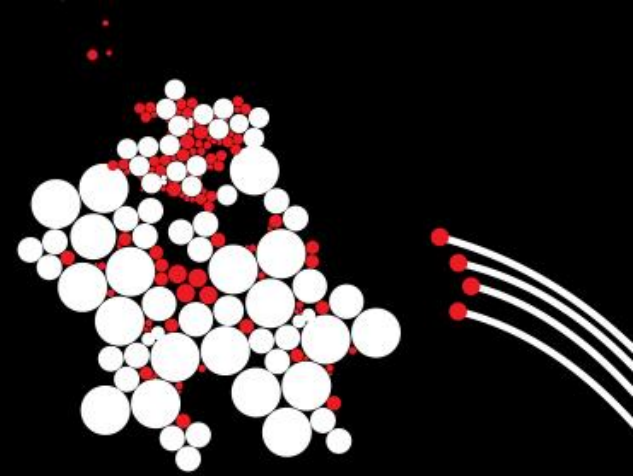


UNIVERSITY OF TWENTE.

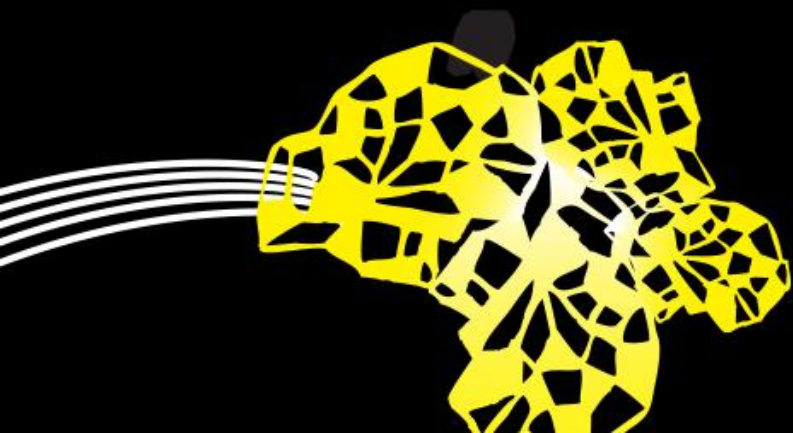


CODE ORANJE VOOR HET KLIMAAT

LEIDSE WEER- EN STERREKUNDIGE KRING, 18 JUNI 2019

PROF. DR. GERARD VAN DER STEENHOVEN

KNMI EN UNIVERSITEIT TWENTE (ITC)



Code oranje klimaat



Twee weken voor klimaattop in Parijs (dec. 2015)





Klimaatakkoord

Jullie zijn helemaal gek geworden!

Woensdag 8 augustus 2018

NRC
HANDELSBLAD



Na de Holocaust was
een eigen Joodse staat
de enige oplossing

Mirjam Lapid-Andriesse
Fakkeldraagster Yad Vashem

Leven C8-9



ALGEMEEN HANDELSBLAD (1828) EN NIEUWE ROTTERDAMSE COURANT (1844)

nrc.nl

JAARGANG 48 NO. 261

PRIJS €2,60

We hebben de opwarming in het gezicht gekeken

Steeds meer wetenschappers spreken zich uit: de extreme
temperaturen komen door klimaatverandering.

In het Nieuws 4-5

Afwijking wereldwijde temperatuur t.o.v.
gemiddelde temperatuur in de periode



deVerdieping
Trouw 75

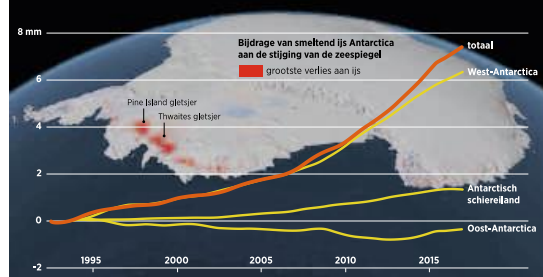


DONDERDAG 14 JUNI 2018

Bas Haring, filosoof:
Van sommige diersoorten
is het niet zo erg
als ze zouden uitsterven
DE VERDIEPING 9

WWW.TROUW.NL | 7652E JAARGANG NR 22579 | E-MAIL VIA WWW.TROUW.NL/SERVICE | POSTBUS 859 1000 AW AMSTERDAM | REDACTIE 020-562 9444 | KLANTENSERVICE 088-056 1588 | BEZORGING 088-056 1599

Smelten Antarctica niet meer te stoppen



WK
2018

Wordt hij de sterspeler in Rusland?

Terug naar het
Madeira van Ronaldo
DE VERDIEPING



Donald J. Trump

@realDonaldTrump

Following

The concept of global warming was created by
and for the Chinese in order to make U.S.
manufacturing non-competitive.

RETWEETS

104,728

LIKES

67,204









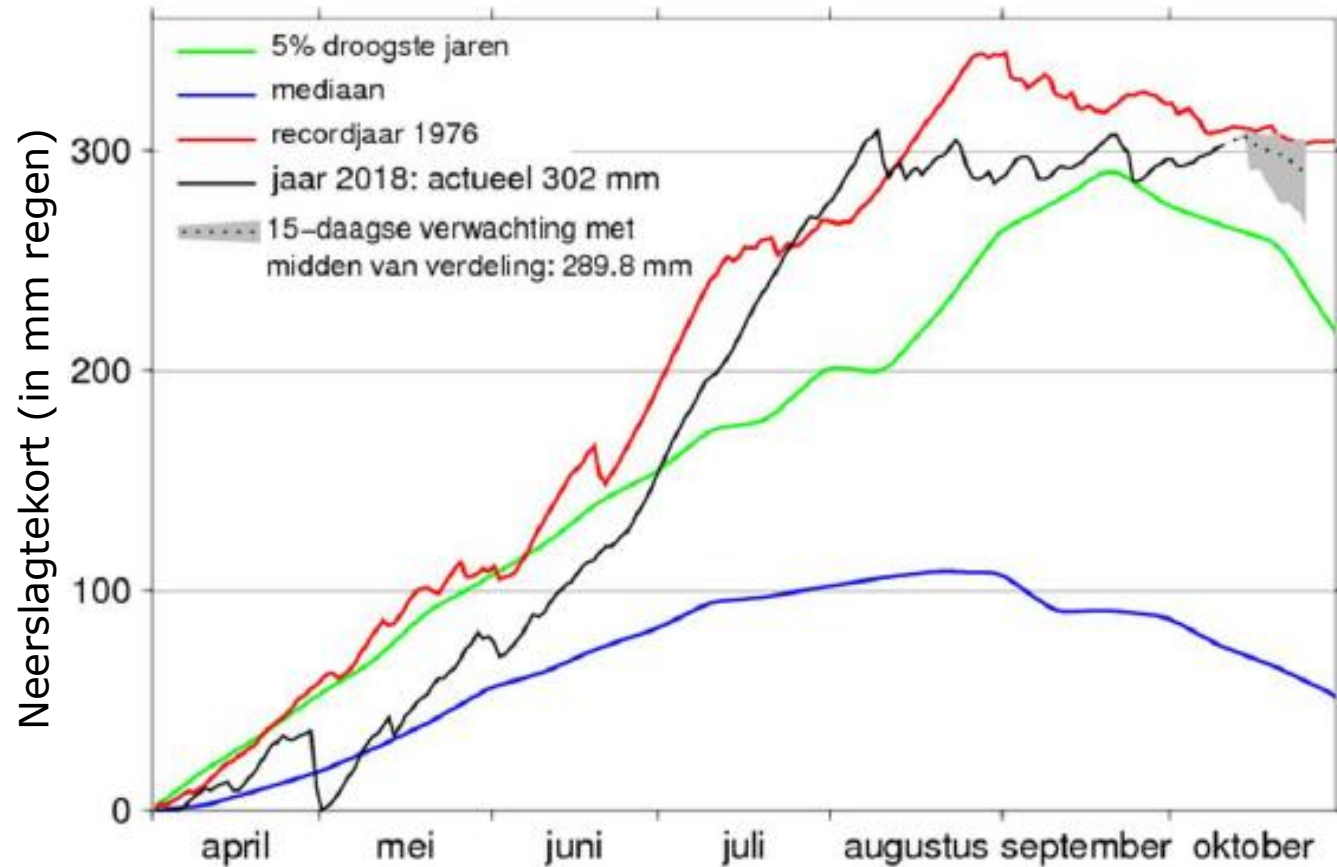
De zomer van 2018



De droogte van 2018



Neerslagtekort (in mm regen)



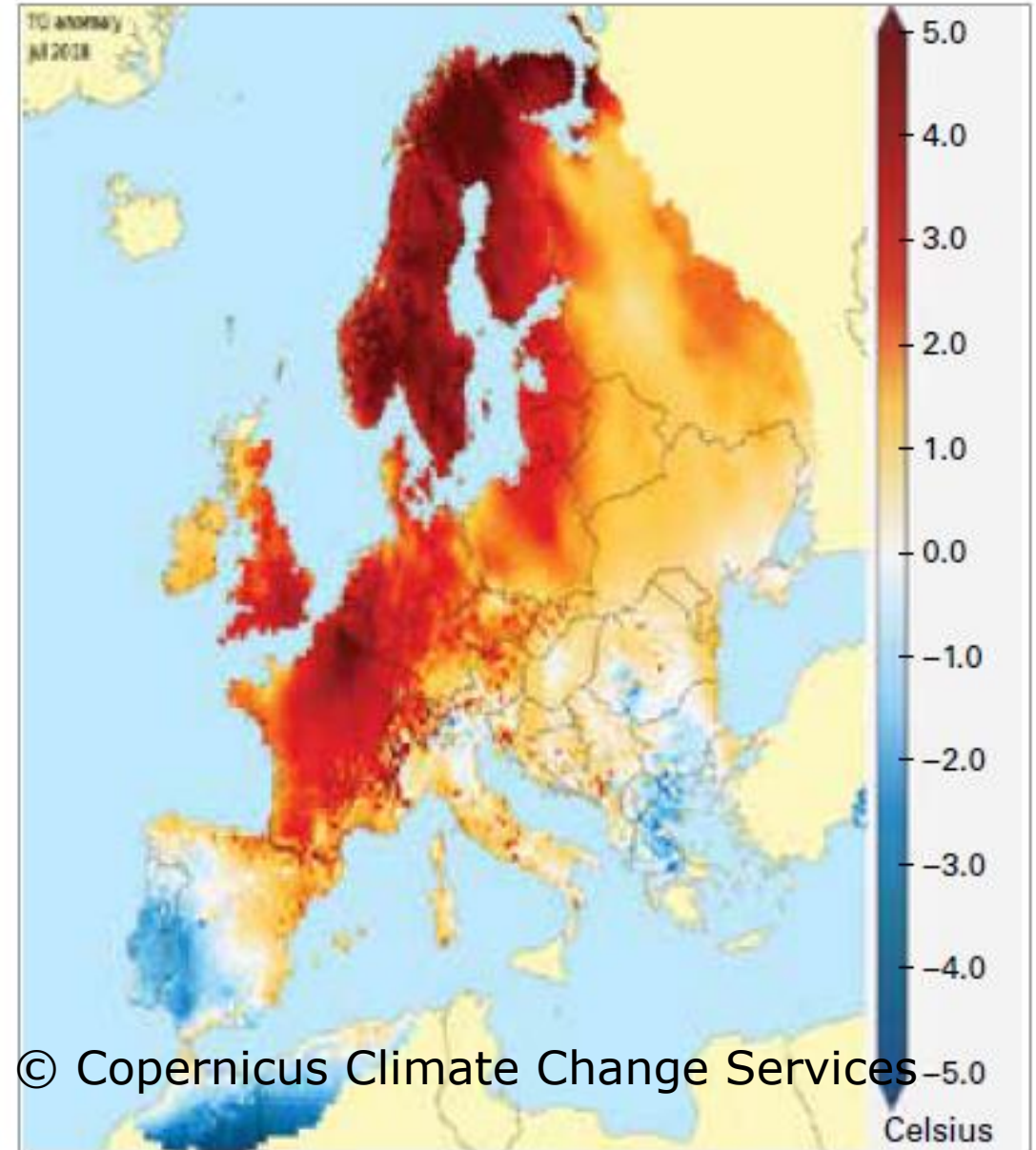
(c) KNMI, bijgewerkt 2018-10-10, 12:14 UT



De zomer van 2018



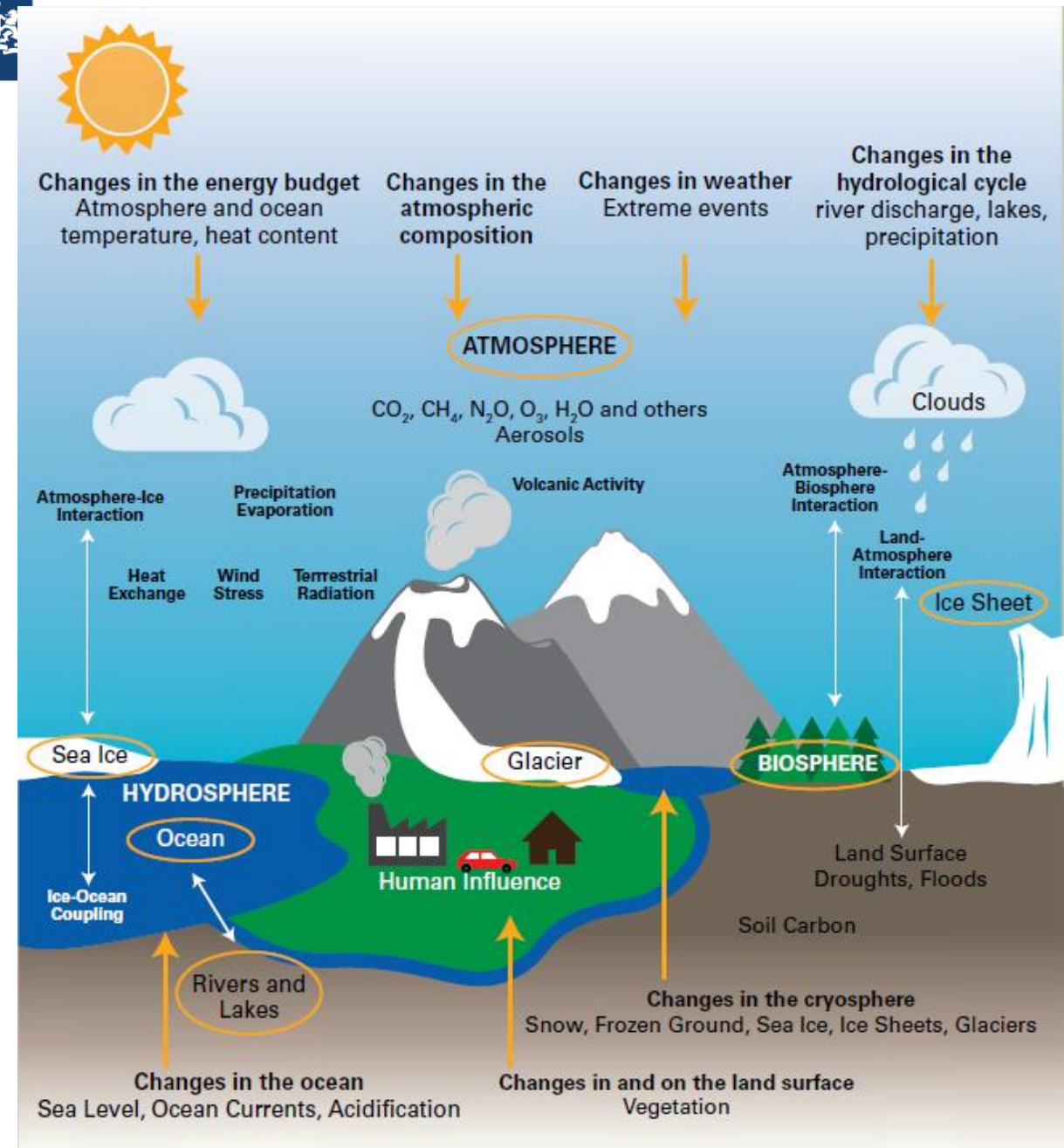
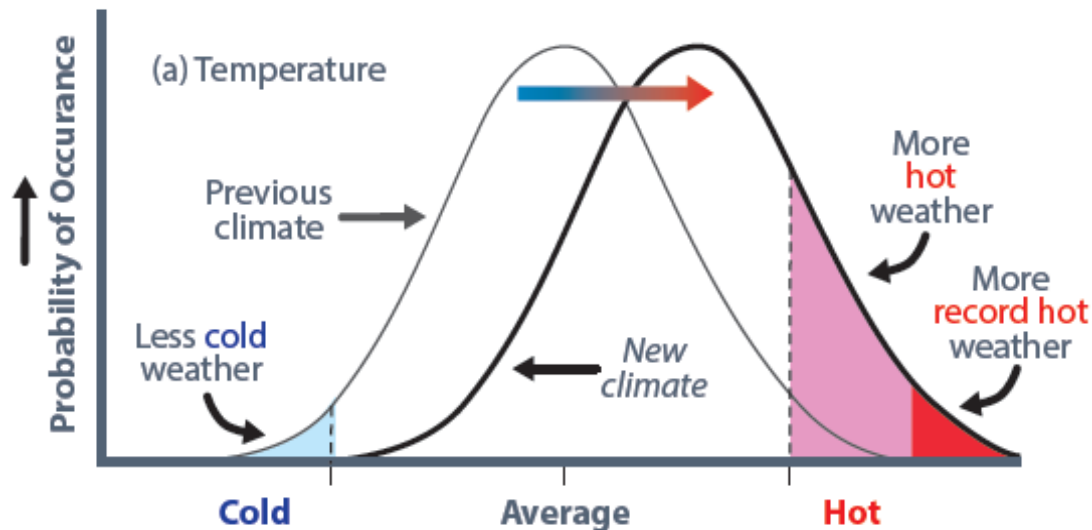
- Warmste in 300 jaar
- $T_{gemid} = 18.9^{\circ}\text{C}$ (vs 17.0°C)
- 2 hittegolven
- 60 warme dagⁿ ($T > 20^{\circ}\text{C}$)
- 8 tropische dagⁿ ($T > 30^{\circ}\text{C}$)



