

The impact of a global temperature rise of 4 °C (7 °F) in South East Asia



The impact of a global temperature rise of 4 °C (7 °F) in South East Asia

Climate change

Wetland risks

The wetland risks in the Mekong delta are low to medium in the short term, but could increase significantly by the end of the century. A rise in sea level of around 50 cm by the end of the century could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

Under a 4 °C global average temperature increase, the global average sea level could rise by up to 60 cm by the end of the century. Rising sea levels could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

Sisal crops

A global average temperature rise of 4 °C has the potential to have an impact on sisal crops. Global average sea levels could rise by up to 60 cm by the end of the century, which could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

The coastal geography of Singapore makes increasing temperatures under climate change a particular health concern. An increase in temperature as a result of climate change will be in addition to the higher temperatures that result from the urban heat island effect. In such areas, the combination of higher daytime temperatures and the lack of night-time cooling can result in higher overnight temperatures. This can be a health risk, particularly for those with pre-existing health conditions. Singapore can also be affected by smoke haze pollution caused by forest fires in Indonesia. The climate change also includes a global average temperature rise of 4 °C, which is projected to increase the risk of forest fires in Indonesia, putting the population of Singapore at a greater risk of inhaling hazardous particles, such as upper respiratory tract viruses, asthma and meningitis.

Fishing in Indonesia

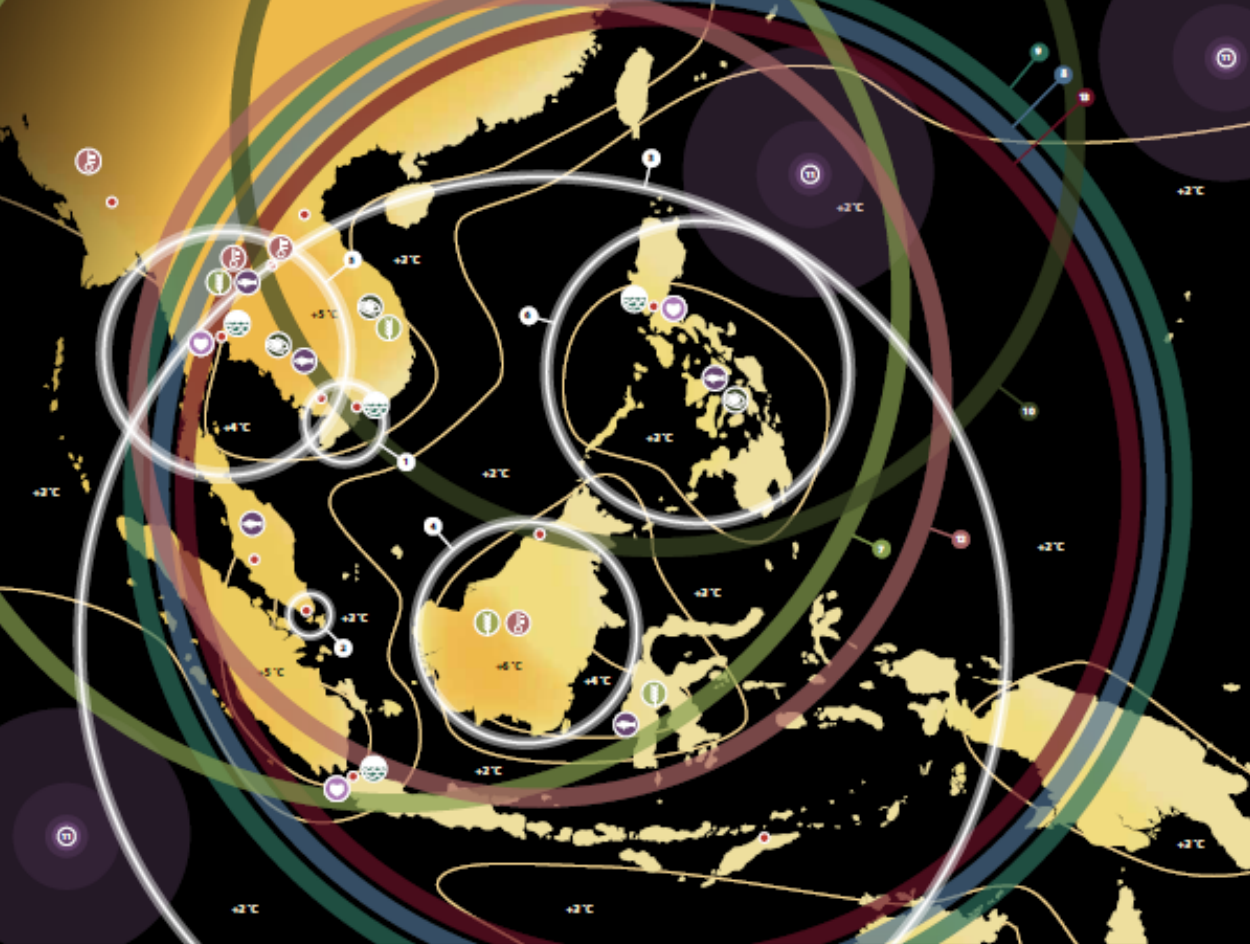
In Indonesia, fishing and aquaculture play a vital role in the country's economy, influencing the livelihoods of much of the Indonesian population. In 2007, inland fisheries, marine fisheries and aquaculture provided more than 10 million people with direct employment, with the total depending on marine capture fisheries. For their income, Indonesia also has an important role in national food security, as fish and fish products are commonly consumed by poor households across the country and fish is the main source of animal protein in the tropics in Indonesia.

