WMO

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Climate change

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Key findings from the IPCC Fourth Assessment Report

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GEOSS Symposium

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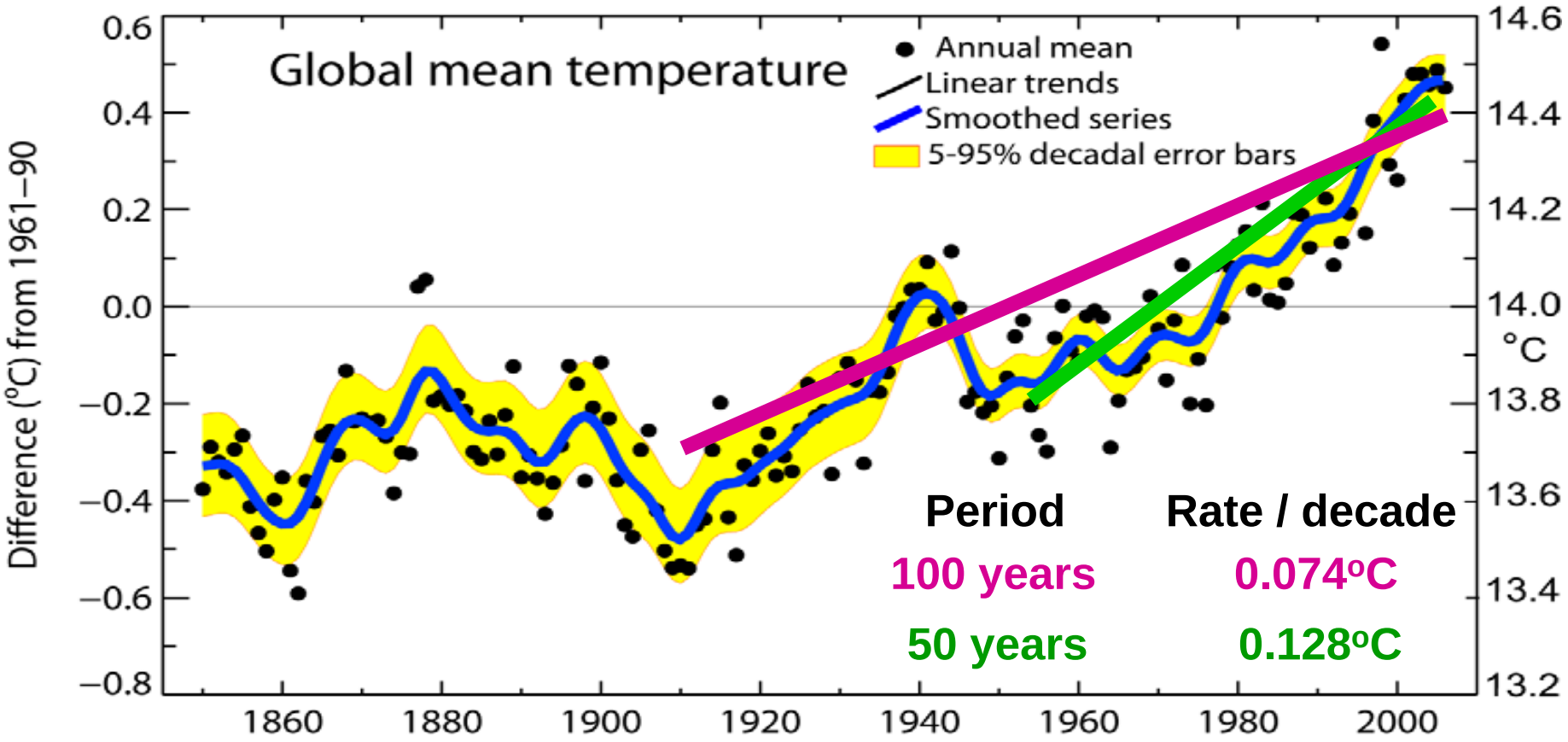
IPCC