Klimaatverandering

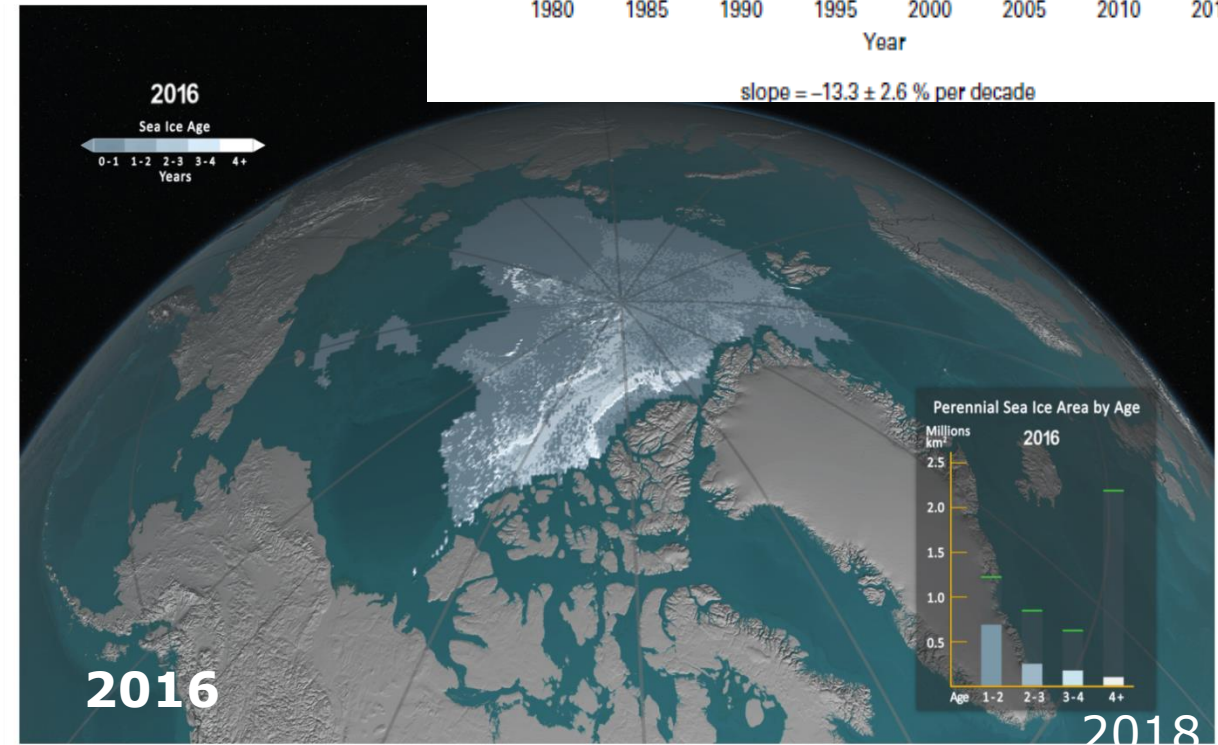
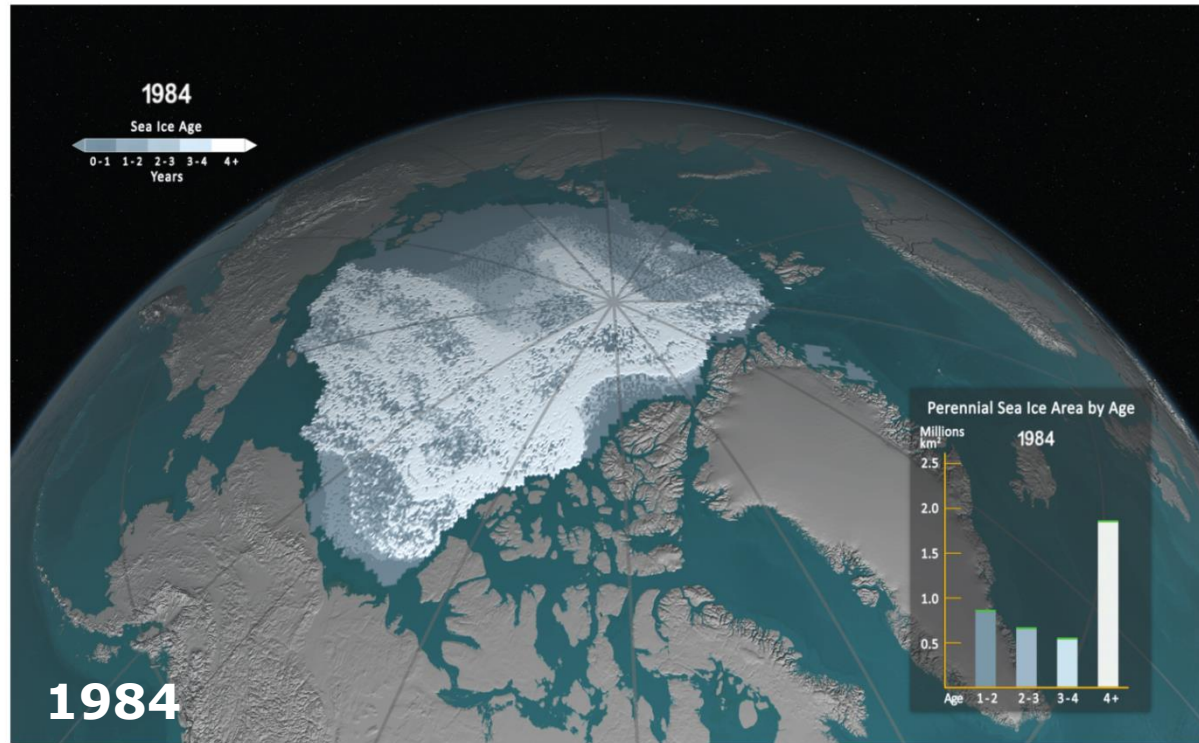
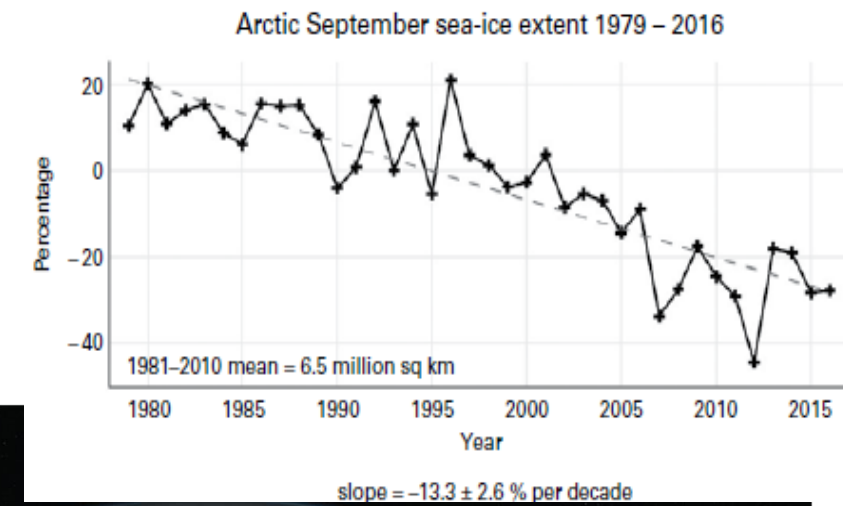
Klimaat $\neq$ Weer

- Weer: *elke dag anders*
- Klimaat: *30-jr gemiddelde*



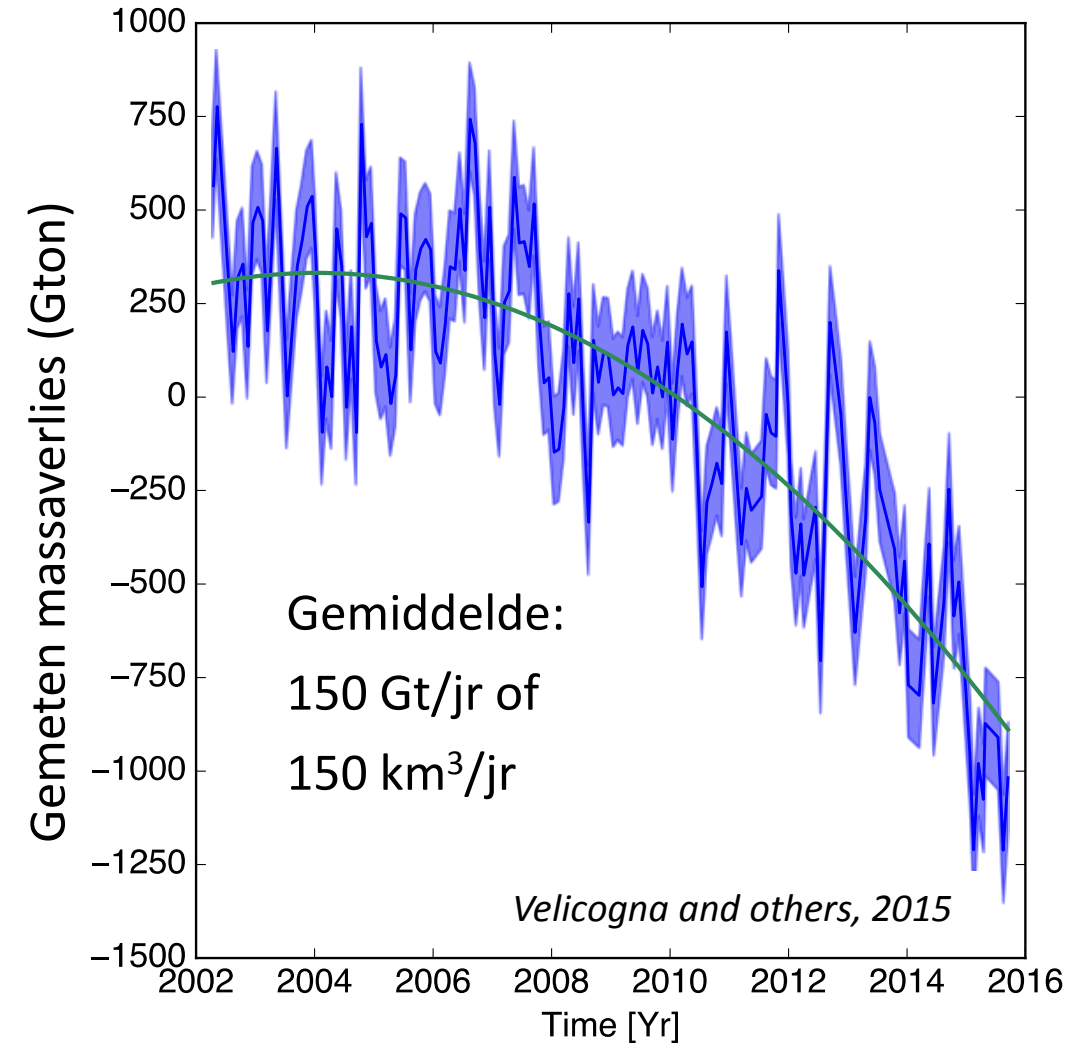
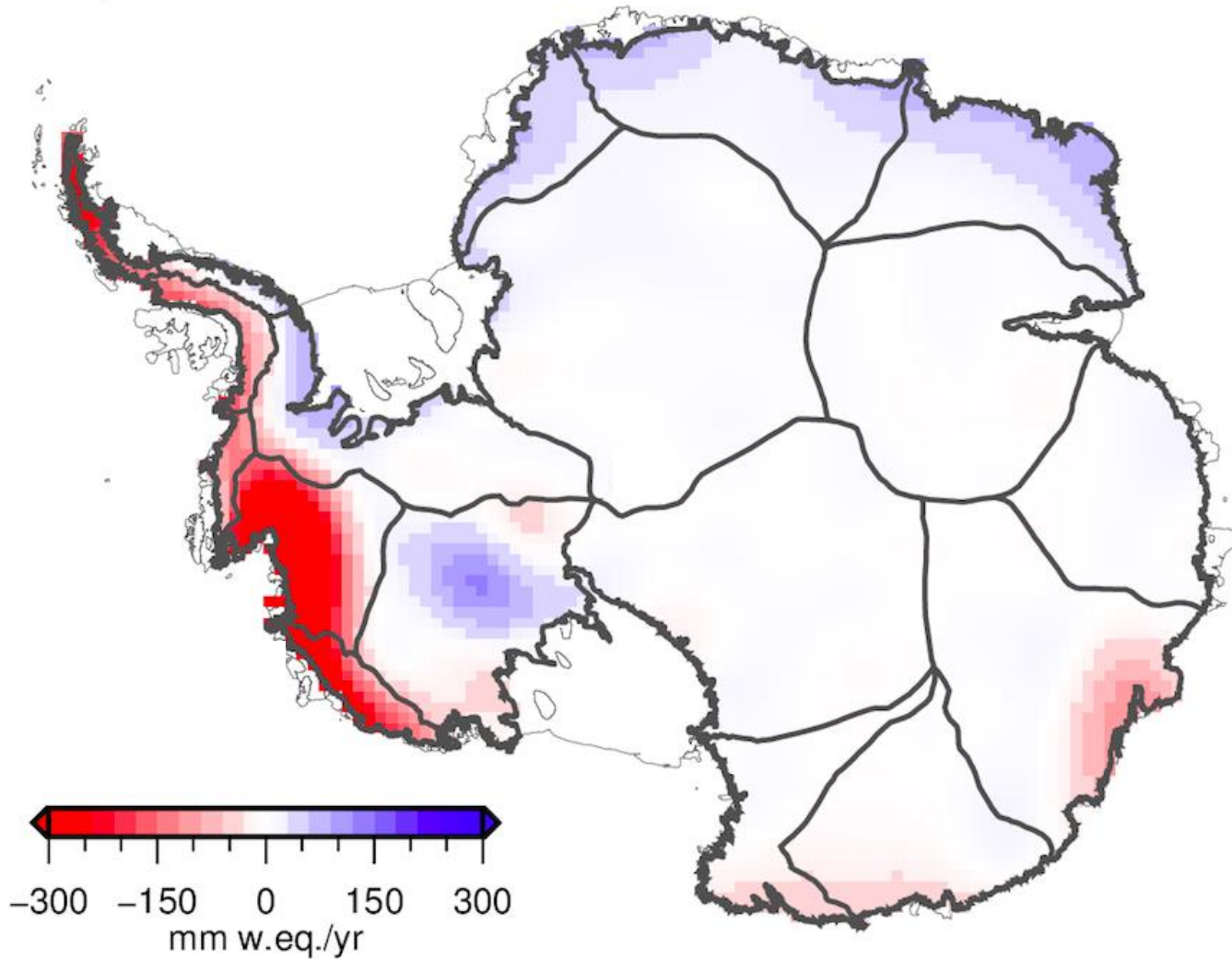
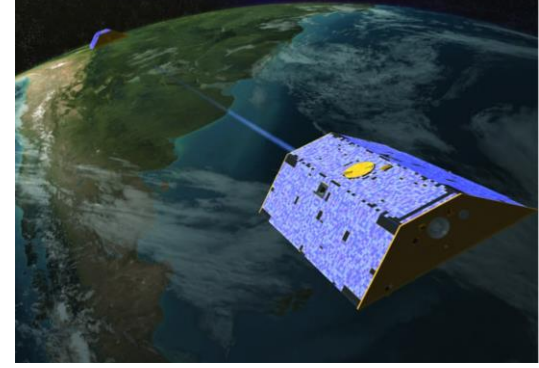