A 4 °C rise in global average temperature is expected to have negative implications for fishing and aquaculture across Indonesia, and even into the effects of a global temperature rise on marine capture fisheries around the world. It has been found that Indonesia may be one of the countries that experience the largest decline in catch potential, as warmer coastal temperatures can directly affect the physiology, life history, productivity and distribution of fish in the waters. Furthermore, the availability of food for fish and shellfish, known as primary production, is influenced by variations in nutrient loading, a process controlled by ocean currents, coastal upwelling and the efficiency of nutrient recycling, all of which could change under a warmer climate.

Such projections may have large implications for food security in Indonesia, due to the reliance in many areas on communities dependent on fisheries for food and livelihoods.

Agriculture

There is a high risk of a significant decline in rice yields in the South East Asia region. Rice yields could drop by up to 10% by the end of the century. This is due to a combination of factors, including a rise in sea level, which could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.



Climate change

Wetland risks

The wetland risks in the Mekong delta are low to medium in the short term, but could increase significantly by the end of the century. A rise in sea level of around 50 cm by the end of the century could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

Under a 4 °C global average temperature increase, the global average sea level could rise by up to 60 cm by the end of the century. Rising sea levels could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

Sisal crops

A global average temperature rise of 4 °C has the potential to have an impact on sisal crops. Global average sea levels could rise by up to 60 cm by the end of the century, which could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

The coastal geography of Singapore makes increasing temperatures under climate change a particular health concern. An increase in temperature as a result of climate change will be in addition to the higher temperatures that result from the urban heat island effect. In such areas, the combination of higher daytime temperatures and the lack of night-time cooling can result in higher overnight temperatures. This can be a health risk, particularly for those with pre-existing health conditions. Singapore can also be affected by smoke haze pollution caused by forest fires in Indonesia. The climate change also includes a global average temperature rise of 4 °C, which is projected to increase the risk of forest fires in Indonesia, putting the population of Singapore at a greater risk of inhaling hazardous particles, such as upper respiratory tract viruses, asthma and meningitis.

Fishing in Indonesia

In Indonesia, fishing and aquaculture play a vital role in the country's economy, influencing the livelihoods of much of the Indonesian population. In 2007, inland fisheries, marine fisheries and aquaculture provided more than 10 million people with direct employment, with the total depending on marine capture fisheries. For their income, Indonesia also has an important role in national food security, as fish and fish products are commonly consumed by poor households across the country and fish is the main source of animal protein in the tropics in Indonesia.

A 4 °C rise in global average temperature is expected to have negative implications for fishing and aquaculture across Indonesia, and even into the effects of a global temperature rise on marine capture fisheries around the world. It has been found that Indonesia may be one of the countries that experience the largest decline in catch potential, as warmer coastal temperatures can directly affect the physiology, life history, productivity and distribution of fish in the waters. Furthermore, the availability of food for fish and shellfish, known as primary production, is influenced by variations in nutrient loading, a process controlled by ocean currents, coastal upwelling and the efficiency of nutrient recycling, all of which could change under a warmer climate.

Such projections may have large implications for food security in Indonesia, due to the reliance in many areas on communities dependent on fisheries for food and livelihoods.

Agriculture

There is a high risk of a significant decline in rice yields in the South East Asia region. Rice yields could drop by up to 10% by the end of the century. This is due to a combination of factors, including a rise in sea level, which could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

1 **Water availability**

There is a high risk of a significant decline in rice yields in the South East Asia region. Rice yields could drop by up to 10% by the end of the century. This is due to a combination of factors, including a rise in sea level, which could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

2 **Sea level rise**

Under a 4 °C global average temperature increase, the global average sea level could rise by up to 60 cm by the end of the century. Rising sea levels could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

3 **Health**

The coastal geography of Singapore makes increasing temperatures under climate change a particular health concern. An increase in temperature as a result of climate change will be in addition to the higher temperatures that result from the urban heat island effect. In such areas, the combination of higher daytime temperatures and the lack of night-time cooling can result in higher overnight temperatures. This can be a health risk, particularly for those with pre-existing health conditions. Singapore can also be affected by smoke haze pollution caused by forest fires in Indonesia. The climate change also includes a global average temperature rise of 4 °C, which is projected to increase the risk of forest fires in Indonesia, putting the population of Singapore at a greater risk of inhaling hazardous particles, such as upper respiratory tract viruses, asthma and meningitis.

4 **Water resources**

The coastal geography of Singapore makes increasing temperatures under climate change a particular health concern. An increase in temperature as a result of climate change will be in addition to the higher temperatures that result from the urban heat island effect. In such areas, the combination of higher daytime temperatures and the lack of night-time cooling can result in higher overnight temperatures. This can be a health risk, particularly for those with pre-existing health conditions. Singapore can also be affected by smoke haze pollution caused by forest fires in Indonesia. The climate change also includes a global average temperature rise of 4 °C, which is projected to increase the risk of forest fires in Indonesia, putting the population of Singapore at a greater risk of inhaling hazardous particles, such as upper respiratory tract viruses, asthma and meningitis.

