Basics of Climate Change

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WeerOnline BV / NOS

KNPV

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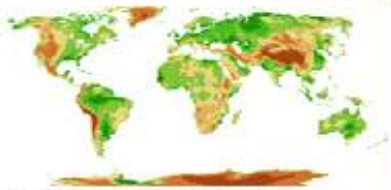
Atlas Building

Wageningen


SONY
SONY

Reisweer

- Europa
- Afrika
- Noord-Amerika
- Centraal-Amerika
- Zuid-Amerika
- Azië
- Oceanië



13:00 MEZ Cairo 25°C licht bewolkt

Ga je op vakantie? Het weer op je bestemming:
Verwachting GO

Buienradar

Het weer

Zonnige perioden
Vandaag is het op veel plaatsen een grijze en kille dag. Aan de oostkant van Nederland valt mogelijk lichte regen. In het westen kan de zon er af en toe bij komen. Onder de bewolking wordt het niet veel warmer dan 5 graden.

>> Lees meer

WeerNieuws

do	11:45	Zonnige perioden
do	11:15	Wintersportweerbericht
do	09:29	Wisselvallig Alpenweer
wo	10:30	Het weer in Europa
wo	08:45	Eerste gladheid van het seizoen
wo	08:00	Het weercijfer de komende 5 dagen
di	15:02	Het weerbericht als reddingsboei
di	14:20	Vervolgcursus Weer in de praktijk
di	14:18	FC WeerOnline op titelkoers?
di	13:30	Cursus Weer & Watersport

>> Lees meer

Weercijfer

do	vr	za	zo	ma
4	5	5	6	7

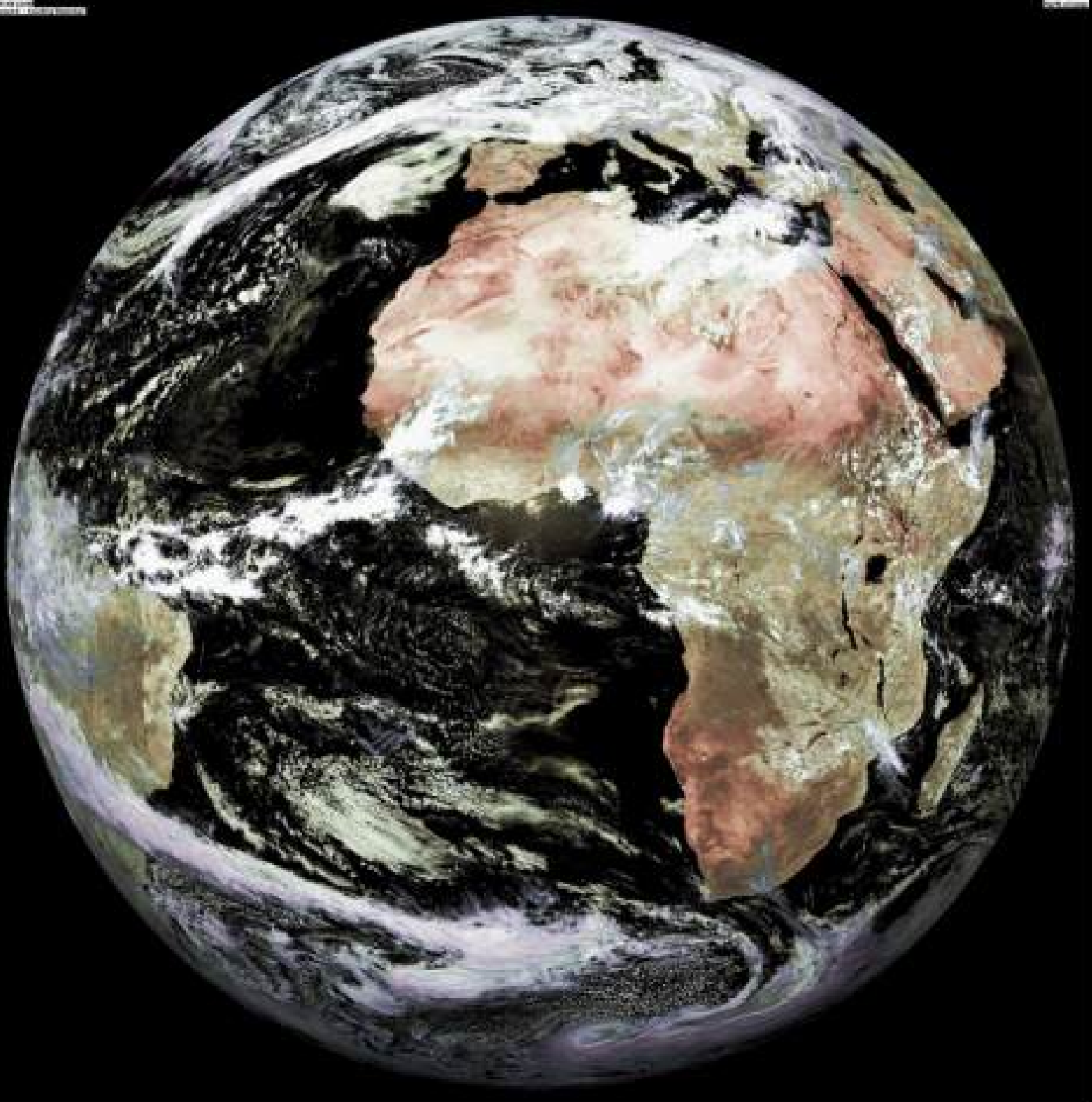
Mobiel

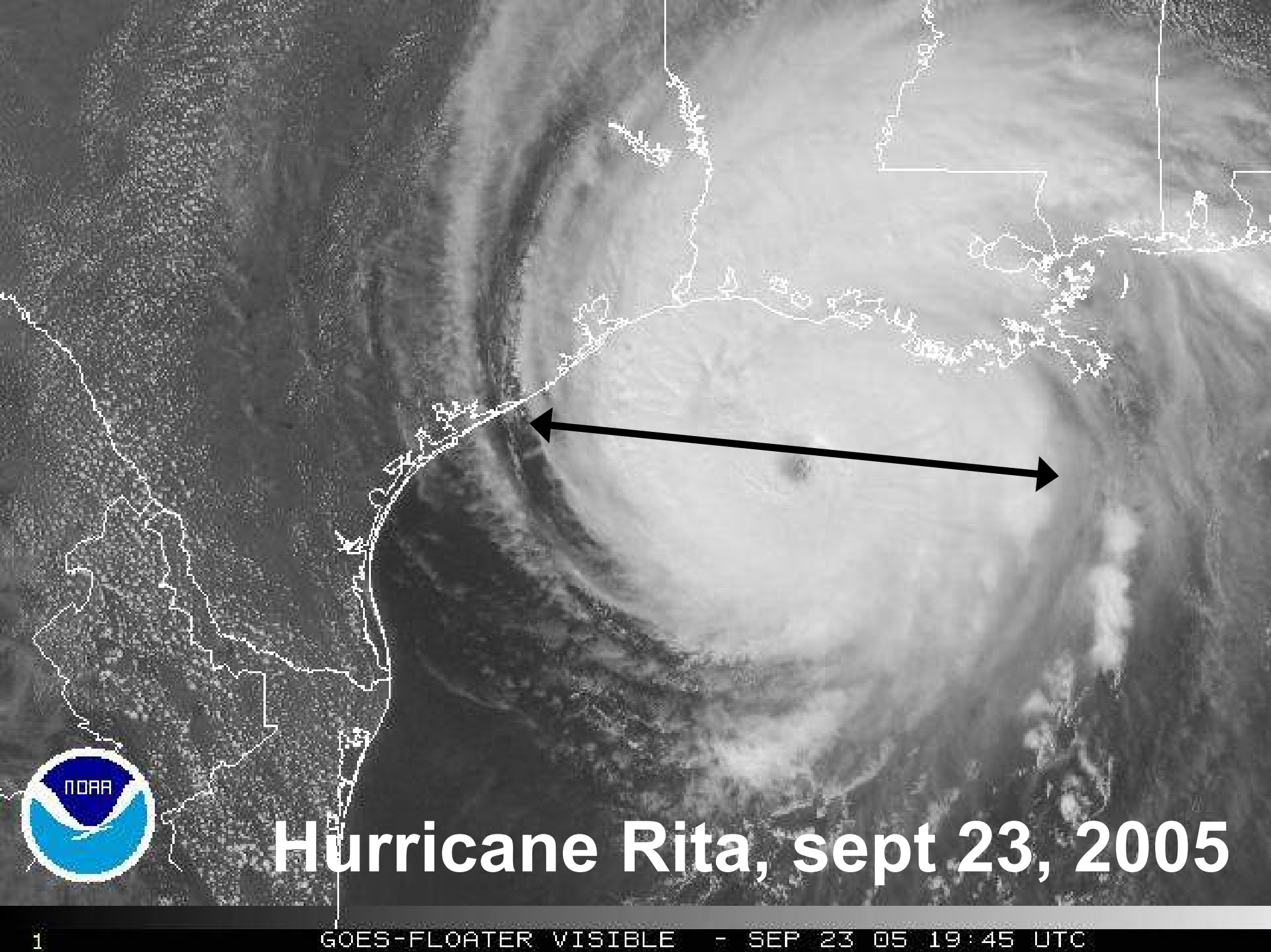
WeerOnlineTV

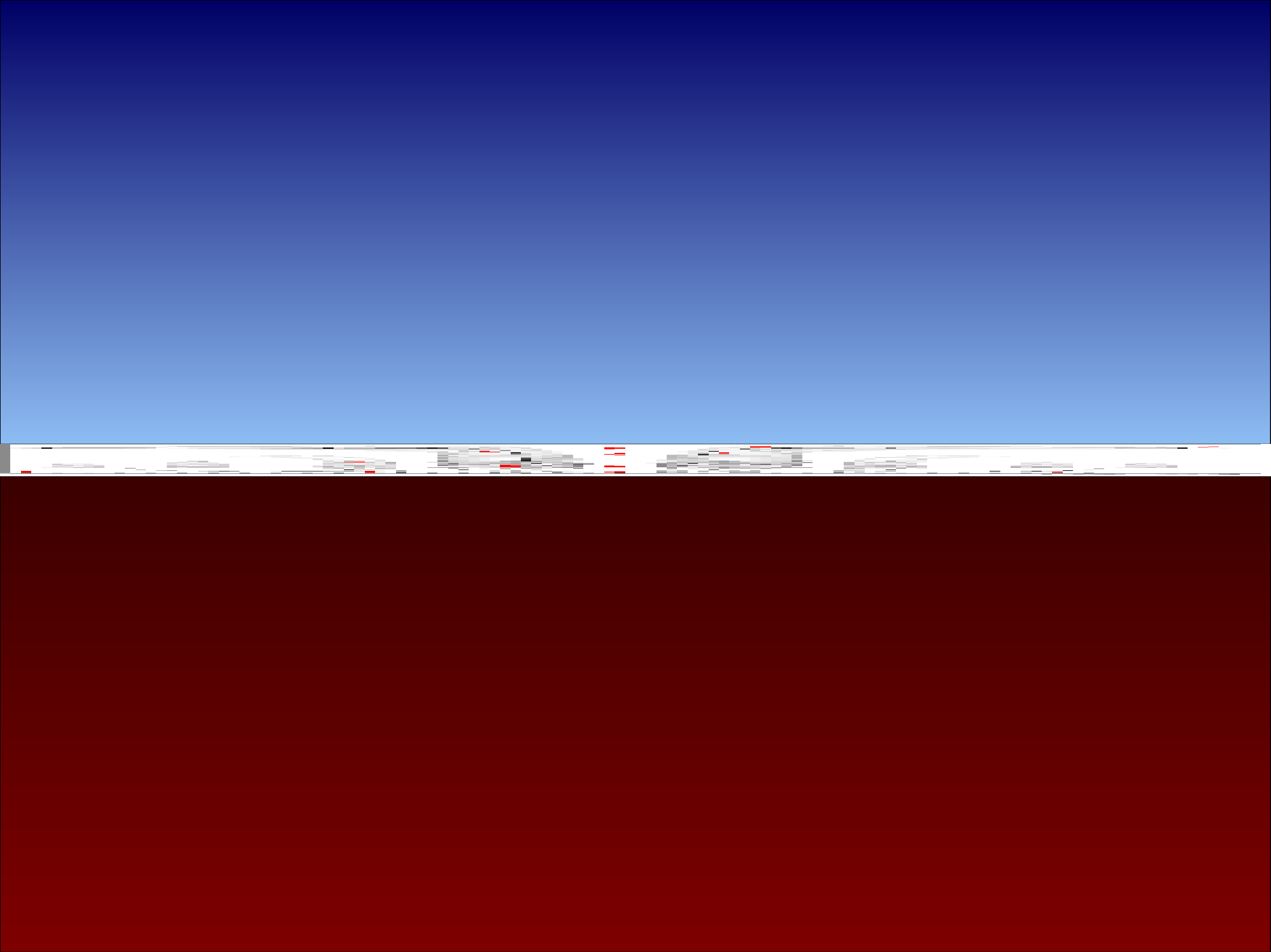
My presentation

- The atmosphere
- Climate change
- What may we expect?
- Something about communication