IJsbedekking Noordpool

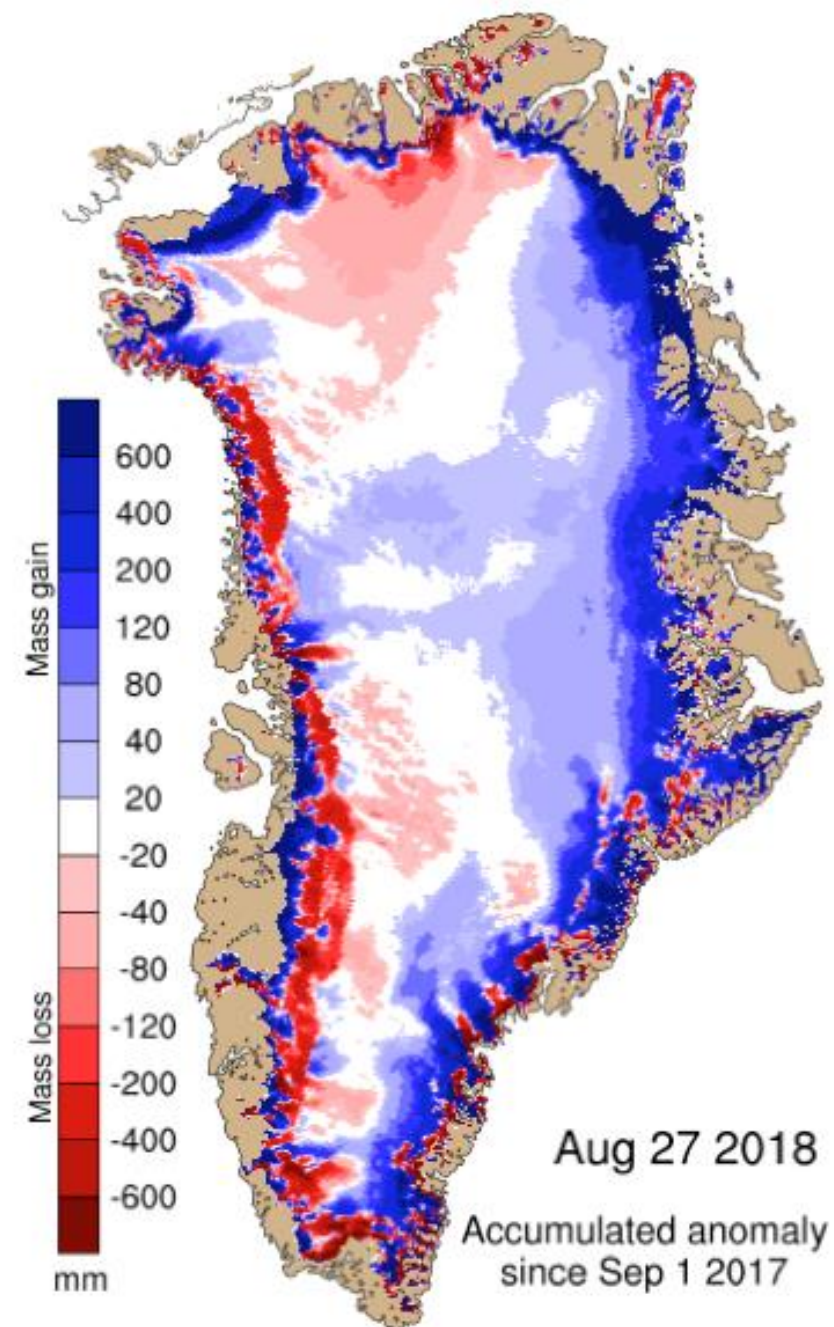
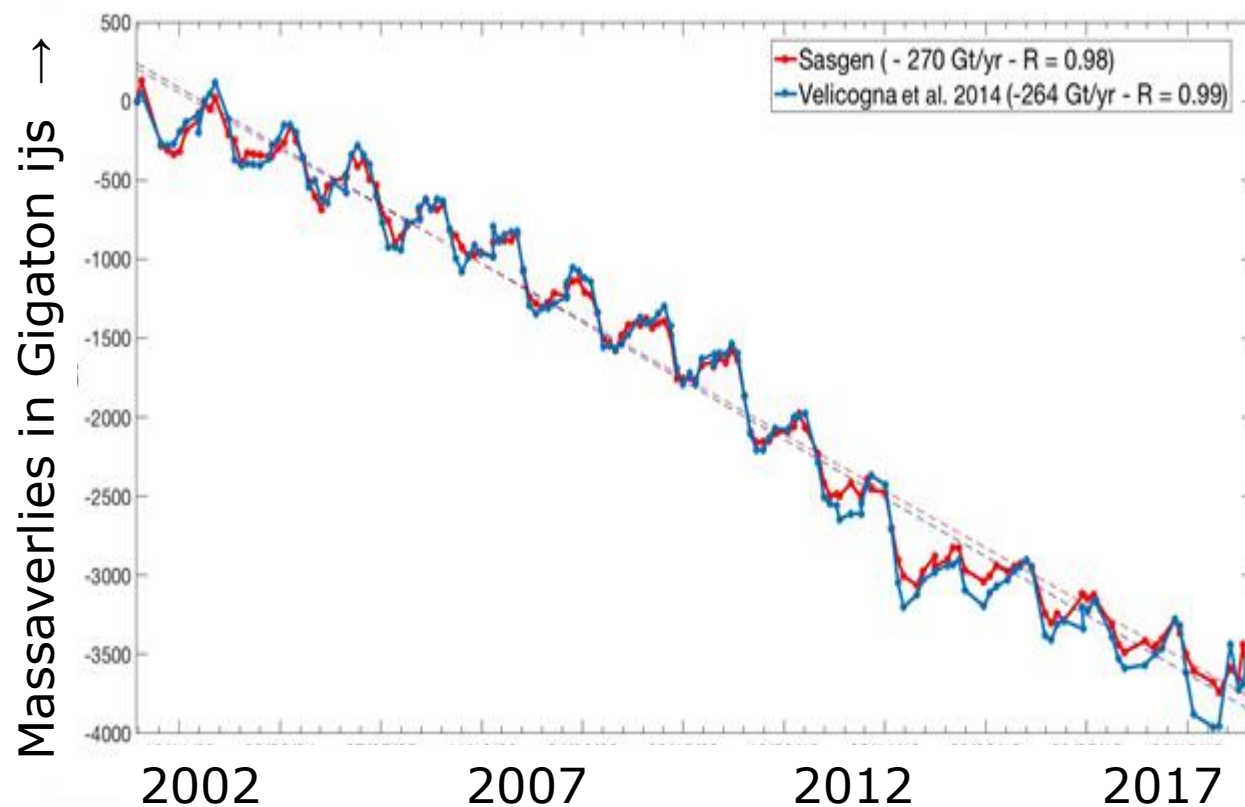


Ref: WMO 2017.

Massaverlies Antarctica



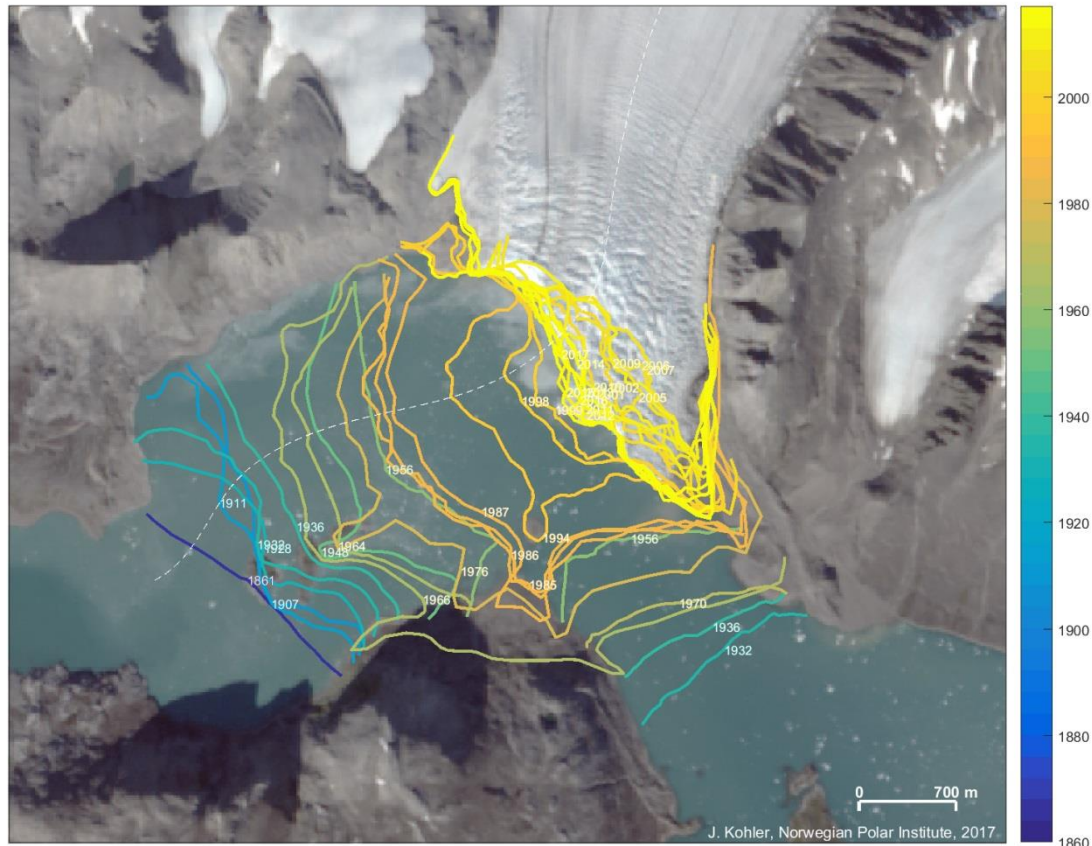
IJsverlies Groenland



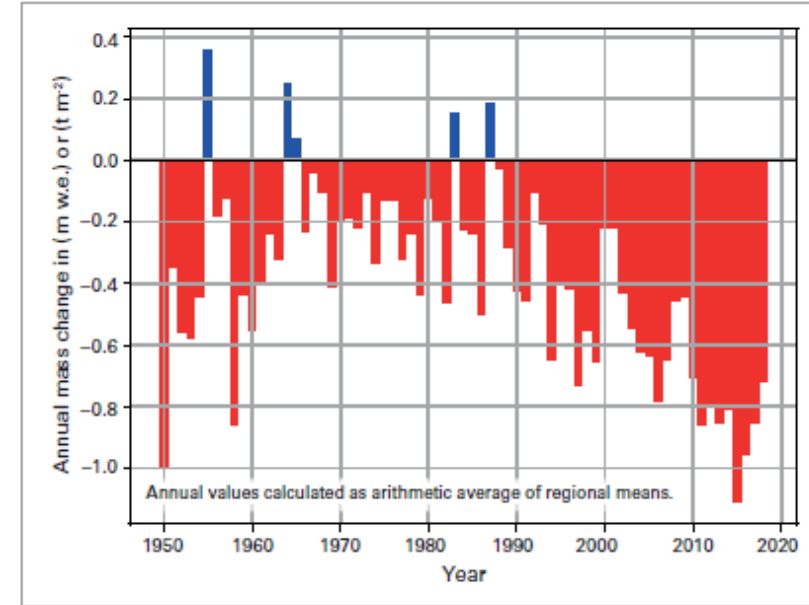
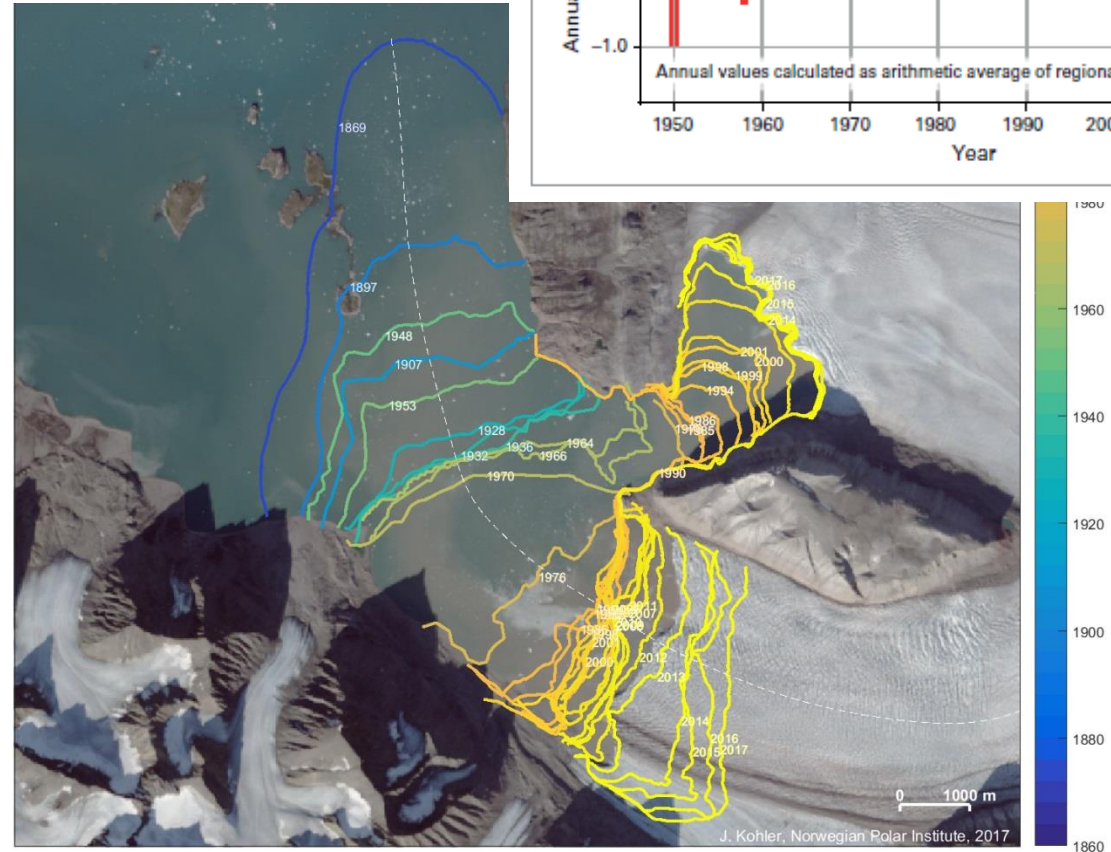
Gletsjers @ Spitsbergen