Climate change is unequivocal

Changes in global average surface temperature



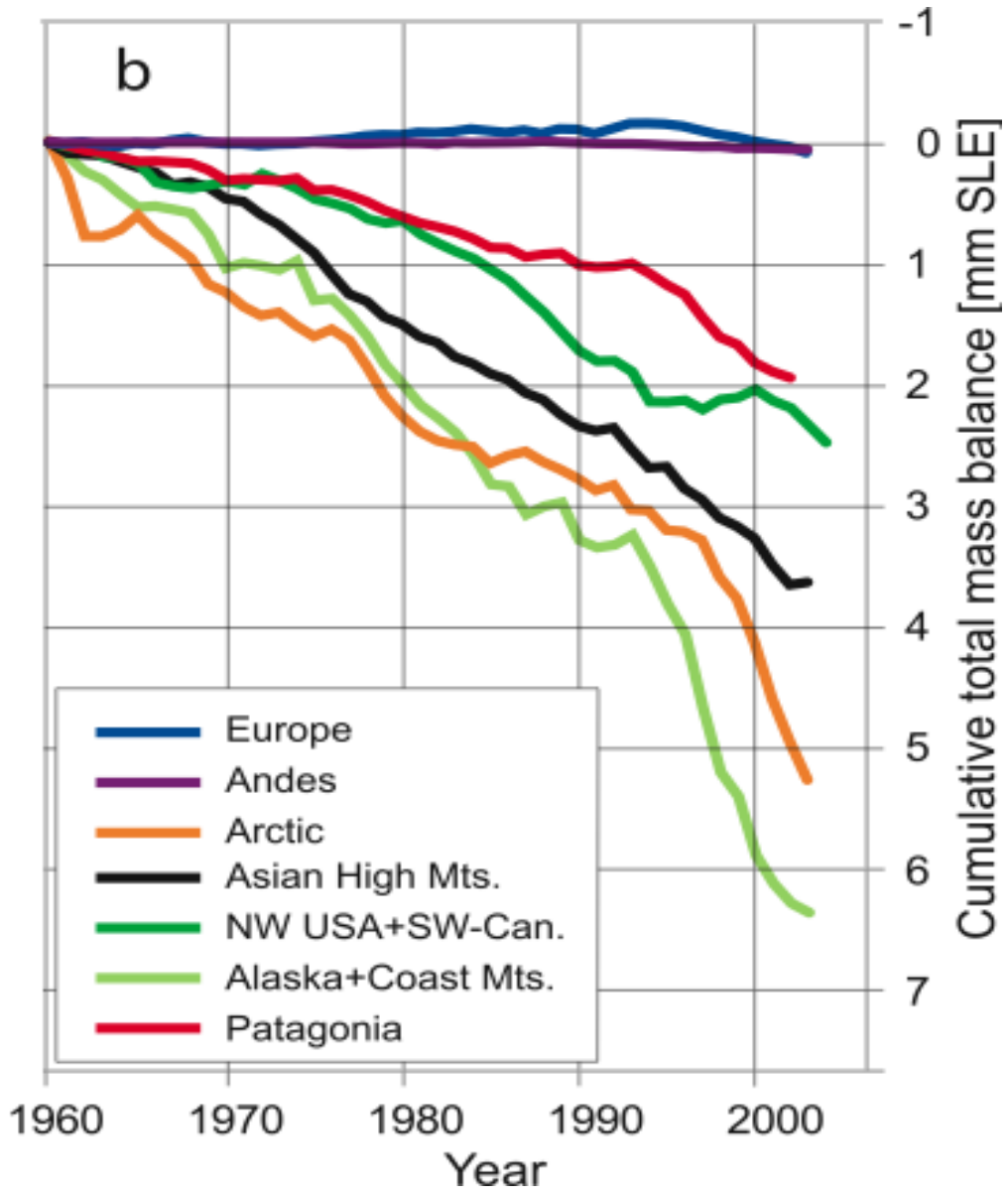
Eleven of the last twelve years rank among the twelve warmest years in the instrumental record of global surface temperature