The atmosphere is thin

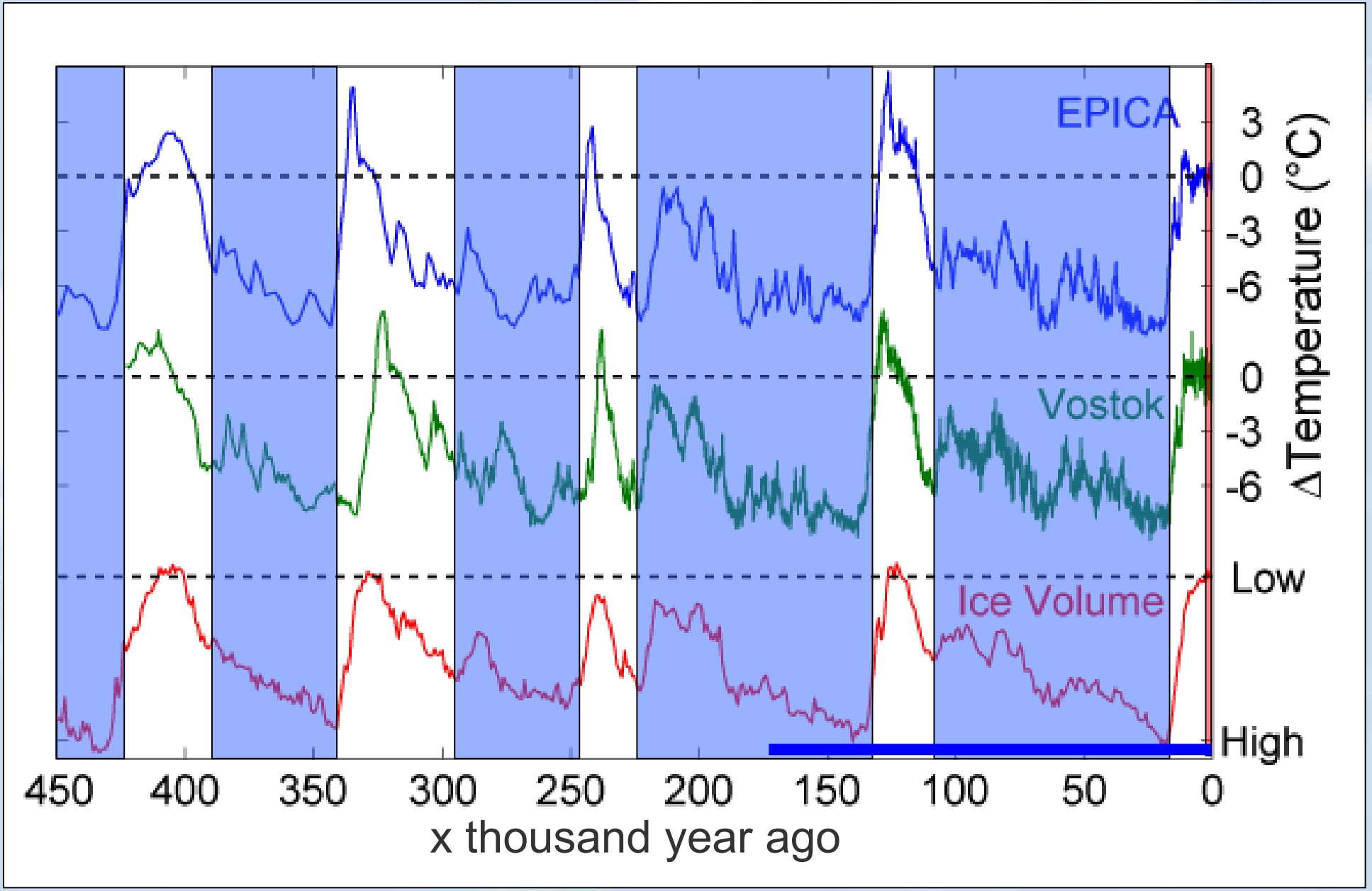



NOAA
Hurricane Rita, sept 23, 2005
1
GOES-FLOATER VISIBLE - SEP 23 05 19:45 UTC



Climate change is very common

Glacials (“ice ages”)

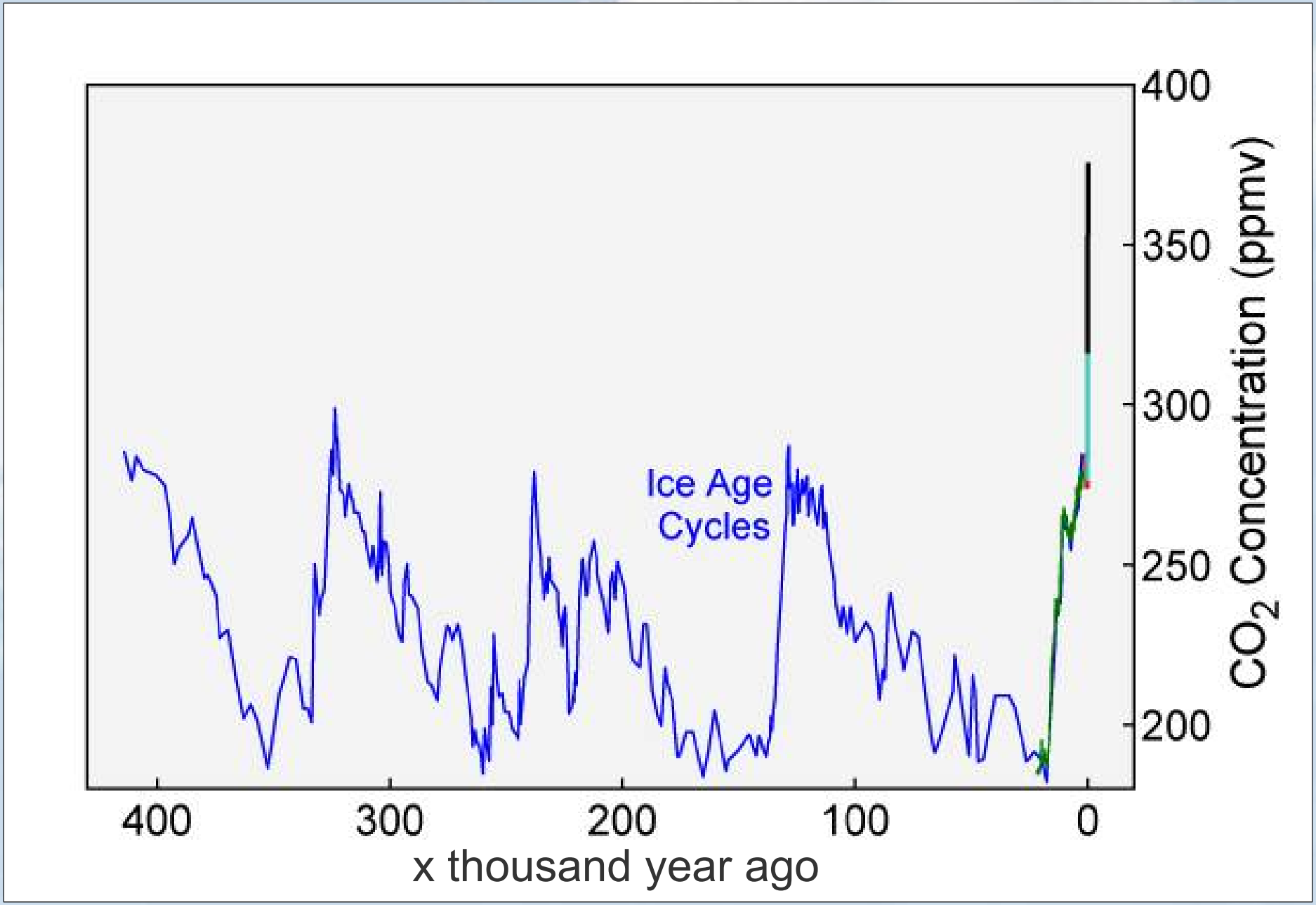


Causes of ice ages

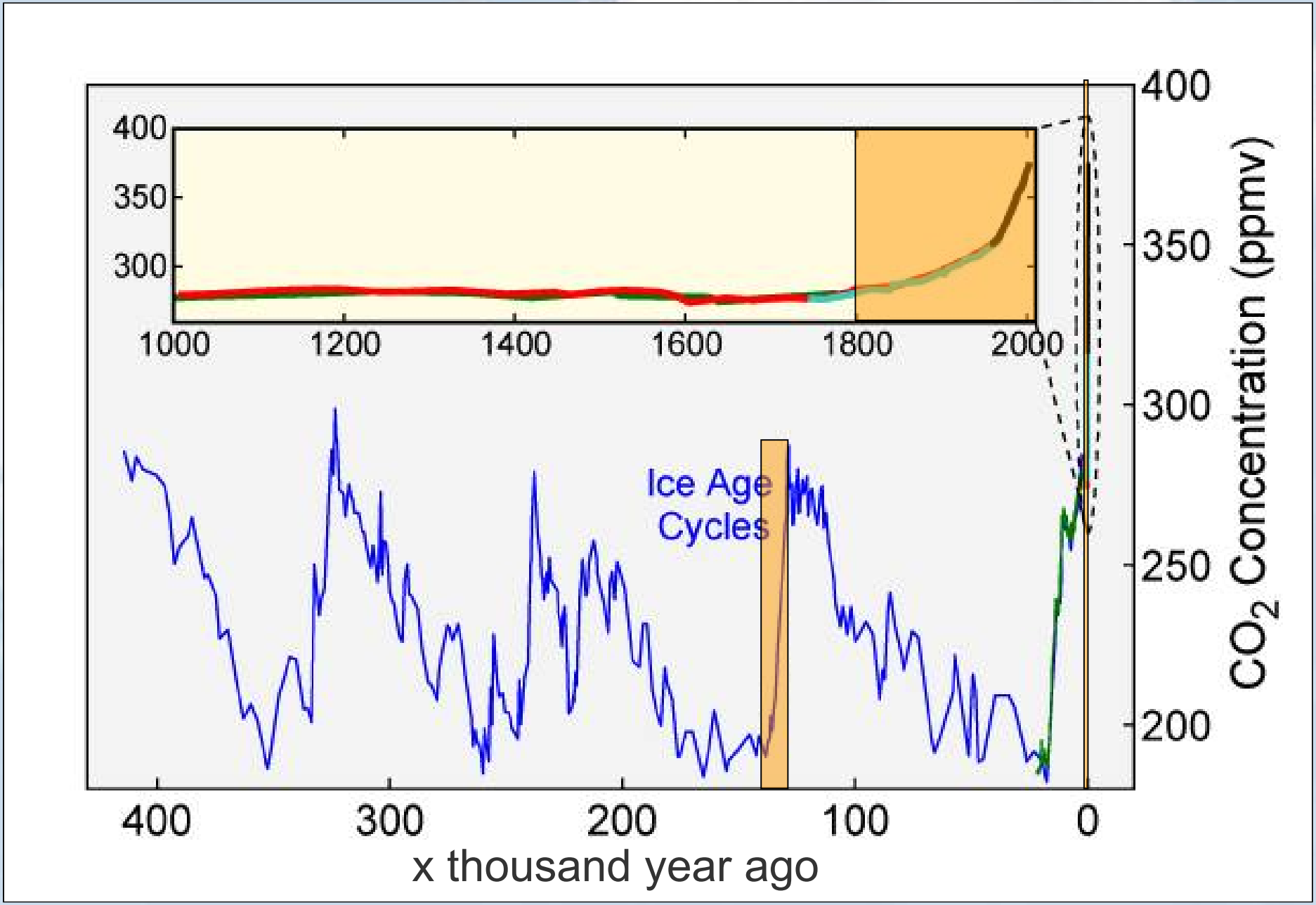
Different causes:

- **composition of the atmosphere**
- **Milankovitch cycles**
- **tectonic motion**
- **wind and ocean currents**
- **solar radiation**
- **earth-moon orbit**
- **large meteorites**
- **supervulcanoes**