Blomstrand breen



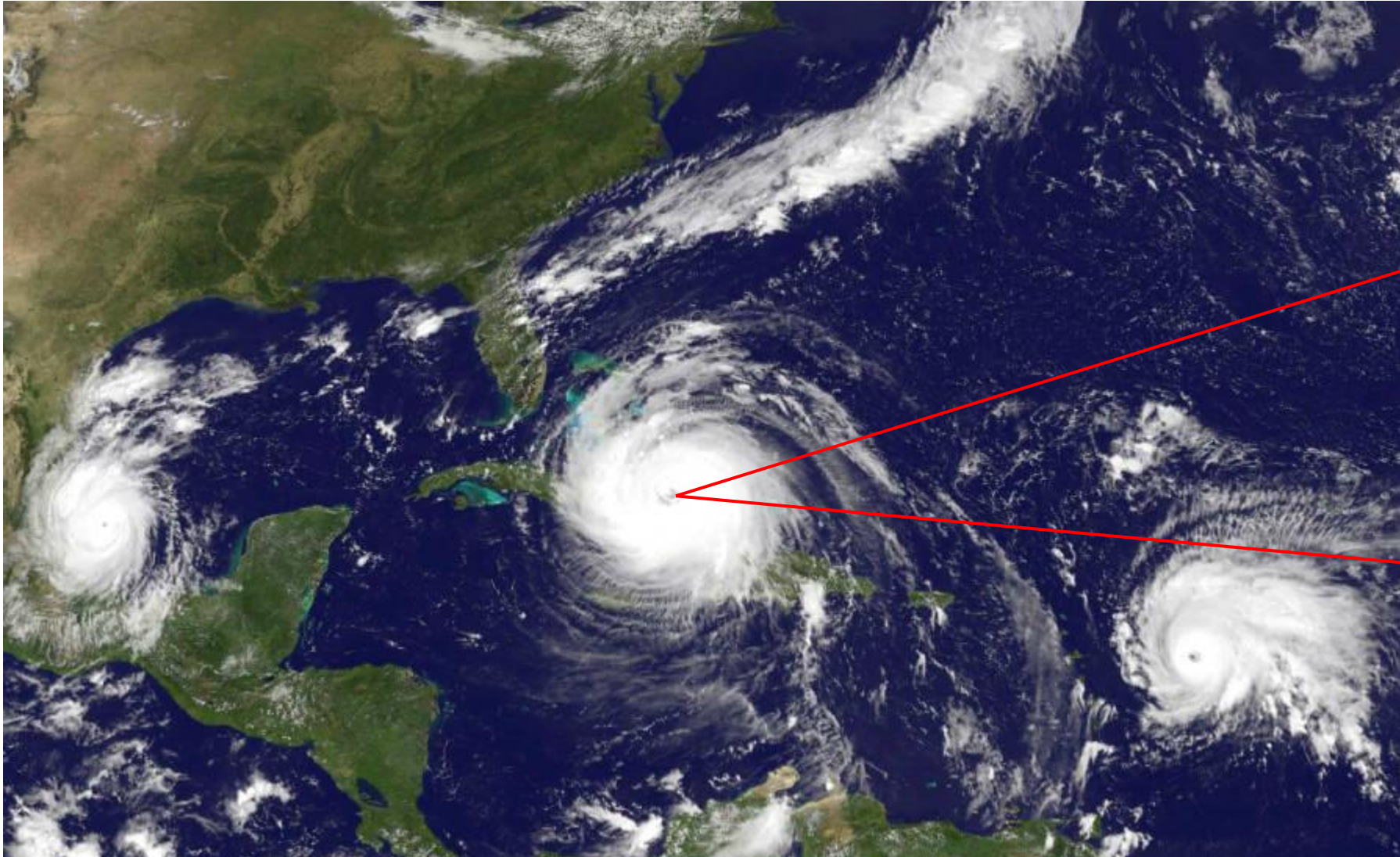
Krone breen



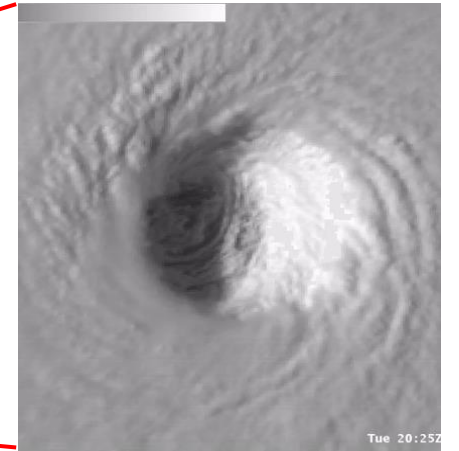
Caribische orkanen



8 SEPT. '17



Katia, Irma & Jose

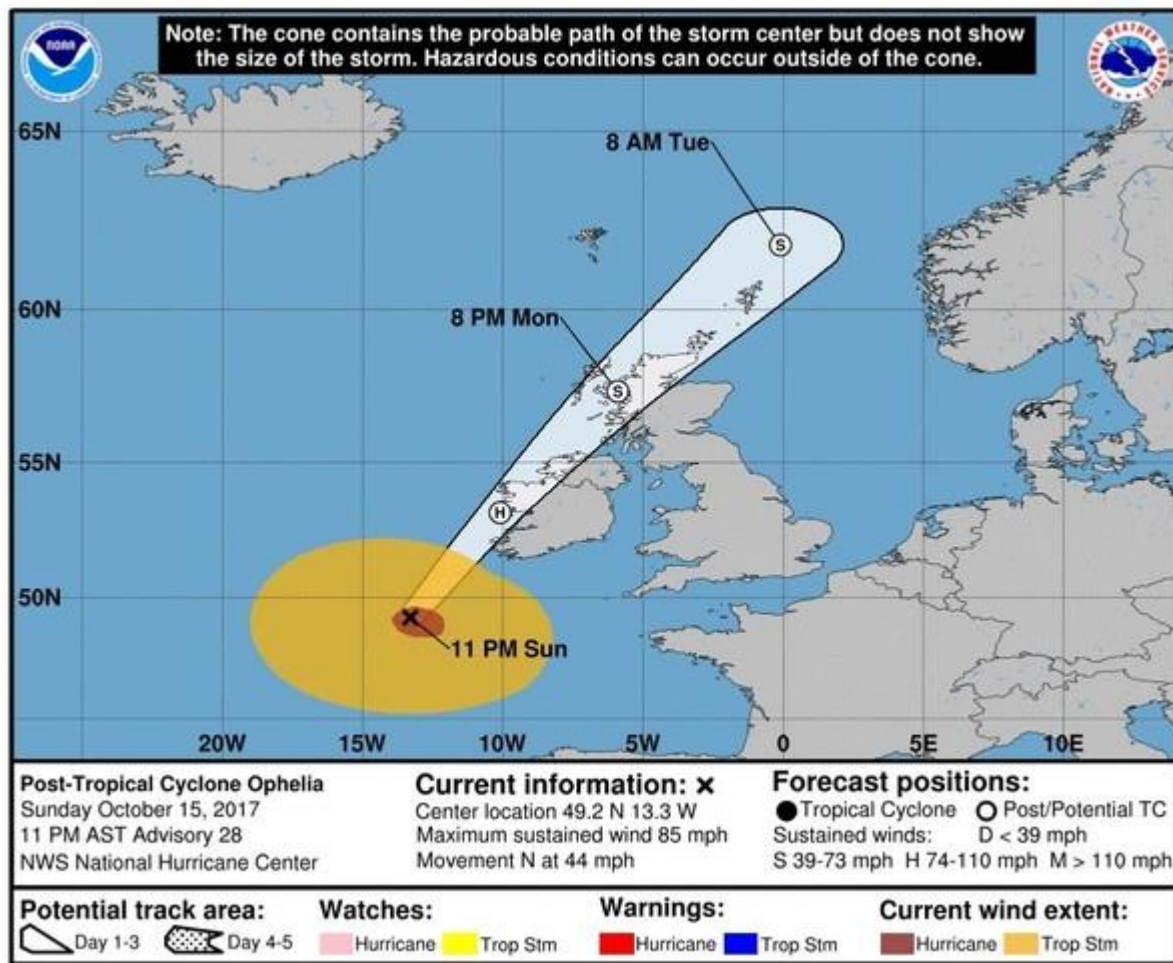


Wind < 300 km/u

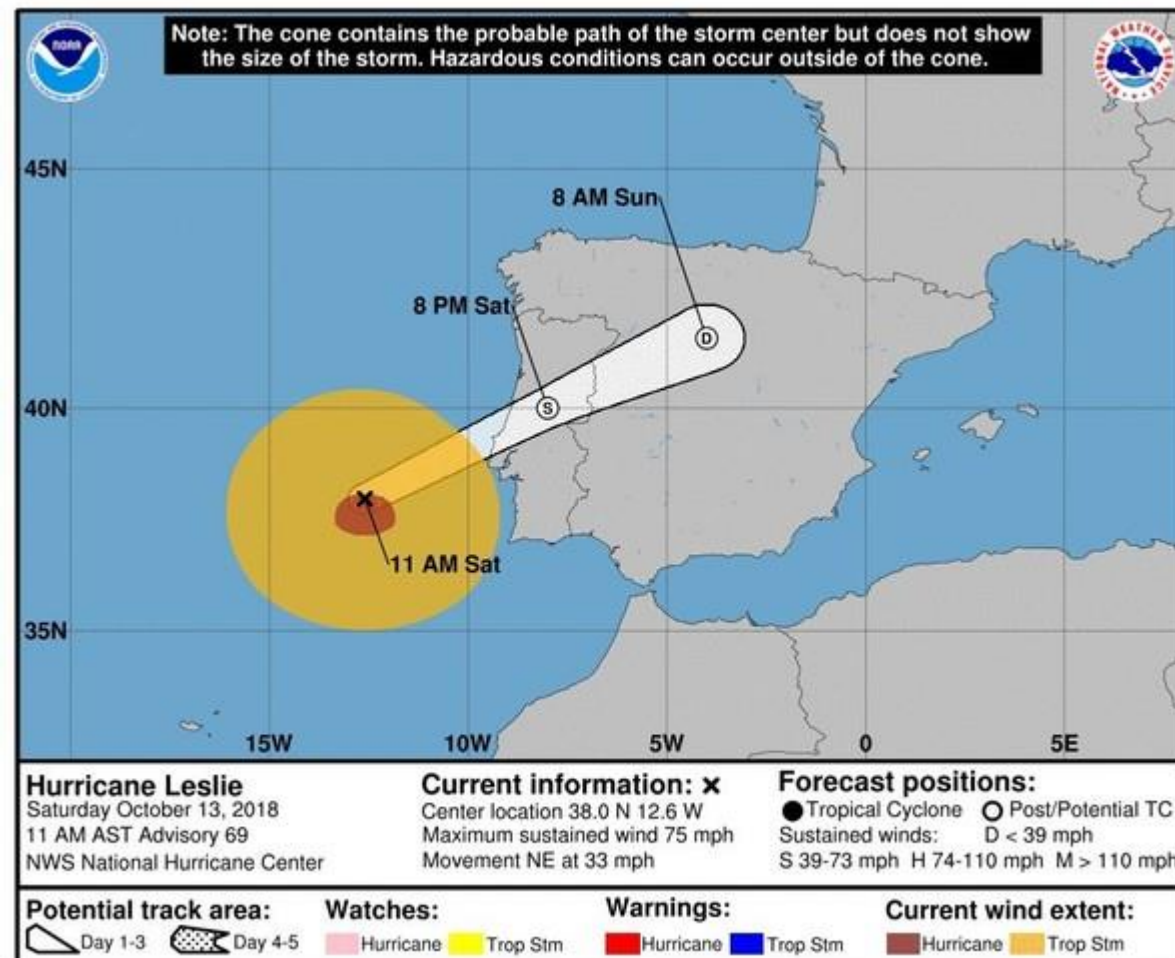
Orkanen in Europa

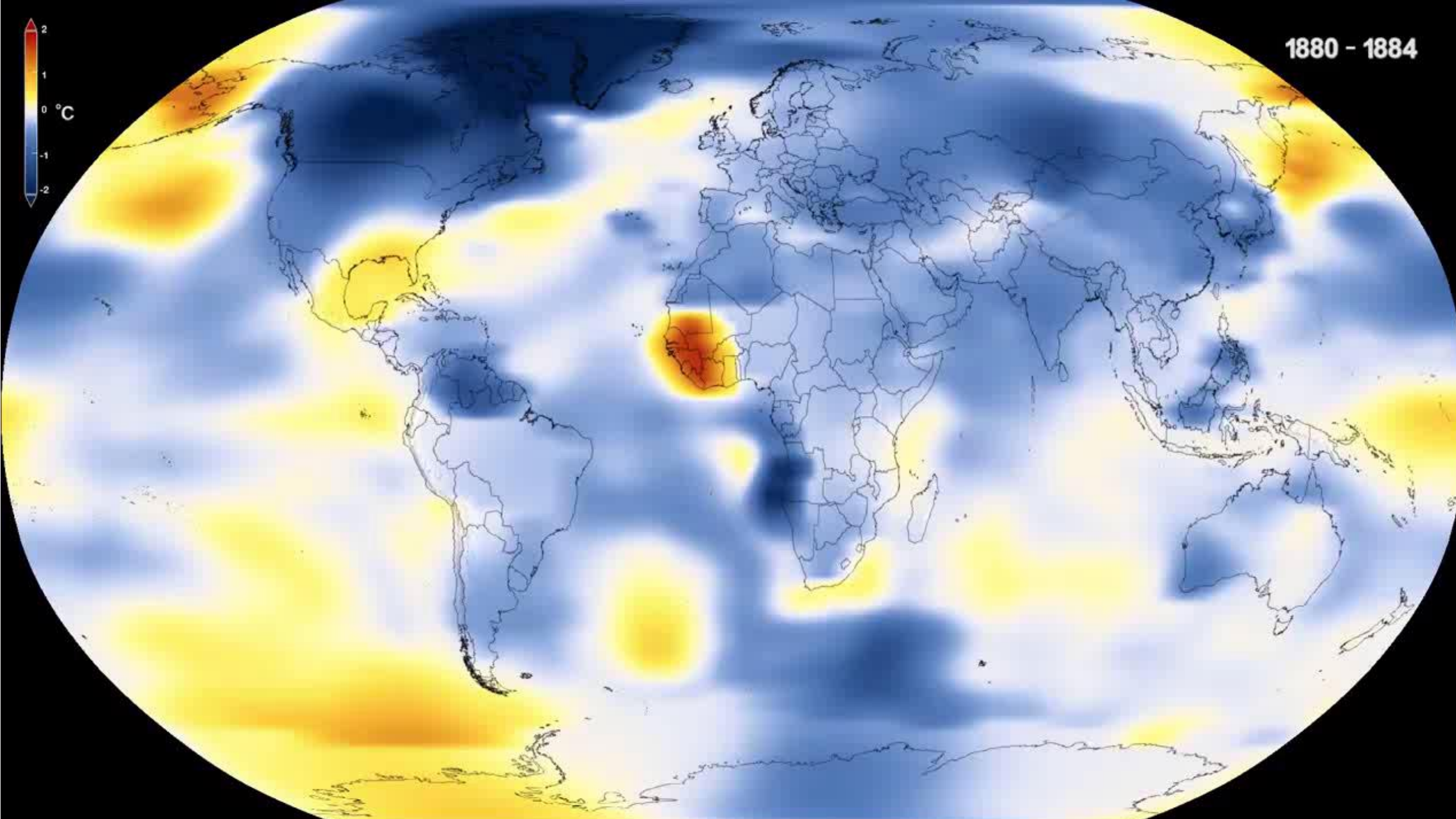


Ophelia, 13 okt '17



Leslie, 15 okt '18

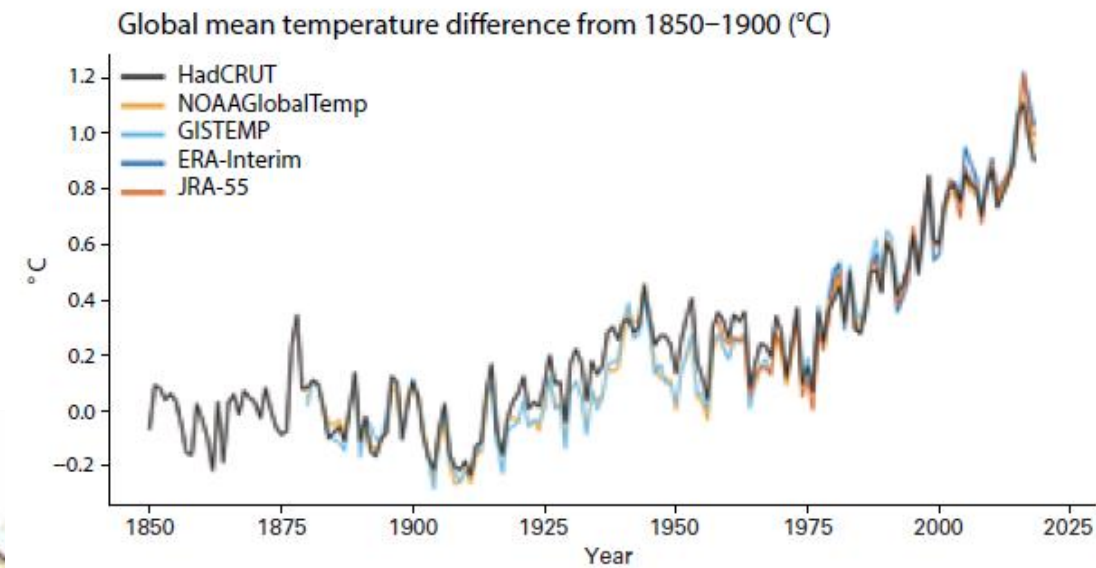
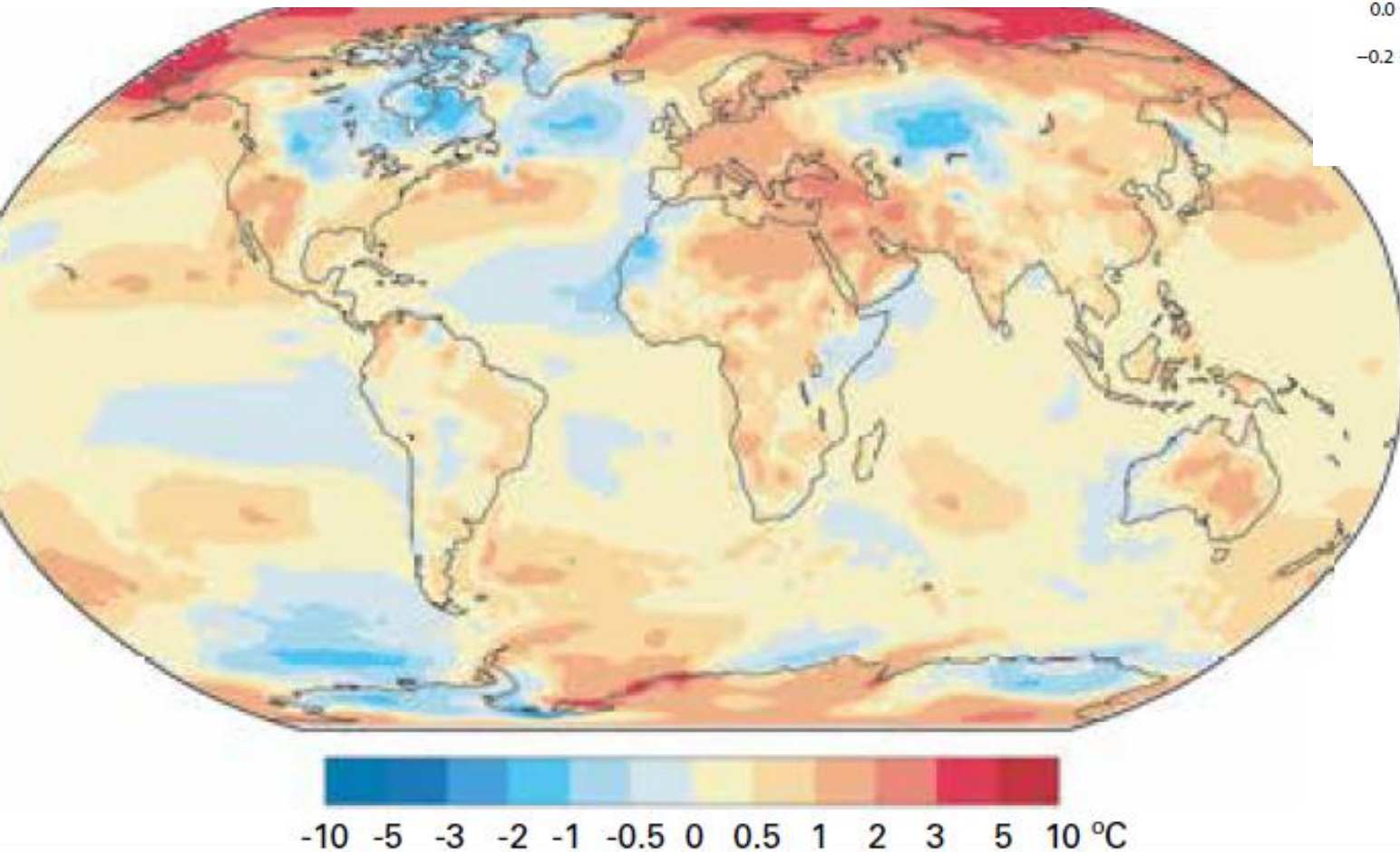




1880 - 1884



Het beeld van 2018