Cumulative balance of glacier mass

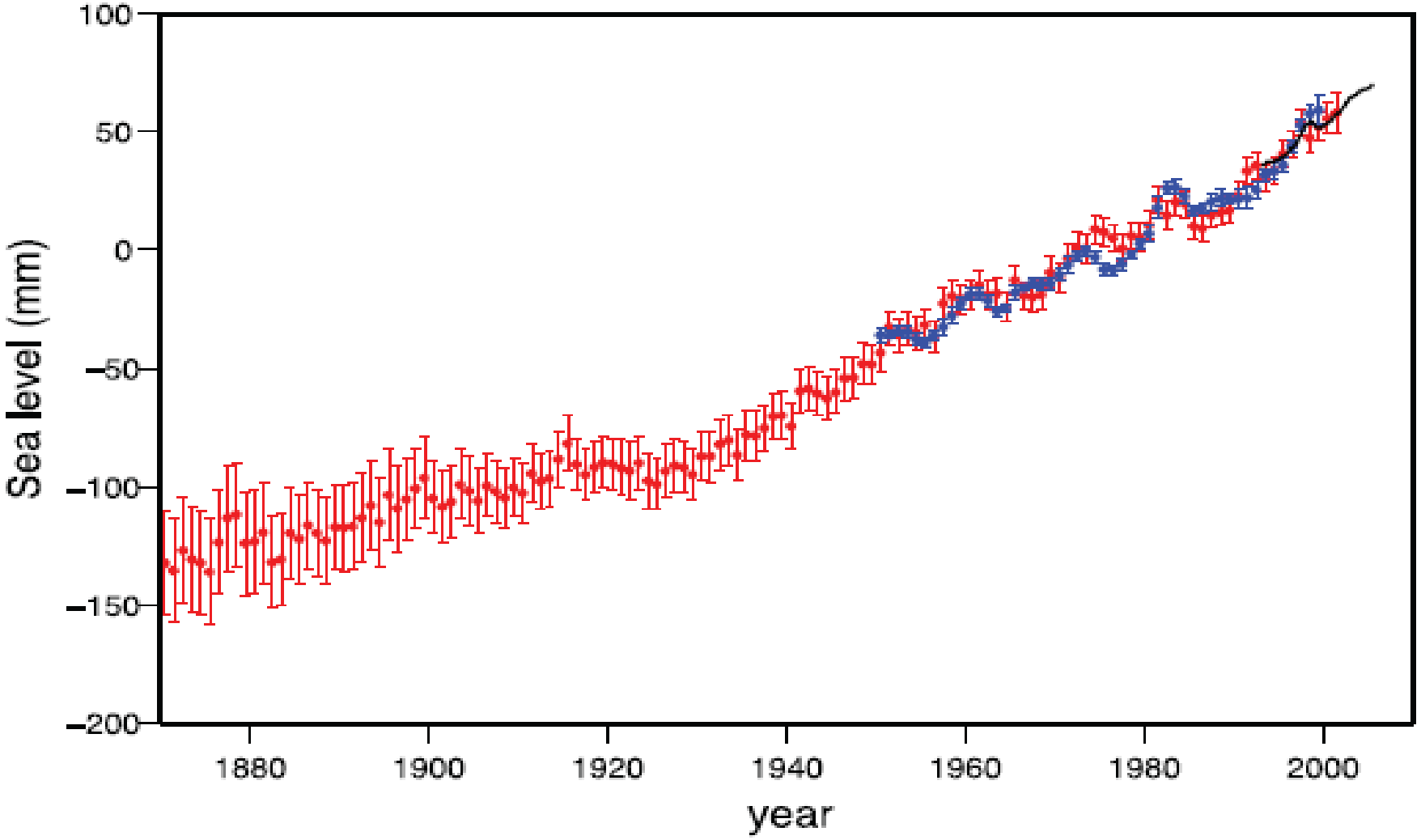
Decreases in glaciers have contributed about 28% of sea level rise since 1993

(thermal expansion oceans: 57%; losses from polar ice sheets: 15%)

Water supplies stored in glaciers are projected to decline in the course of the century



Changes in global average sea level



Global average sea level has risen since 1961 at an average rate of 1.8mm/yr and since 1993 at 3.1mm/yr

Average arctic temperatures increased at almost twice the global average rate in the past 100 years

