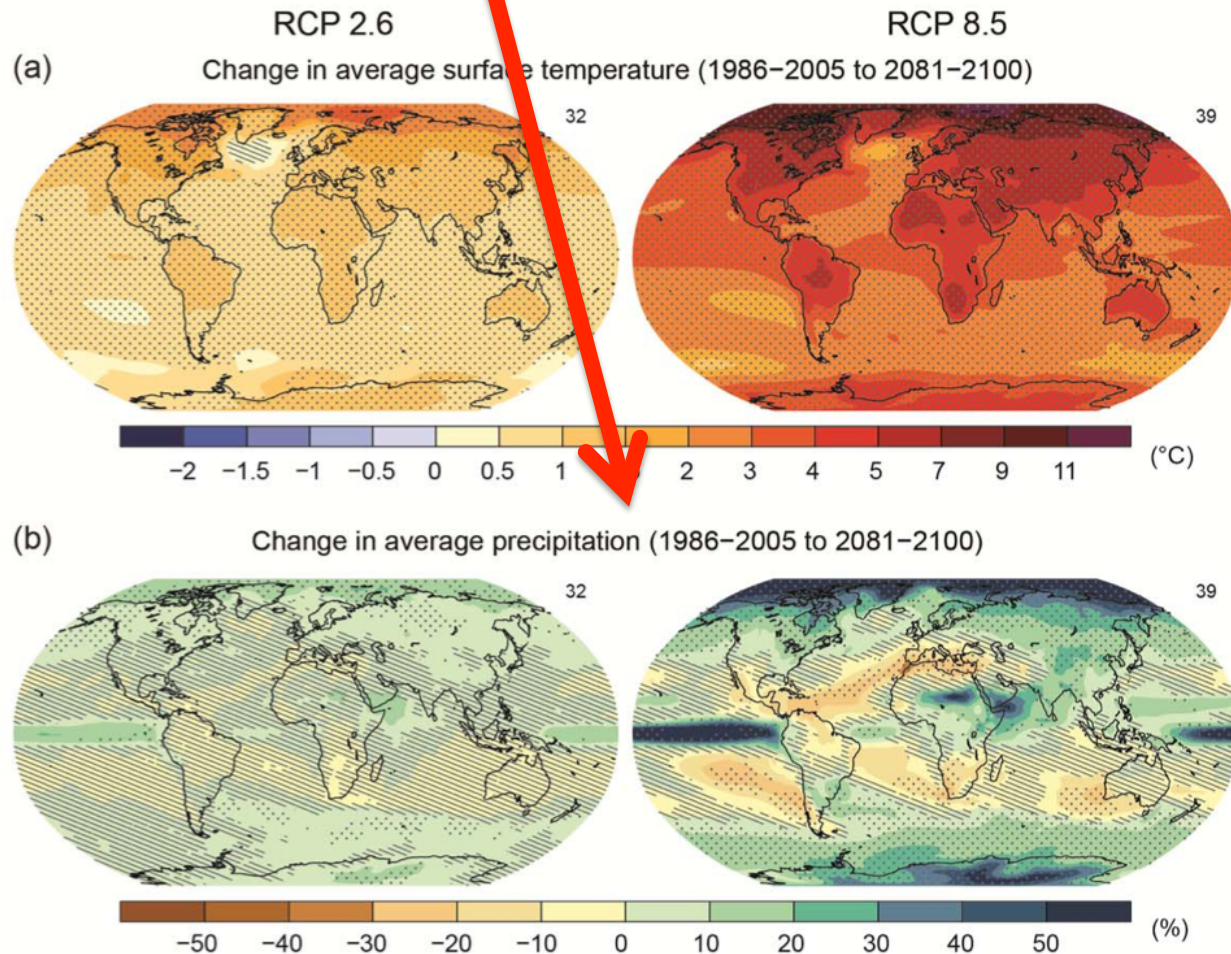
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Figure SPM.8 [FIGURE SUBJECT TO FINAL COPYEDIT]



Changes in the global water cycle in response to the warming over the 21st century will not be uniform. The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase, although there may be regional exceptions (see Figure SPM.8). {12.4, 14.3}

Figure SPM.8 [FIGURE SUBJECT TO FINAL COPYEDIT]