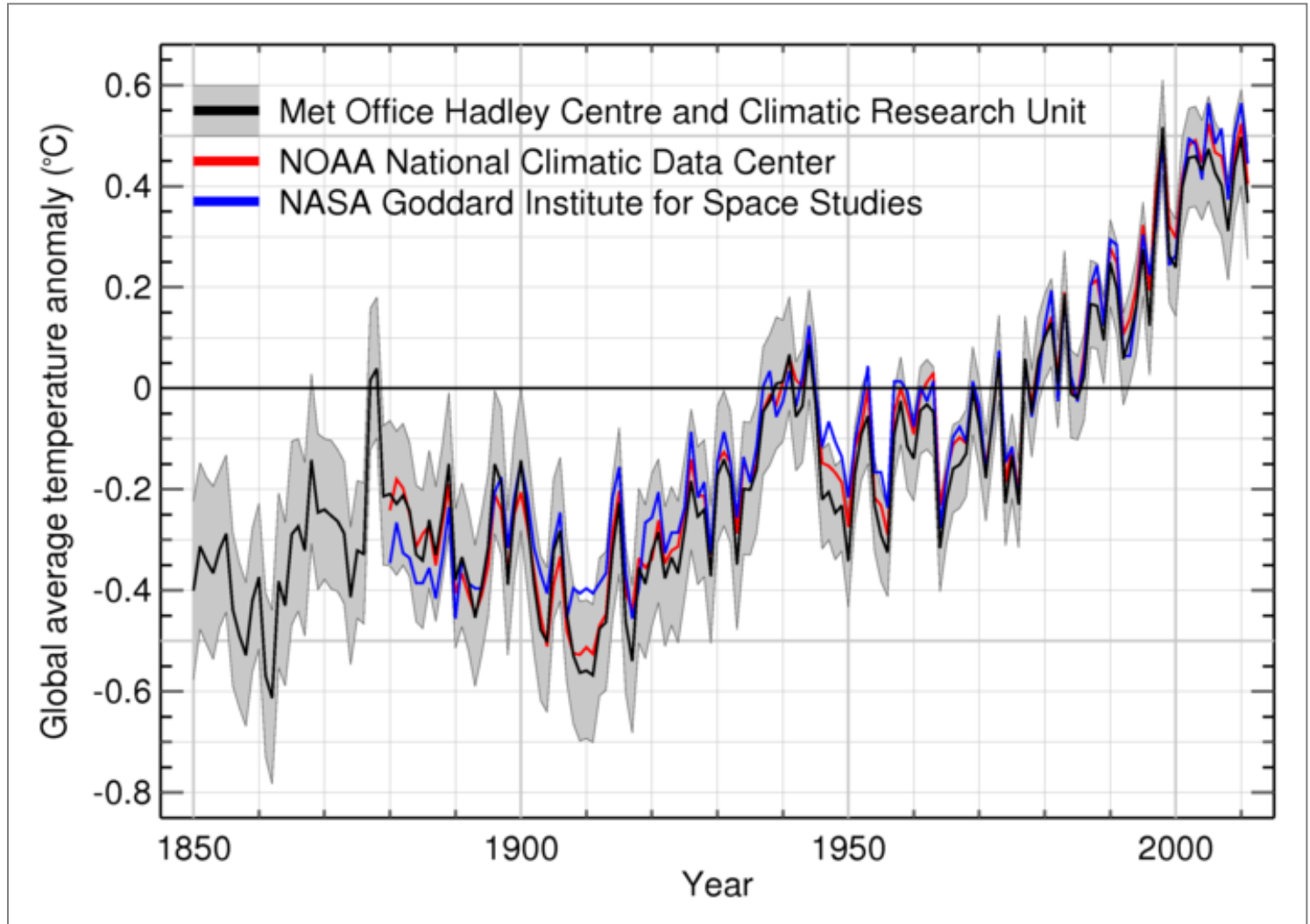
5 **Drought**

Under a 4 °C global average temperature increase, the global average sea level could rise by up to 60 cm by the end of the century. Rising sea levels could mean that the low-lying coastal areas are at risk of being inundated by storm surges and saline intrusion. Sea level rise is a threat to the economy and ecology of the region. The wetland risks are greatest over the long term.

