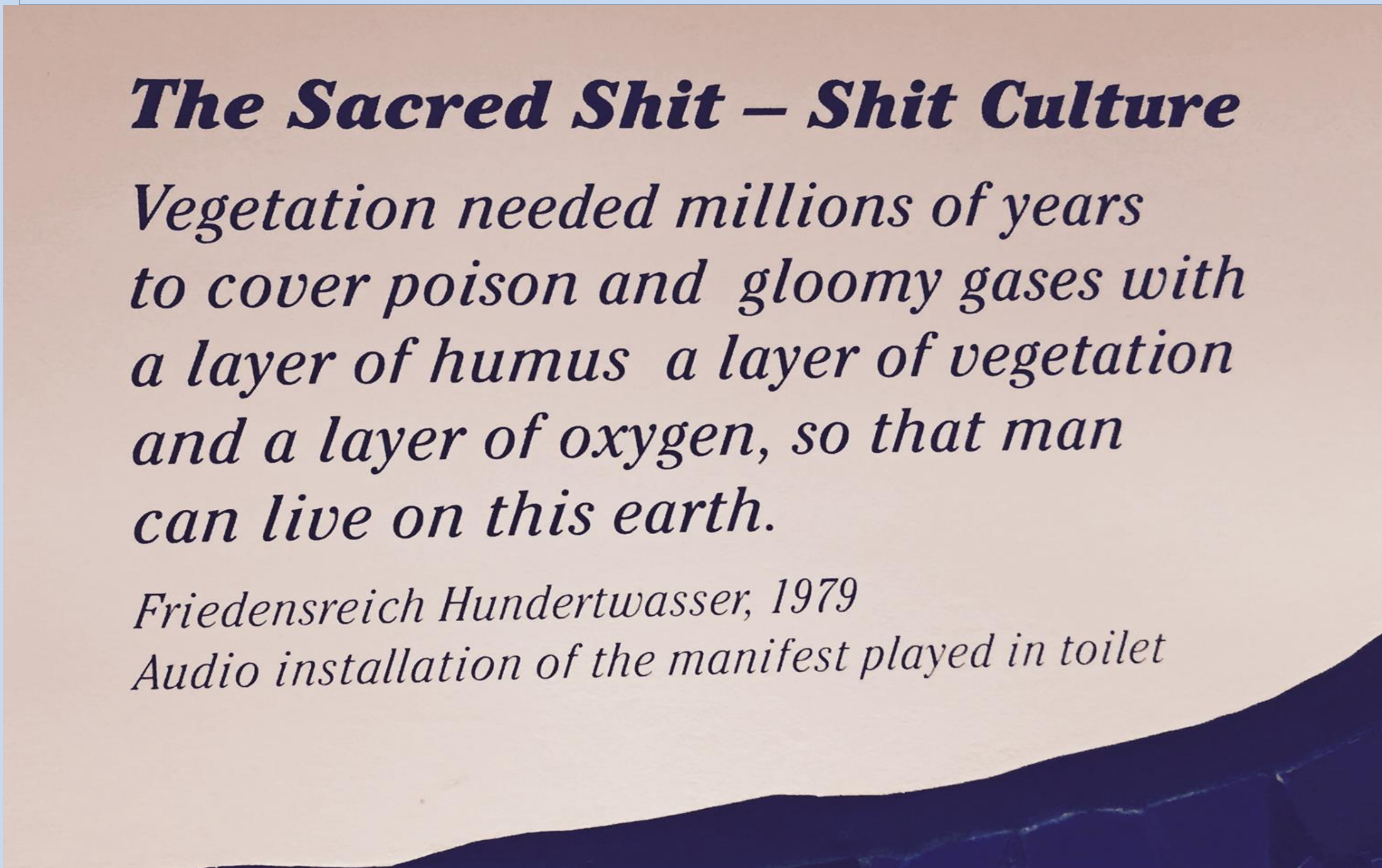
HUNDERTWASSER



JORDEN

JORDEN

Kulstoffet

Fotosyntese

Kuldioxid + vand + sollys => druesukker + ilt

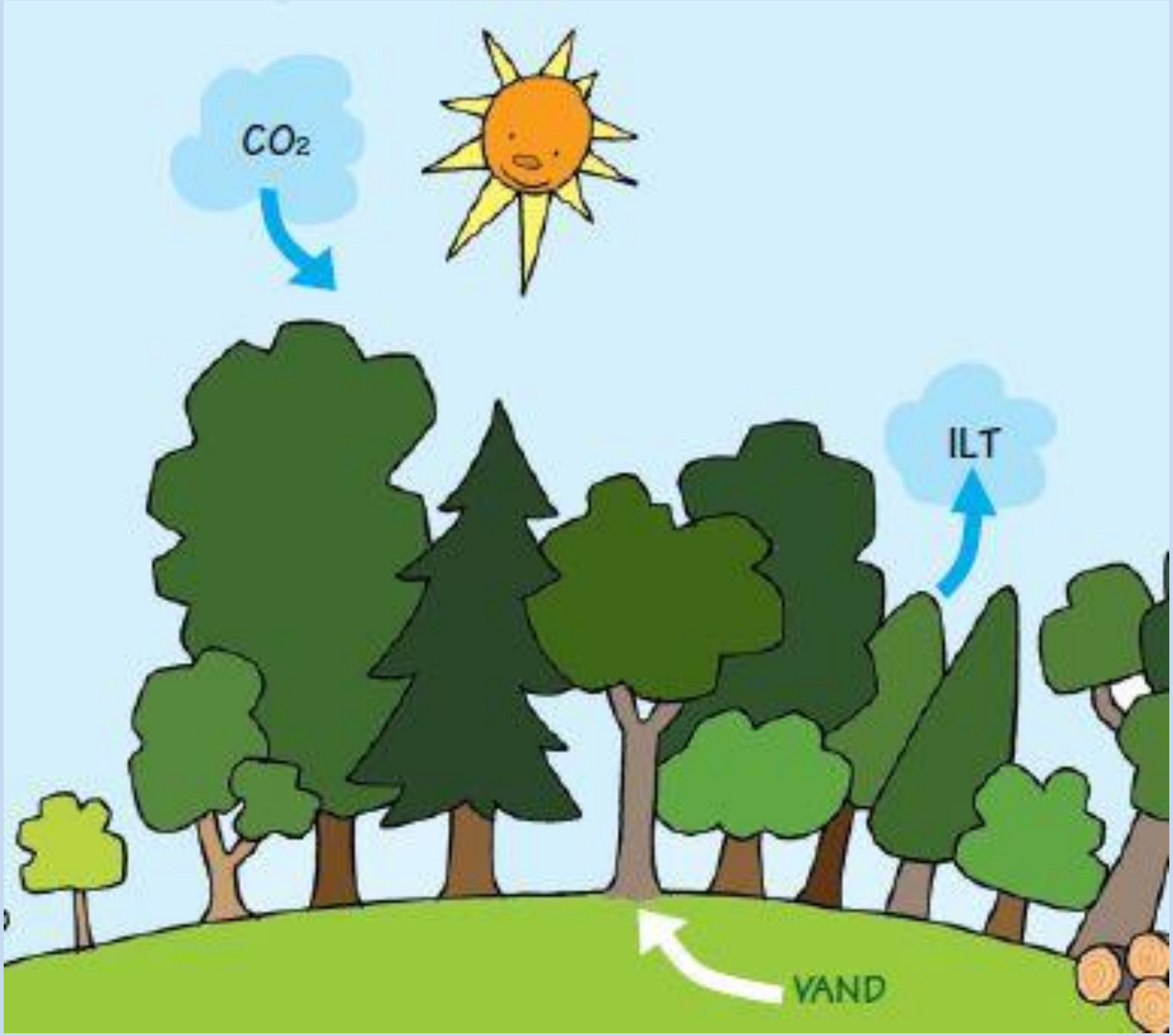
$6\ CO_2 + 6\ H_2O \Rightarrow C_6H_{12}O_6 + 6\ O_2$