- Annual average arctic sea ice extent has shrunk by 2.7% per decade

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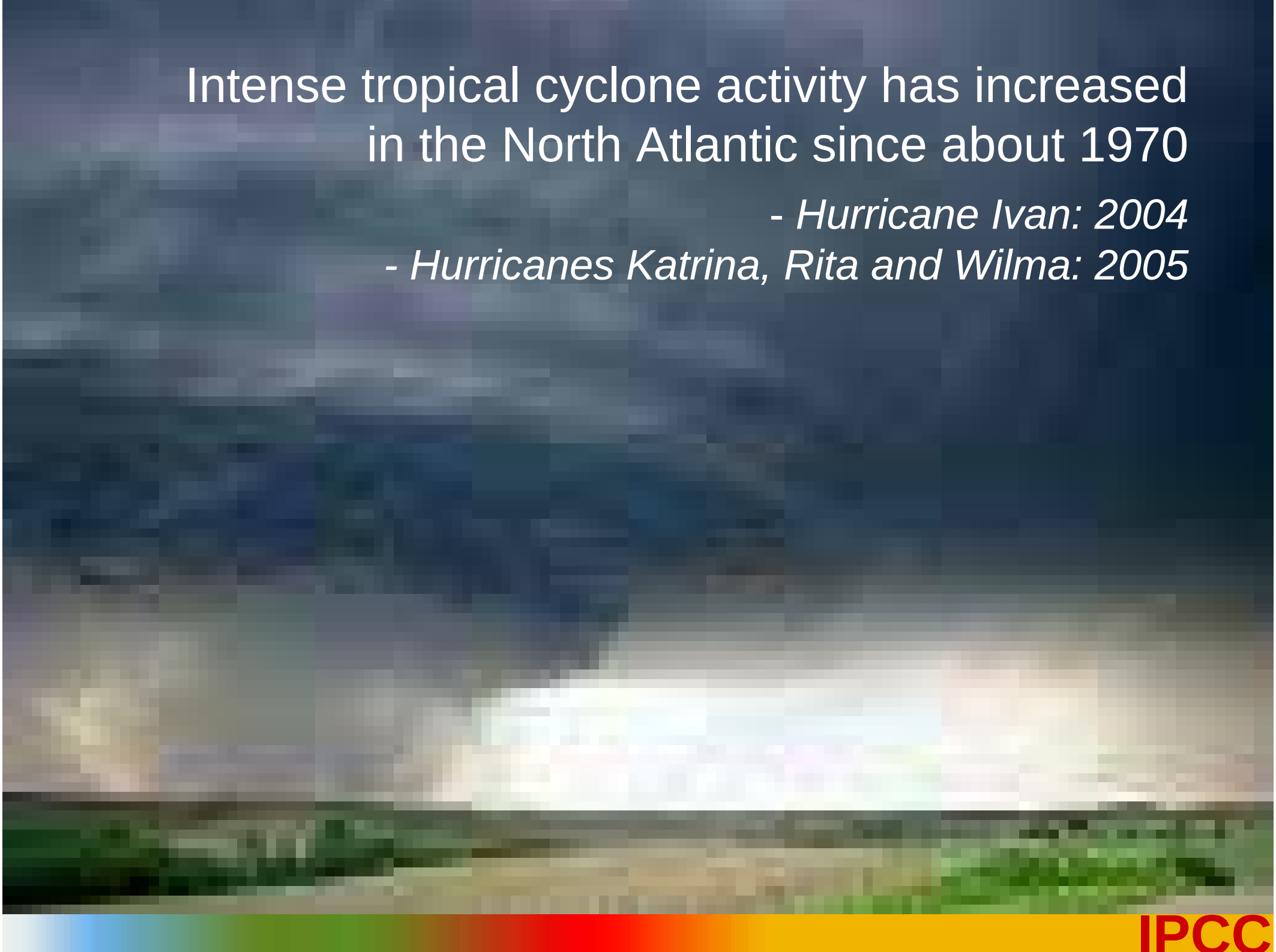
Heat waves have become more frequent over most land areas