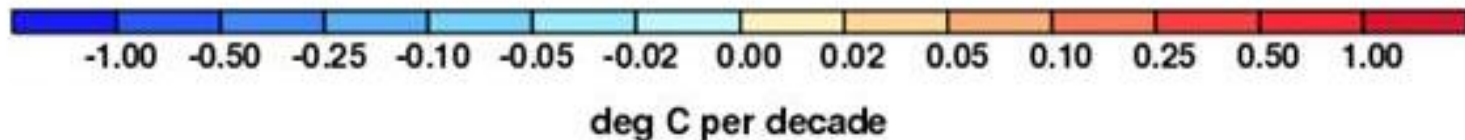
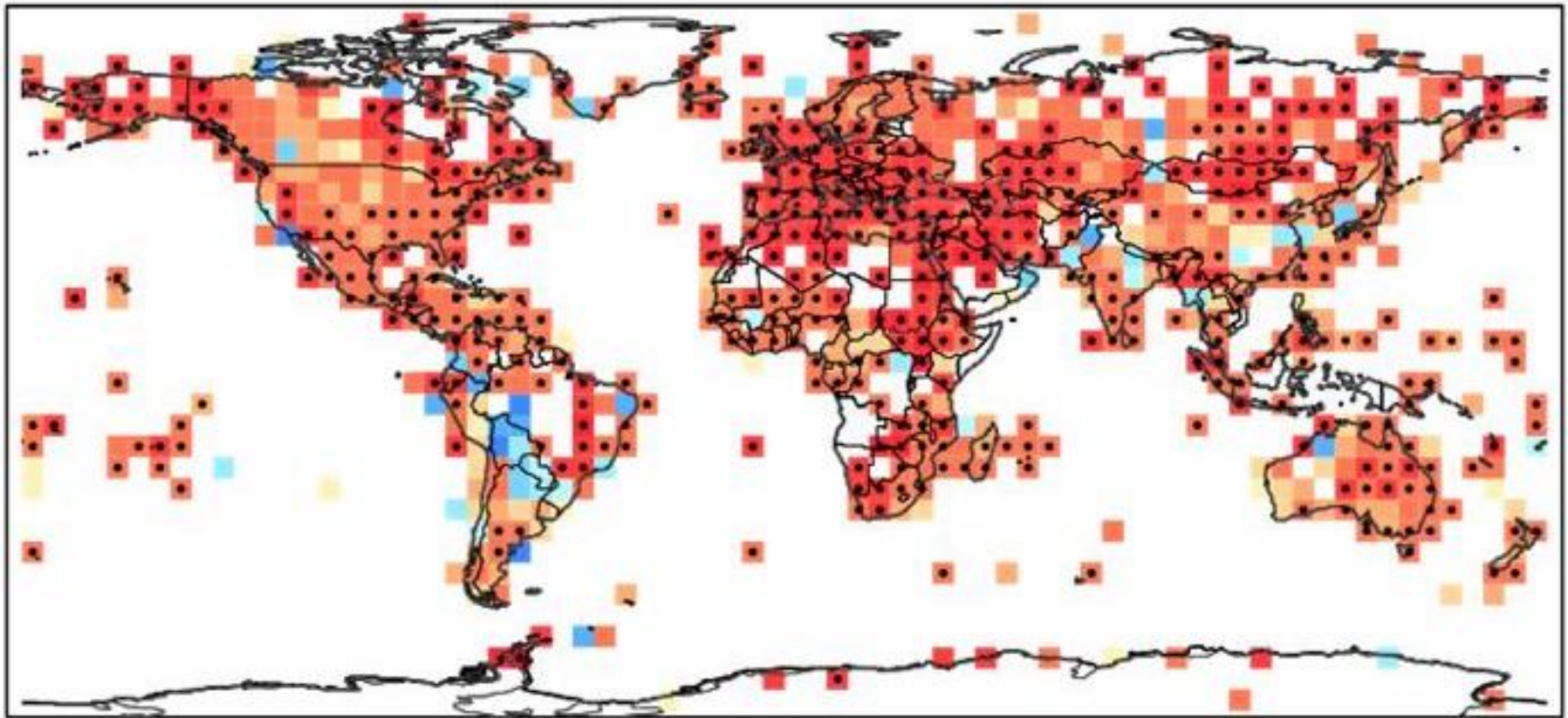
6 **Change in temperature from pre-industrial levels**

Year	1	2	3	4	5	6	7	8	9	10	11	12
Global	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
South East Asia region	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0

Global temperature rise

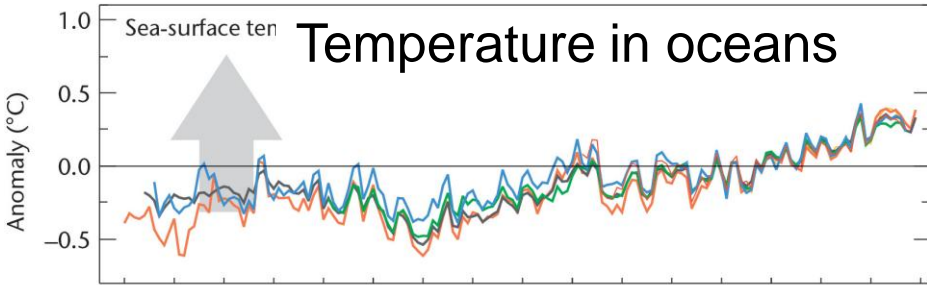
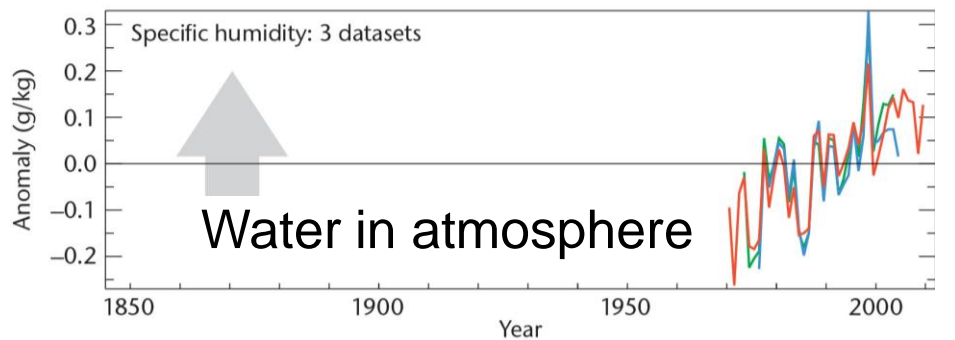
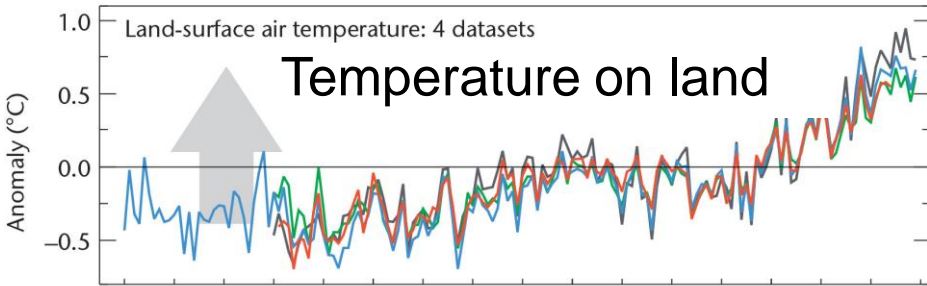
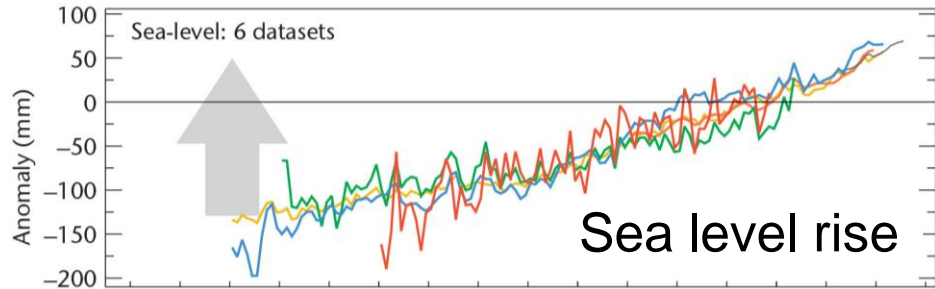
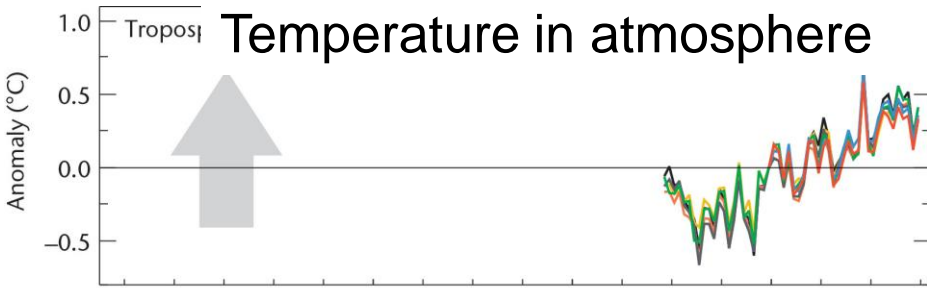