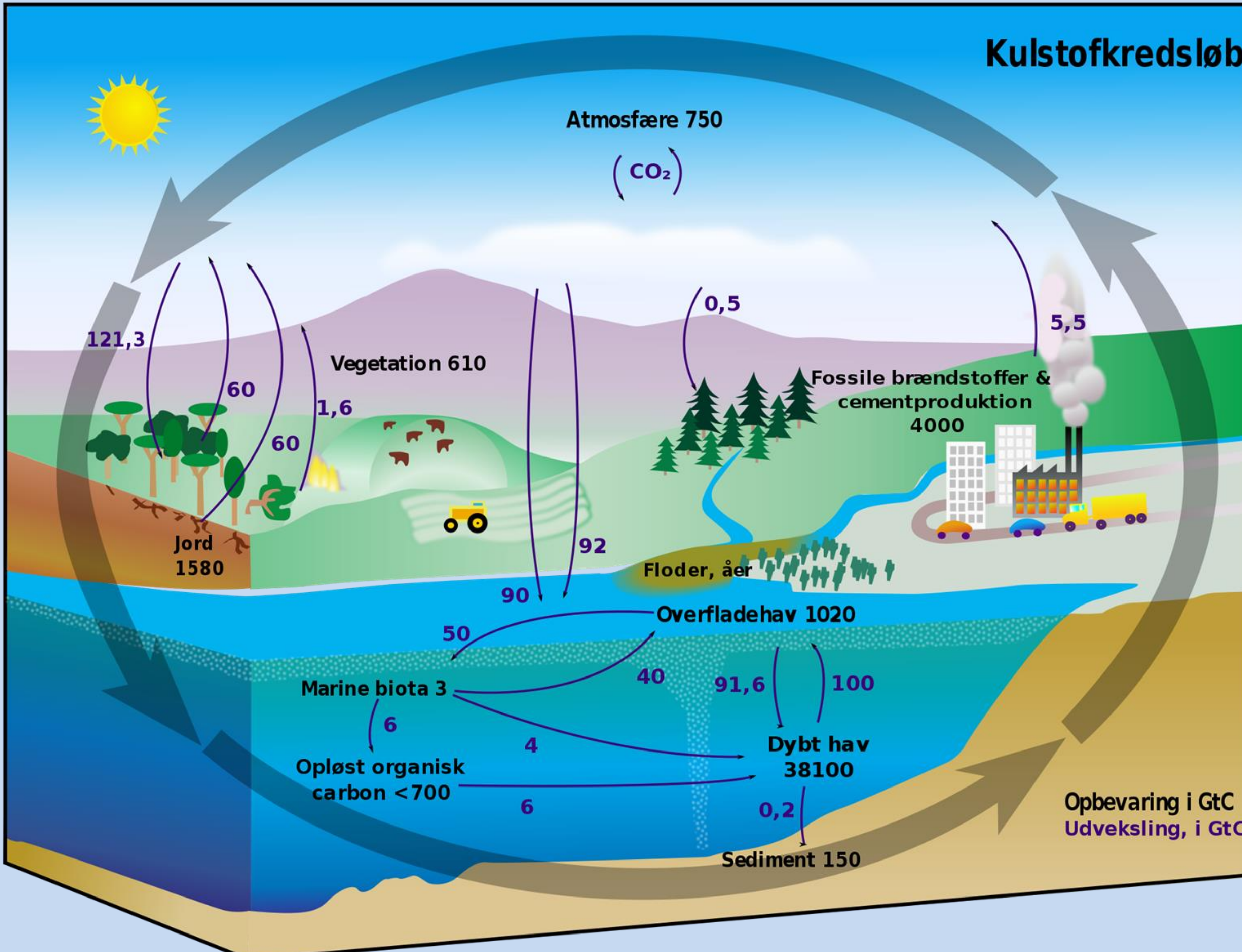
Ånding

Ilt + sukker => energi + kuldioxid + vand

$O_2 + C_6H_{12}O_6 \Rightarrow Energi + CO_2 + H_2O$

Kulstoffet





Kulstofkredsløbe
Atmosfære 750
CO_2
121,3
60
60
1,6
Vegetation 610
Jord
1580
90
92
0,5
5,5
Fossile brændstoffer &
cementproduktion
4000
Floder, åer
Overfladehav 1020
50
40
91,6
100
Marine biota 3
6
4
Dybt hav
38100
Opløst organisk
carbon <700
6
0,2
Sediment 150
Opbevaring i GtC
Udveksling, i GtC/

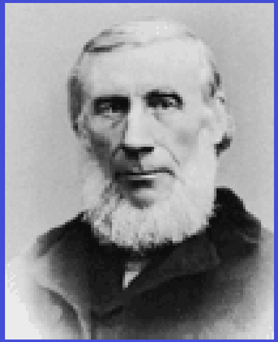
Kulstoffet

DRIVHUSEFFEKTEN

Discovery of the Greenhouse Effect

Joseph Fourier (1827)

Recognized that gases in the atmosphere might trap the heat received from the Sun.

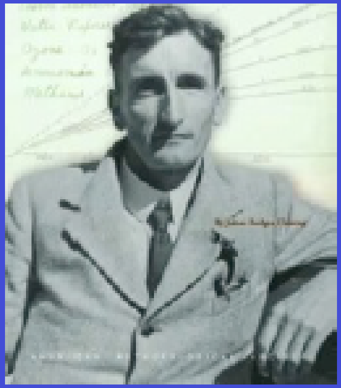


James Tyndall (1859)

Careful laboratory experiments demonstrated that several gases could trap infrared radiation. The most important was simple water vapor. Also effective was carbon dioxide, although in the atmosphere the gas is only a few parts in ten thousand.

Svante Arrhenius (1896)

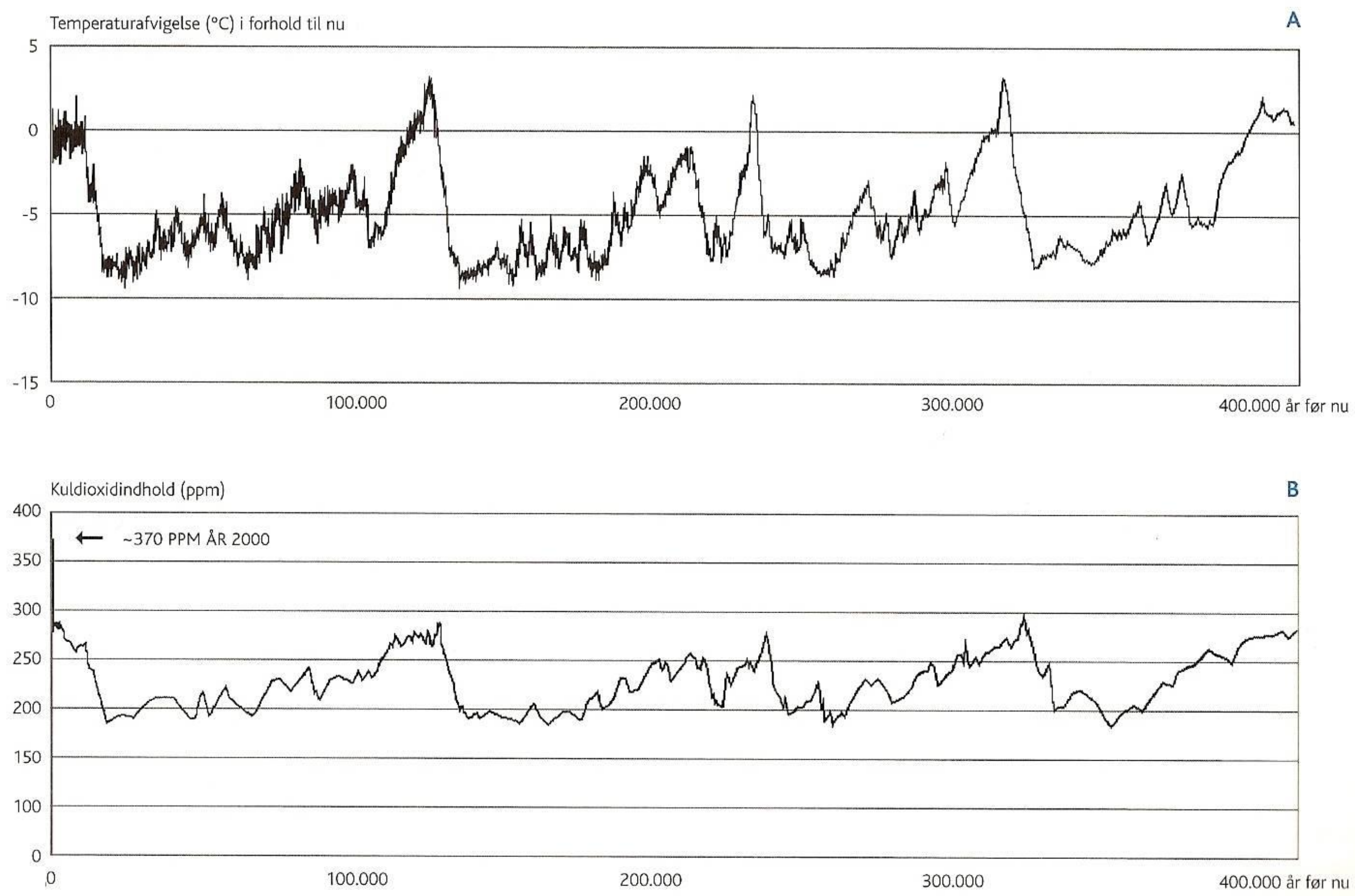
Performed numerical calculations that suggested that doubling the amount of carbon dioxide in the atmosphere could raise global mean surface temperatures by 5-6°C.



Guy Callendar (1939)

Argued that rising levels of carbon dioxide were responsible for measurable increases in Earth surface temperatures. Estimated that doubling the amount of CO_2 in the atmosphere could raise global mean surface temperatures by 2°C.

CO2 OG TEMPERATUR



Der er en nøje sammenhæng mellem atmosfærens temperatur (A) og dens indhold af kuldioxid (B) gennem de sidste 400.000 år. Kurverne fortæller dog ikke, om det er CO_2-indholdet, som skaber de høje temperaturer eller omvendt. Oplysningerne stammer fra den antarktiske indlandsis.

Indhold af GHG

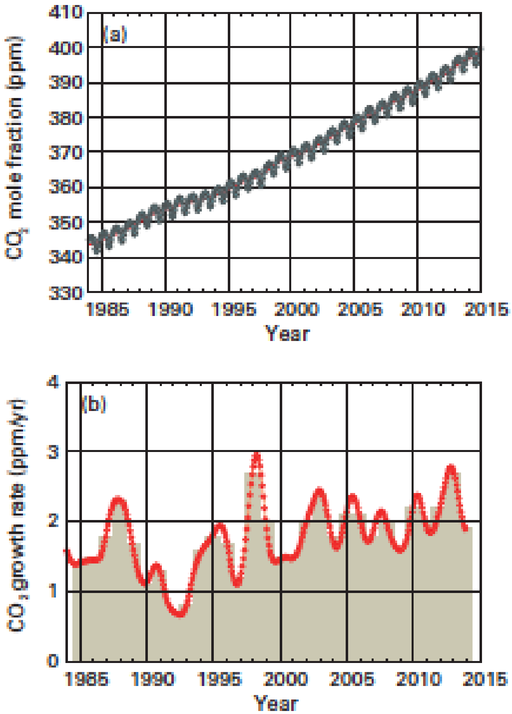


Figure 3. Globally averaged CO_2 mole fraction (a) and its growth rate (b) from 1984 to 2014. Annually averaged growth rates are shown as columns in (b).

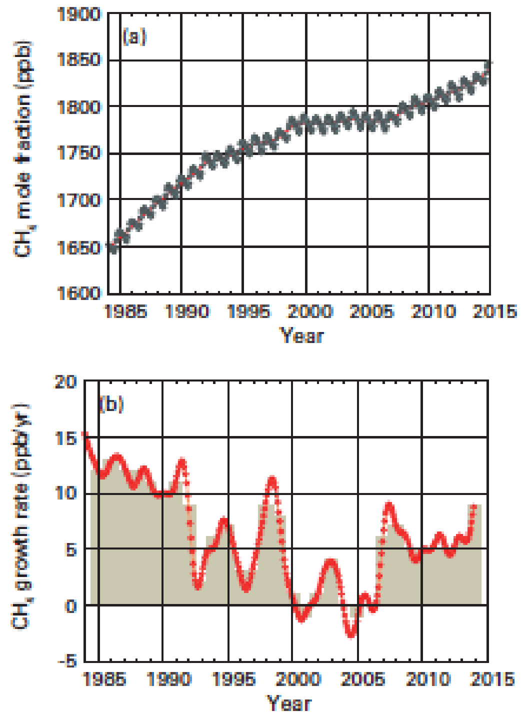


Figure 4. Globally averaged CH_4 mole fraction (a) and its growth rate (b) from 1984 to 2014. Annually averaged growth rates are shown as columns in (b).