- Heat wave in Europe, 2003: 35 000 deaths


Intense tropical cyclone activity has increased in the North Atlantic since about 1970
- Hurricane Ivan: 2004
- Hurricanes Katrina, Rita and Wilma: 2005
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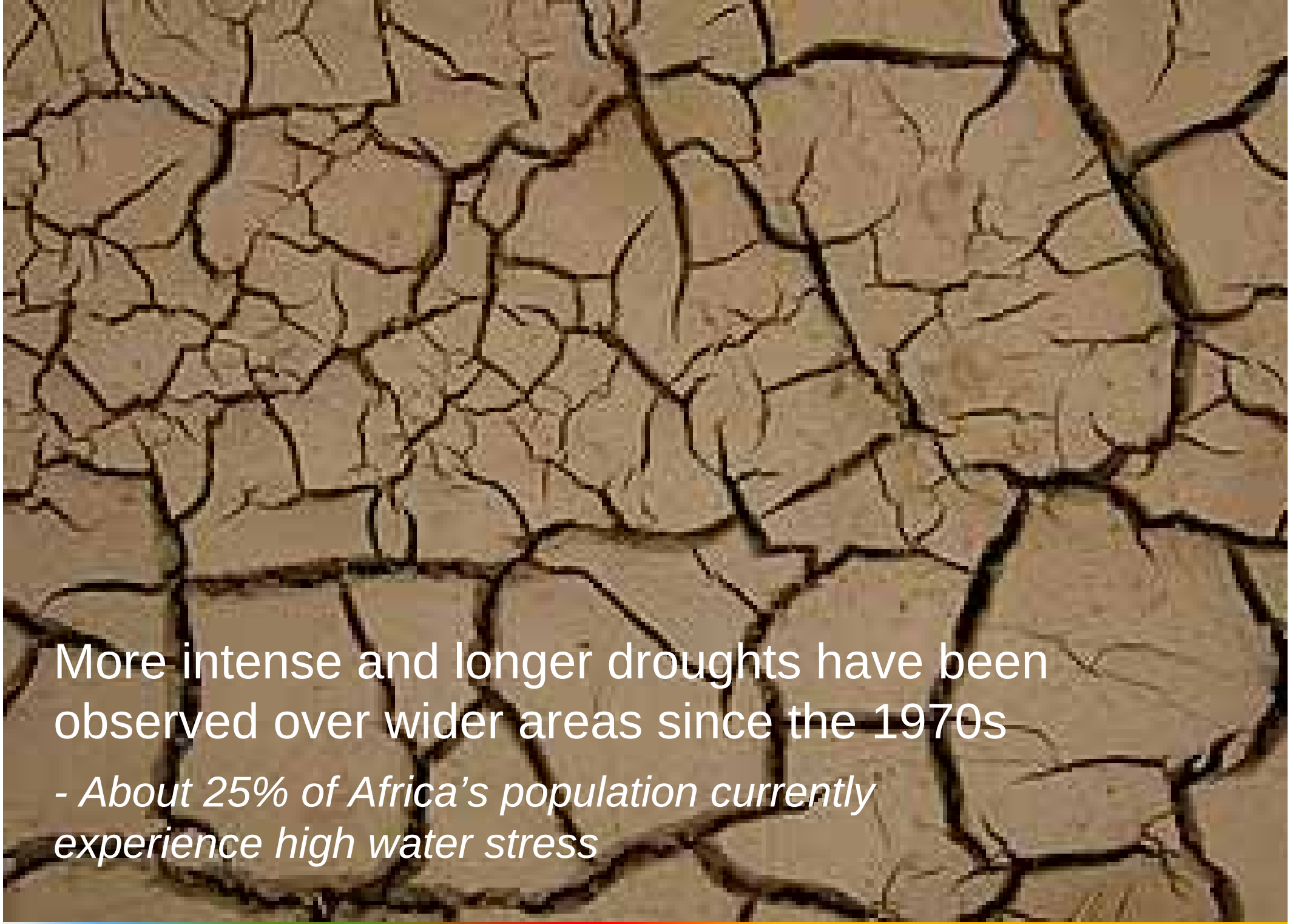
The frequency of heavy precipitation events has increased over most land areas