Temperature trends from 1960-2010 for the June-July-August seasonal average



Other signs consistent with a warming world

↑ INCREASING – Observations consistent with a warming world

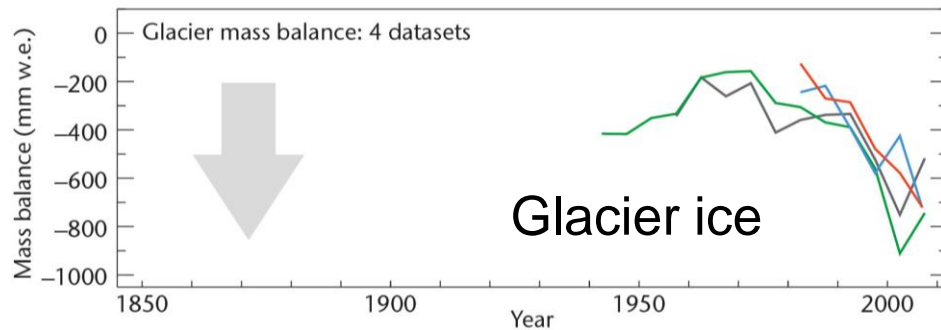
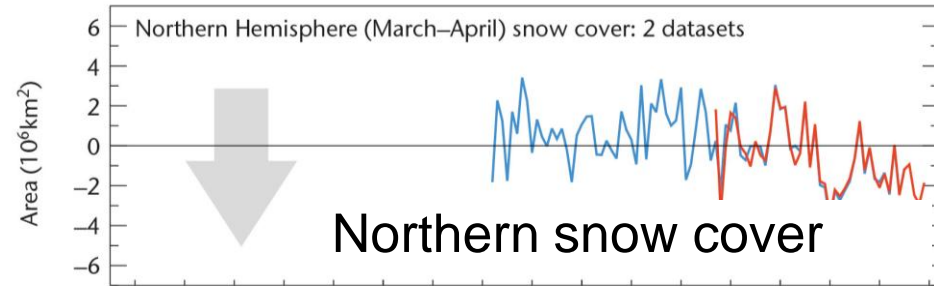
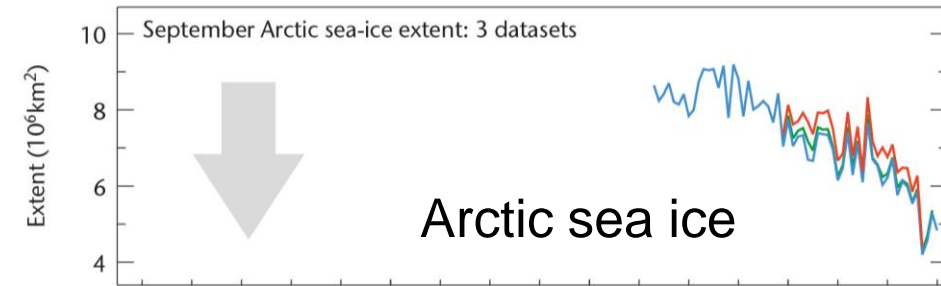