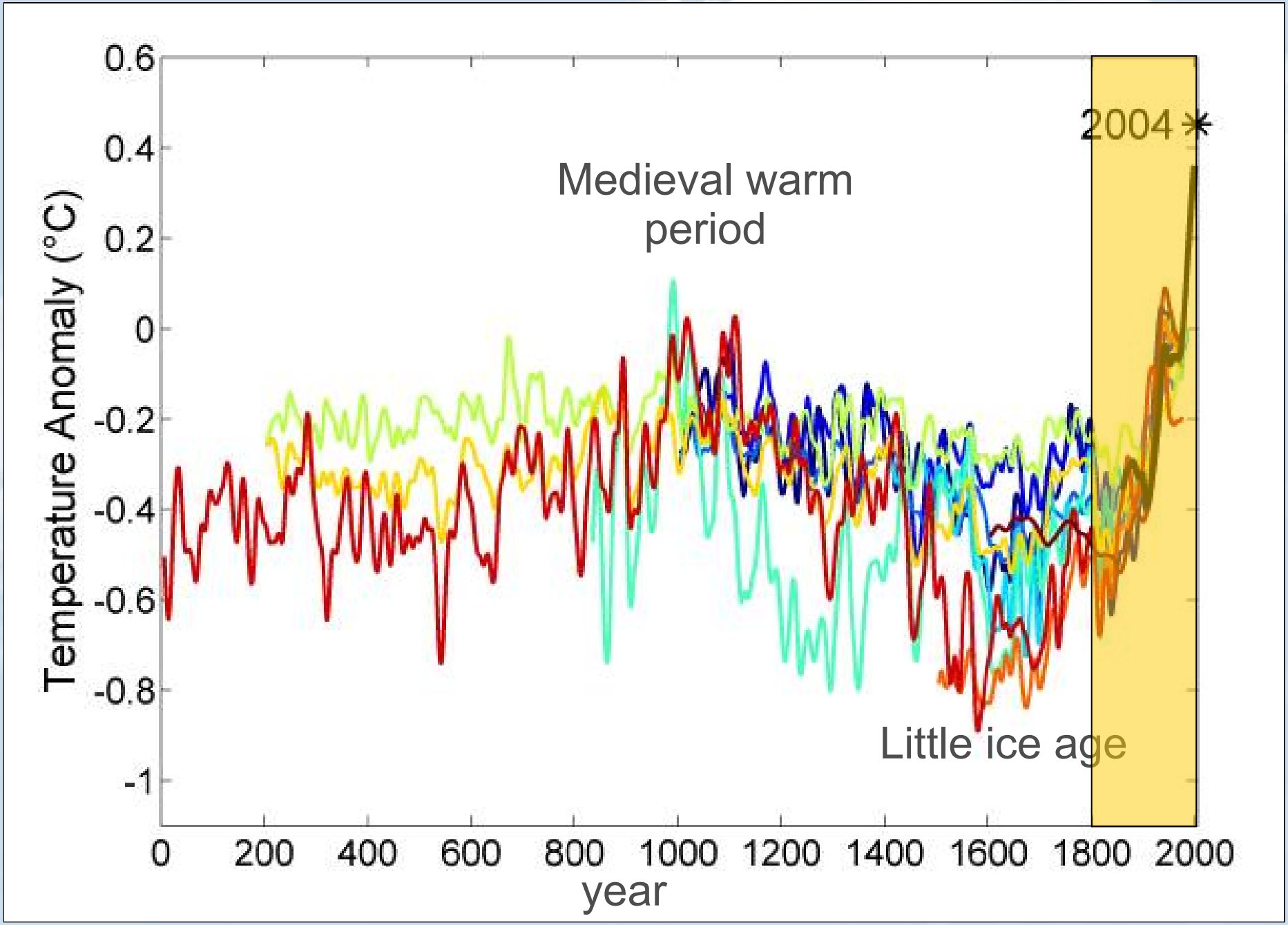
Variations in CO_2 concentration



Variations in CO_2 concentration



Temperature reconstruction



Greenhouse effect

- greenhouse gasses affect temperature
  - greenhouse effect: +33°C
  - atmosphere consists for 99% N_2 en O_2
  - greenhouse gasses:
    - H_2O: variable (0-7%)
    - CO_2: 0,04%
    - CH_4: 0,002%
    - N_2O: 0,00005%
  - less then 0,05%!

Increase greenhouse gasses

- Cause: mainly human activity
  - CO_2: use of fossil fuels, deforestation
  - CH_4: agriculture, animals, rice farming,
  - N_2O: use of fertilizers

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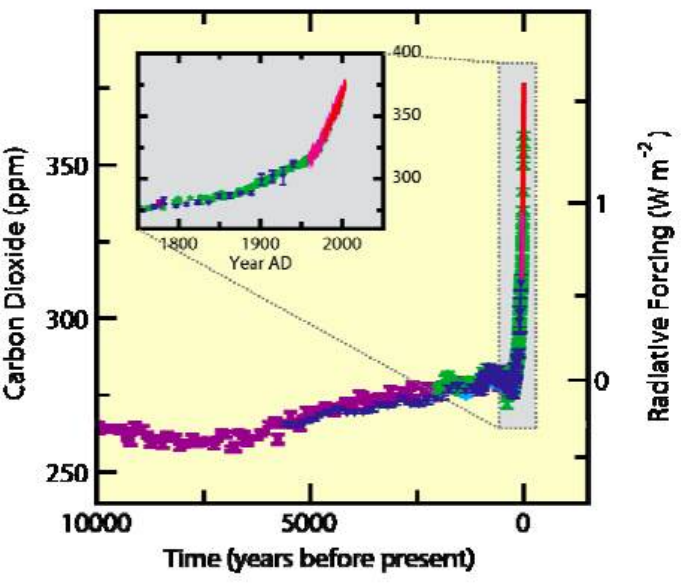
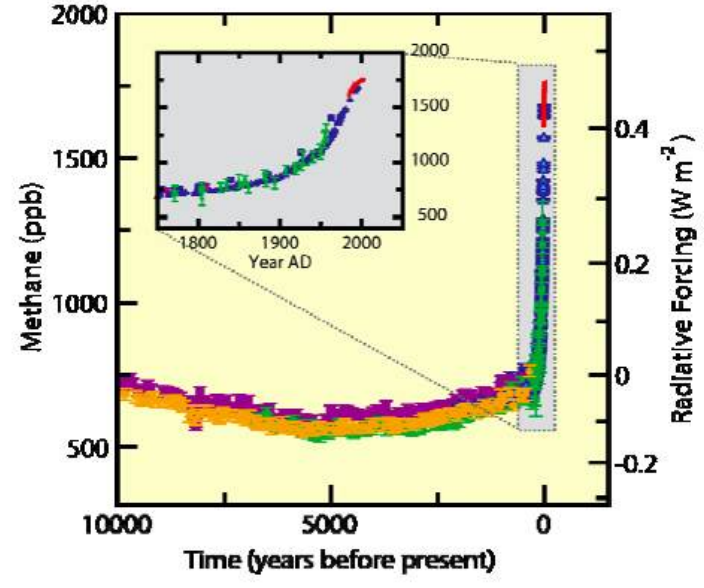
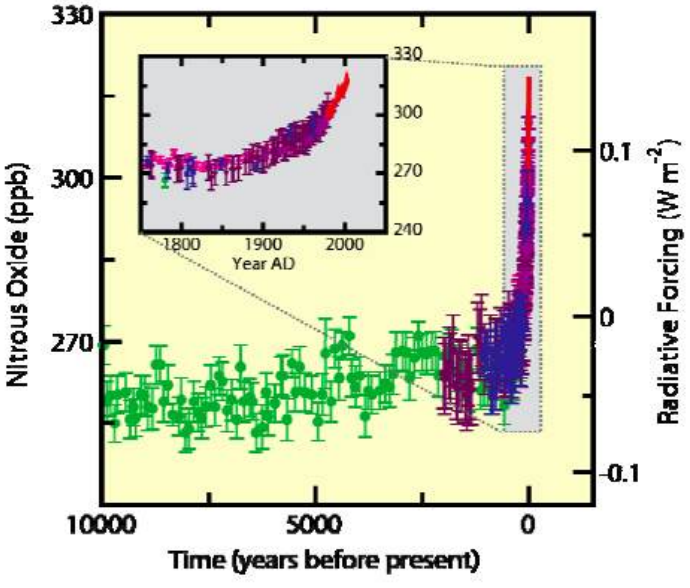
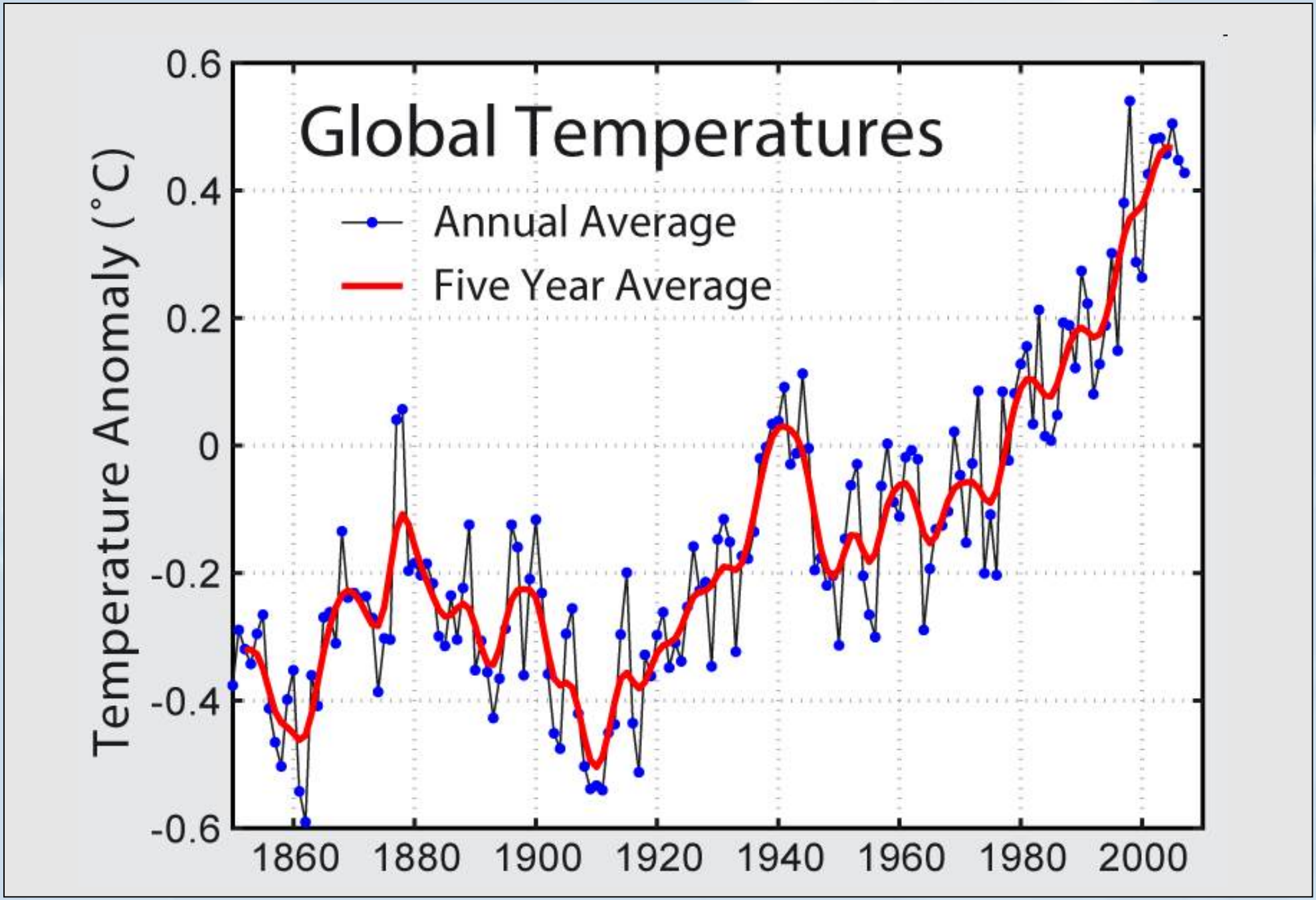