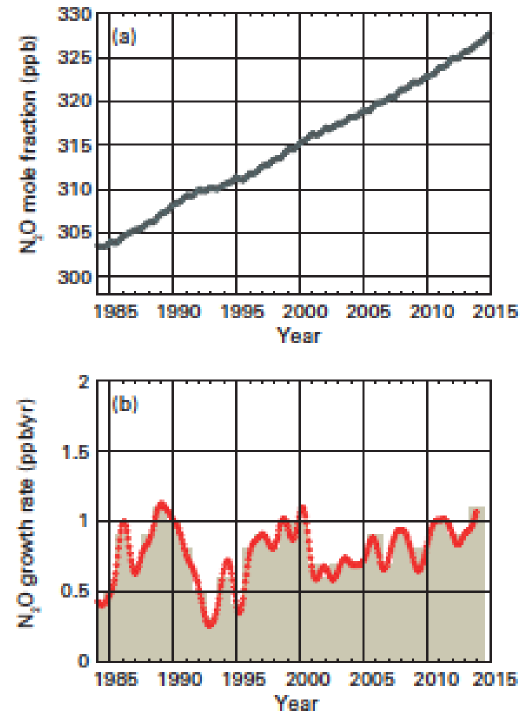
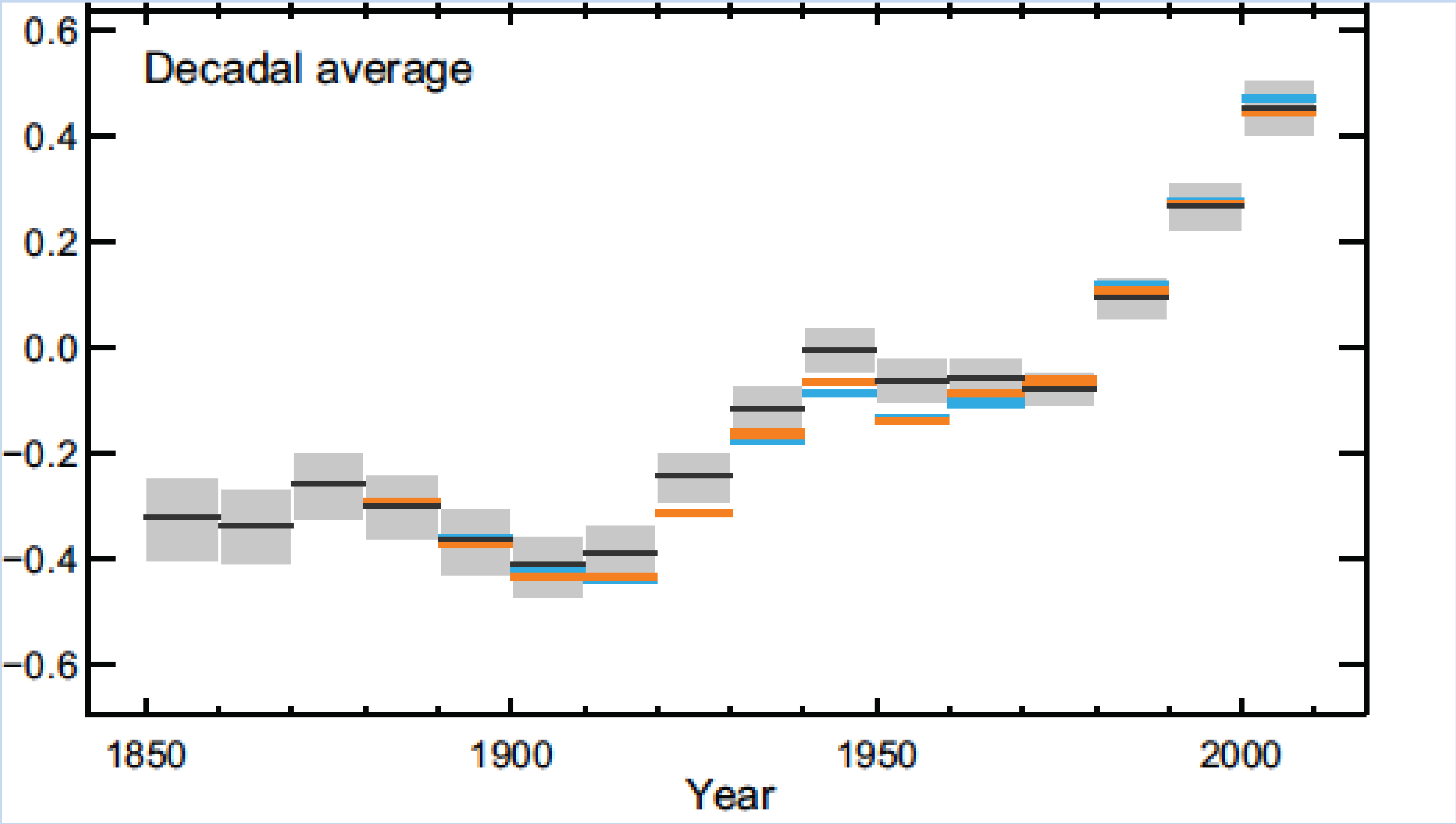


Figure 5. Globally averaged N_2O mole fraction (a) and its growth rate (b) from 1984 to 2014. Annually averaged growth rate is shown as columns in (b).