1850 1900 1950 2000

YEAR

Other signs consistent with a warming world

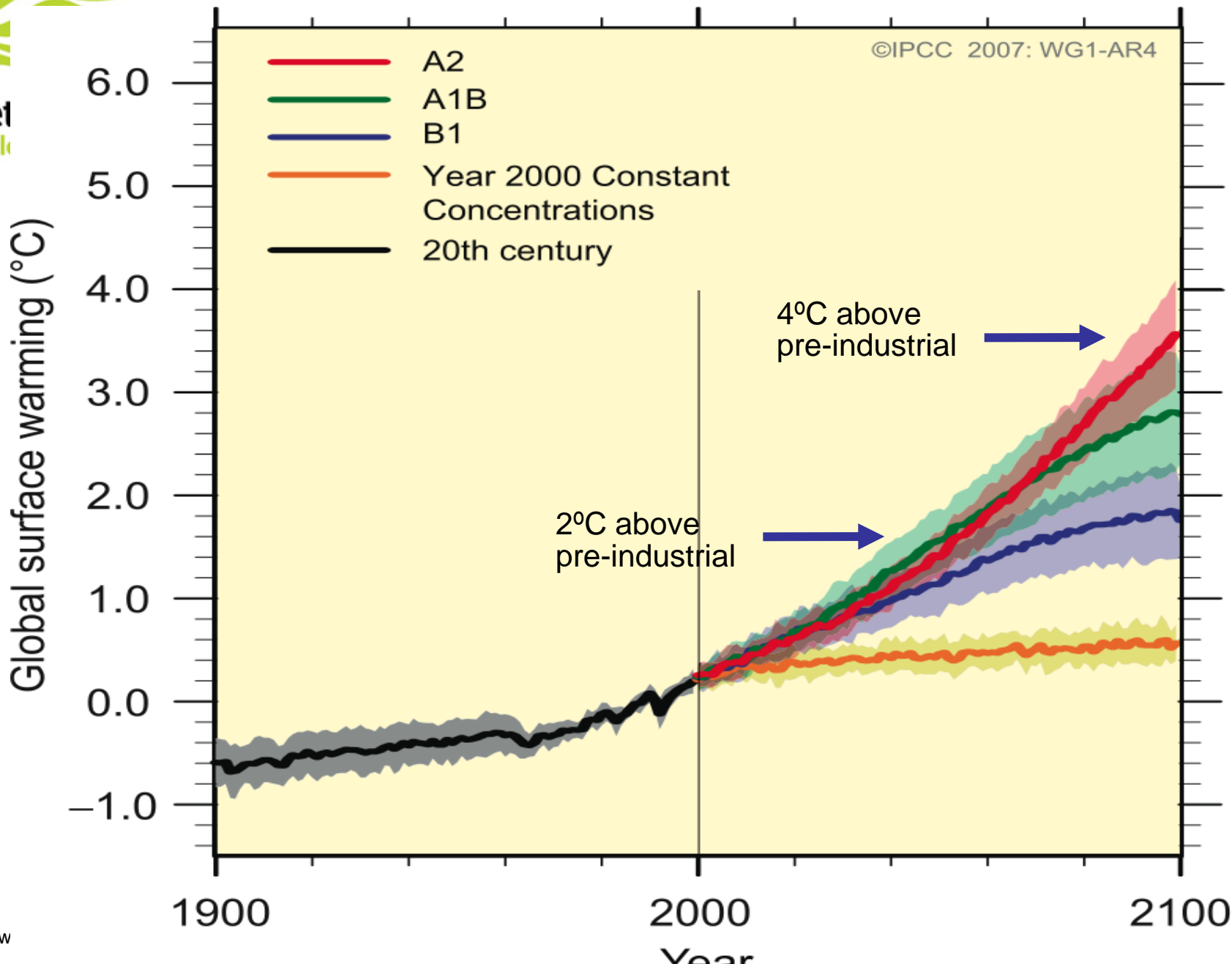
↓ **DECREASING** – Observations consistent with a warming world