The climate is changing

Global temperature since 1850



Change in precipitation 1920-1990

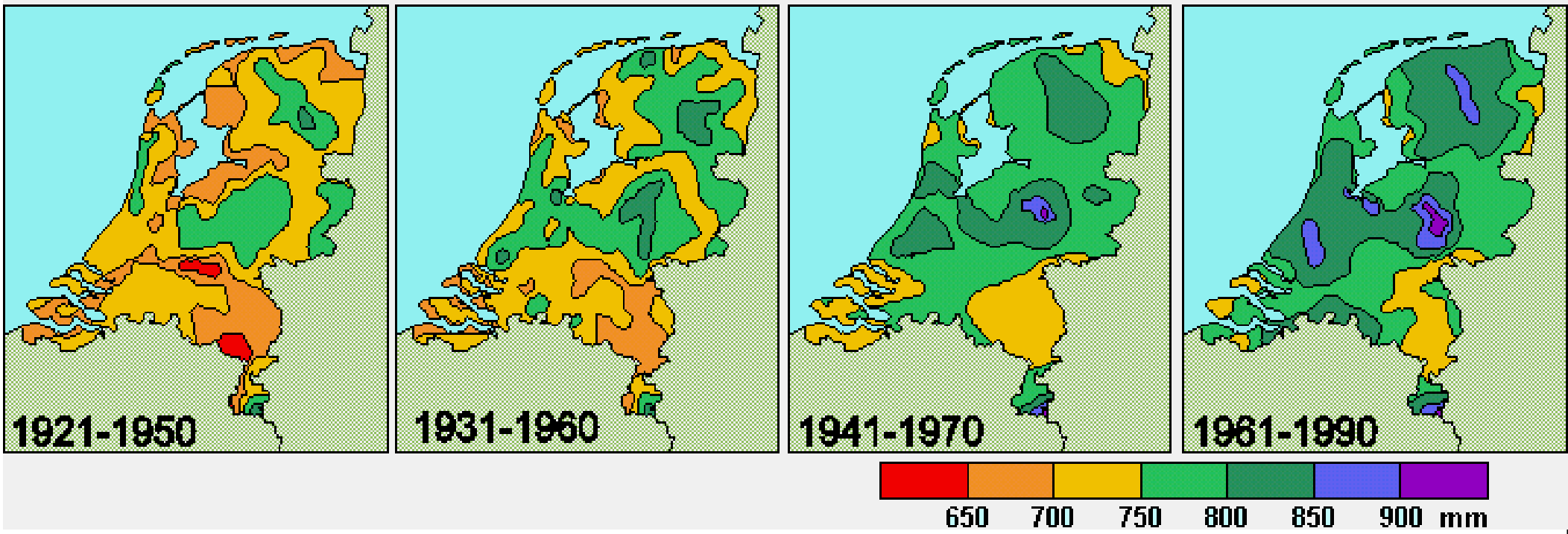


Fig. 4.1 Klimatologisch gemiddelde neerslag in Nederland gedurende de tijd (van Boxel en Cammeraat, 1999a)

Bron: Van Boxel en Cammeraat, 1999a

- **increase of 20% since 1900**

Observed effects

- **Temperature (since 1900):**
  - **mean temperature + 1 °C**
  - **3 x more “warm” days**
  - **0,5 x less “cold” days**
- **Evaporation**
  - **increase in summer proportional with temperature**

Observed effects

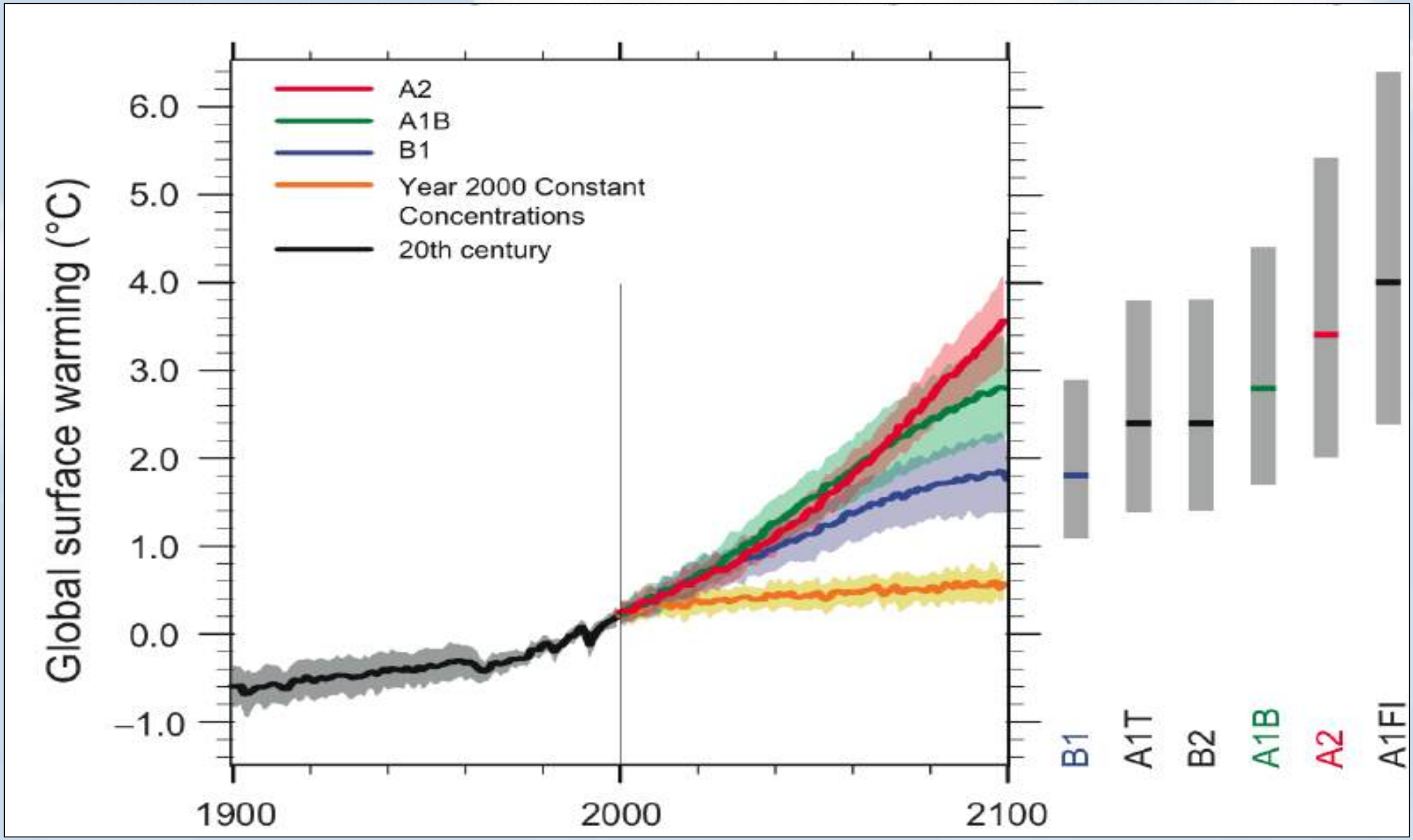
- **Precipitation (since 1900):**
  - **20% yearly increase**
  - **50% more wet days (> 15, 20, 25 mm)**
  - **likely more dry years**

Observed effects agriculture

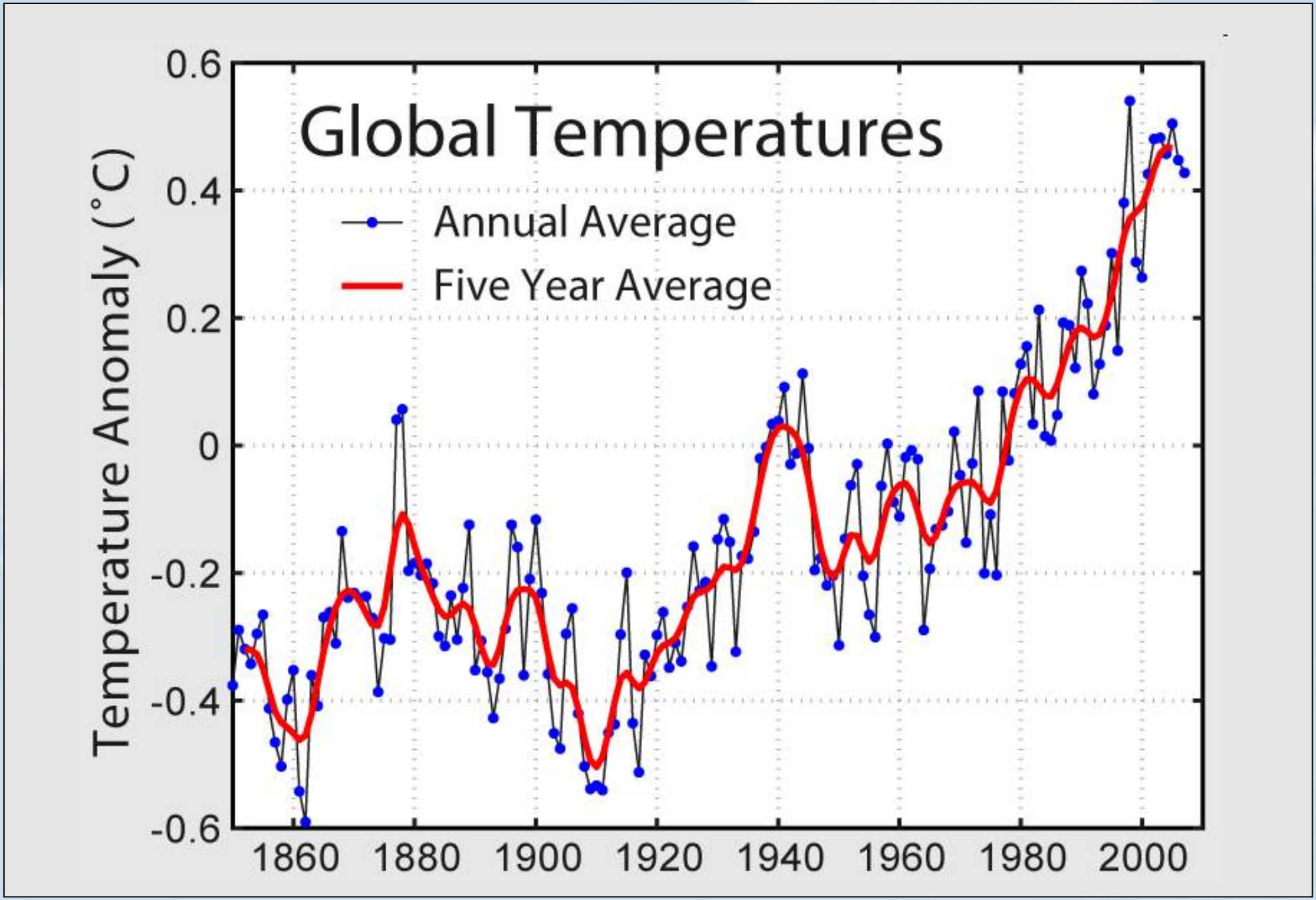
- longer growing season (in 25 yr ca. 3 weeks)
- more extreme weather events:
  - more frequent damage by flooding
  - More frequent damage by hail storms
  - more frequent damage by droughts
- increase of pests and diseases

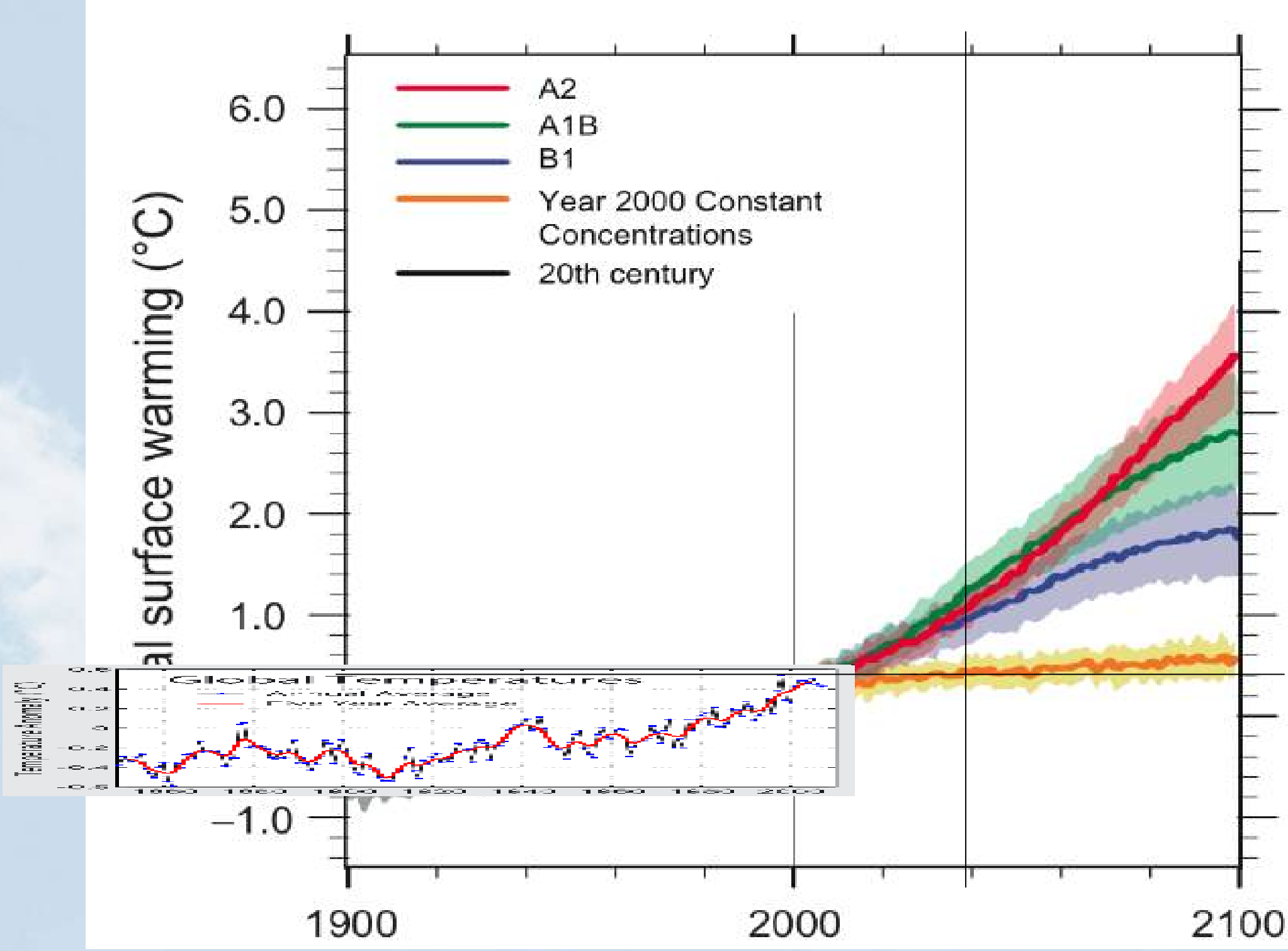
What may we expect?