- Rainfall in Mumbai (India), 2005: 1 million people lost their homes

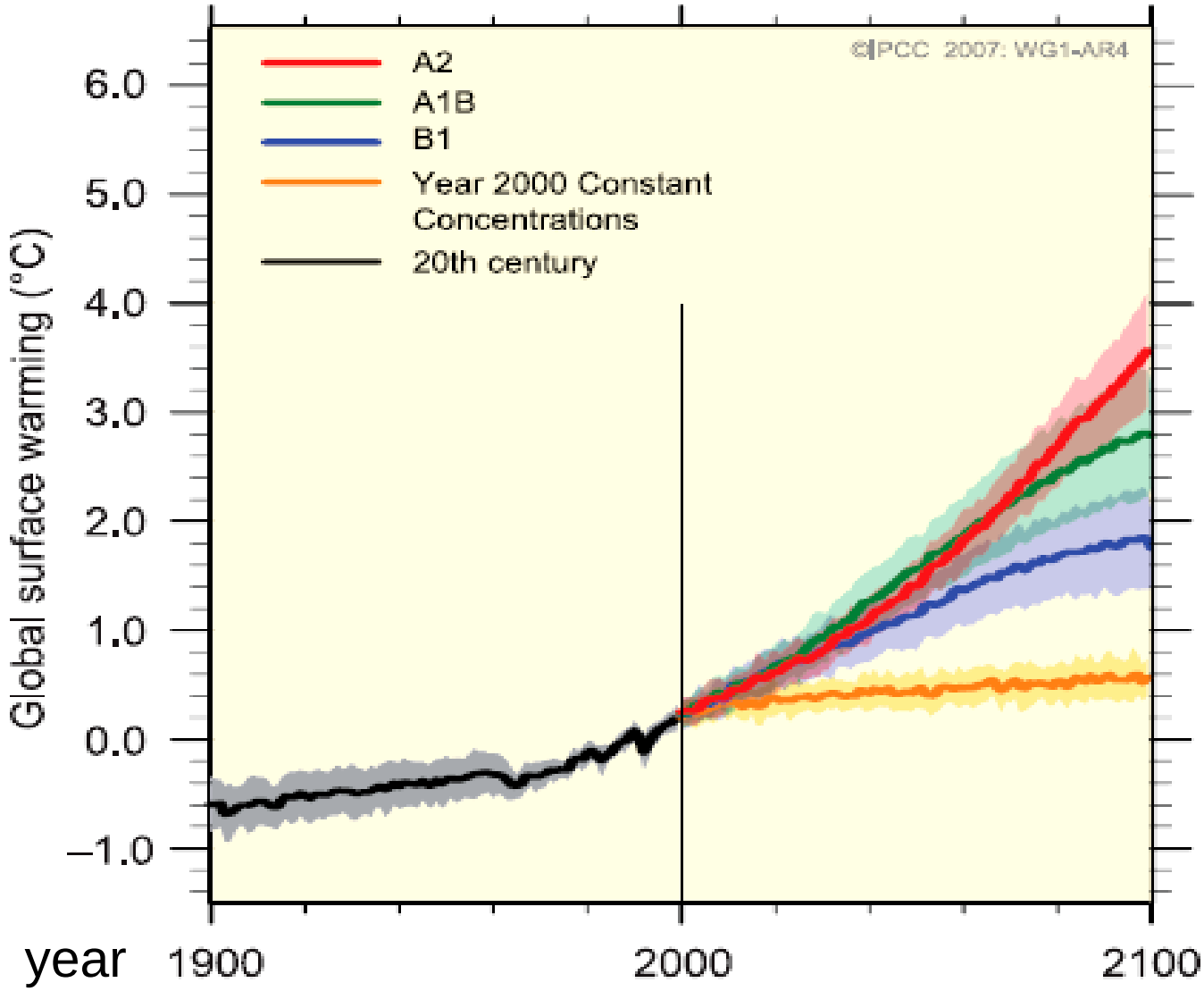


More intense and longer droughts have been observed over wider areas since the 1970s

- About 25% of Africa's population currently experience high water stress

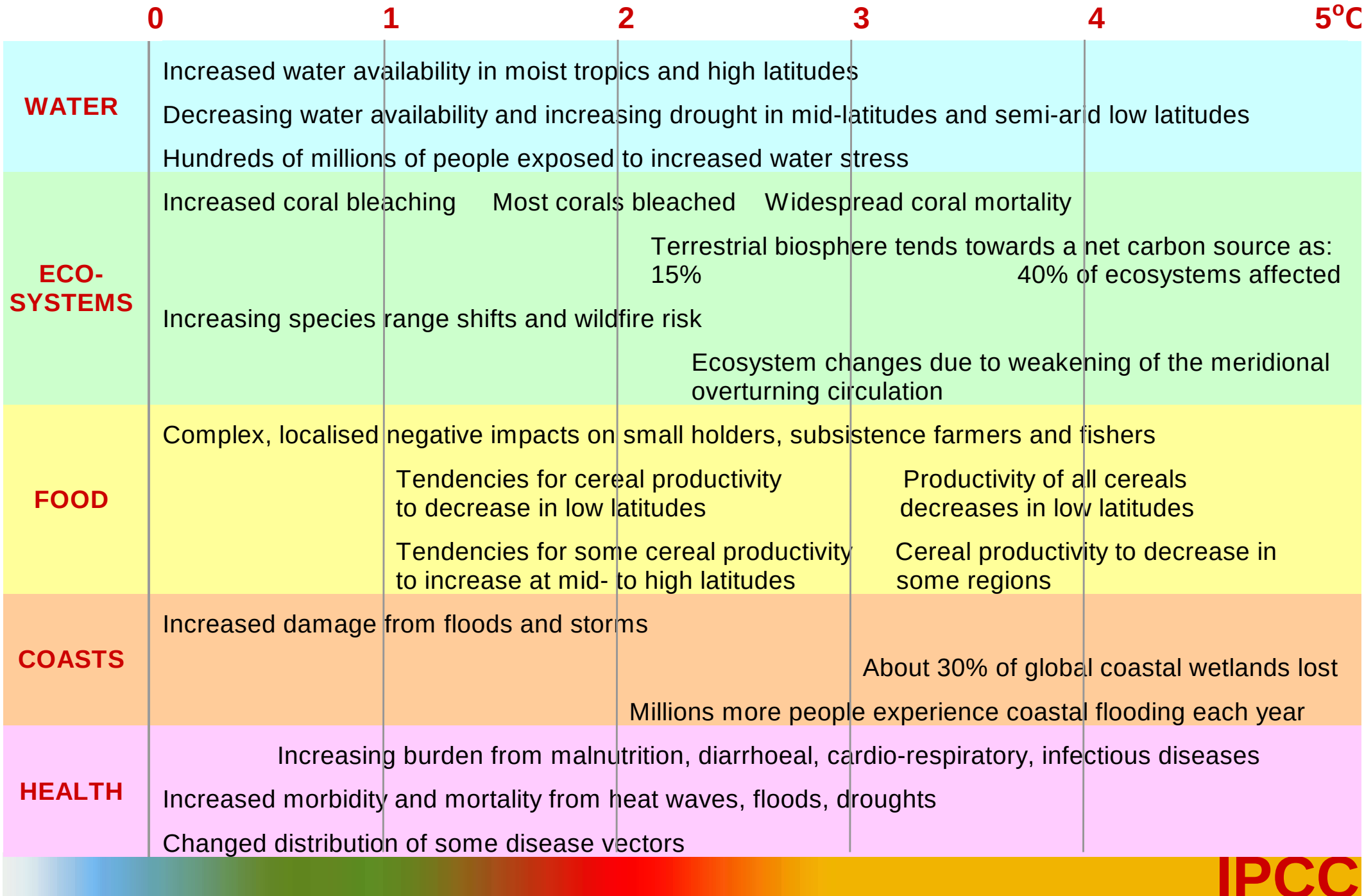
Expected trends and impacts of climate change