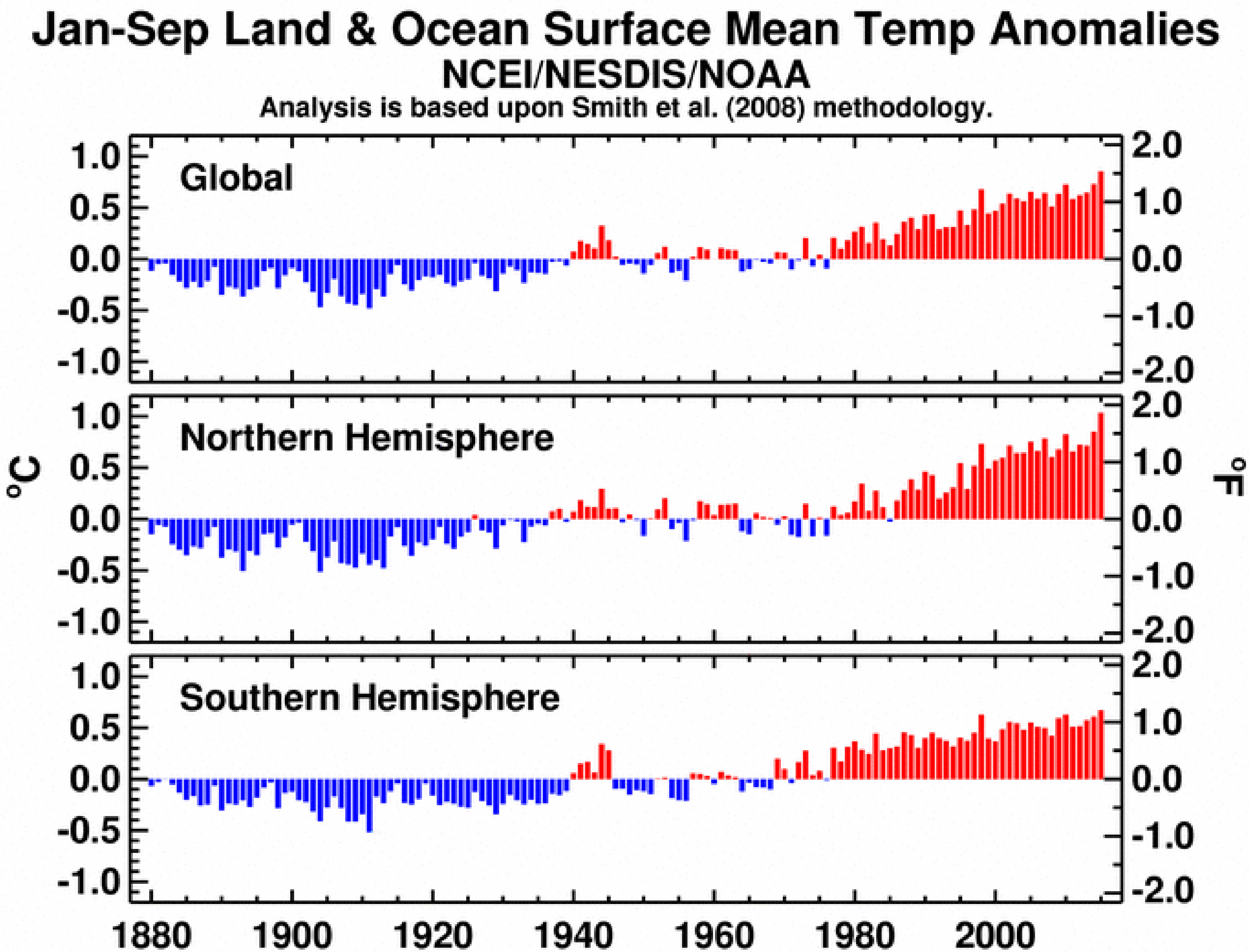
WMO Greenhouse bulletin

Warmest decade

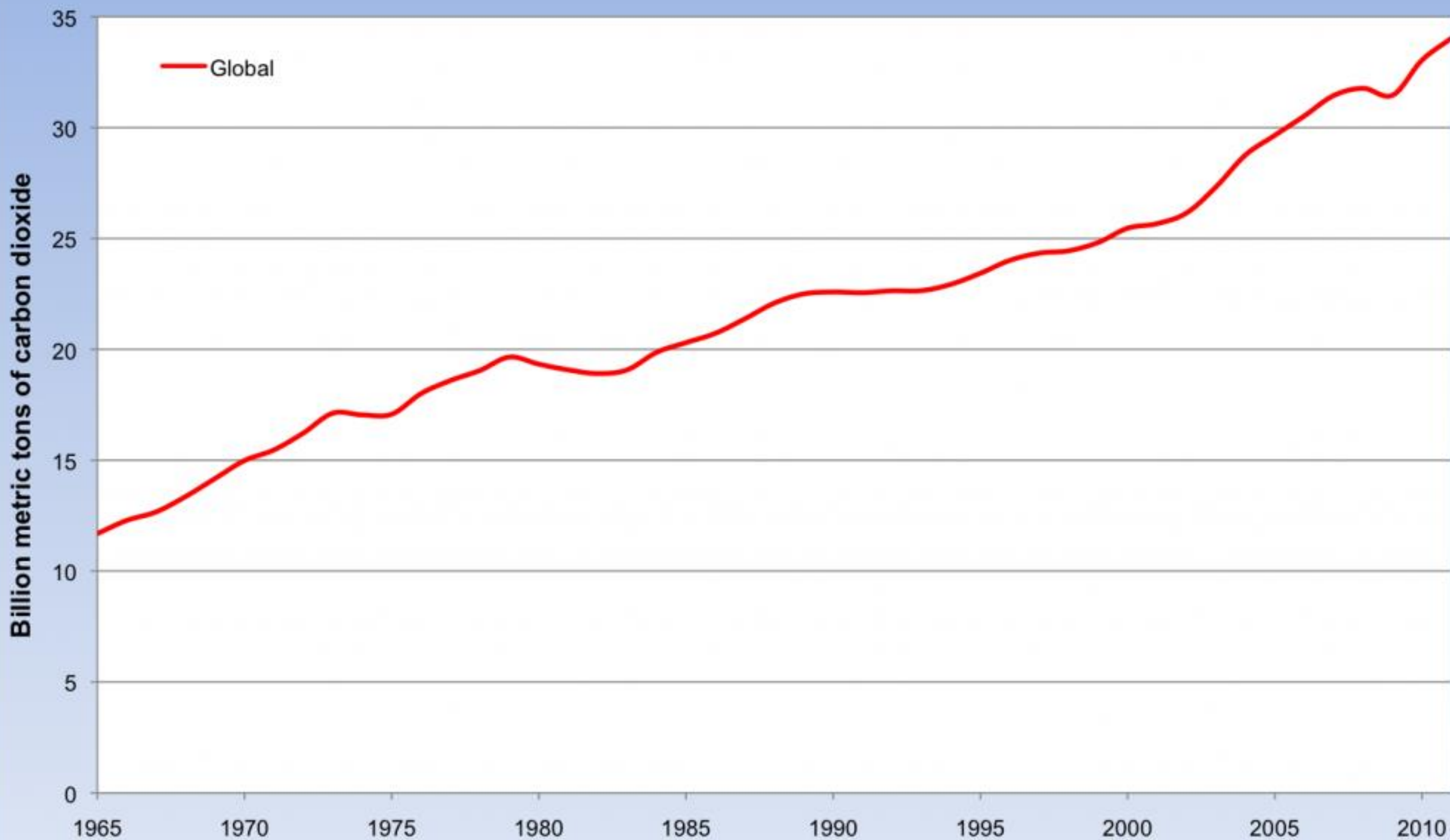


Ipcc spm wg1

Jan-Sep Land & Ocean Surface Mean Temp Anomalies



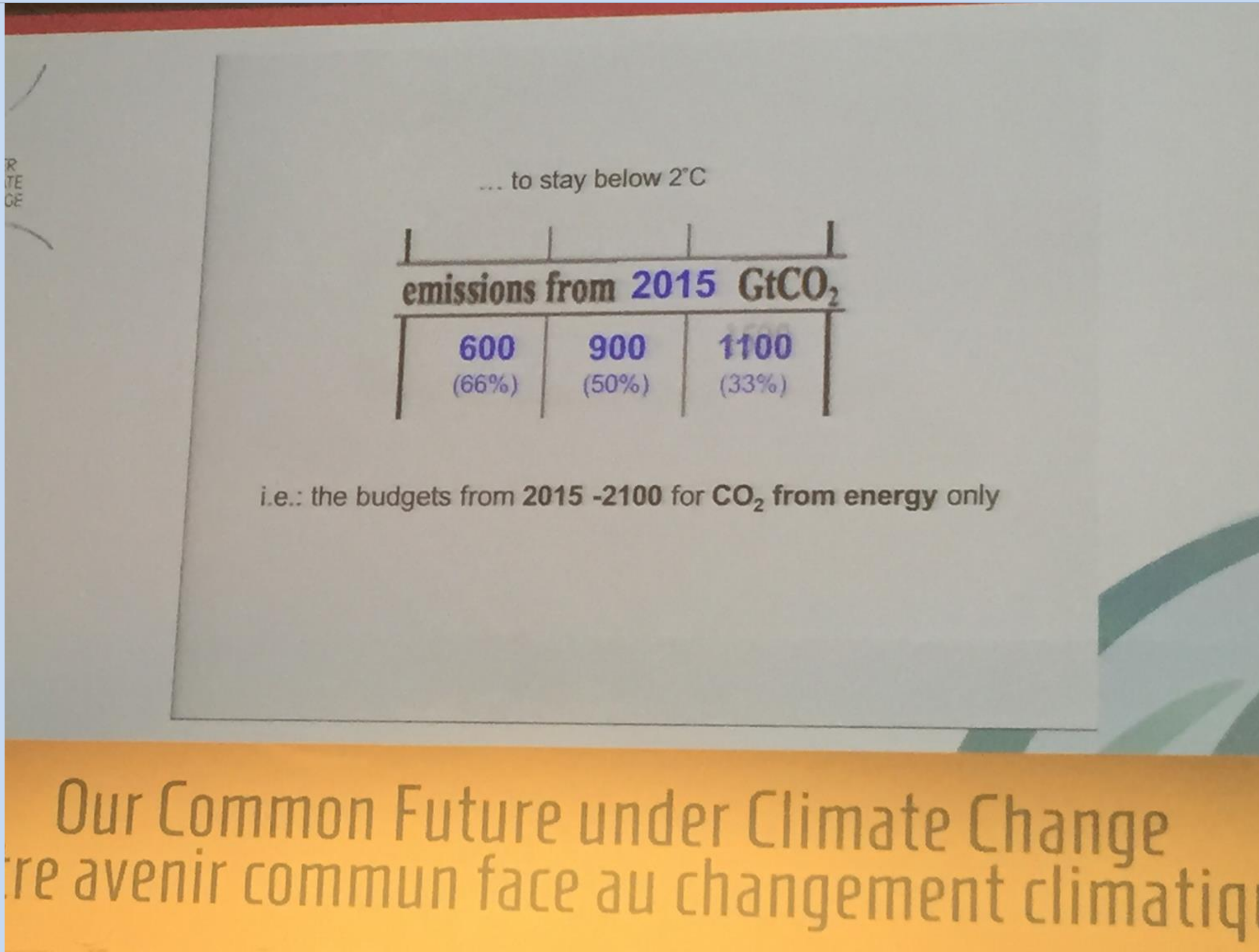
CO_2 Emissions 1965-2011



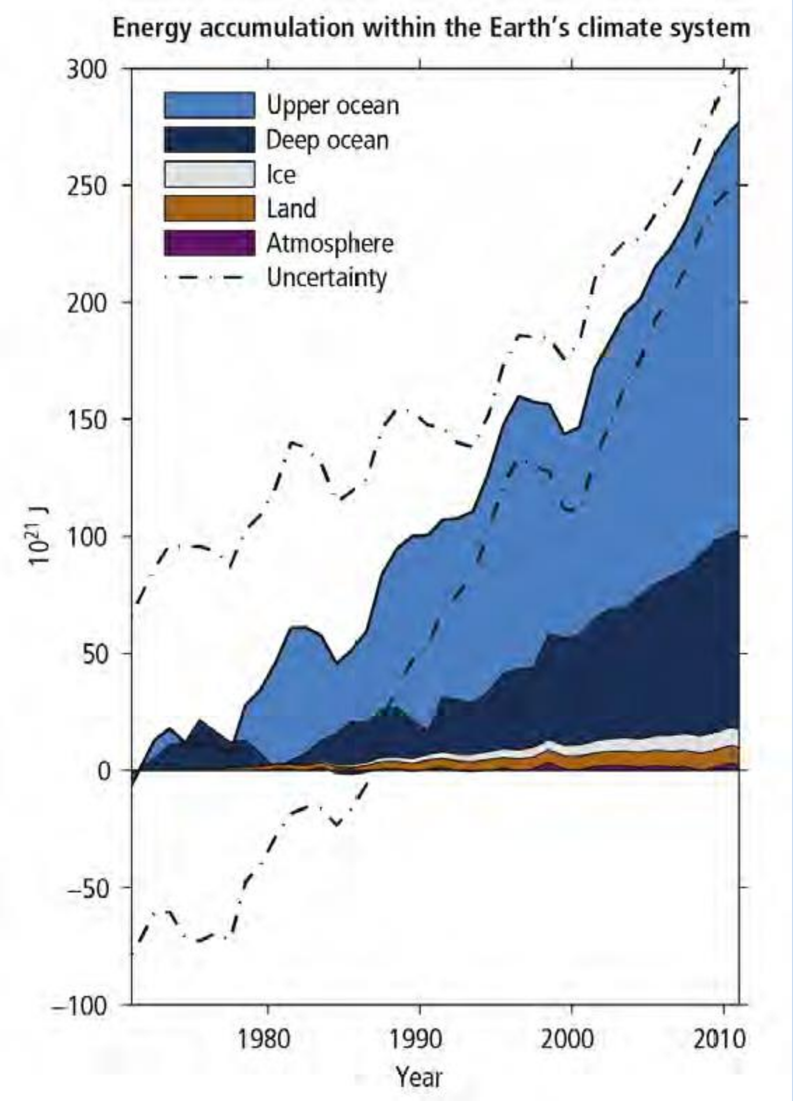
Data source: 2012 BP Statistical Review of World Energy