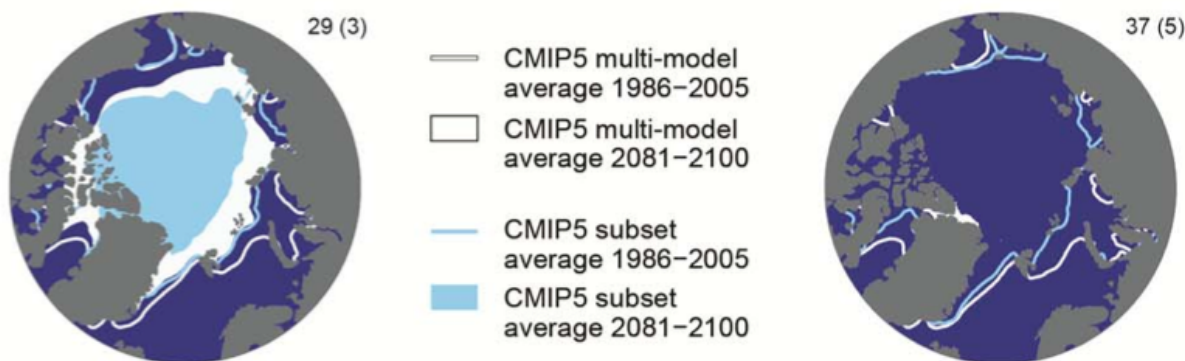


The global ocean will continue to warm during the 21st century. Heat will penetrate from the surface to the deep ocean and affect ocean circulation. {11.3, 12.4}

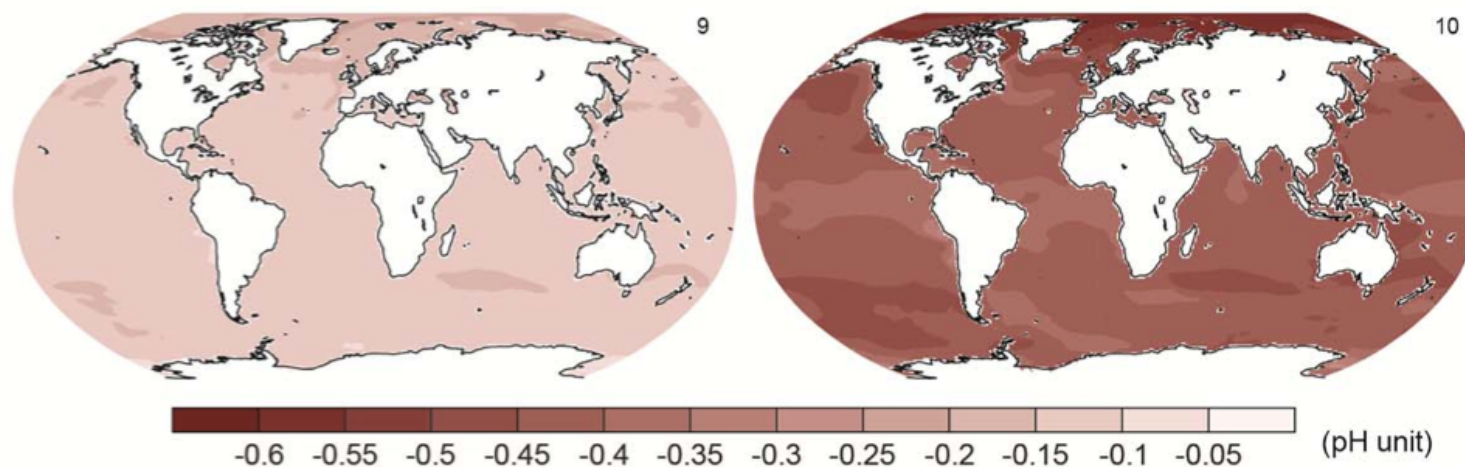
Climate change will affect carbon cycle processes in a way that will exacerbate the increase of CO₂ in the atmosphere (*high confidence*). Further uptake of carbon by the ocean will increase ocean acidification. {6.4}

It is *very likely* that the Arctic sea ice cover will continue to shrink and thin and that Northern Hemisphere spring snow cover will decrease during the 21st century as global mean surface temperature rises. Global glacier volume will further decrease. {12.4, 13.4}

(c) Northern Hemisphere September sea ice extent (average 2081–2100)