Ranges for predicted surface warming



Continued emissions would lead to further warming of 1.8ºC to 4ºC over the 21st century

Examples of impacts associated with warming



Climate change could lead to some abrupt or irreversible impacts

Partial loss of ice sheets on polar land could imply metres of **sea level rise**, major changes in coastlines and inundation of low-lying areas

20-30% of **species** are likely to be at risk of extinction if increases in warming exceed 1.5-2.5°C

Large scale and persistent changes in **Meridional Overturning Circulation** would have impacts on marine ecosystem productivity, fisheries, ocean CO_2 uptake and terrestrial vegetation

Key vulnerabilities in the Asia-Pacific region

Human health

Endemic morbidity and mortality due to **diarrhoeal disease** in East, South and Southeast Asia

Aggravation of **cholera** in South Asia

Increased **deaths, disease and injury** due to heat waves, floods, storms, fires and droughts

Coastal areas

Coastal erosion and inundation of coastal lowland as sea level continues to rise, flooding the homes of millions of people living in low lying areas

Significant losses of coastal ecosystems, affecting the aquaculture industry, particularly in heavily-populated mega-deltas

Small islands

Sea-level rise will compromise the **socio-economic** well-being of island communities and states

- In the Pacific islands, more than 50% of the population live within 1.5 km of the shore
- International airports, roads and capital cities are sited along the coast, or on tiny coral islands

Most small islands have a limited **water supply**, and water resources are especially vulnerable to future changes and distribution of rainfall

Tourism may be affected by water shortages, warmer climate, beach erosion, degradation of coral reefs, loss of cultural heritage from flooding and aggravation of vector-borne diseases

Food production

By 2050, taking into account the positive physiological effects of CO_2, crop yields could increase up to 20% in **East Asia** while they could decrease up to 30% in **Central and South Asia**

- In **Japan**, rice yield could decrease up to 40% in irrigated lowland areas
- In **Bangladesh**, production of wheat might drop by 32%

An additional number of people at risk of **hunger** in Asia:

- 49 million by 2020
- 132 million by 2050
- 266 million by 2080

Water resources

Winter **precipitation** will likely increase, while summer precipitation will increase in North, South and East Asia but decrease in West and Central Asia

Glacier melt is projected to increase flooding, rock avalanches and to affect water resources within the next 2 to 3 decades

Sea level rise, coupled with over-exploitation of groundwater, will increase **water salinity**

Number of people experiencing increased **water stress** in South and South East Asia:

- 120 million to 1.2 billion by the 2020s
- 185 to 981 million by the 2050s

Ecosystems

Up to **50%** of Asia's total biodiversity is at risk

30% of **coral reefs** are projected to be lost in the next 30 years

Climate change will alter the structure and function of **forests**

- Boreal forests in North Asia would move further north
- Large increase in taiga is likely to displace tundra, while the northward movement of tundra will decrease polar desert
- For an average temperature increase of 1 ° C, the duration of wild fire season in North Asia could increase by 30%

Alteration of services provided by ecosystems, including carbon sequestration

The role of observation in addressing climate change

The role of climate observation

Observation of climate variables contributes to better **adaptation planning** in agriculture, coastal management, water management, health, tourism, and disaster risk management