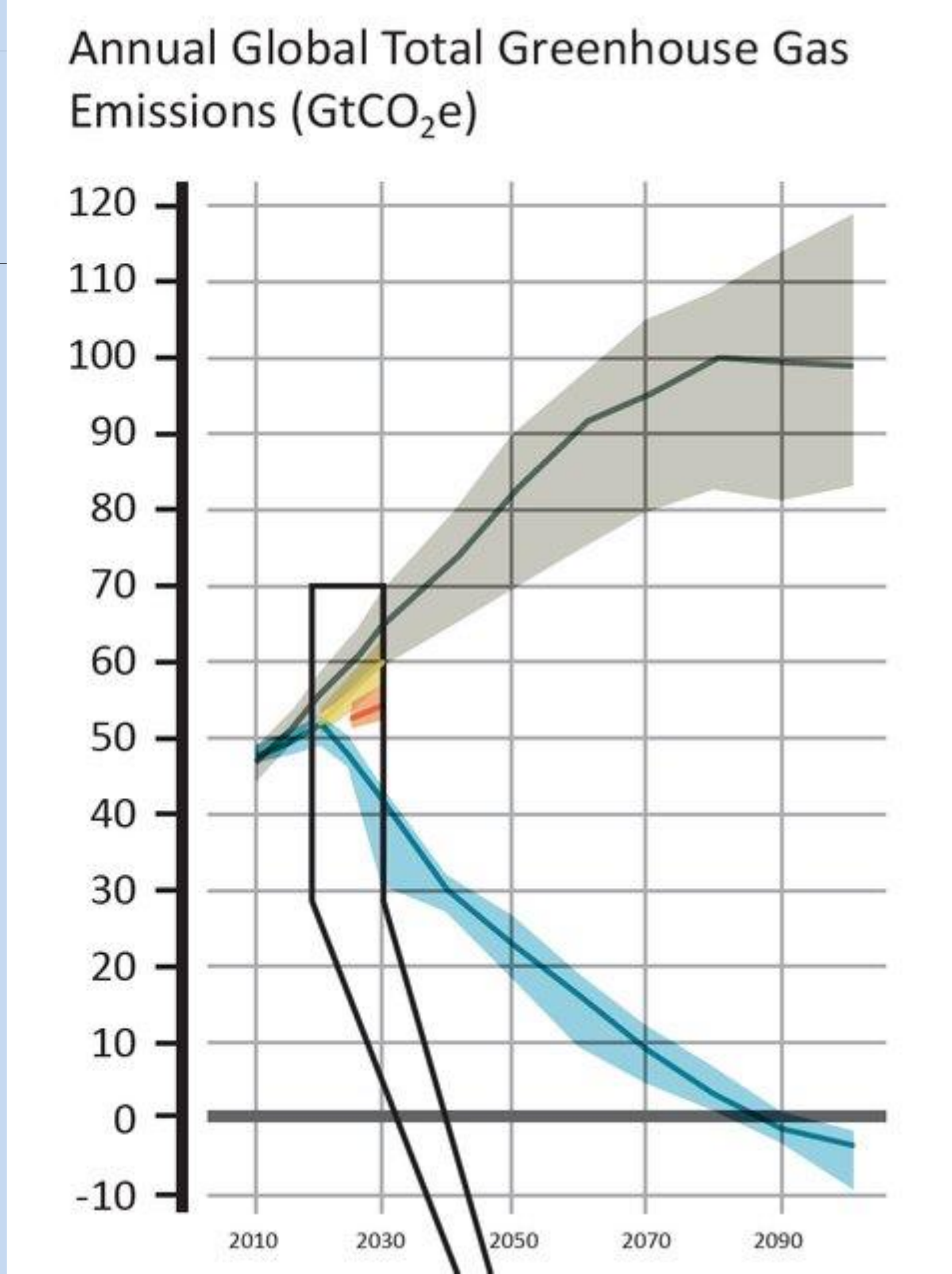
Consumer Energy Report

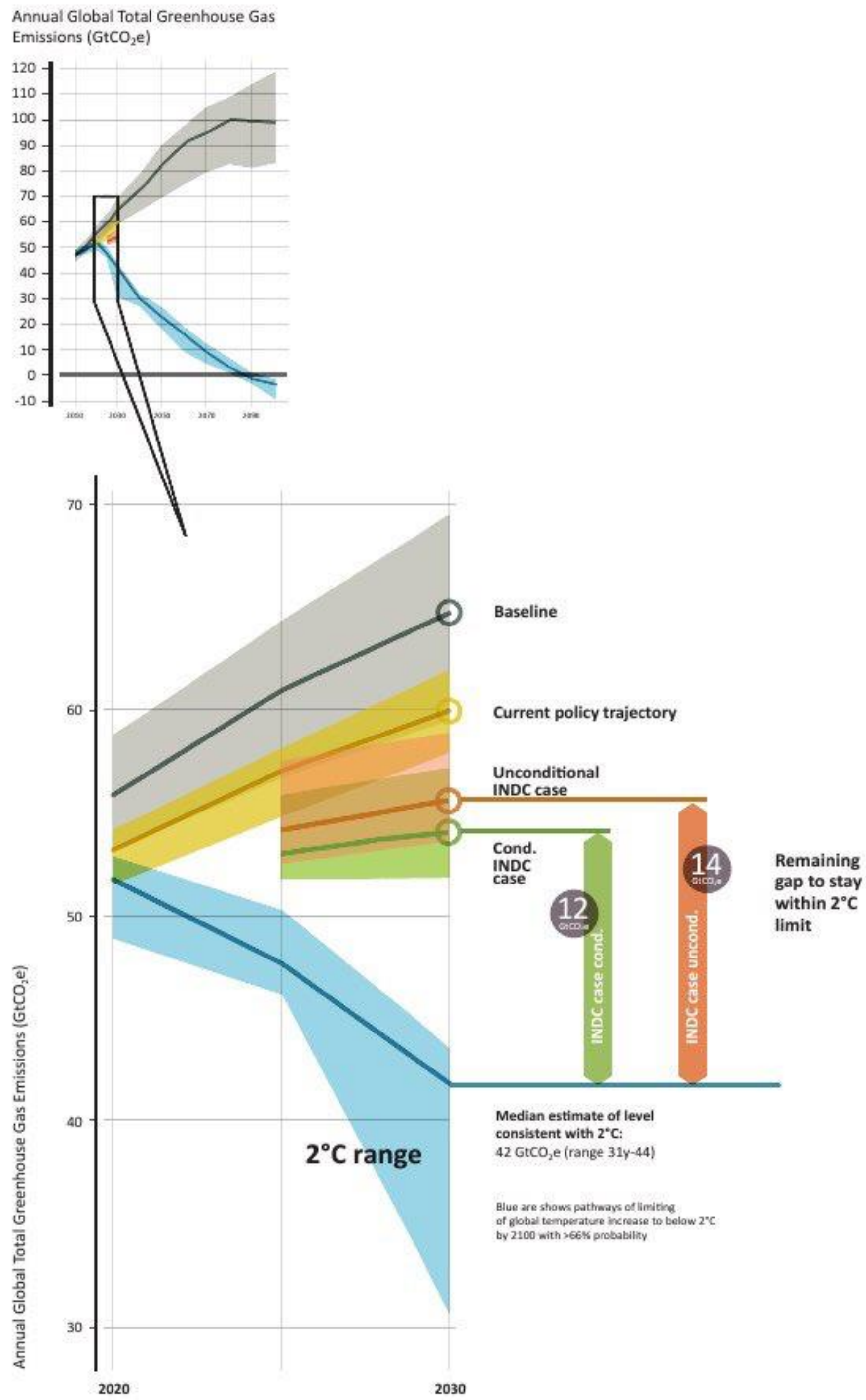
2 graders målet



Energioptag

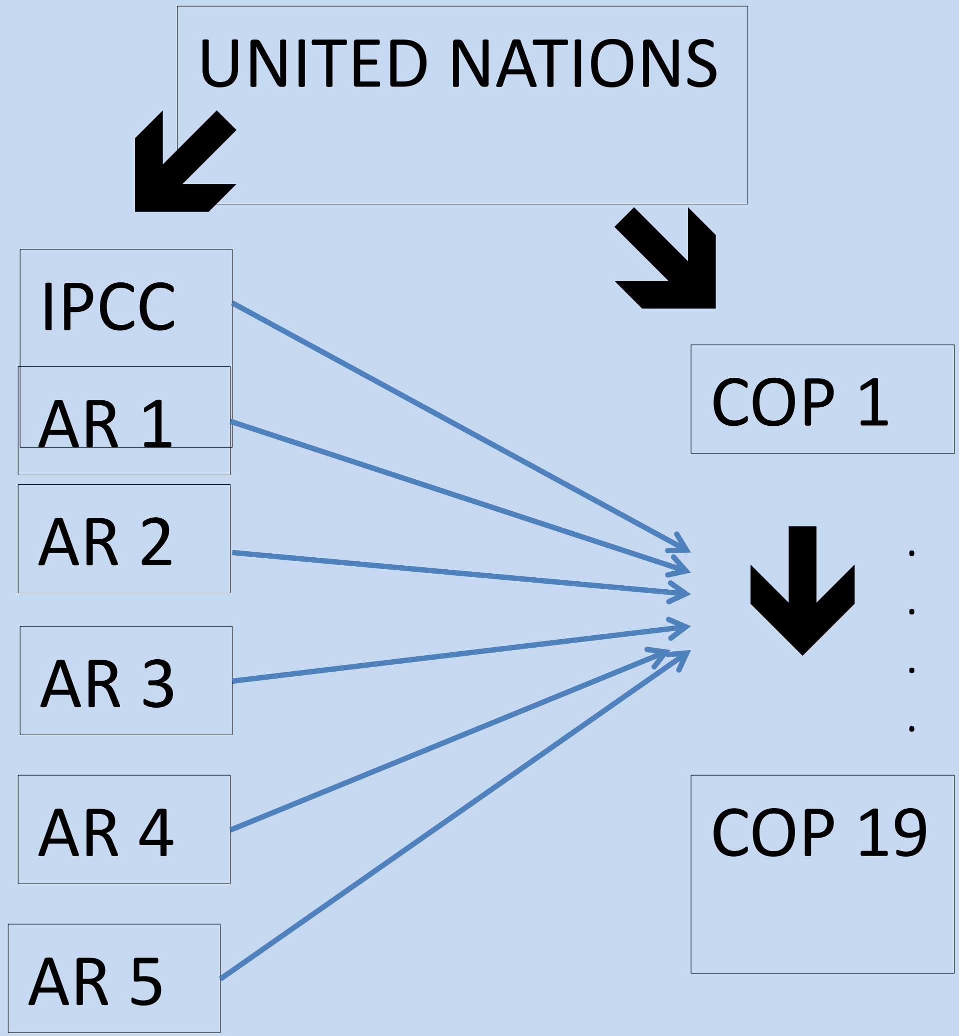



Annual Global Total Greenhouse Gas Emissions (GtCO2e)
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
2010
2030
2050
2070
2090