1850 1900 1950 2000

YEAR

IPCC AR4 future temperature change

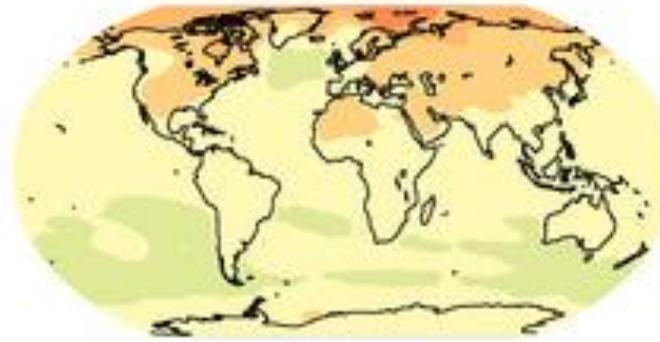


IPCC AR4 future temperature change

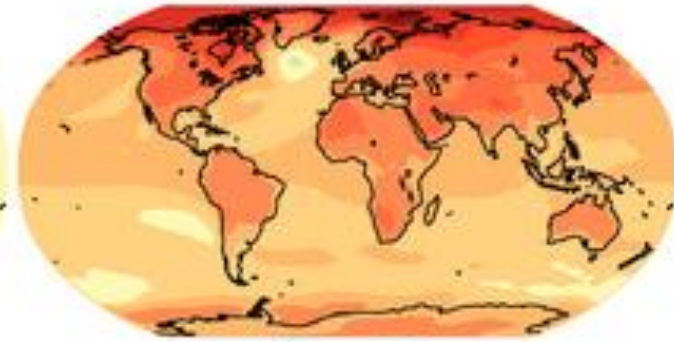


B1

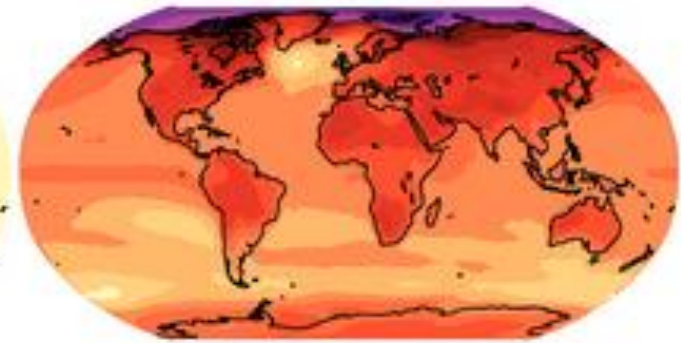
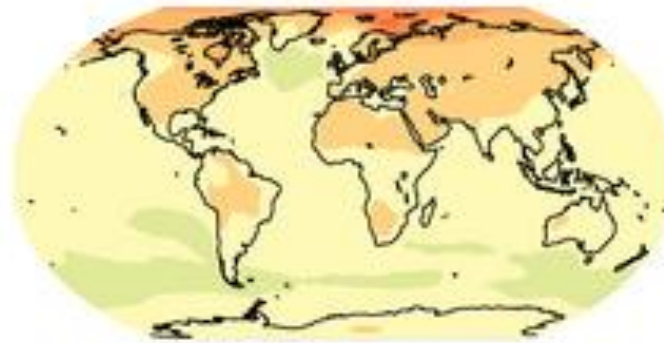
2020 - 2029



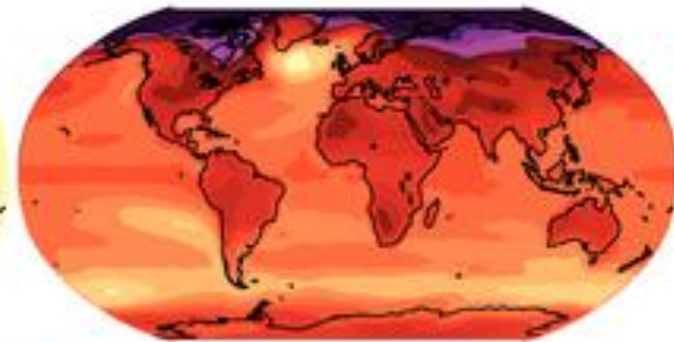
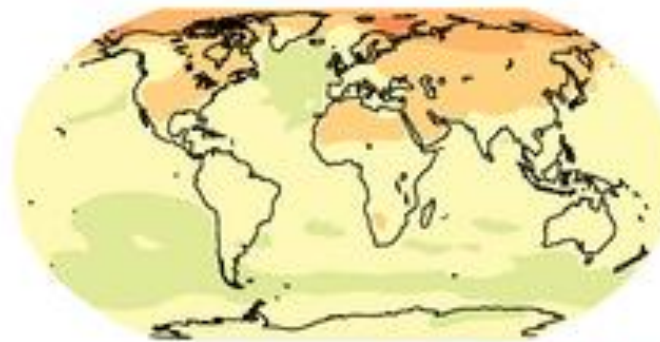
2090 - 2099