Temperature increase IPCC 2007



Global temperature since 1850

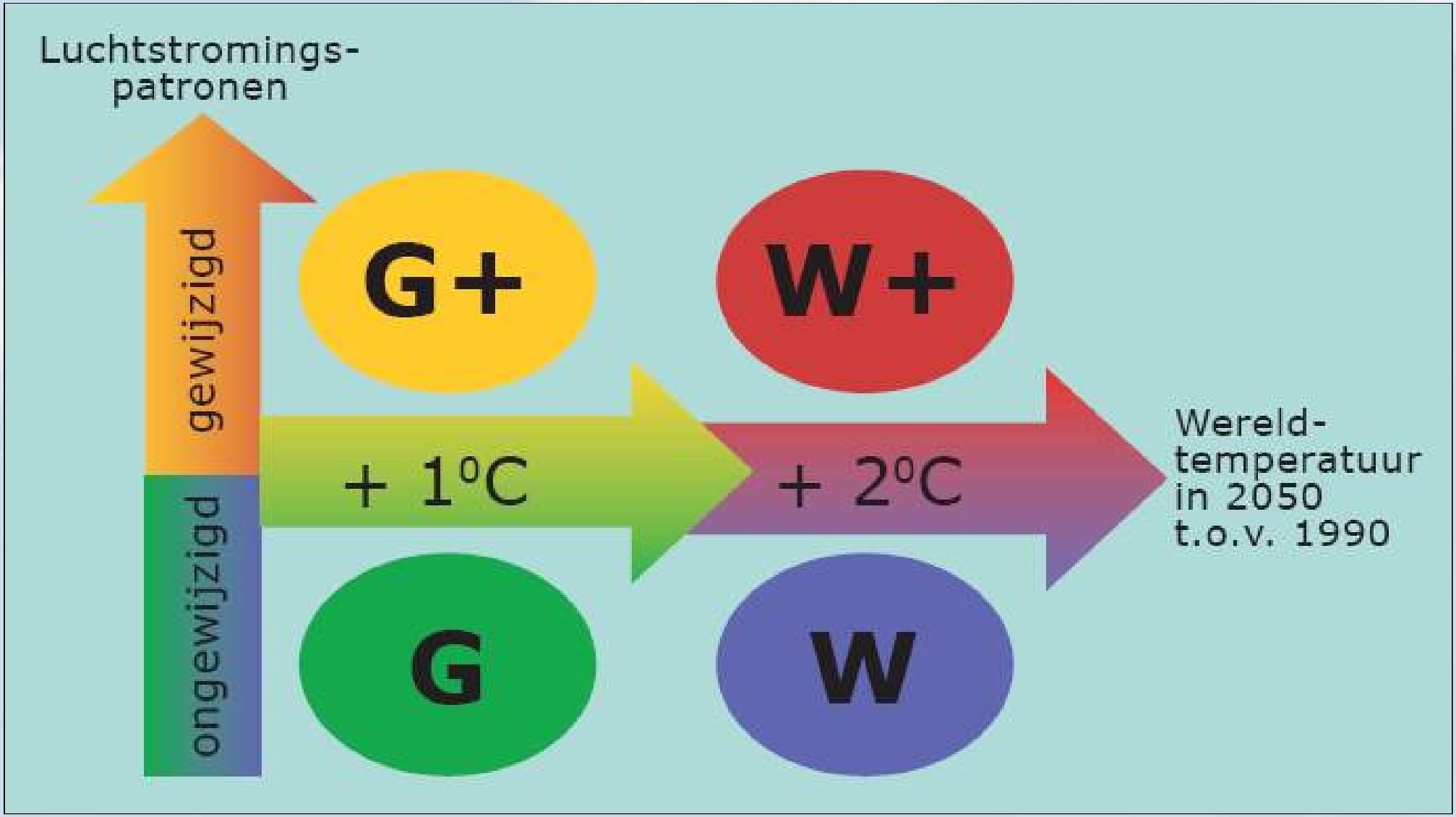


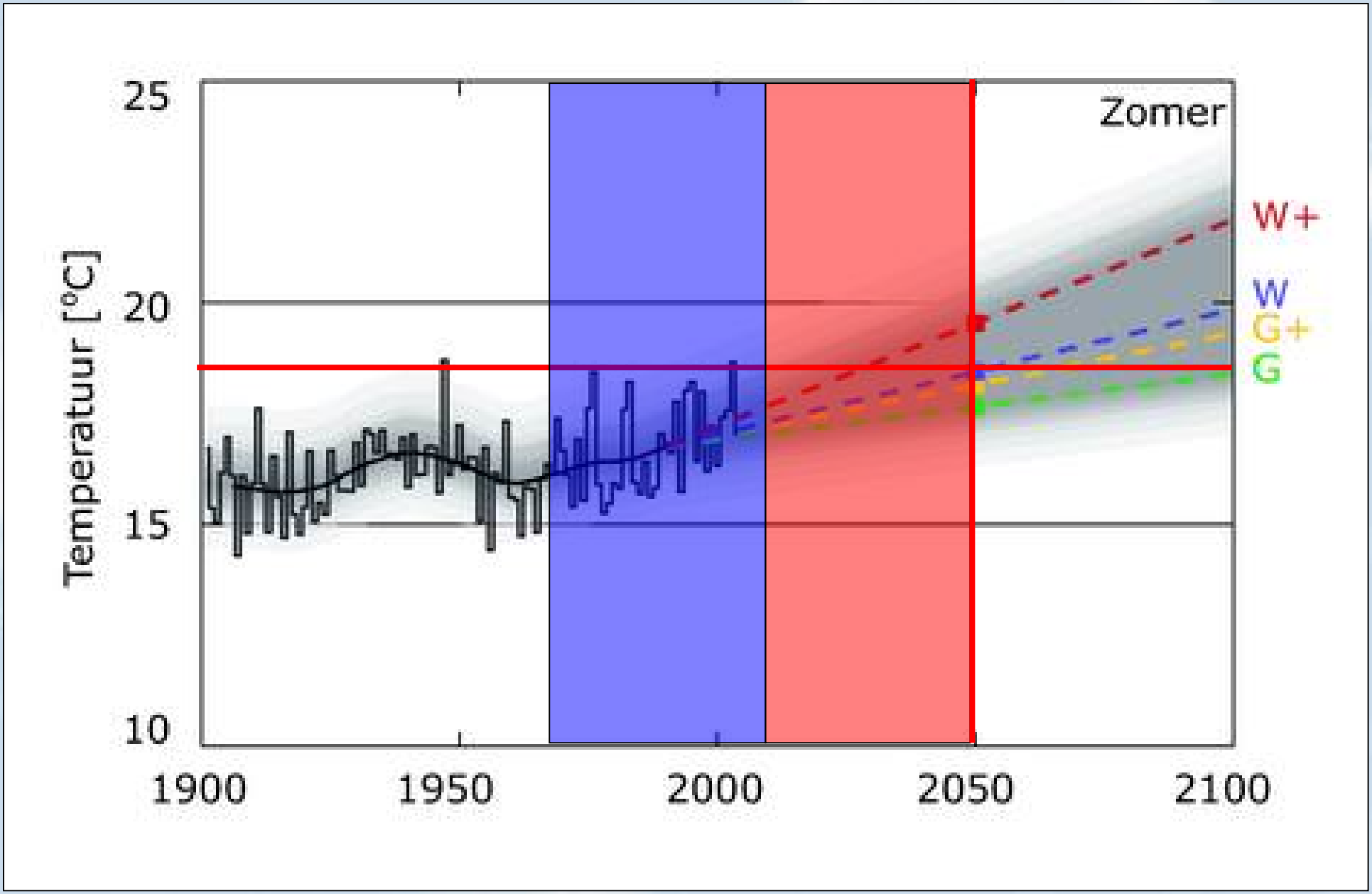

A2
A1B
B1
Year 2000 Constant Concentrations
20th century
al surface warming (°C)
6.0
5.0
4.0
3.0
2.0
1.0
−1.0
1900
2000
2100
Global Temperatures
Annual Average
Five-Year Average

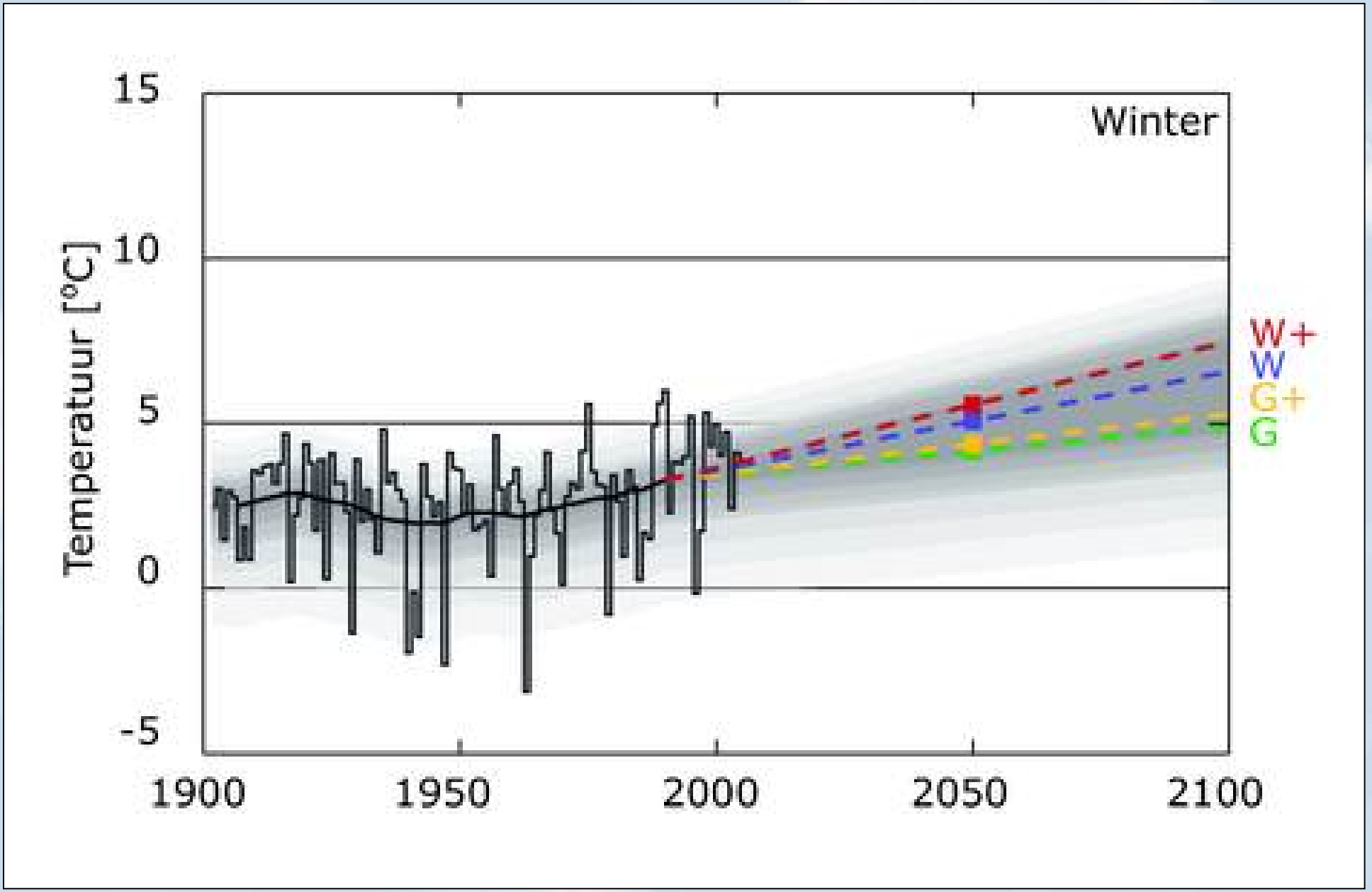
In general (Europe)