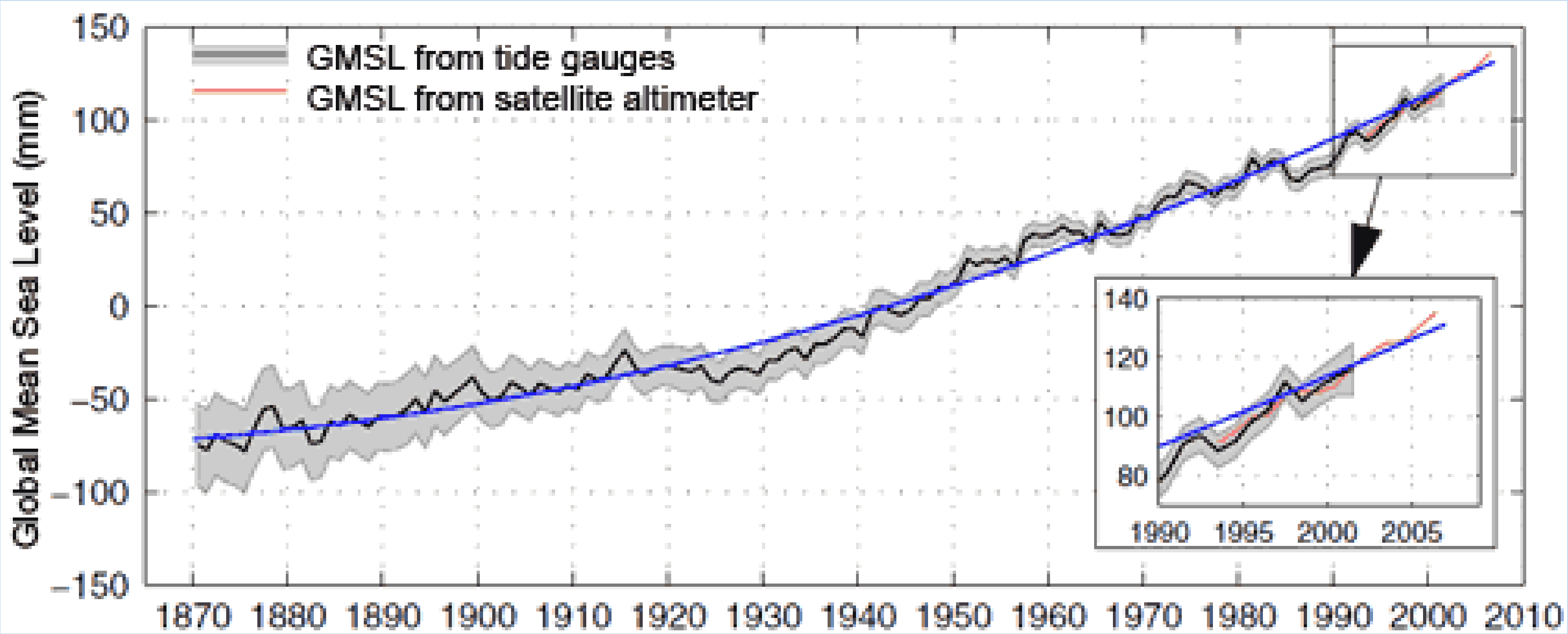
Annual Global Total Greenhouse Gas Emissions (GtCO2e)
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
70
60
50
40
30
Baseline
Current policy trajectory
Unconditional INDC case
Cond. INDC case
12
14
INDC case cond.
INDC case uncond.
Remaining gap to stay within 2°C limit
Median estimate of level consistent with 2°C:
42 GtCO2e (range 31y-44)
2°C range
Blue are shows pathways of limiting of global temperature increase to below 2°C by 2100 with >66% probability
Annual Global Total Greenhouse Gas Emissions (GtCO2e)
2020
2030