A1B



A2

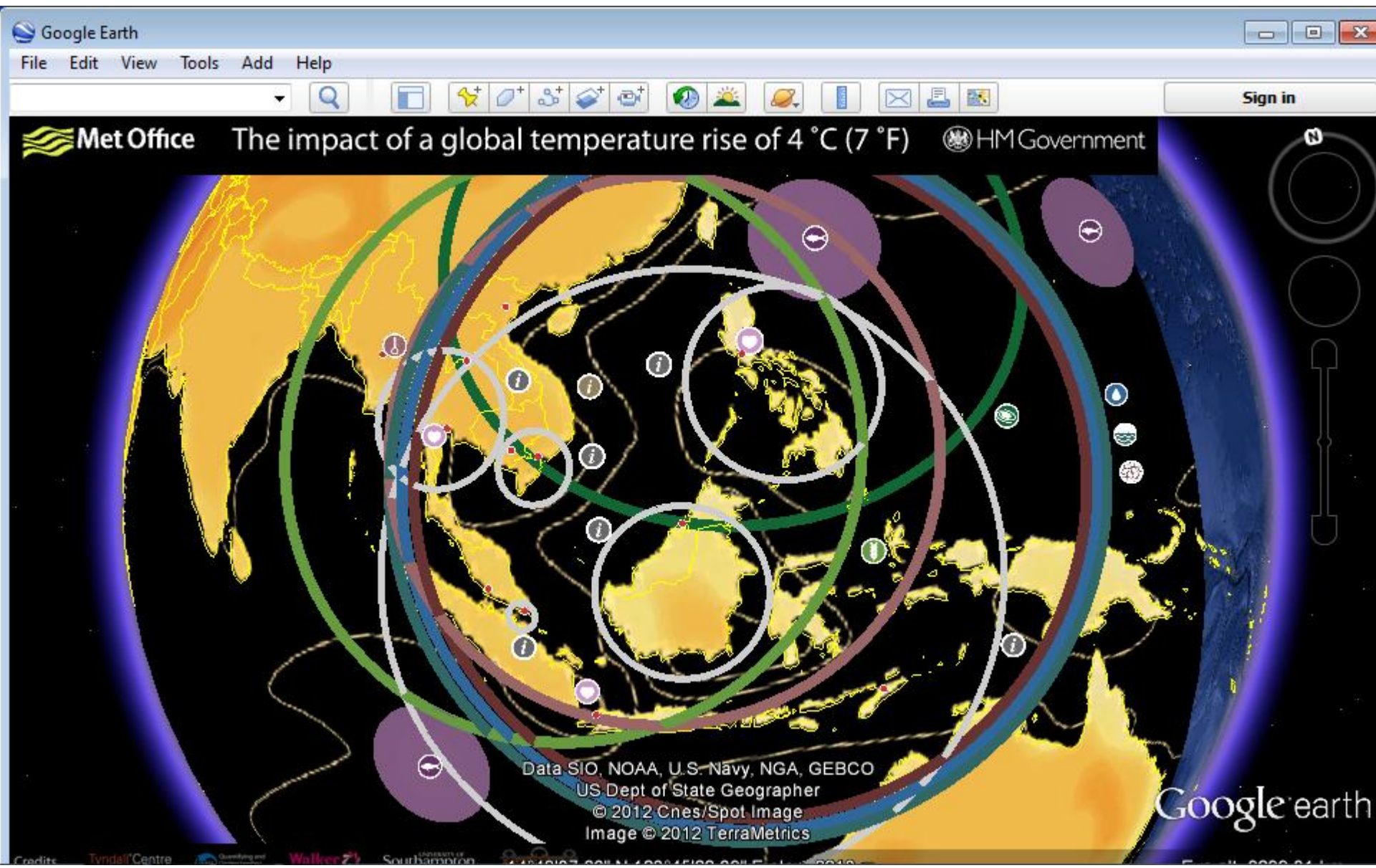


0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5

(°C)

c)

Greenhouse
gas
emissions



Google Earth

File Edit View Tools Add Help

Met Office The impact of a global temperature rise of 4 °C (7 °F) HM Government

Mekong Delta

The Mekong Delta is a low-lying region in southern Vietnam and Cambodia. Around half of the Mekong Delta is less than 2 m above sea-level, making it vulnerable to fluvial flooding, storm surges and saline intrusion. Sea-level rise is a threat to the economy and ecology of the region. The Mekong Delta alone generates over half of Vietnam's total rice production.

Under a 4 °C global average temperature increase, the global average sea-level could rise by up to 80 cm by the end of the century. Taking account of local variations in sea-level and changes in land height, this would translate to a local, relative sea-level rise of 65 cm in the Mekong Delta region. Such sea-level rises could submerge the lowest parts of the delta as a significant proportion of the land mass in the area is very low-lying. It could also increase the threat of saline intrusion and storm surge damage to rice crops across the region.

[Click here for the scientific background](#)

[Click here for background information](#)

Copyright 2011 Met Office

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
© 2012 Cnes/Spot Image
Image © 2012 TerraMetrics

Google earth

Crédits Tyndall Centre Quantifying and Walker Southampton

One example
multiple impact sectors on the map

▼ Guide

- What is climate?
- What is climate change?
- The science behind climate change
- How has our climate changed?

▼ Future

- Climate projections
- ▼ Impacts
- ▼ High-end climate change
- Agriculture
- Drought
- El Niño
- Extreme temperatures
- Fire danger
- Health
- Marine Ecosystems
- Permafrost
- Sea-level rise
- Tropical cyclones
- Water

Mekong Delta - case study

The Mekong Delta is a low-lying region in southern Vietnam. Around half of the Mekong Delta is less than 2 m above sea-level, making it vulnerable to fluvial flooding, storm surges and saline intrusion.

Sea-level rise is a threat to the economy and ecology of the region. The Mekong Delta alone generates over half of Vietnam's total rice production.

Under a 4 °C global average temperature increase the global average sea-level could rise by up to 80 cm by the end of the century.

Taking account of local variations in sea-level and changes in land height, this would translate to a local, relative sea-level rise of 65 cm in the Mekong Delta region;

Such sea-level rises would submerge the lowest parts of the delta with up to 13% (5,100 km²) of the land mass in the area being below sea-level. It would also considerably increase the threat of saline intrusion and storm surge damage to vital rice crops across the whole region.

In Vietnam, the Mekong Delta alone yields 54% of the national rice production with the Red River Delta adding another 17% (data for 2005 from IRRI 2008). Production growth in the Mekong Delta has driven the steadily increasing rice production in Vietnam over the last decades. The Mekong Delta contributes to the vast share of rice exports in Vietnam, which accounts for 4.7 million tons of rice every year, making it the second largest exporter worldwide (IRRI 2008). Any shortfall in rice production in this area because of climate change would not only affect the economy and food security in Vietnam but also have repercussions on the international rice market.



Includes scientific source references

Dr Jason Lowe - Sea level rise and climate change

Met Office



Mike Sanderson - Climate model projection
by TheMetOffice
404 views
2:47

Andy Wiltshire -- Impact of 4 °C rise in global
by TheMetOffice
1,308 views
1:38

Gillian Kaye -- Impact of 4 °C rise in global
by TheMetOffice
6,932 views
3:20

Joanne Camp -- Impact of 4 °C rise in global
by TheMetOffice
1,760 views
1:19

11 / 13 Impacts of a 4 deg C temperature rise TheMetOffice

11 **NOW PLAYING** **Dr Jason Lowe - Sea level rise and climate change**
2 **Gillian Kaye -- Impact of 4 °C rise in global average**
3 **Ian Totterdell by TheMetOffice**

13 videos online



Using the map online

- Please explore the online map and information resources
- Build your own picture of climate change impacts in your region of the world
- Remember that 4degC is not extreme compared to what is projected to happen with no mitigation action
- Do look at other areas of the world as well – climate change is a truly global issue
- The 4 degC map is one way of making the impacts of climate change more tangible



Met Office
Hadley Centre

How to view the map?



1. You need to download [Google Earth](#).
2. Use your Google Earth to view the map at <http://www.fco.gov.uk/google-earth-4degrees.kml>
3. Click the radio button in the 'Temporary places' hierarchy to view the Southeast Asia map.

Alternatively, you can [download](#) the map [PDF, 296KB, opens in new window]



Further information about this map



Please go to:

www.metoffice.gov.uk/climatechange/guide/effects/

Or Le Bich, Climate Change Attaché
South East Asia Climate Change Network
British Embassy Hanoi

le.bich@fco.gov.uk