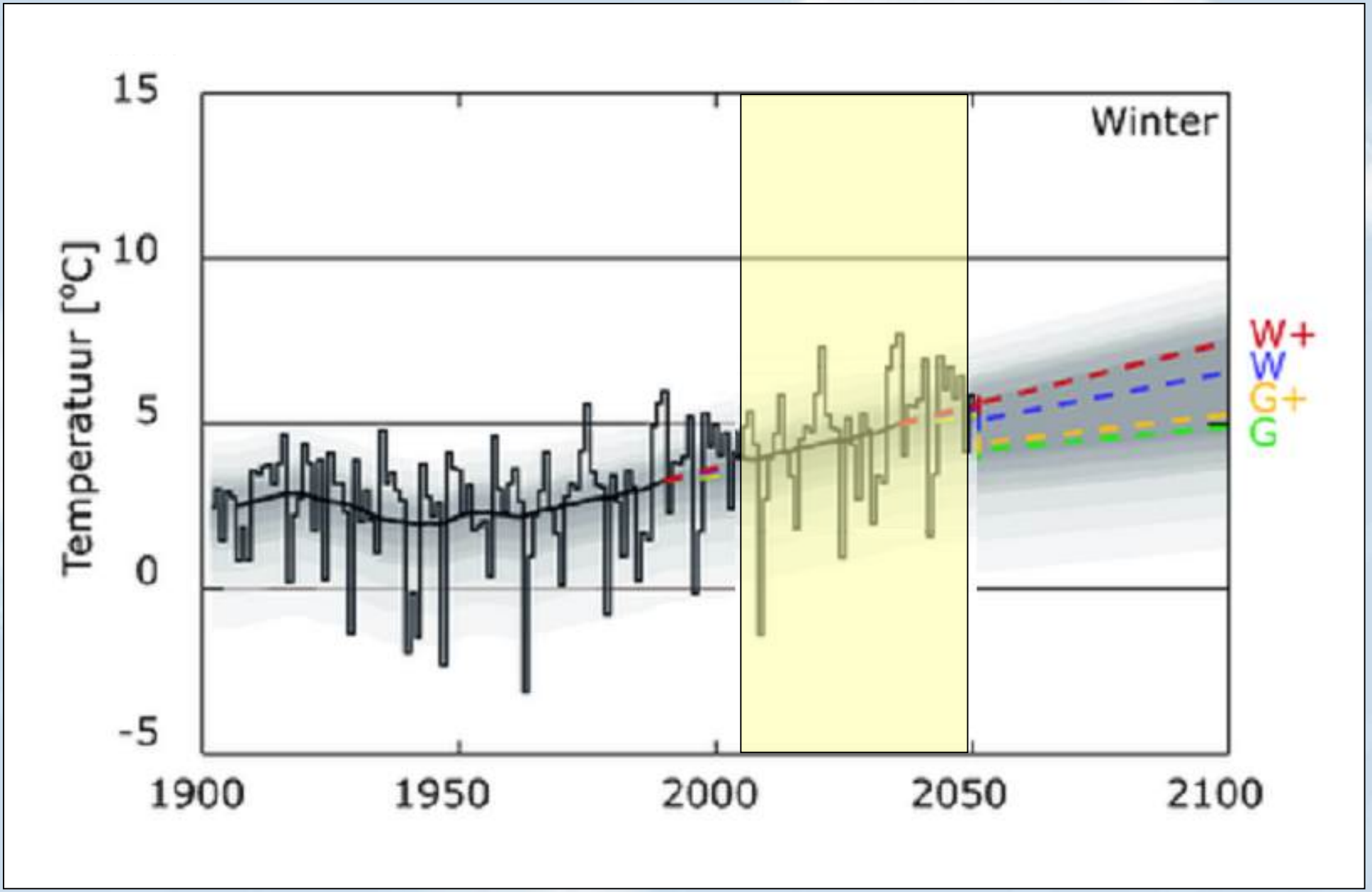
- winter
  - more often high temperatures
  - more precipitation
  - increase in extreme precipitation events
- summer
  - increase in hot summer spells
  - decrease in rain days
  - increase summer storms (heavy showers)
- wind will hardly change
- rising sea level
- stronger variation in river drainage
- higher risk of river flooding

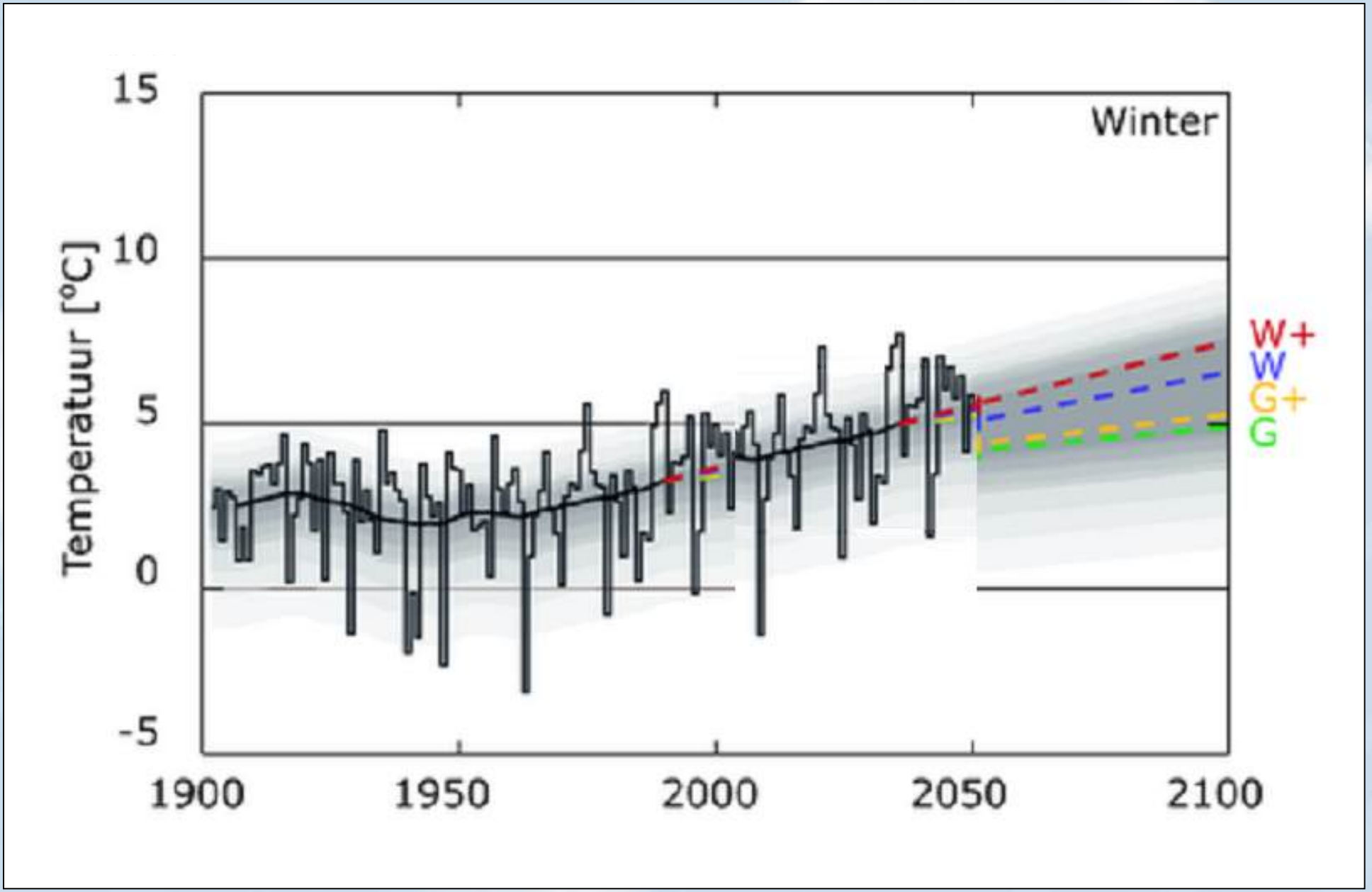
4 scenarios


Luchtstromings-
patronen
gewijzigd
ongewijzigd
G+
W+
G
W
+ 1°C
+ 2°C
Wereld-
temperatuur
in 2050
t.o.v. 1990