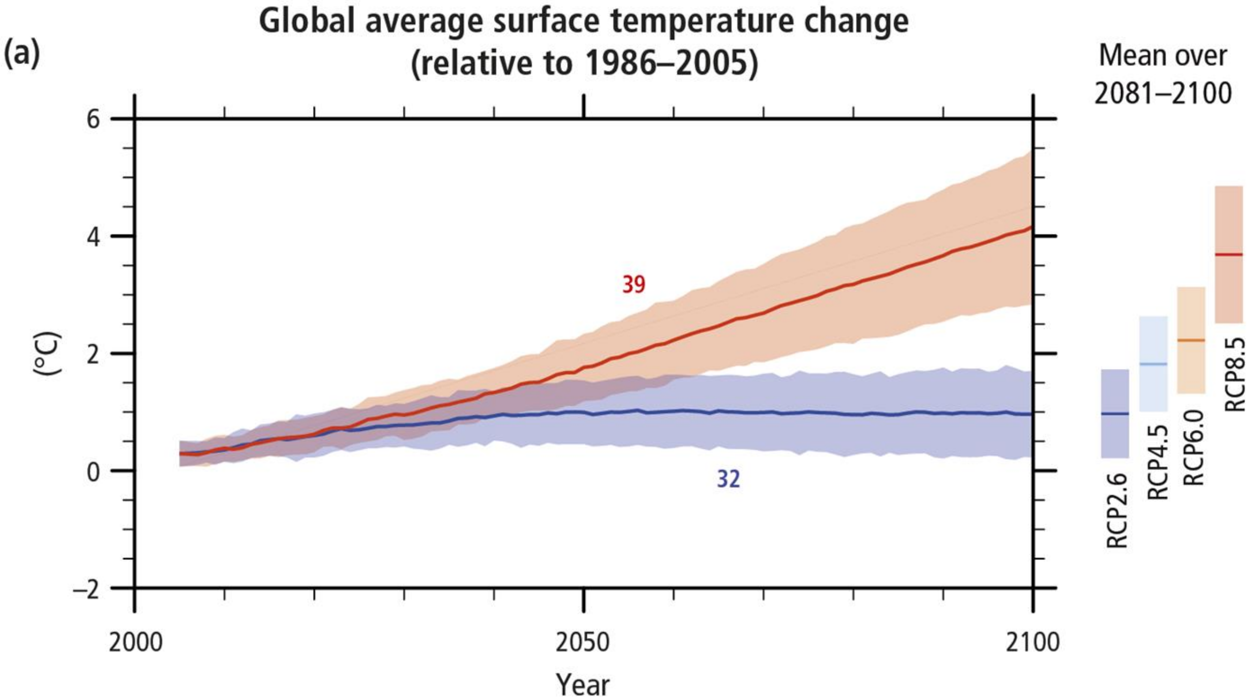
POLITISK VILJE



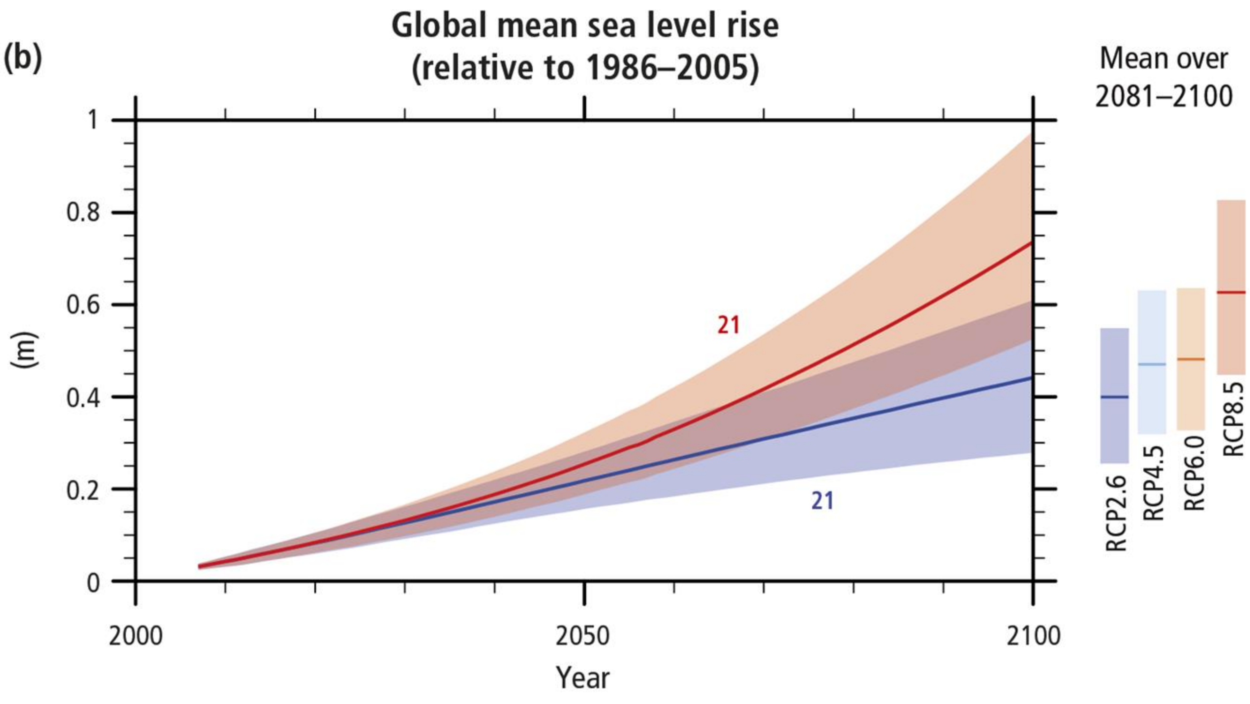
COP21 I PARIS

Havstigning trend

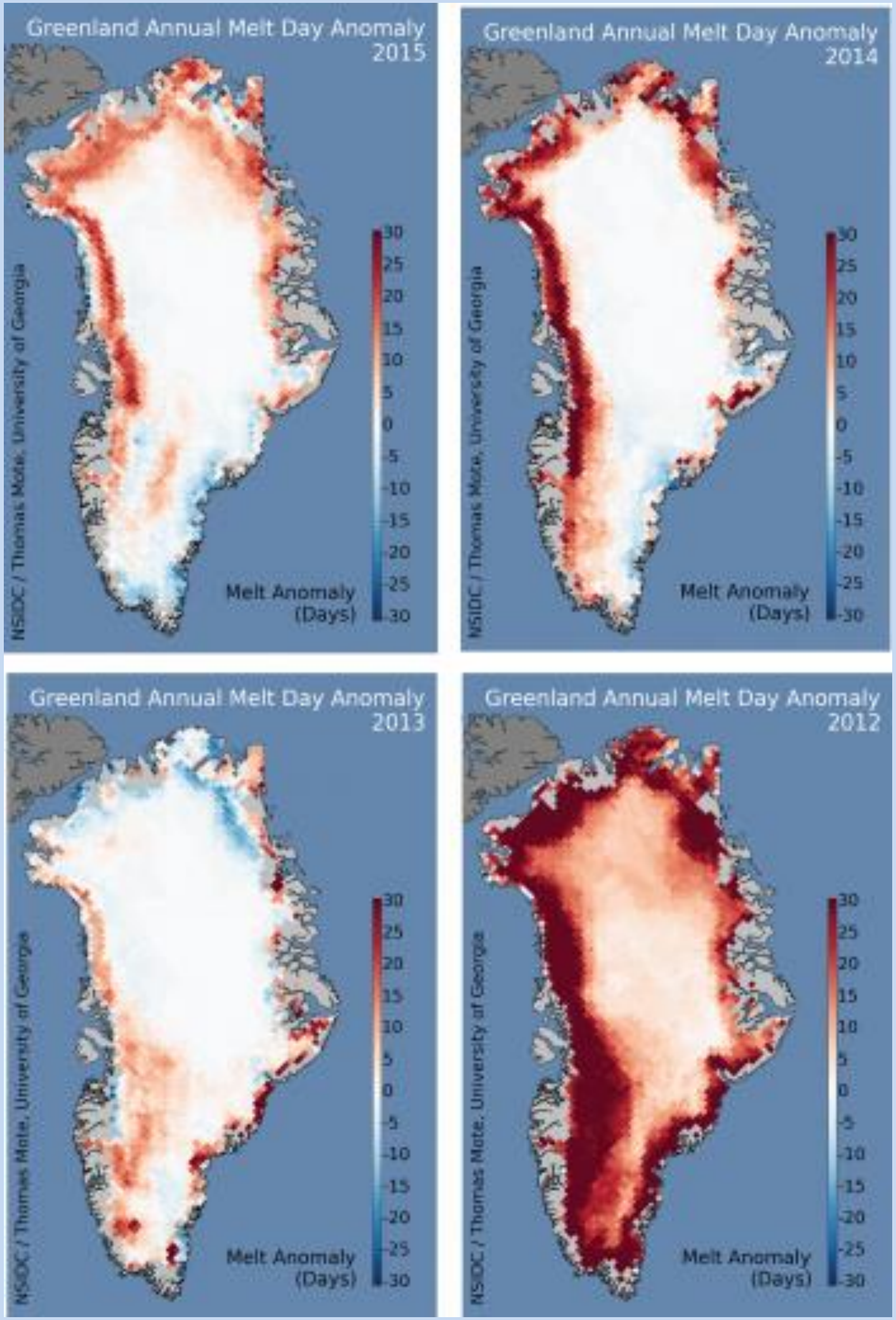




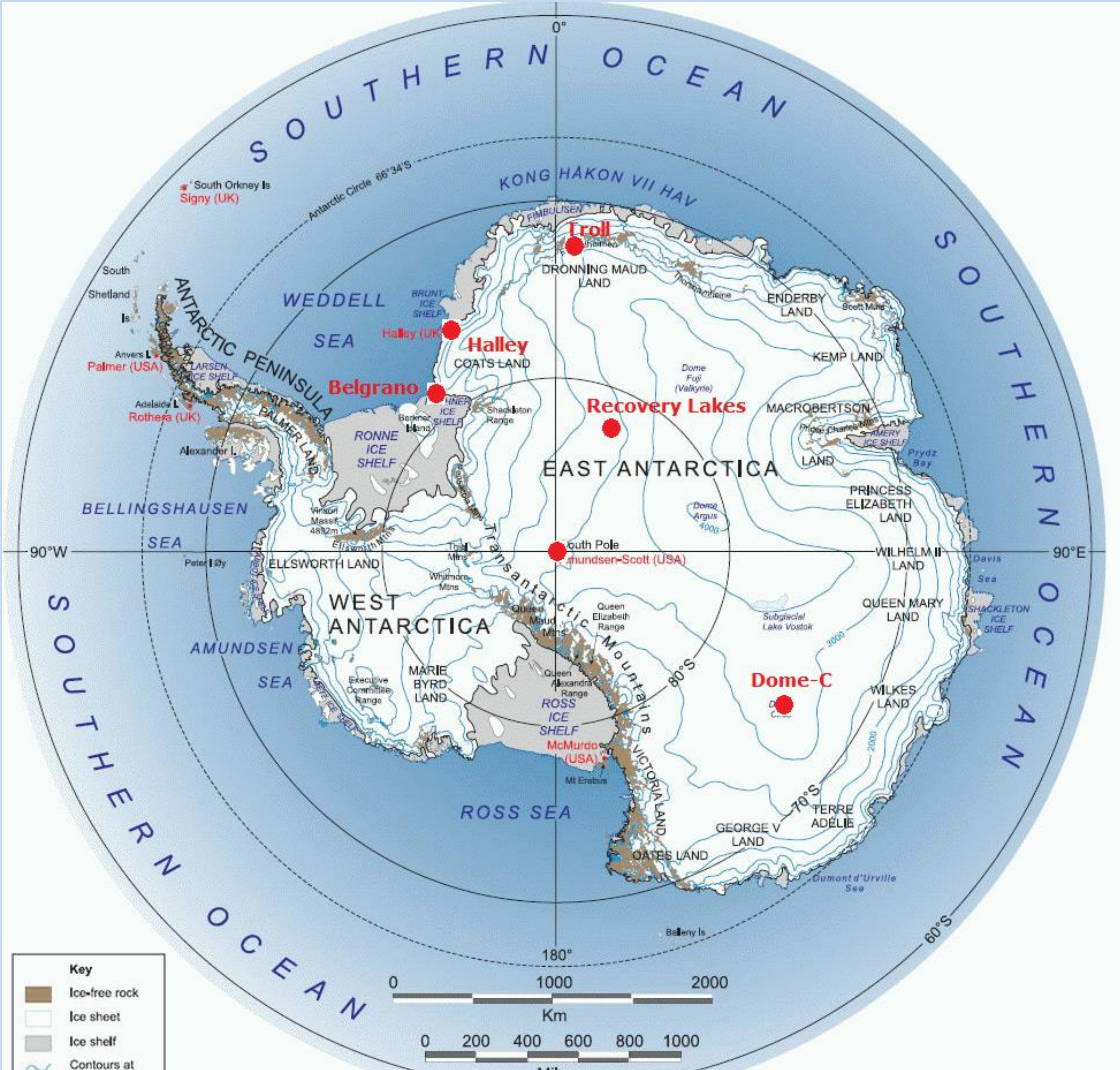
(a)
Global average surface temperature change
(relative to 1986–2005)
Mean over
2081–2100
6
4
2
0
−2
(°C)
39
32
2000
2050
2100
Year
RCP2.6
RCP4.5
RCP6.0
RCP8.5



(b)
Global mean sea level rise
(relative to 1986–2005)
Mean over
2081–2100
1
0.8
0.6
0.4
0.2
0
(m)
21
21
2000
2050
2100
Year
RCP2.6
RCP4.5
RCP6.0
RCP8.5



Grønlands smeltesæson


SOUTHERN OCEAN
KONG HÅKON VII HAV
Antarctic Circle 66°34'S
South Orkney Is
Signy (UK)
South Shetland Is
ANTARCTIC PENINSULA
WEDDELL SEA
Halley (UK)
Halley
COATS LAND
Belgrano
Troll
DRONNING MAUD LAND
ENDERBY LAND
KEMP LAND
MACROBERTSON LAND
Recovery Lakes
EAST ANTARCTICA
PRINCESS ELIZABETH LAND
WILHELM II LAND
QUEEN MARY LAND
WILKES LAND
Dome-C
TERRE ADÉLIE
GEORGE V LAND
OATES LAND
VICTORIA LAND
Transantarctic Mountains
South Pole
Amundsen-Scott (USA)
Palmer (USA)
Rothera (UK)
RONNE ICE SHELF
BELLINGSHAUSEN SEA
ELLSWORTH LAND
WEST ANTARCTICA
AMUNDSEN SEA
MARIE BYRD LAND
ROSS ICE SHELF
McMurdo (USA)
ROSS SEA
90°W
90°E
0°
180°
80°S
70°S
60°S
Key
Ice-free rock
Ice sheet
Ice shelf
Contours at
0 1000 2000
Km
0 200 400 600 800 1000

Decemberstormen 1999

HVAD SKAL VI GØRE

TILPASNING

HVAD SKAL VI GØRE

TILPASNING

MITIGATION

CO2 eq

Table TS.2: *Classification of recent (Post-Third Assessment Report) stabilization scenarios according to different stabilization targets and alternative stabilization metrics [Table 3.5].*

Category	Additional radiative forcing (W/m^2)	CO_2 concentration (ppm)	CO_2-eq concentration (ppm)	Global mean temperature increase above pre-industrial at equilibrium, using "best estimate" climate sensitivity[a], [b] (°C)	Peaking year for CO_2 emissions[c]	Change in global CO_2 emissions in 2050 (% of 2000 emissions)[c]	No. of assessed scenarios
I	2.5-3.0	350-400	445-490	2.0-2.4	2000 - 2015	-85 to -50	6
II	3.0-3.5	400-440	490-535	2.4-2.8	2000 - 2020	-60 to -30	18
III	3.5-4.0	440-485	535-590	2.8-3.2	2010 - 2030	-30 to +5	21
IV	4.0-5.0	485-570	590-710	3.2-4.0	2020 - 2060	+10 to +60	118
V	5.0-6.0	570-660	710-855	4.0-4.9	2050 - 2080	+25 to +85	9
VI	6.0-7.5	660-790	855-1130	4.9-6.1	2060 - 2090	+90 to +140	5
						Total	177

Notes:

a) Note that global mean temperature at equilibrium is different from expected global mean temperatures in 2100 due to the inertia of the climate system.

b) The simple relationships $T_{eq} = T_{2\times CO2} \times \ln([CO_2]/278)/\ln(2)$ and $\Delta Q = 5.35 \times \ln([CO_2]/278)$ are used. Non-linearities in the feedbacks (including e.g., ice cover and carbon cycle) may cause time dependence of the effective climate sensitivity, as well as leading to larger uncertainties for greater warming levels. The best-estimate climate sensitivity (3 °C) refers to the most likely value, that is, the mode of the climate sensitivity PDF consistent with the WGI assessment of climate sensitivity and drawn from additional consideration of Box 10.2, Figure 2, in the WGI AR4.

c) Ranges correspond to the 15th to 85th percentile of the Post-Third Assessment Report (TAR) scenario distribution. CO_2 emissions are shown, so multi-gas scenarios can be compared with CO_2-only scenarios.

Note that the classification needs to be used with care. Each category includes a range of studies going from the upper to the lower boundary. The classification of studies was done on the basis of the reported targets (thus including modelling uncertainties). In addition, the relationship that was used to relate different stabilization metrics is also subject to uncertainty (see Figure 3.16).

Klimaændringer – hvor?

Klimaændringer – hvor?

DOMMEDAG

Klimaændringer – hvor?