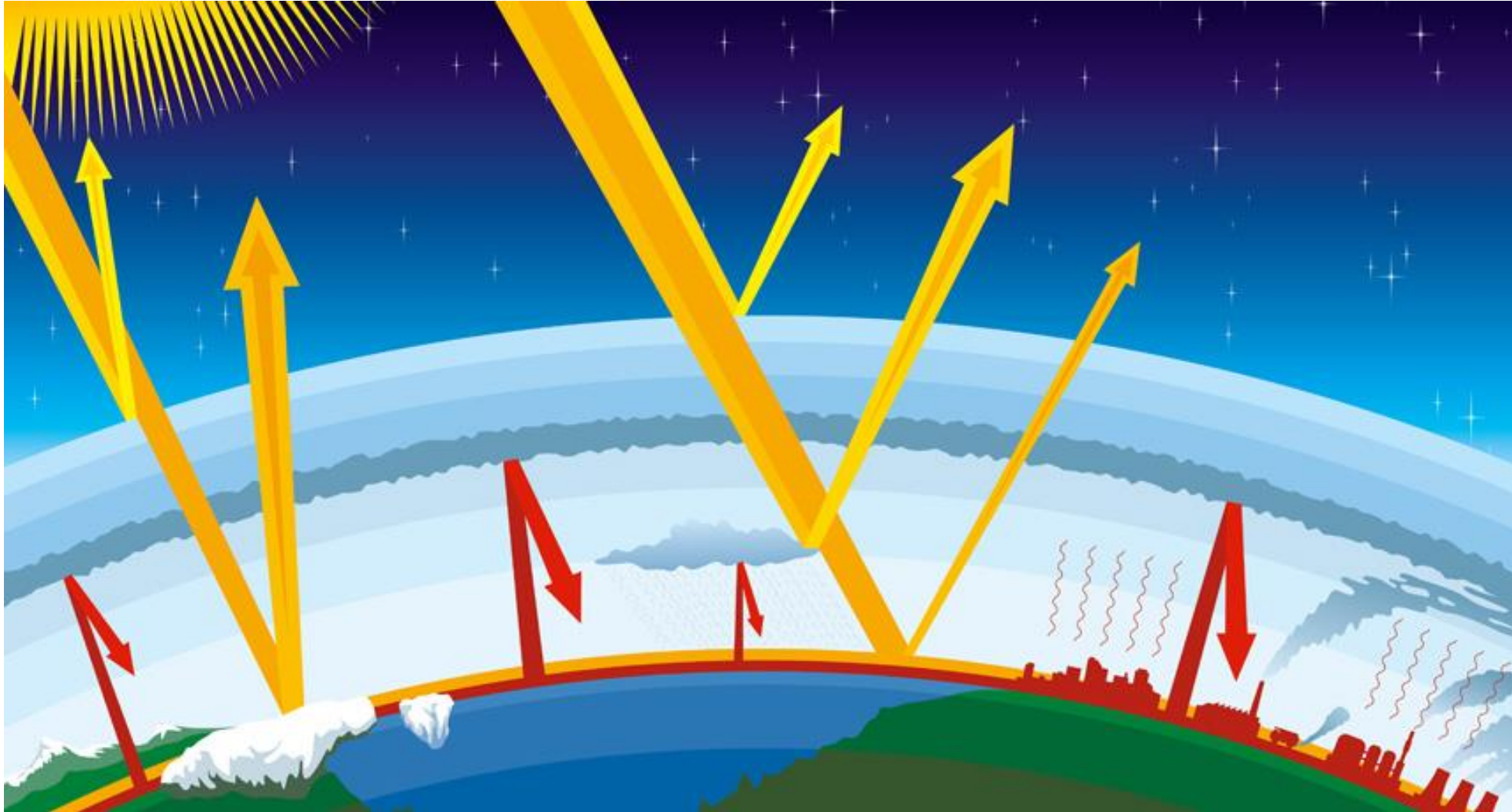


WMO Climate Report:

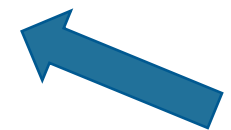
$$T_{2019} = T_{1850} + 1^{\circ}\text{C}$$

Broeikaseffect

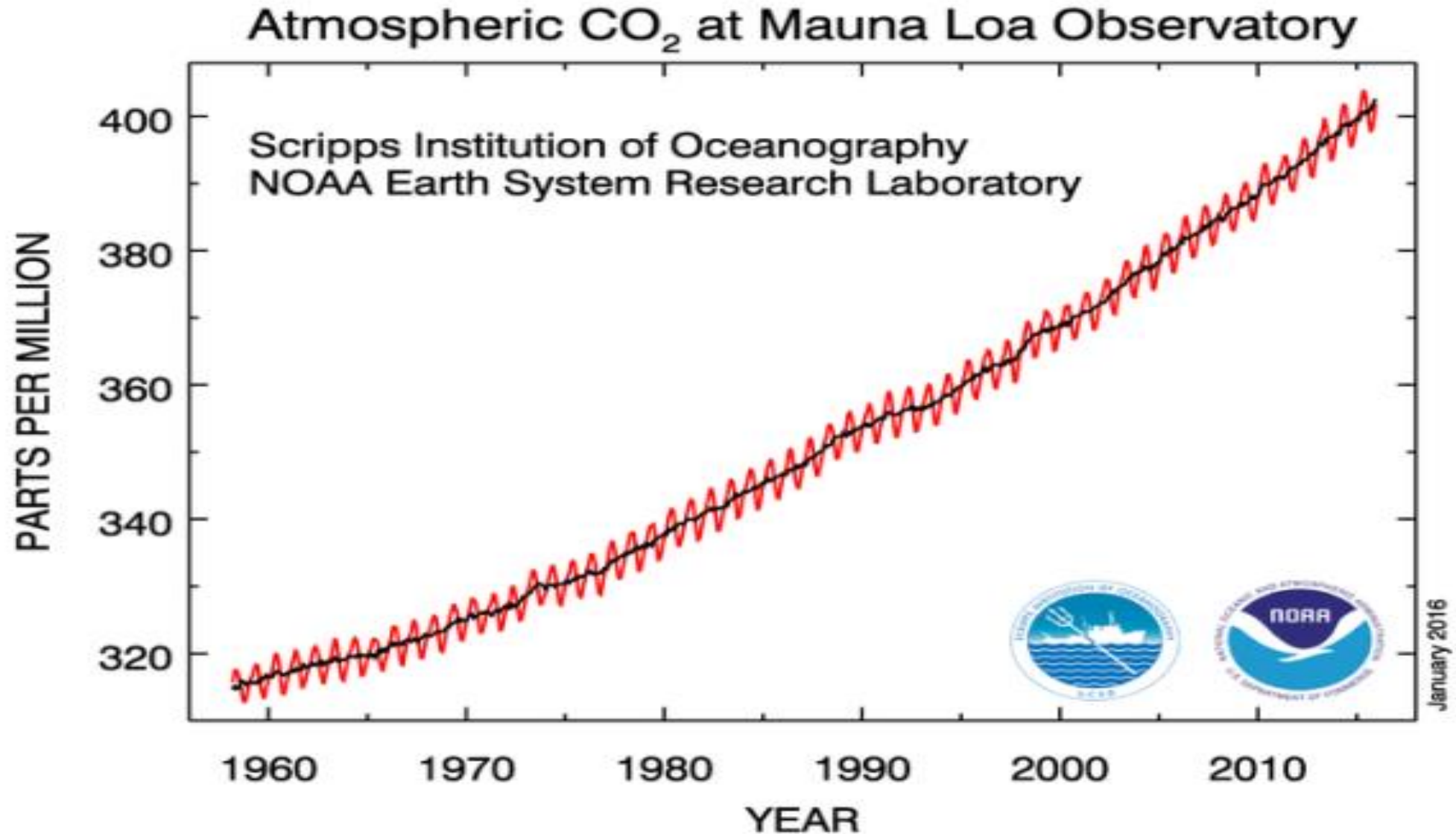
Broeikaseffect



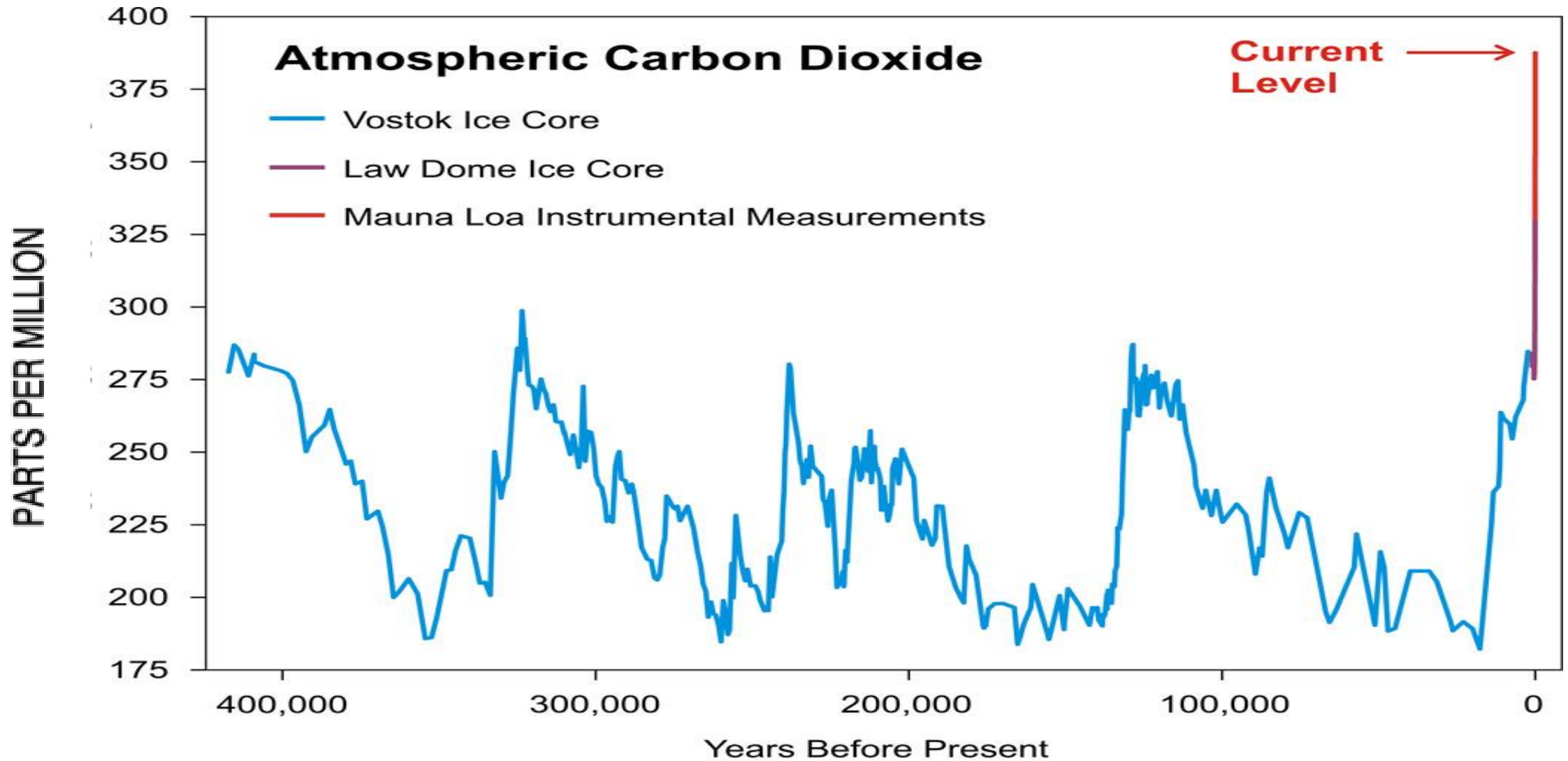
Toename van
CO₂ niveaus



Toename CO₂ niveau



Historische CO₂ niveaus



Nieuw Zeeland 1912

© *The Rodney & Otamatea Times*

New Zealand newspaper,

14 August 1912.

The Rodney & Otamatea Times

WAITEMATA & KAIPARA GAZETTE.