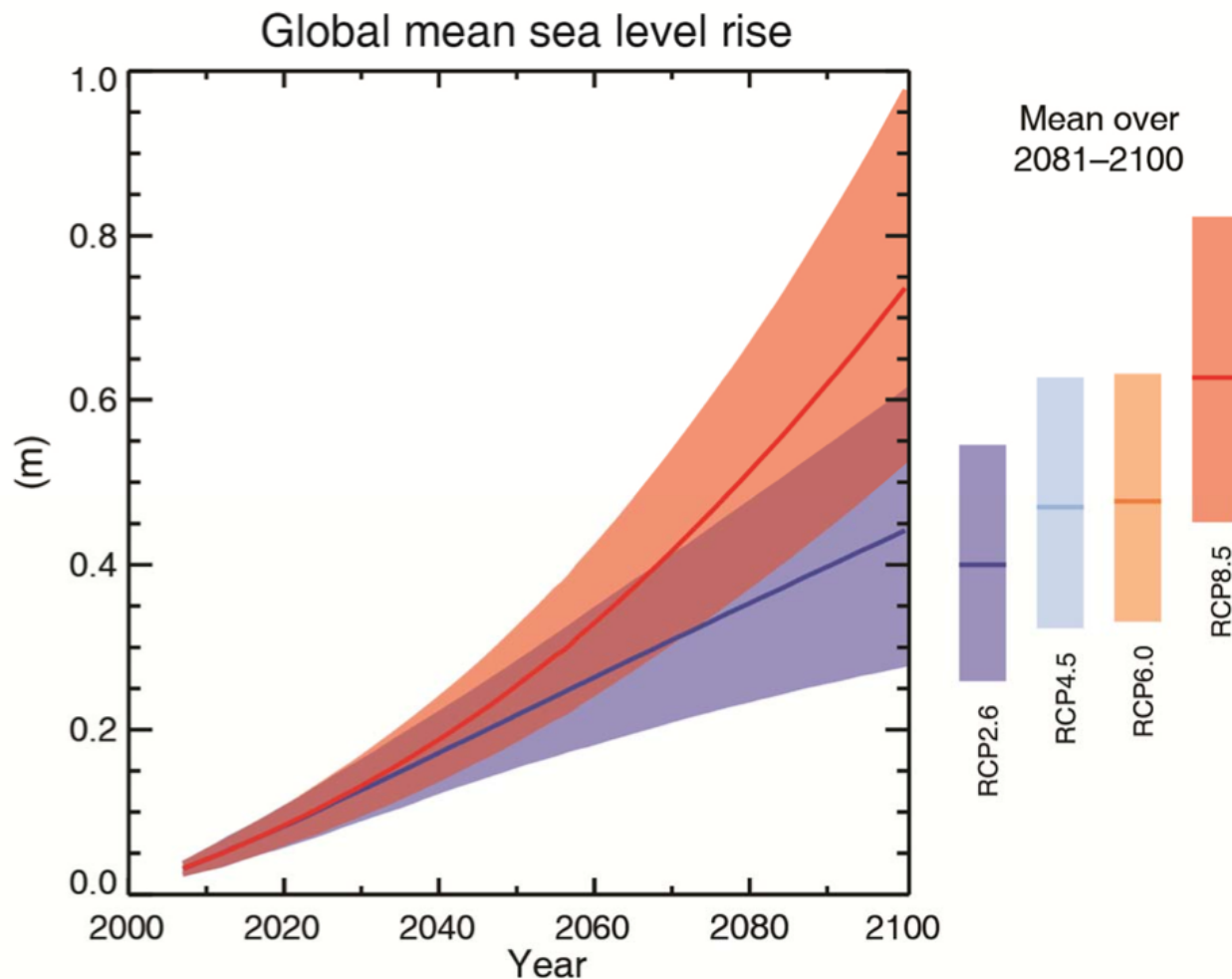


(d) Change in ocean surface pH (1986–2005 to 2081–2100)



Global mean sea level will continue to rise during the 21st century (see Figure SPM.9). Under all RCP scenarios the rate of sea level rise will *very likely* exceed that observed during 1971–2010 due to increased ocean warming and increased loss of mass from glaciers and ice sheets. {13.3–13.5}

Figure SPM.9 [FIGURE SUBJECT TO FINAL COPYEDIT]



Cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond (see Figure SPM.10). Most aspects of climate change will persist for many centuries even if emissions of CO₂ are stopped. This represents a substantial multi-century climate change commitment created by past, present and future emissions of CO₂. {12.5}

Figure SPM.10 [FIGURE SUBJECT TO FINAL COPYEDIT]