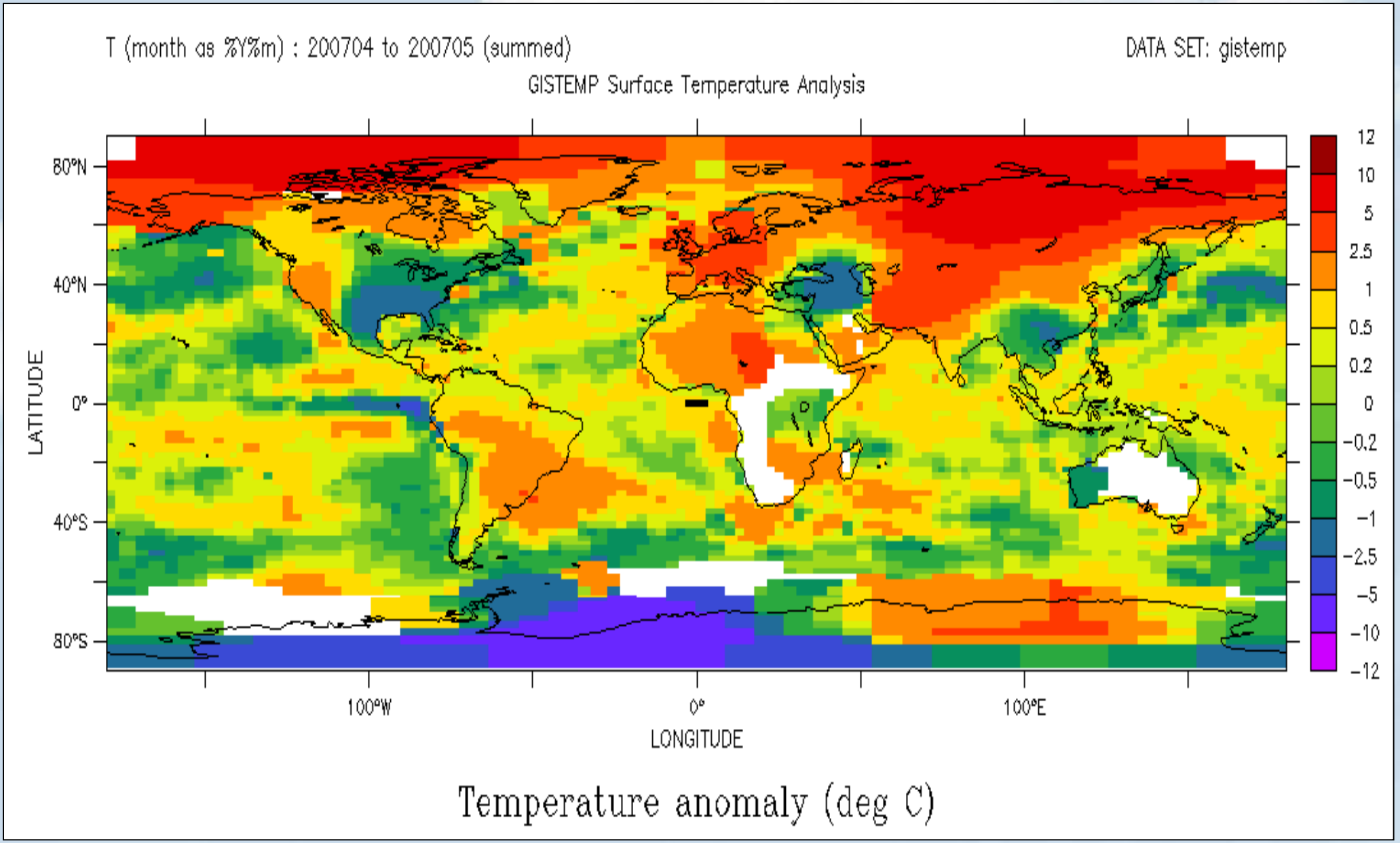

Zomer
Temperatuur [°C]
25
20
15
10
1900
1950
2000
2050
2100
W+
W
G+
G

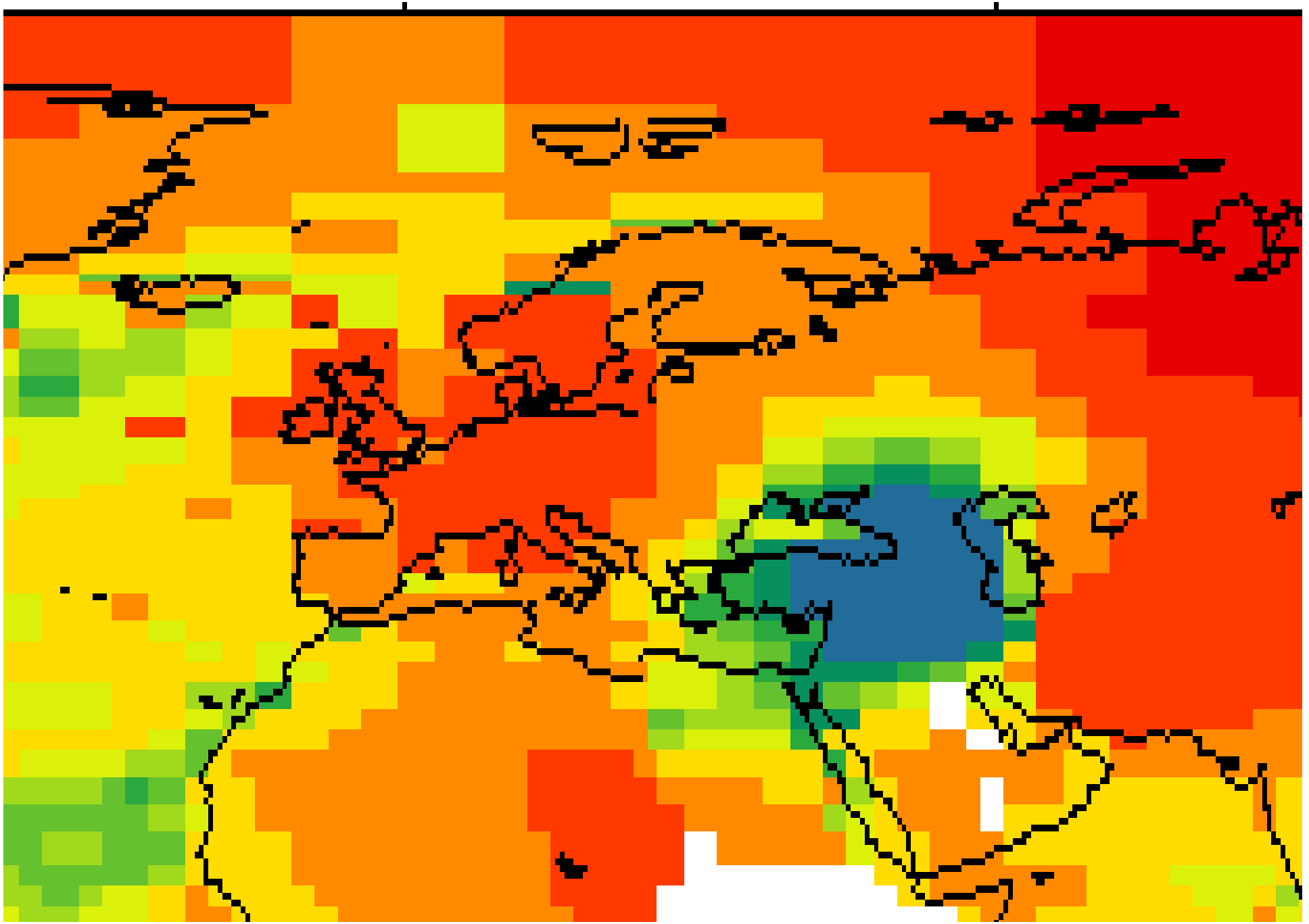

Winter
Temperatuur [°C]
15
10
5
0
-5
1900
1950
2000
2050
2100
W+
W
G+
G


Winter
Temperatuur [°C]
15
10
5
0
-5
1900
1950
2000
2050
2100
W+
W
G+
G


Winter
Temperatuur [°C]
15
10
5
0
-5
1900
1950
2000
2050
2100
W+
W
G+
G

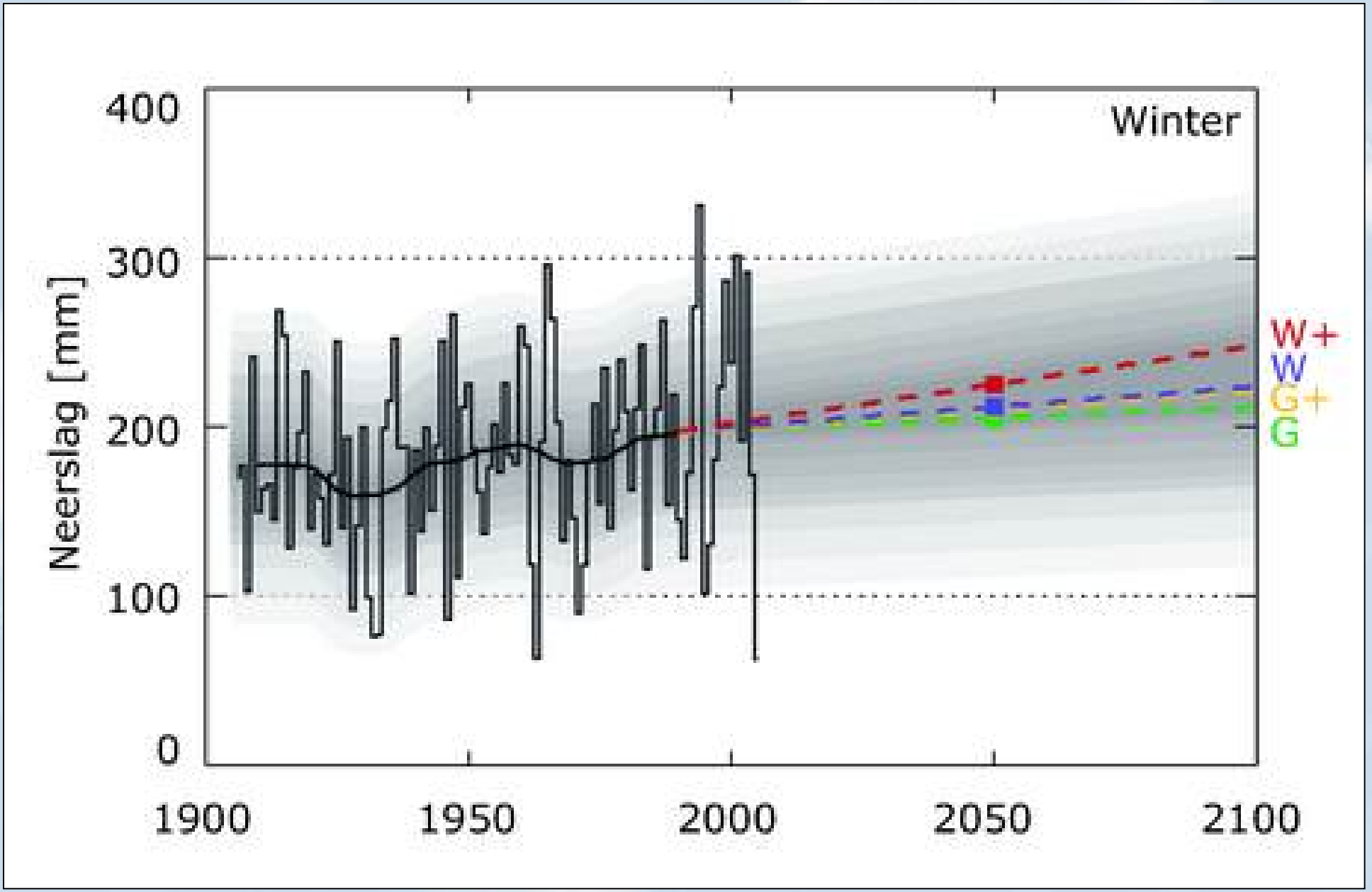
Example april 2007

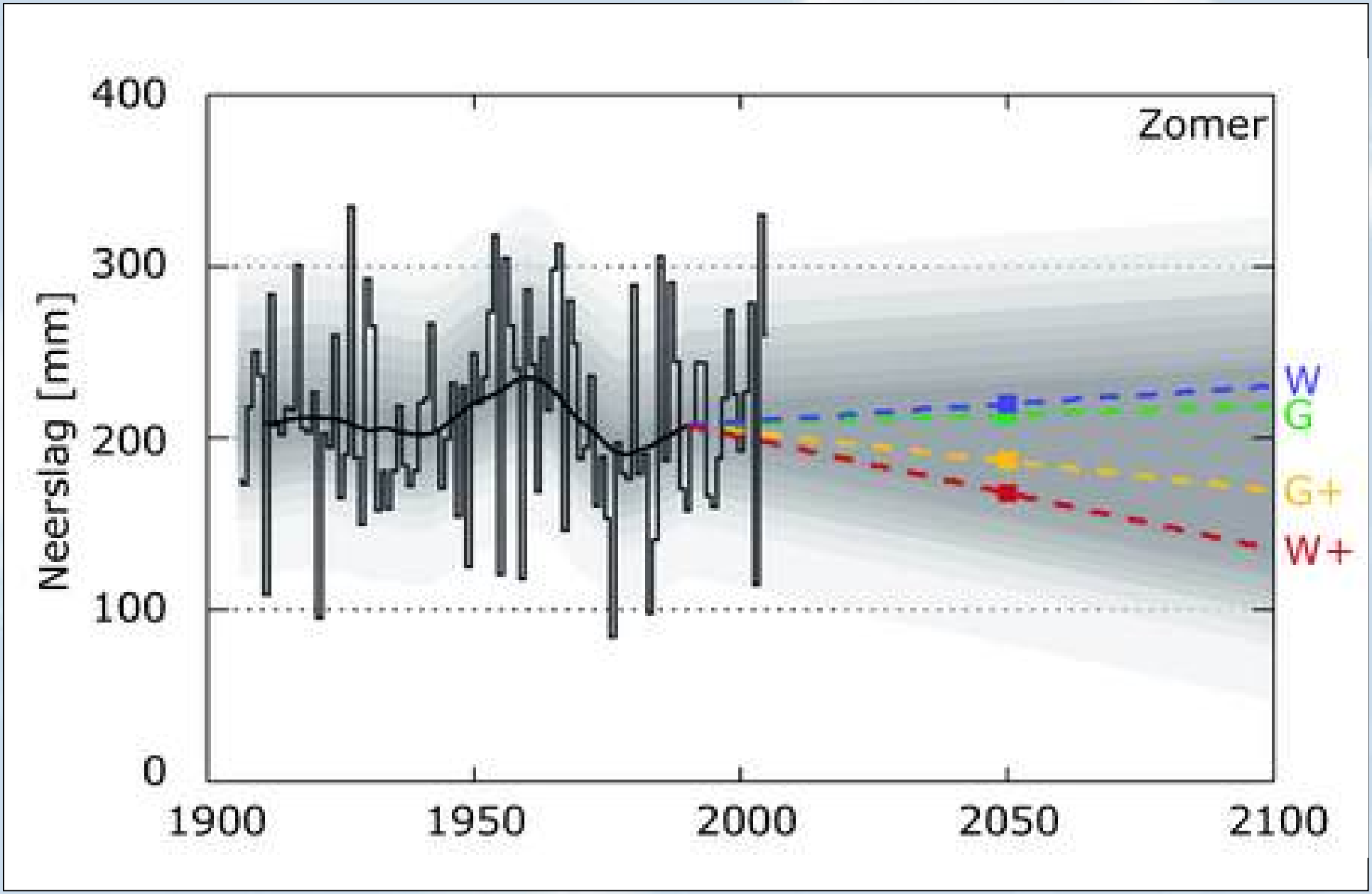




Future: precipitation

- IPCC 2007:
  - N-Europe more precipitation (winter)
  - S-Europe less precipitation (summer)
- The Netherlands are in between
- winter:
  - more precipitation in all scenarios
- summer:
  - +3% if no change in weather circulation
  - -10% per degree temperature increase and changing weather circulation