PRICE—10s per annum in advance

WARKWORTH, WEDNESDAY, AUGUST 14, 1912.

3d per Copy.

Science Notes and News.

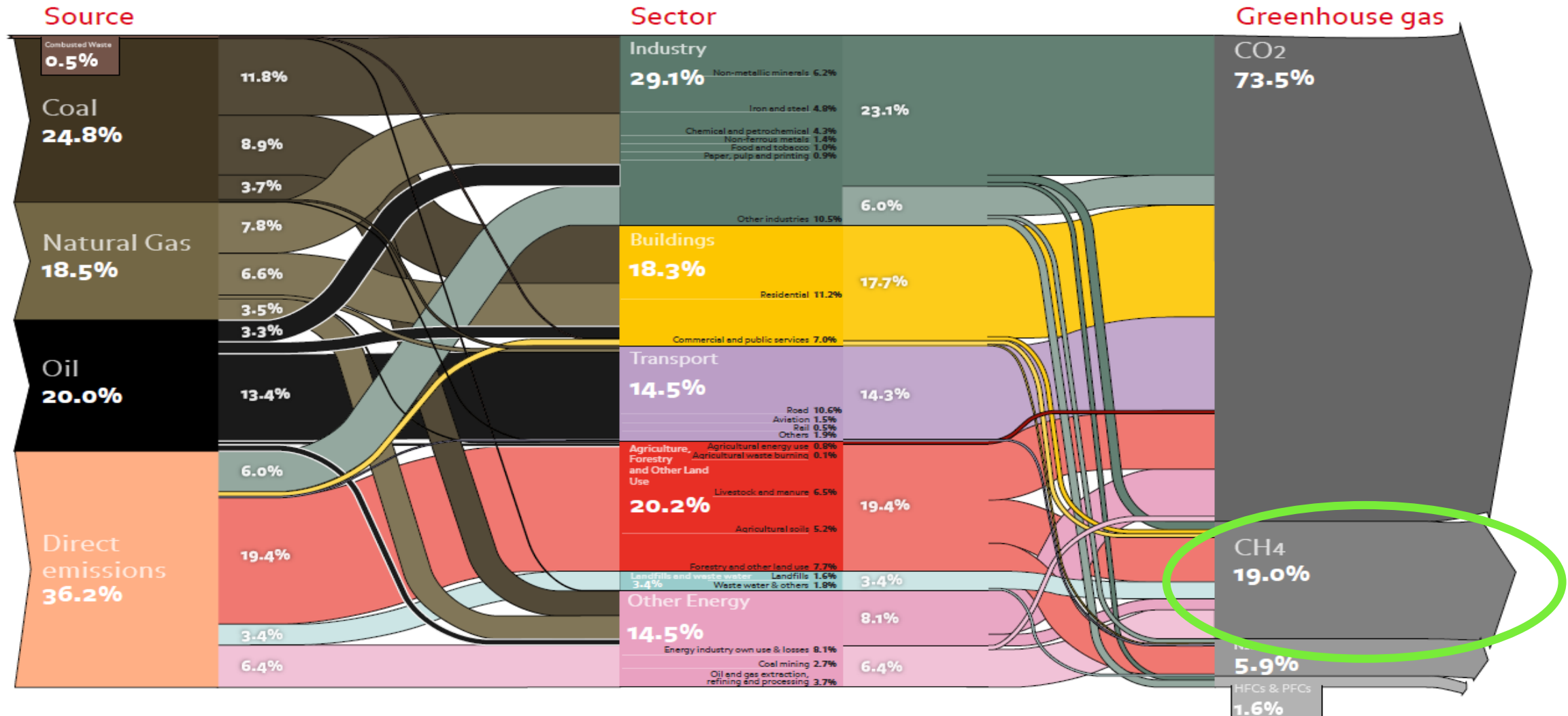
COAL CONSUMPTION AFFECT- ING CLIMATE.

The furnaces of the world are now burning about 2,000,000,000 tons of coal a year. When this is burned, uniting with oxygen, it adds about 7,000,000,000 tons of carbon dioxide to the atmosphere yearly. This tends to make the air a more effective blanket for the earth and to raise its temperature. The effect may be considerable in a few centuries.

Niet alleen CO₂ uitstoot

Aandeel CH₄ in broeikasgasuitstoot

emissions worldwide (2012)
51,840
MtCO₂ EQ

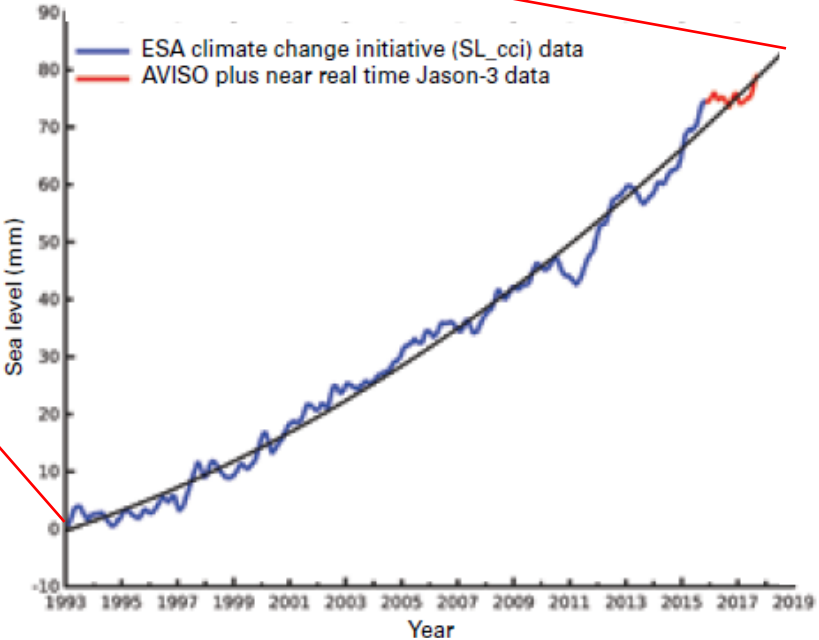
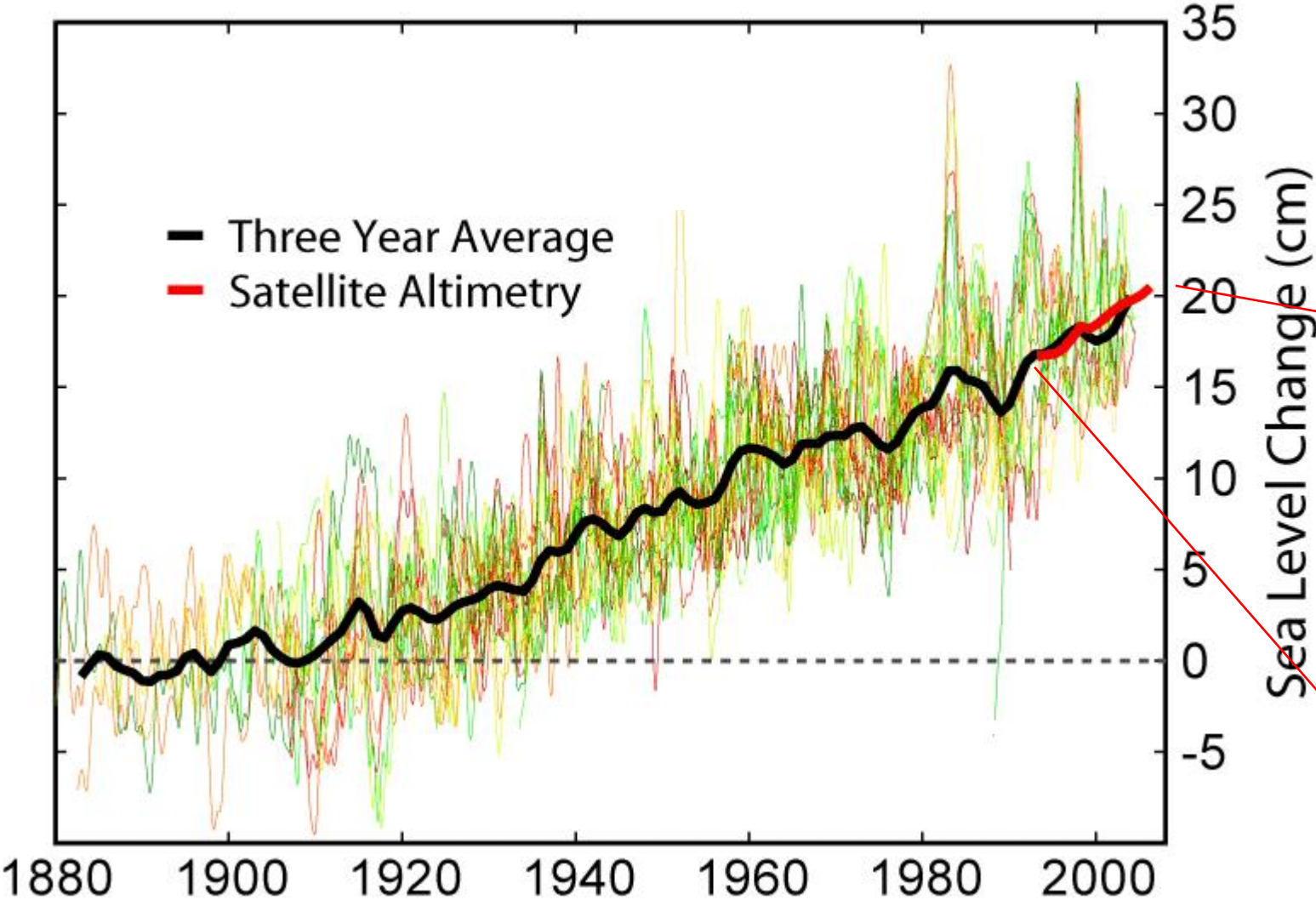


Zeespiegelstijging



Zeespiegelstijging

2100 zonder dijken

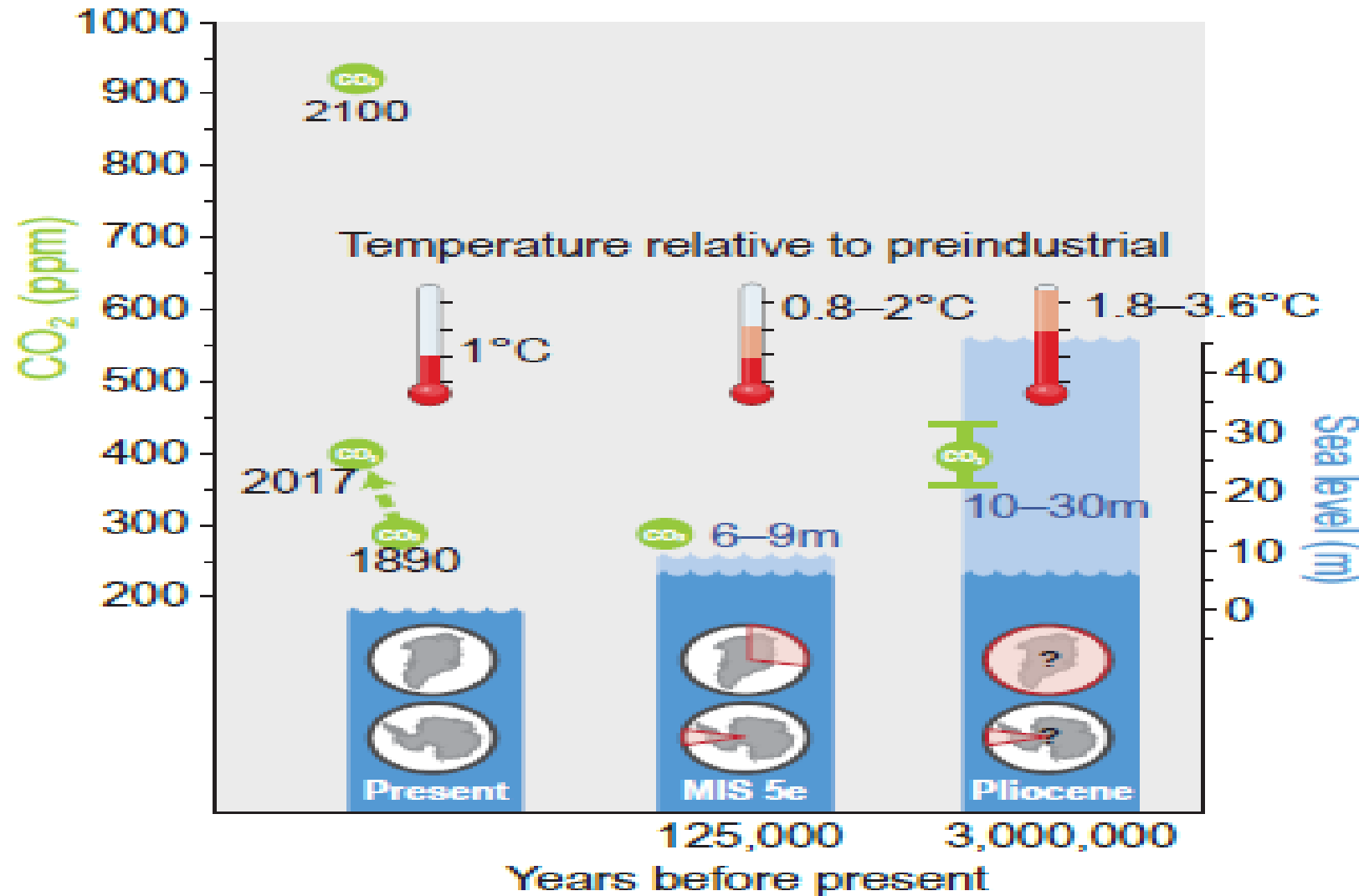


Ref.: WMO Statement 2019



Zeespiegel ijlt na...