23. September 2014

FN topmøde i New York

TILPASNING

Skatebord
område mod
oversvømmelse

Afgrøderne ændres og
tilpasses

Vandopsamling

Afsaltning

MITIGATION

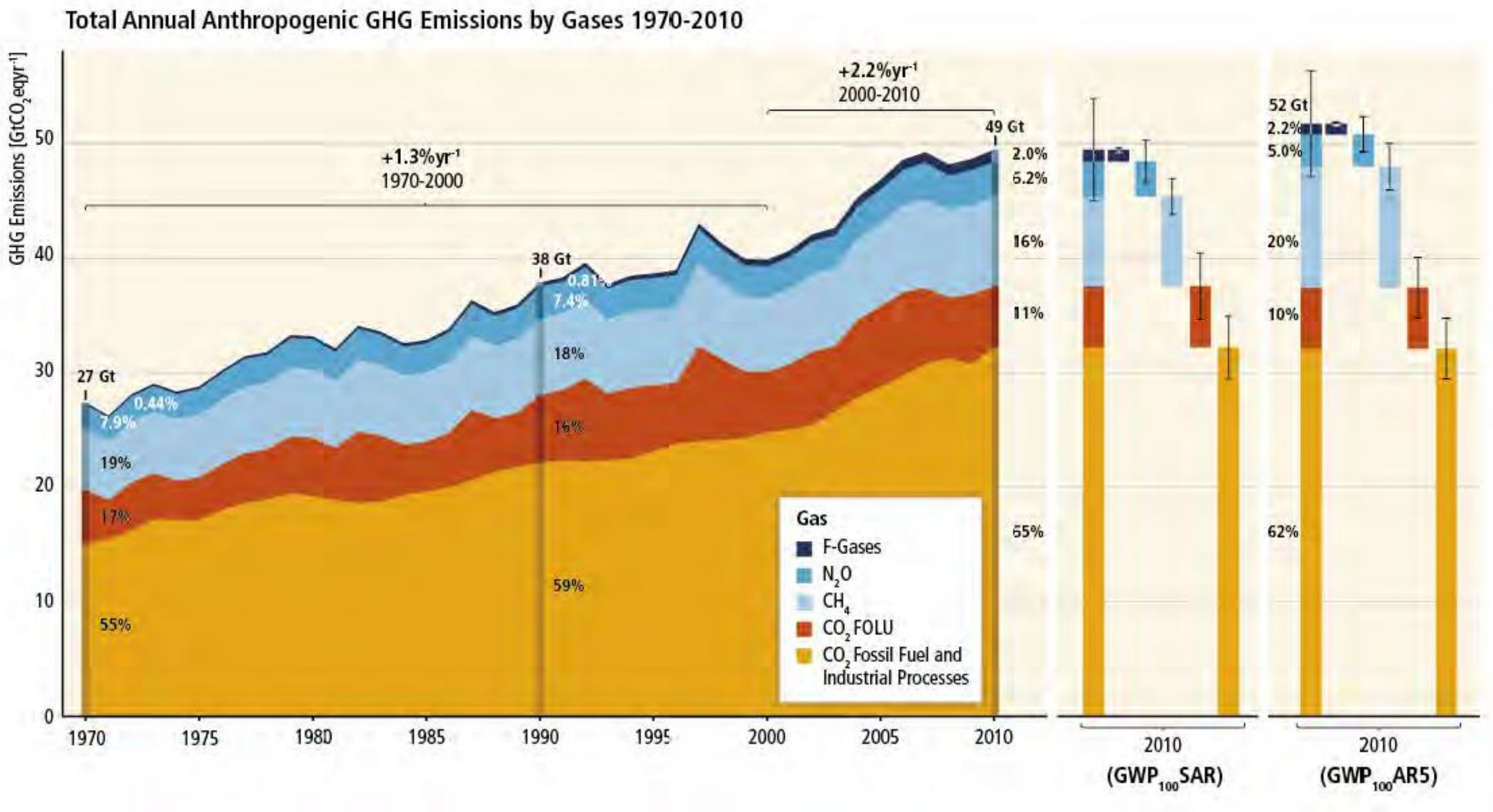
IPCC LØSNINGER (2 grader)

VEDVARENDE ENERGI

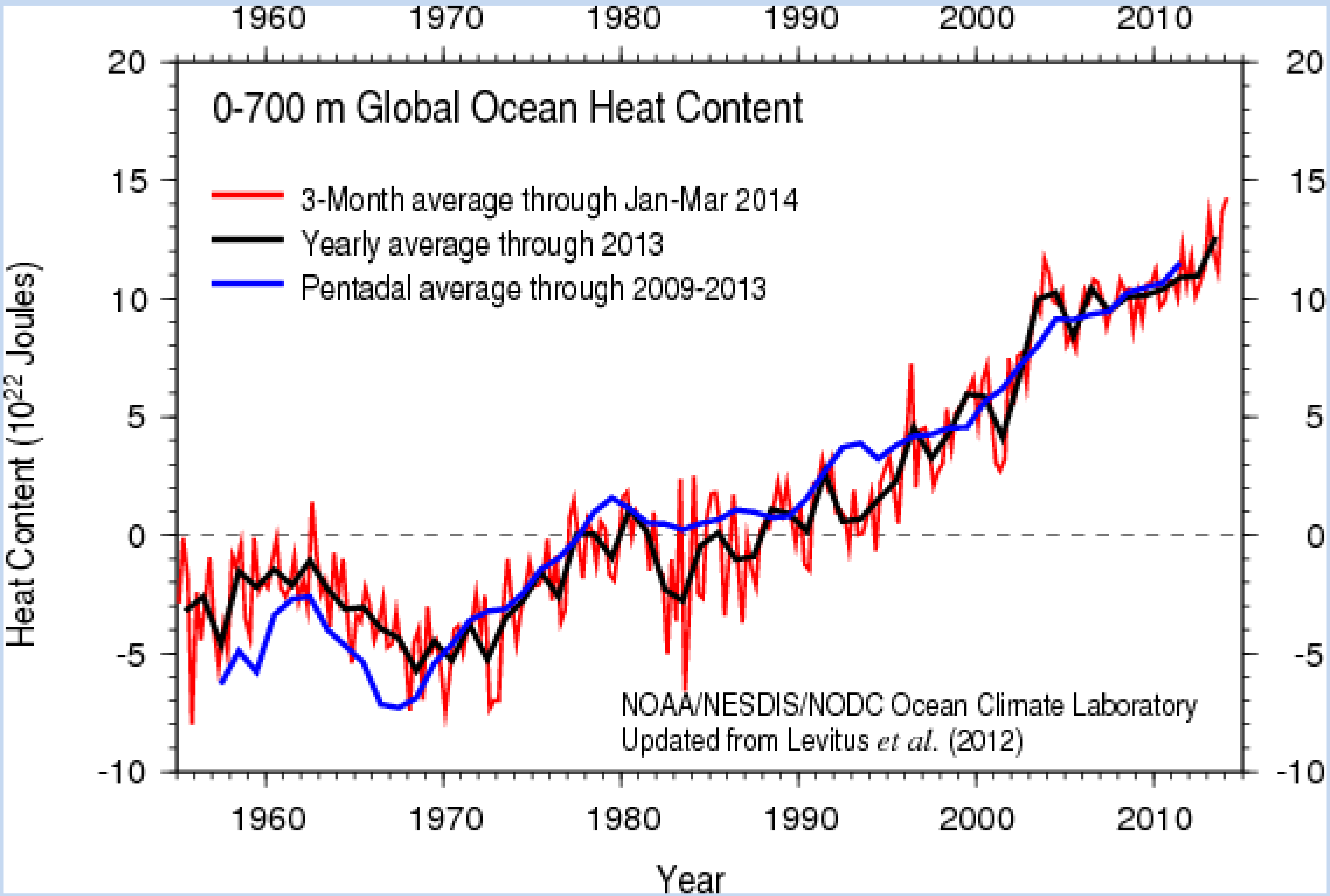
CCS

NUCLEAR

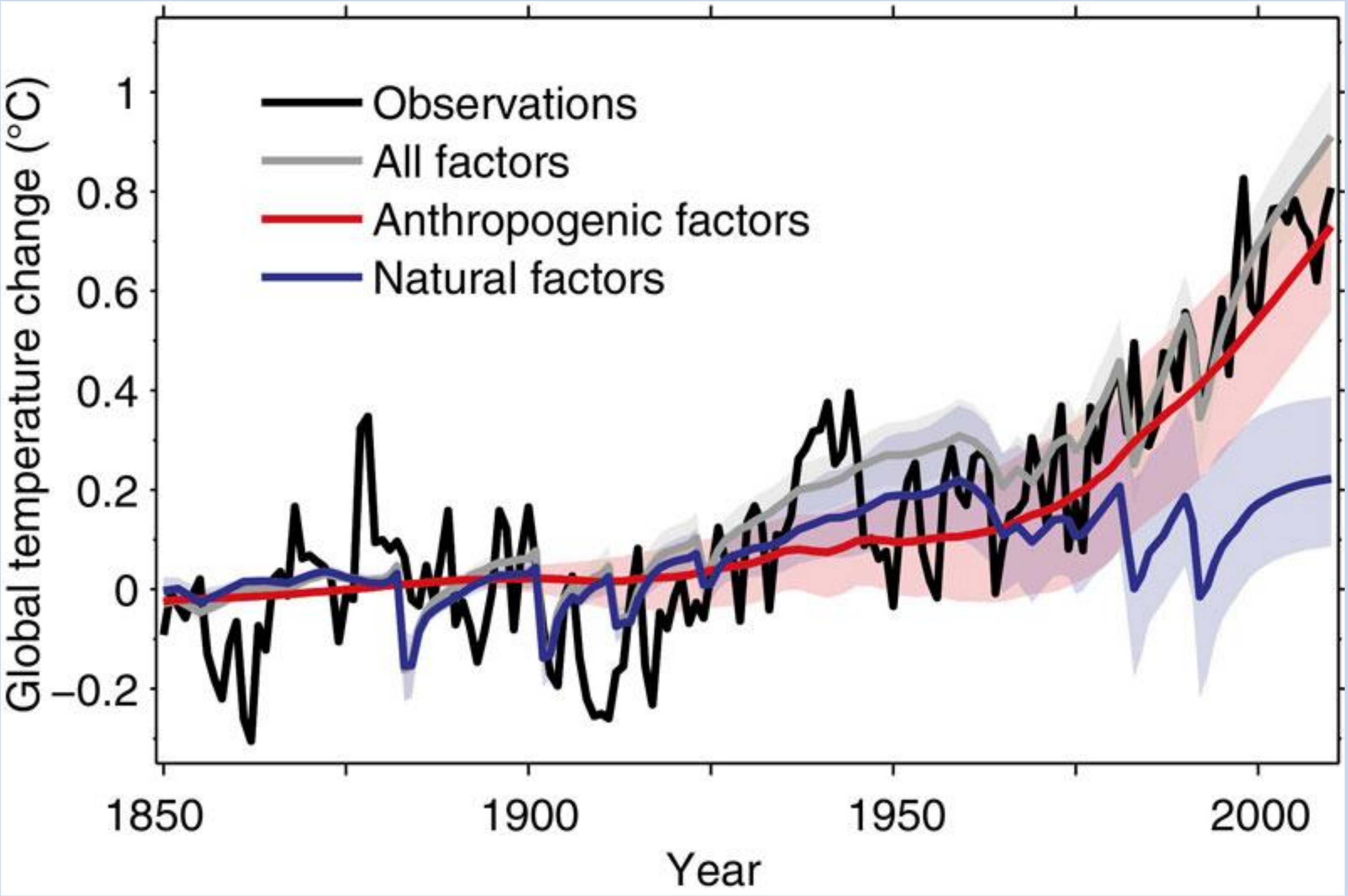
Udledning af GHG



ENERGIOPTAG I HAVET



NATURLIGE VARIATIONER



HVAD PÅVIRKER KLIMAET