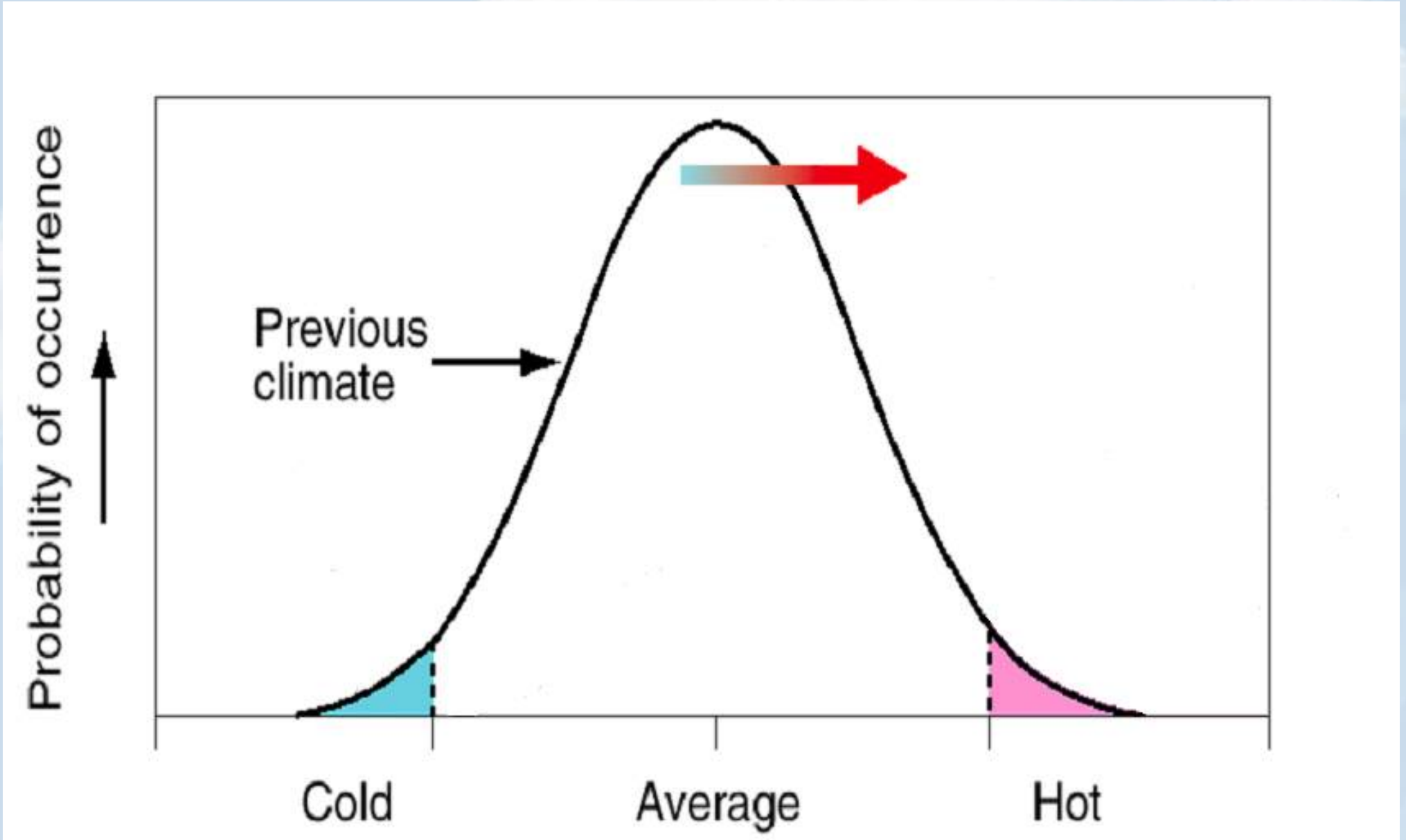

Winter
Neerslag [mm]
400
300
200
100
0
1900
1950
2000
2050
2100
W+
W
G+
G


Zomer
Neerslag [mm]
400
300
200
100
0
1900
1950
2000
2050
2100
W
G
G+
W+

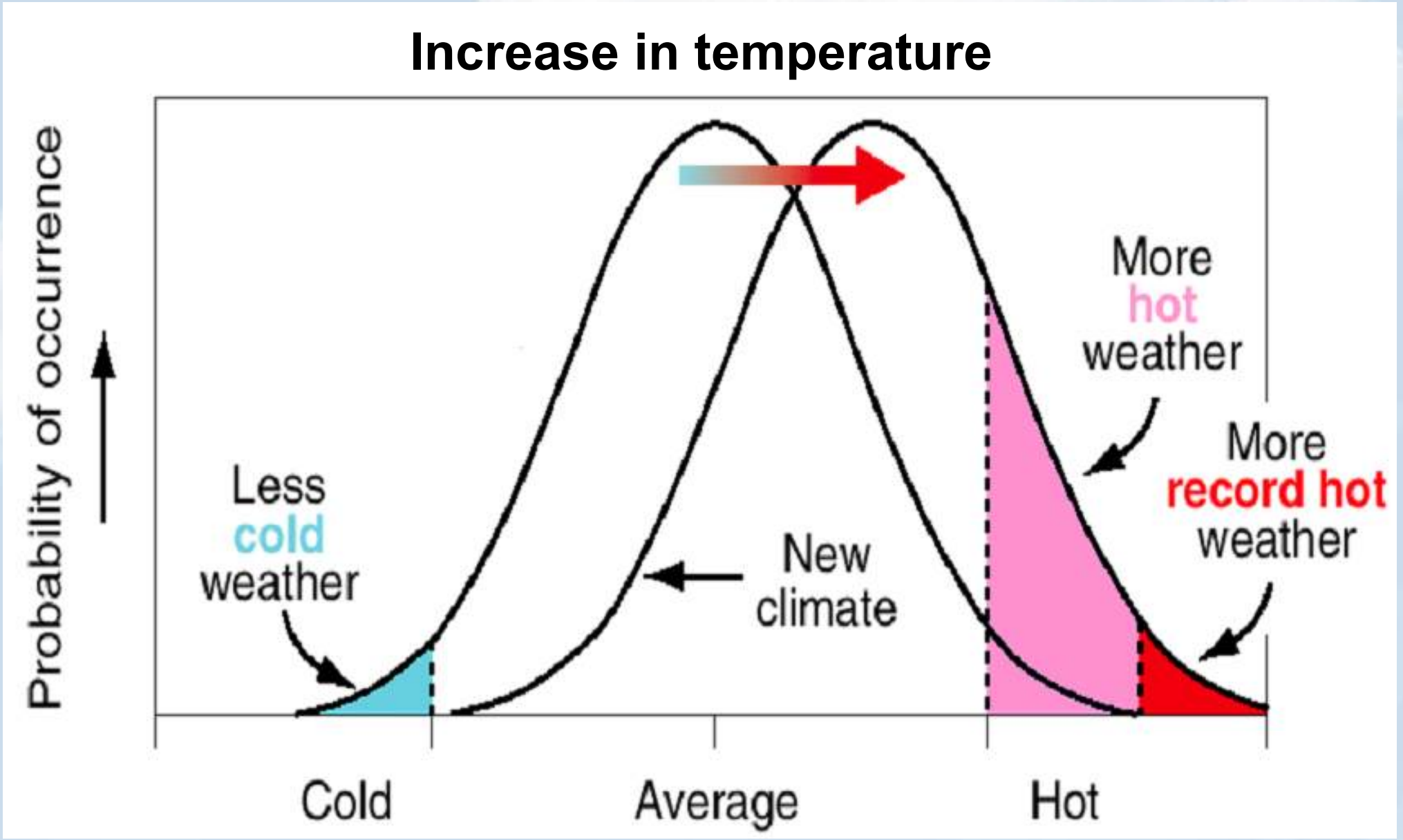
Trends in precipitation

- total rain days will not change
- occurrence of rain days will change:
  - winter: more rain days
  - summer: less rain days (-10 tot -19% +scen)
  - summer: more often droughts
- summer: more extreme rain days (+5-27%)
- winter: increase in precipitation 10-day extreme (+4-12%)

Largest change in extremes

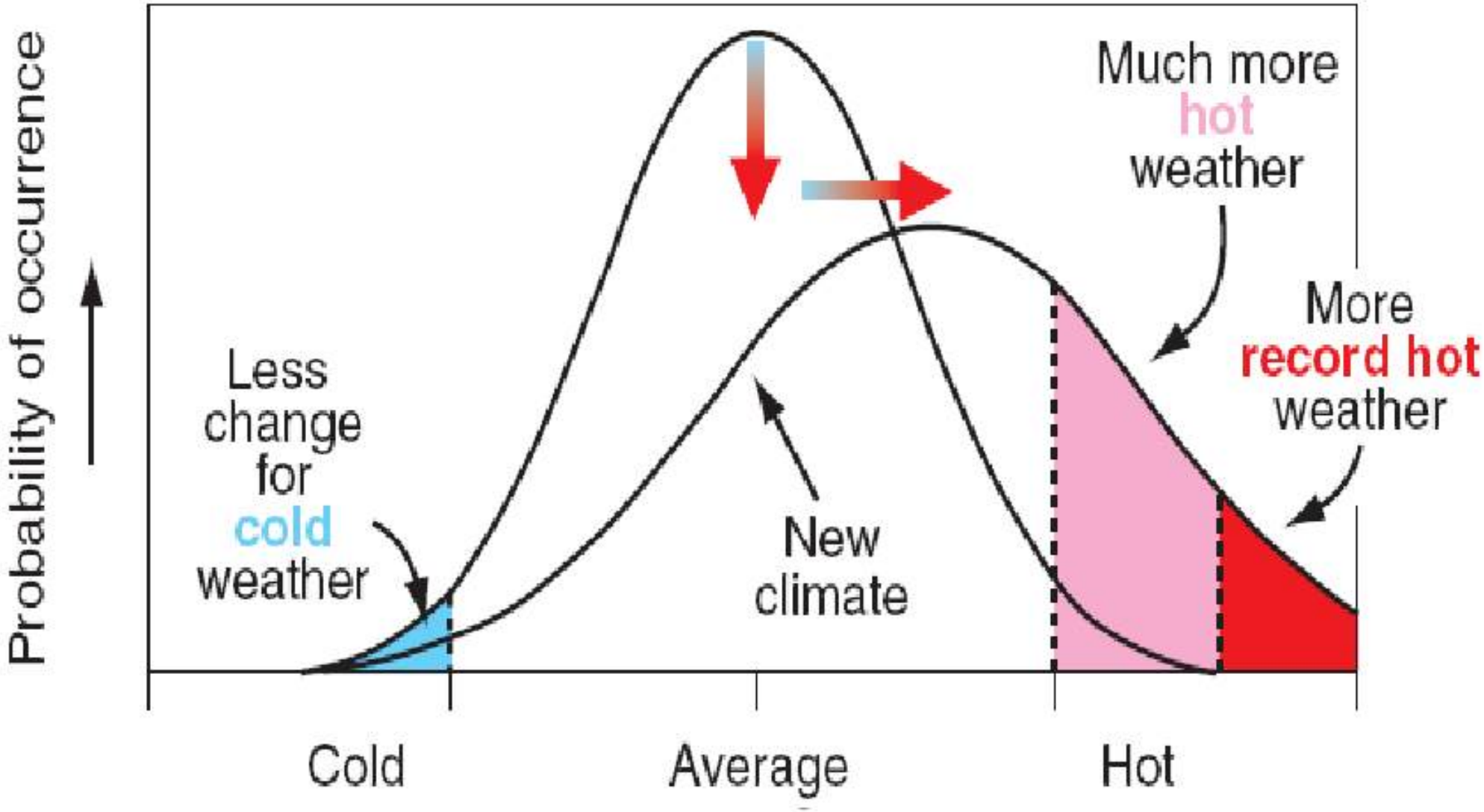


Largest change in extremes



Largest change in extremes

Increase in temperature + changing weather circulation



Consequences pests and diseases

- difficult to determine, depends strongly on the daily weather
- more often warm and dry periods
- higher temperaturer → increase of water vapour in the air
- warmer nights → more dew
- higher temperatures (day and night) → more rapidly development of fungi and insects

Something about communication

Communication Climate Change

- Communication is important
- Communication about climate change is difficult:
  - "bad" news
  - "no" news
  - it covers a long period
  - complex phenomenon
  - difficult to understand
  - mix of science and politics


Bilicki
RESEARCH CONCLUDES:
WE ARE DESTROYING EARTH.
COULD YOU KINDLY REPHRASE THAT IN EQUIVOCAL, INACCURATE, VAGUE, SELF-SERVING AND ROUNDABOUT TERMS THAT WE CAN ALL UNDERSTAND?
GOVERNMENT

Communication Climate Change

- **Professional sources:**
  - **IPCC**
  - **KNMI**
  - **PCCC**
  - **scientific publications**


WHY DON'T THE GREENHOUSE GASES ESCAPE THROUGH THE HOLE IN THE OZONE LAYER?

Communication Climate Change

- Communicating with the press (public):
  - try to understand the press
  - most journalists don't understand the subject
  - journalists understand what the public wants to hear/see/read
  - average news item is 2 minutes/half A4
  - "scoop"/quotes/visualise
  - use "bad" news (it's also pr!)


FOREST FIRES ON ANTARCTICA
HEADLINE PRIME
EXPERTS SAY "FIRES WILL KILL THE FEW PENGUINS THAT SURVIVED THE CLIMATE CHANGES"

Conclusions

- the climate (in general):
  - warming trend will continue
  - more precipitation
  - more summer droughts
  - more weather extremes
  - larger differences between extremes
  - slow, but persistent trend

Suggestions

- accept climate change, don't under-estimate it
- it will dominate the agenda for a long time
- weather risks will increase
- adaptation will be necessary
- try to understand the phenomenon, there is a lot of information available
- give attention to good communication

Get going!