- 125.000 jr geleden:
 - $\text{CO}_2=300$ ppm, $T=1,5$ °C
 - Zeespiegel: + 6-9 meter
- 3 milj. jr geleden:
 - $\text{CO}_2=400$ ppm, $T= 2,7$ °C
 - Zeespiegel: + 10-30 meter
- Als we niks doen:
 - $\text{CO}_2=900$ ppm, $T=4,5$ °C
 - Zeespiegel: + 60 meter



Gevolgen klimaatverandering

WMO Statement on the State of the Global Climate in 2018

WEATHER CLIMATE WATER



WORLD
METEOROLOGICAL
ORGANIZATION

WMO-No. 1233



2018 was the fourth warmest year on record

2015–2018 were the four warmest years
on record as the long-term warming trend continues



Ocean heat content is at a record high and
global mean sea level continues to rise

Arctic and Antarctic sea-ice extent is
well below average



Extreme weather had an impact on lives and
sustainable development on every continent



Average global temperature reached approximately
1 °C above pre-industrial levels

We are not on track to meet climate change targets
and rein in temperature increases

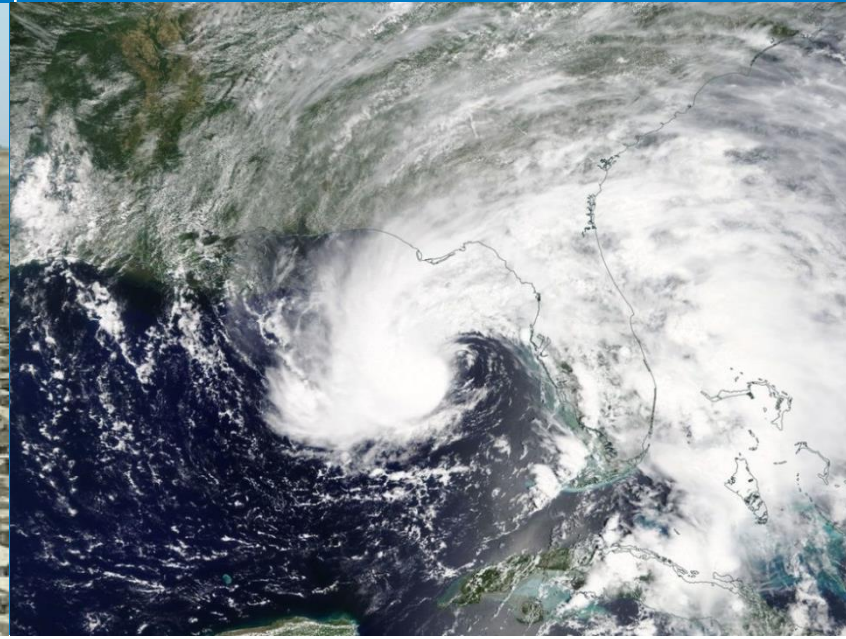


Every fraction of a degree of warming makes a difference

Hitte



Neerslag extremen



Droogte



Bedreiging flora & fauna



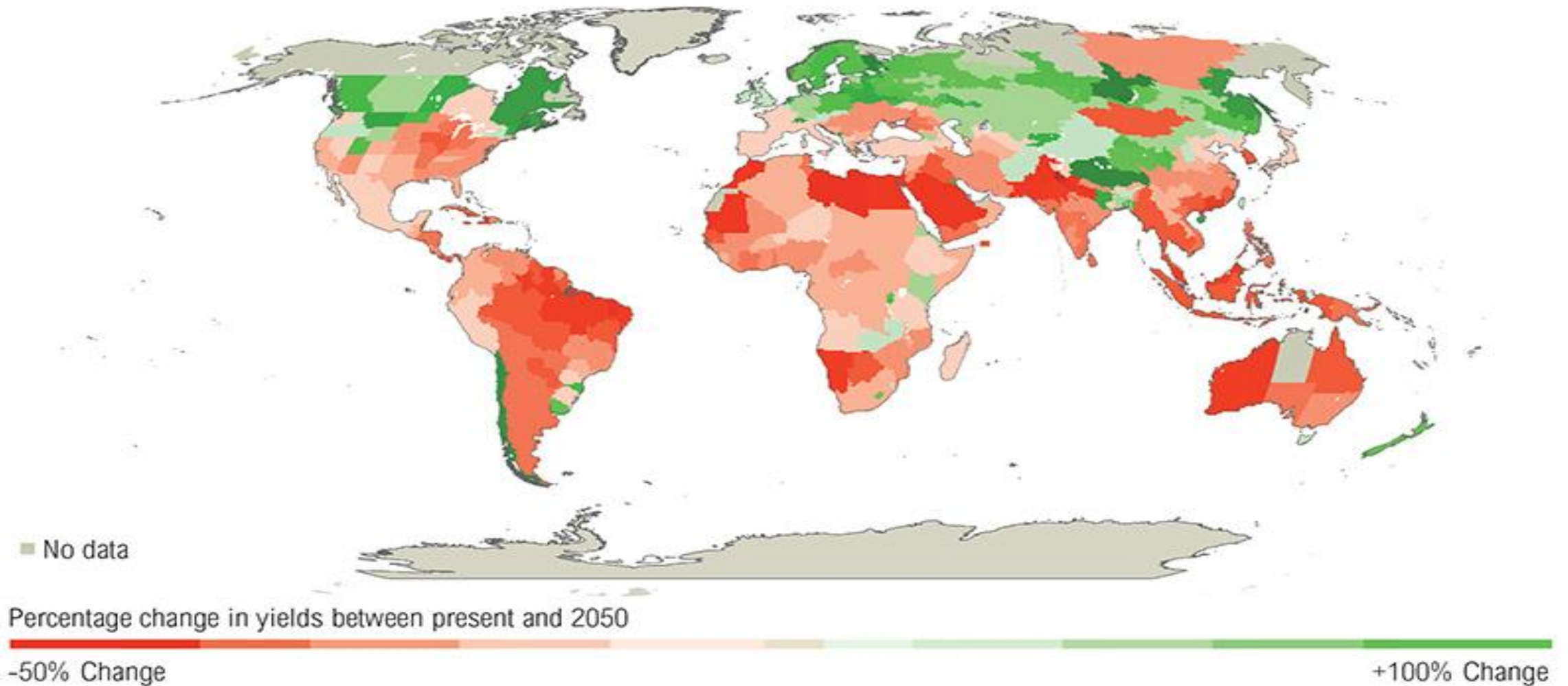
Overstromingen



Voedselzekerheid



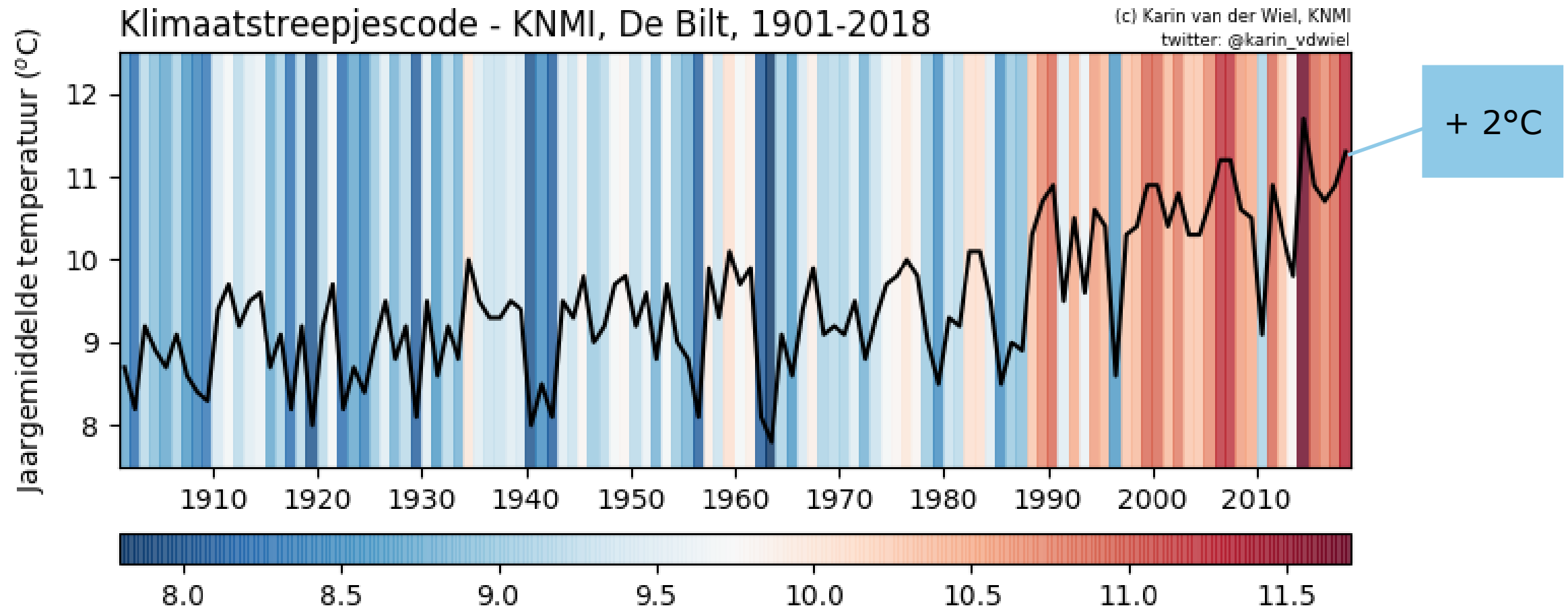
WRI: effect of +3°C op oogstopbrengsten



Gevolgen in Nederland



Nederlandse situatie

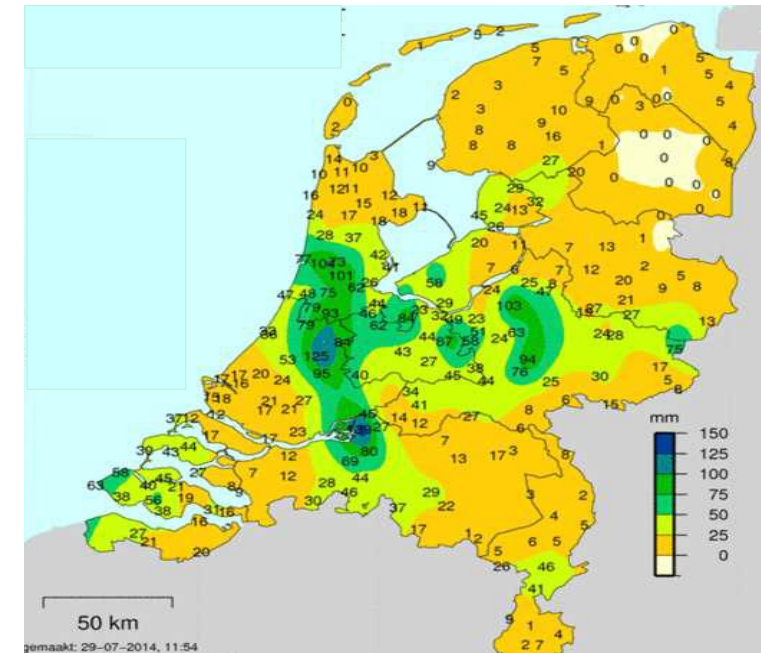


Extreme regenval in NL



28 juli 2014, Alphen a/d Rijn

- Neerslag in 24 u: > 100 mm
- 3x waarschijnlijk dan in 1950
- Verzekeraars: schade $\rightarrow 250$ M€

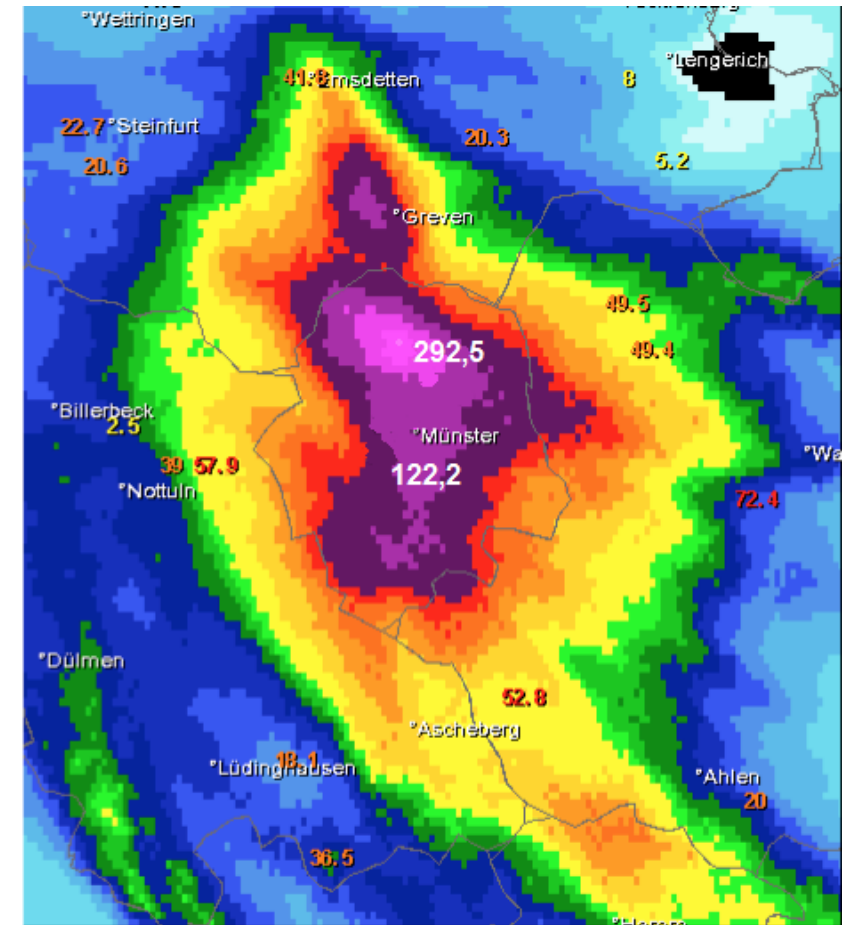




Elders die dag...