Global observation systems such as GEOSS promote information-sharing and synthesis of information and serve the climate as a global public good

Regional and local observation allows finer data essential for adaptation planning and greater incentives to national policy makers

Status of climate change observation

There is now **significant evidence** of observed changes in natural systems in every continent and most oceans

However, documentation of observed changes remains **sparse** in tropical regions and the Southern Hemisphere

- Evidence is particularly lacking in South-east Asia, the Indian Ocean and regions in the Pacific

Possible **reasons** for this imbalance are lack of access to data, lack of data, lag effects in responses to climate variables, resilience in systems and the presence of adaptation

Some research-related priorities

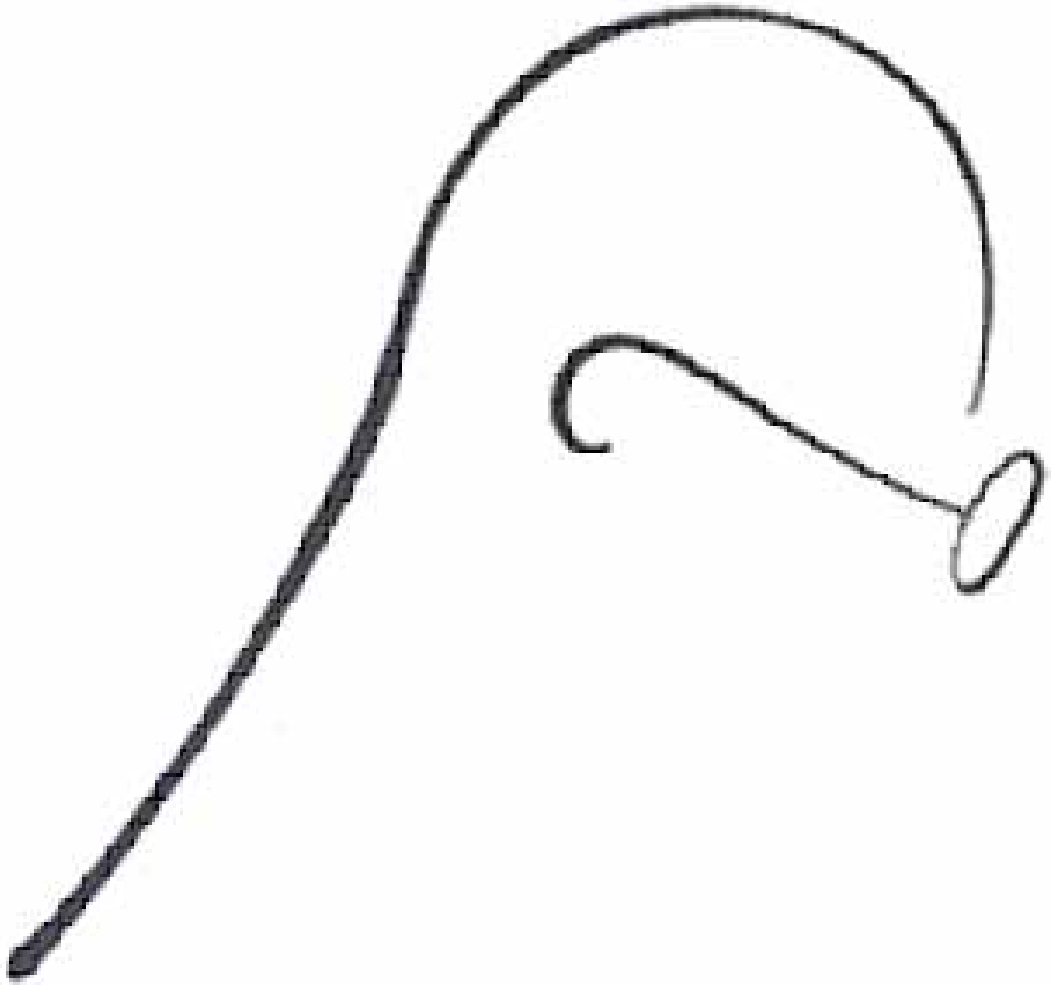
Long-term field monitoring

Regions with sparse data and small islands

Harmonised scenarios and associated regional changes in climate and vulnerabilities

Synergies between adaptive capacity and sustainable development

Multi-disciplinary, multi-institutional research



Democracy must in essence therefore, mean the art and science of mobilizing the entire physical, economics and spiritual resources of all the various sections of the people in the service of the common good for all.