28 juli 2014, Amsterdam



28 juli 2014, Munster



Ook andere extremen

Dijkverzakking, 26 aug 2003, Wilnis



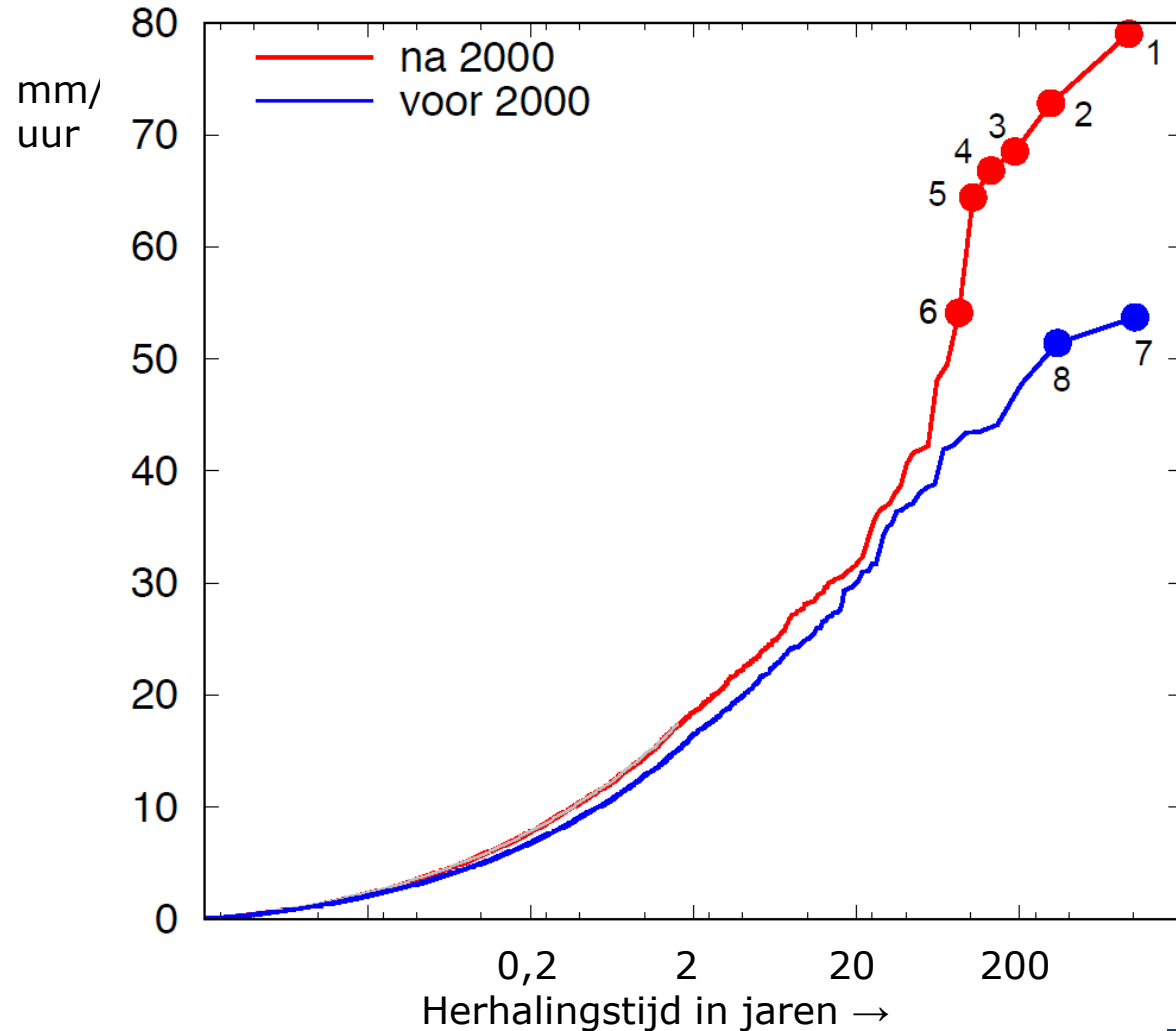
Extreme hagelbui, 23 juni 2016, Someren



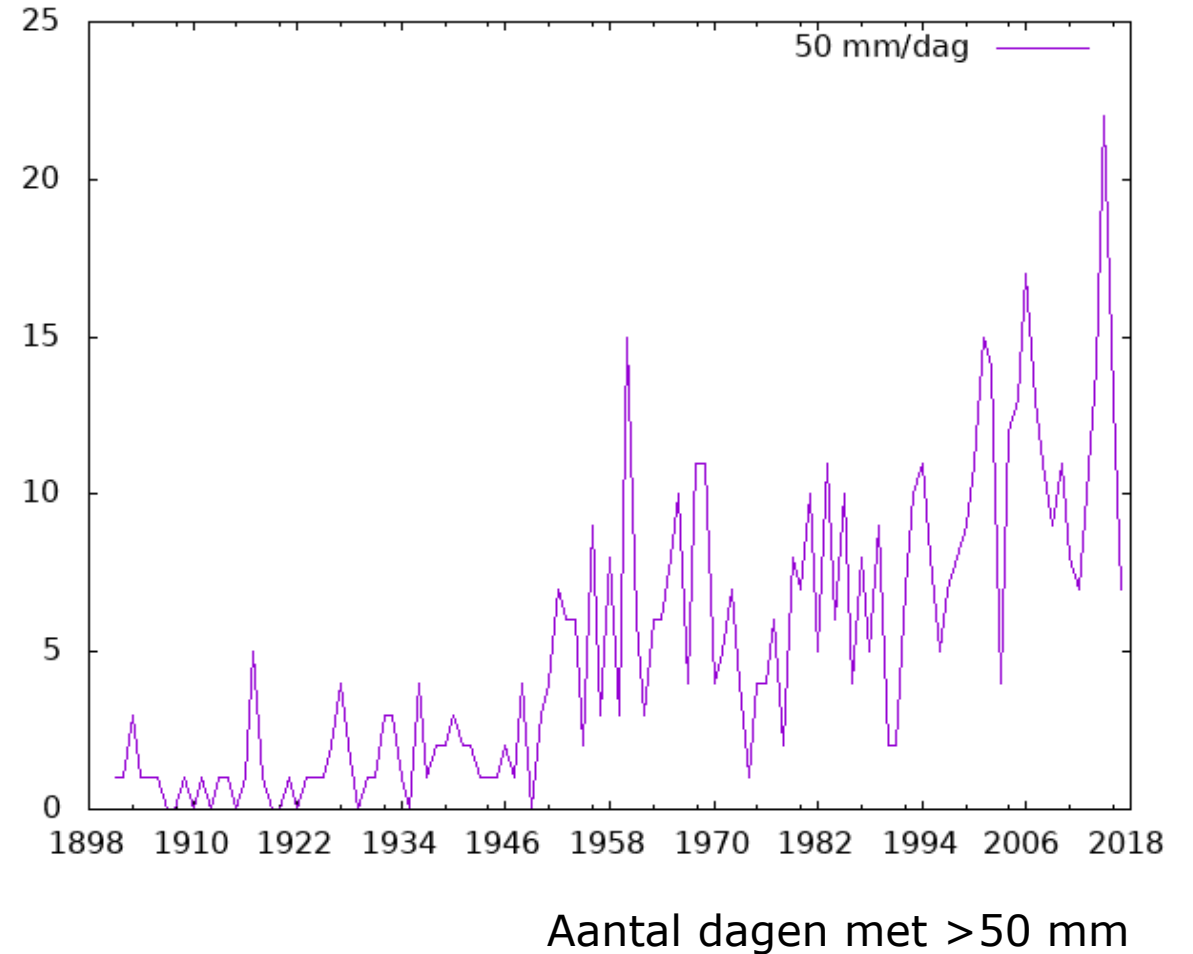
Neerslagtrend



Toename intensiteit



Meer intense buien



Wat doet de politiek?

Klimaataakkoord Parijs



"..strengthen the global response to climate change by keeping the global temperature rise well below 2 °C ..."

December 2015

2015: goals for 2030



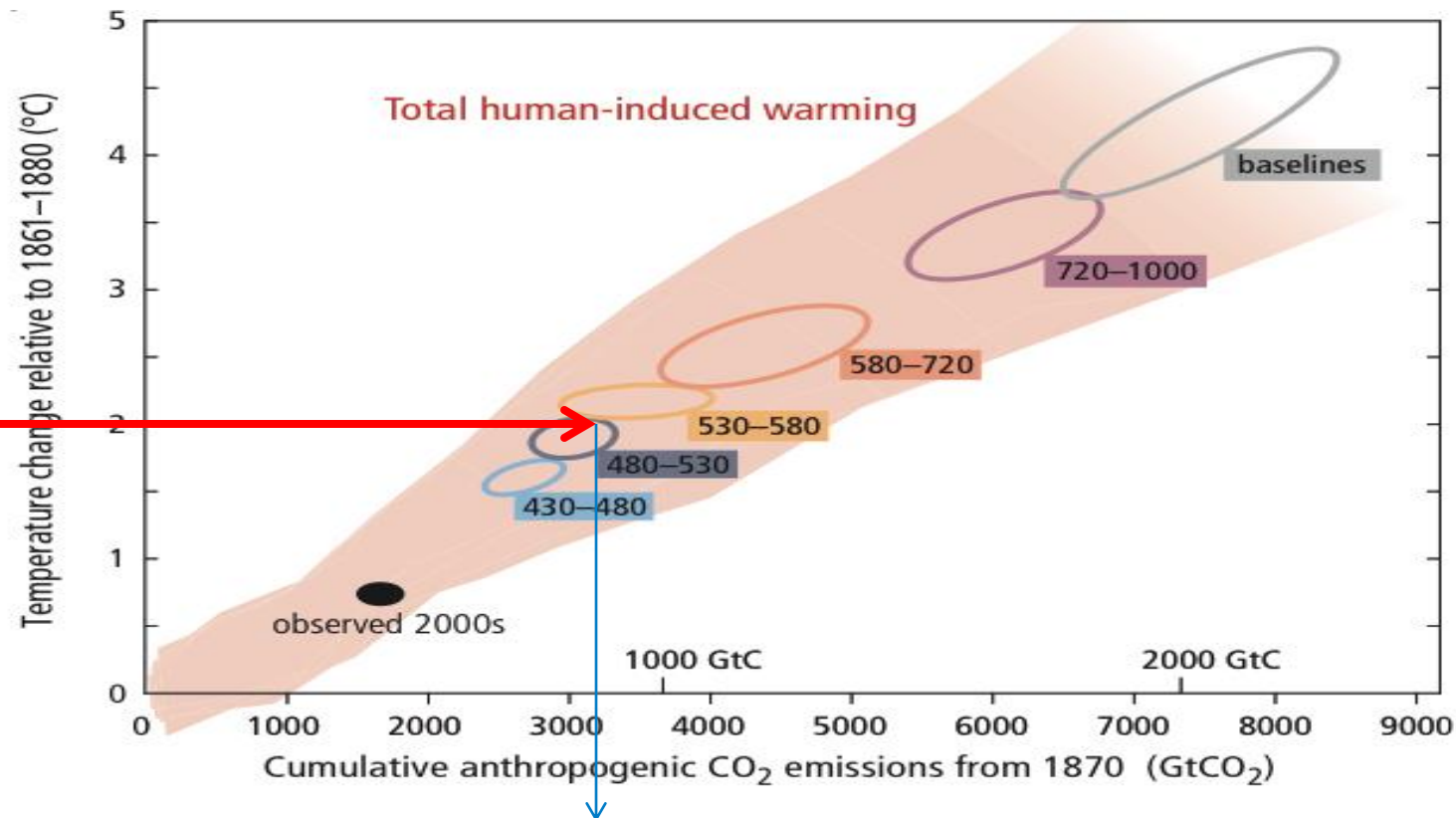
Climate actions relate to SDG's 13 (obviously) and 3, 6, 7, 11, 12, 14 & 15



Hoeveel tijd is er nog?

1. Aanname:

$$\Delta T_{global} = 2^{\circ}\text{C}$$



2. Maximale CO₂ emissie:

3200 GtCO₂

3. Tot nog toe uitgestoten:

2000 GtCO₂

} 1200 GtCO₂ over

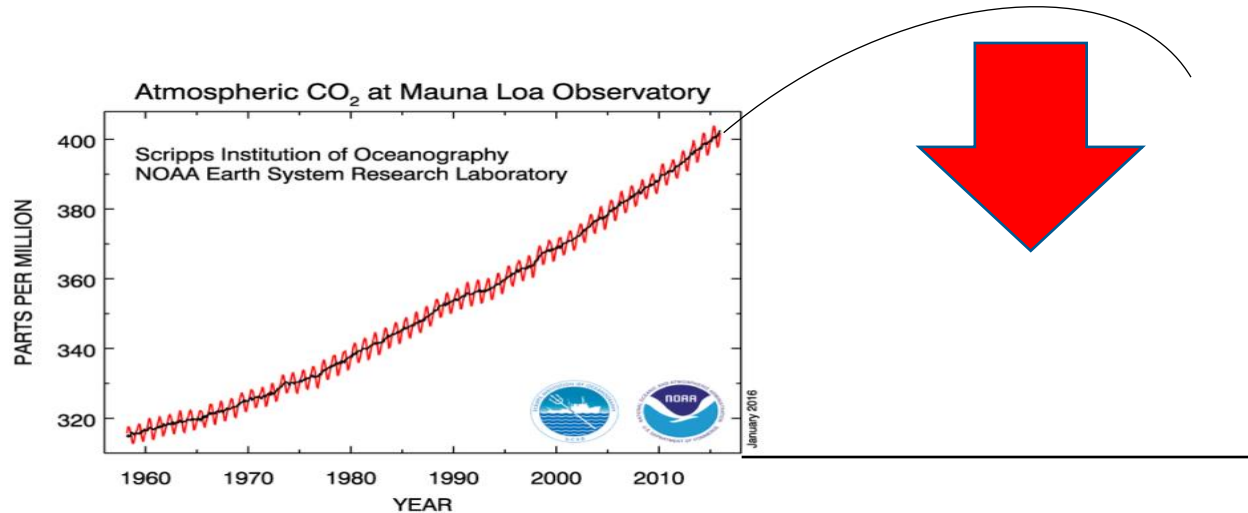
4. Met 40 GtCO₂/yr: hebben we nog $(1200/40 =)$ **30 yr** → **2050**

© Concept: prof. Detlef van Vuren (PBL)

Wat kunnen we doen?



CO₂-uitstoot ombuigen



Paul Hawken et al., *Drawdown*:

Reductie-uitstoot: 1440 GtCO₂ tot 2050



Top-10 *Drawdown*



1. Voorkom vrijkomen koelmiddelen (90 Gt)
2. Windenergie op land (84 Gt)
3. Voedselverspilling tegengaan (70 Gt)
4. Plantenrijk dieet (66 Gt)
5. Tropische bossen → 36xNL (61 Gt)
6. Onderwijs meisjes } → 120 Gt
7. Gezinsplanning }
8. Zonneparken (37 Gt)
9. Bosbeweiding (31 Gt)
10. Zonnepanelen thuis (24 Gt)



Tot slot

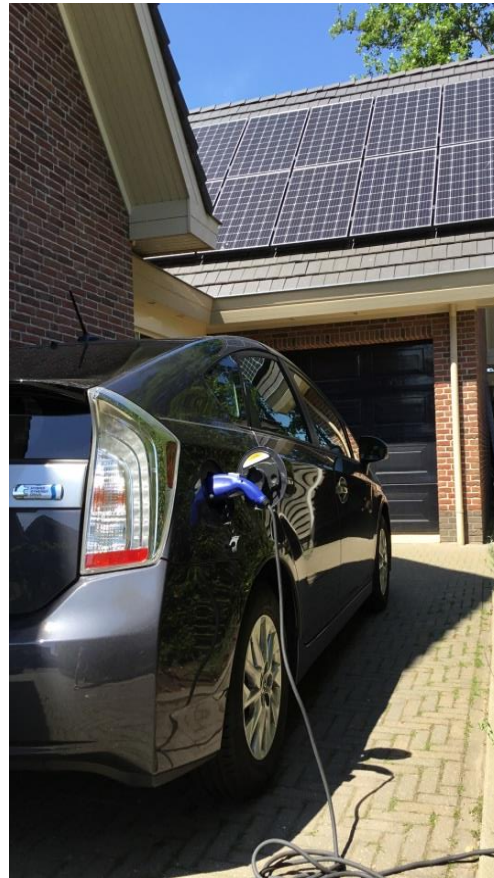
There is no Planet B

(ref. R. Branson)



Apollo 8, 25 dec 1968

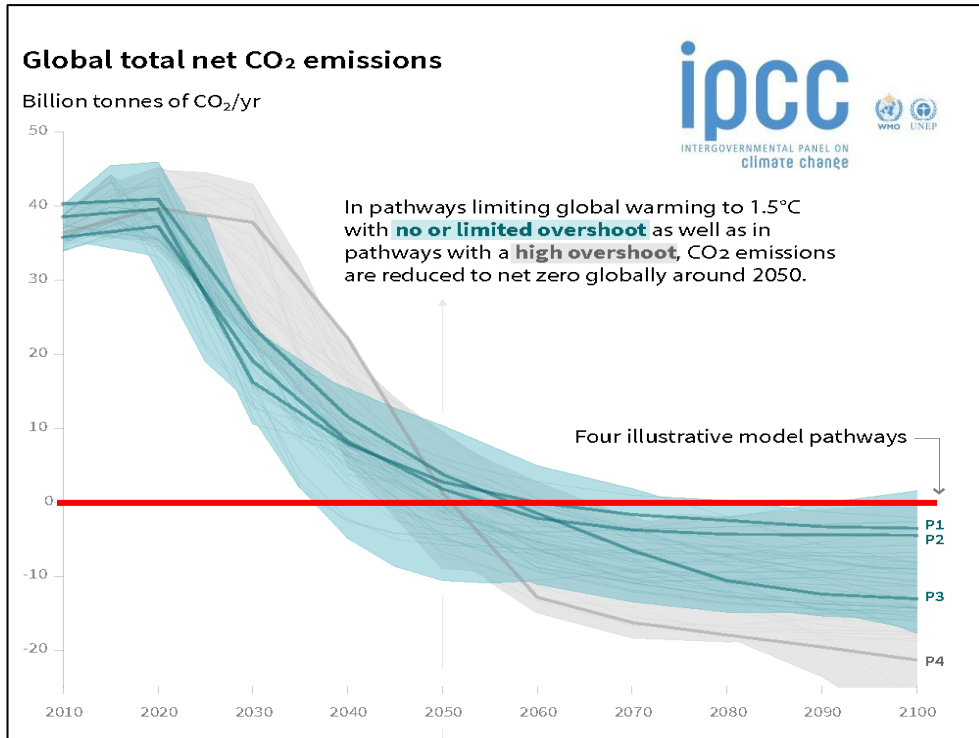
Verbeter de wereld en...



Nog steeds code oranje?



- IPCC 1,5°C rapport:
Negatieve CO₂ emissies



- Maar ook.....



GREEN SHIFT
Innovative business solutions



