



Ciências
ULisboa

Alterações Climáticas

UC Sustentabilidade - FCSE – 1ºCiclo
2022-23

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Sumário

- Alterações Climáticas e Sustentabilidade
- A necessidade (urgência?) em agir
- Clima e Sistema Terra
- ODS 13 - Ação Climática
- Mitigação
- Gestão do Risco Climático, Adaptação e Resiliência

A hand is shown holding a single green leaf. The background is a soft-focus green, suggesting a natural setting. The text is overlaid on the image in white.

1 - What is sustainable?

2 - What is sustainable development?

3 - What is sustainability?



sustainable

/səˈsteɪnəb(ə)l/

adjective

1. able to be maintained at a certain rate or level.
"sustainable economic growth"
2. able to be upheld or defended.
"sustainable definitions of good educational practice"

Merriam-Webster SINCE 1828

GAMES & QUIZZES | THESAURUS | WORD OF THE DAY | FEATURES | SH

sustainable

Dictionary Thesaurus

sustainable adjective

Save Word

sus·tain·able | \ sə-ˈstā-nə-bəl \

Definition of *sustainable*

- 1 : capable of being sustained
- 2 **a** : of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged
// sustainable techniques
// sustainable agriculture
- b** : of or relating to a lifestyle involving the use of sustainable methods
// sustainable society

sustentável

sustentável | *adj.* 2 g.

sus·ten·tá·vel

(*sustentar* + *-ável*)

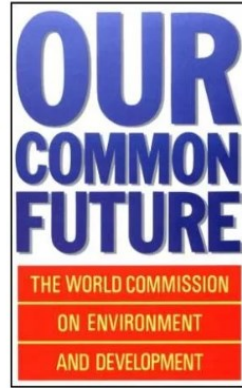
adjectivo de dois géneros

1. Que se pode sustentar.
2. Que se pode defender.
3. Que tem condições para se manter ou conservar (ex.: *desenvolvimento sustentável*). = SUSTENTADO

Palavras relacionadas: [sustentabilidade](#), [auto-sustentável](#), [ecotaxa](#), [ecossustentável](#), [insustentável](#), [biossustentável](#), [sustentado](#).

BRUNDTLAND COMMISSION

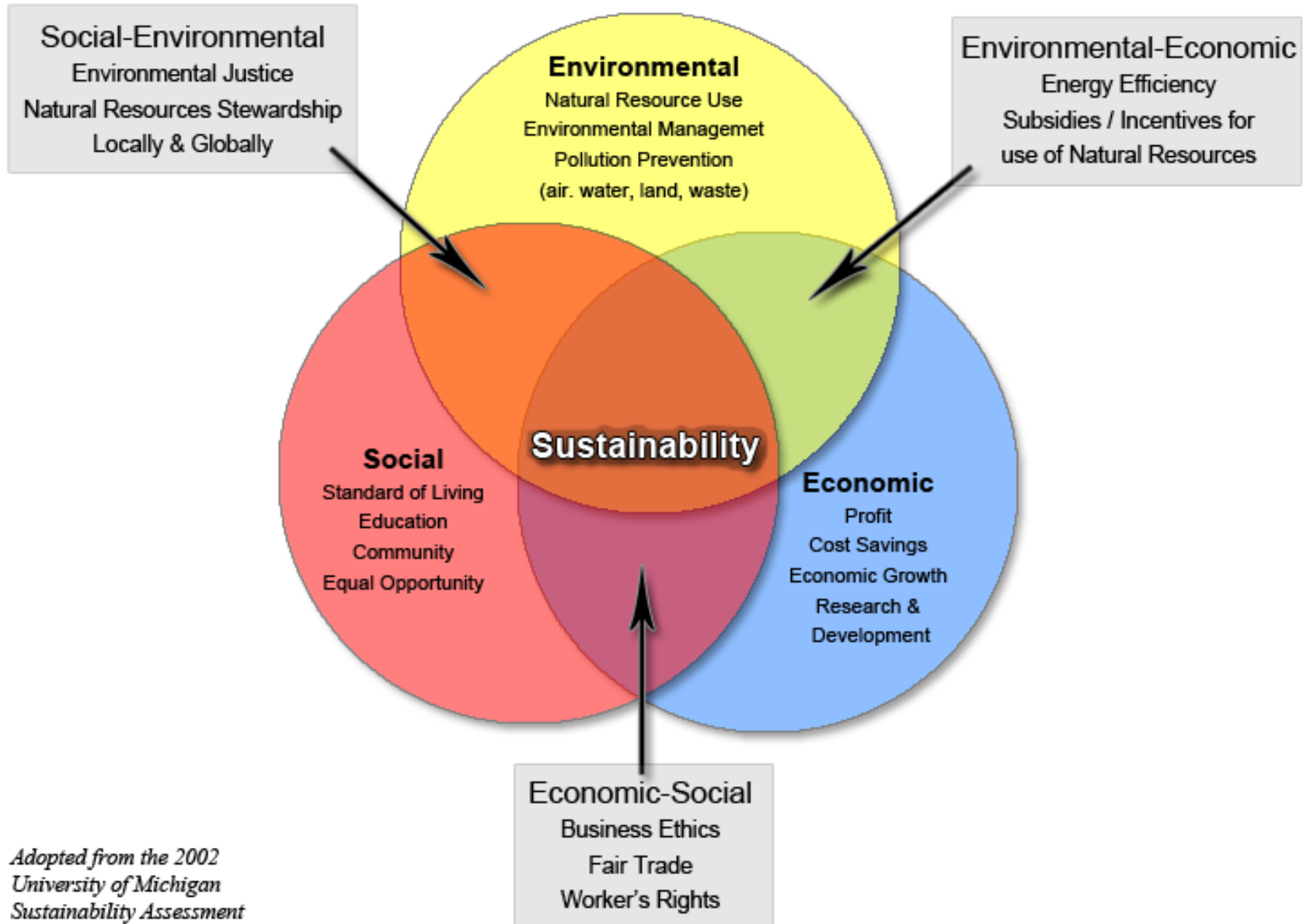
Formally known as the **World Commission on Environment and Development** (WCED), the mission of **Brundtland Commission** is to unite countries to pursue sustainable development together. The Chairperson of the Commission was Gro Harlem Brundtland. To rally countries to work and pursue sustainable development together, the UN decided to establish the **Brundtland Commission**. The Brundtland Commission officially dissolved in December 1987 after releasing **Our Common Future**, also known as the **Brundtland Report**, in October 1987, a document which coined, and defined the meaning of the term "Sustainable Development".



"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Brundtland Report, 1987

The Three Spheres of Sustainability

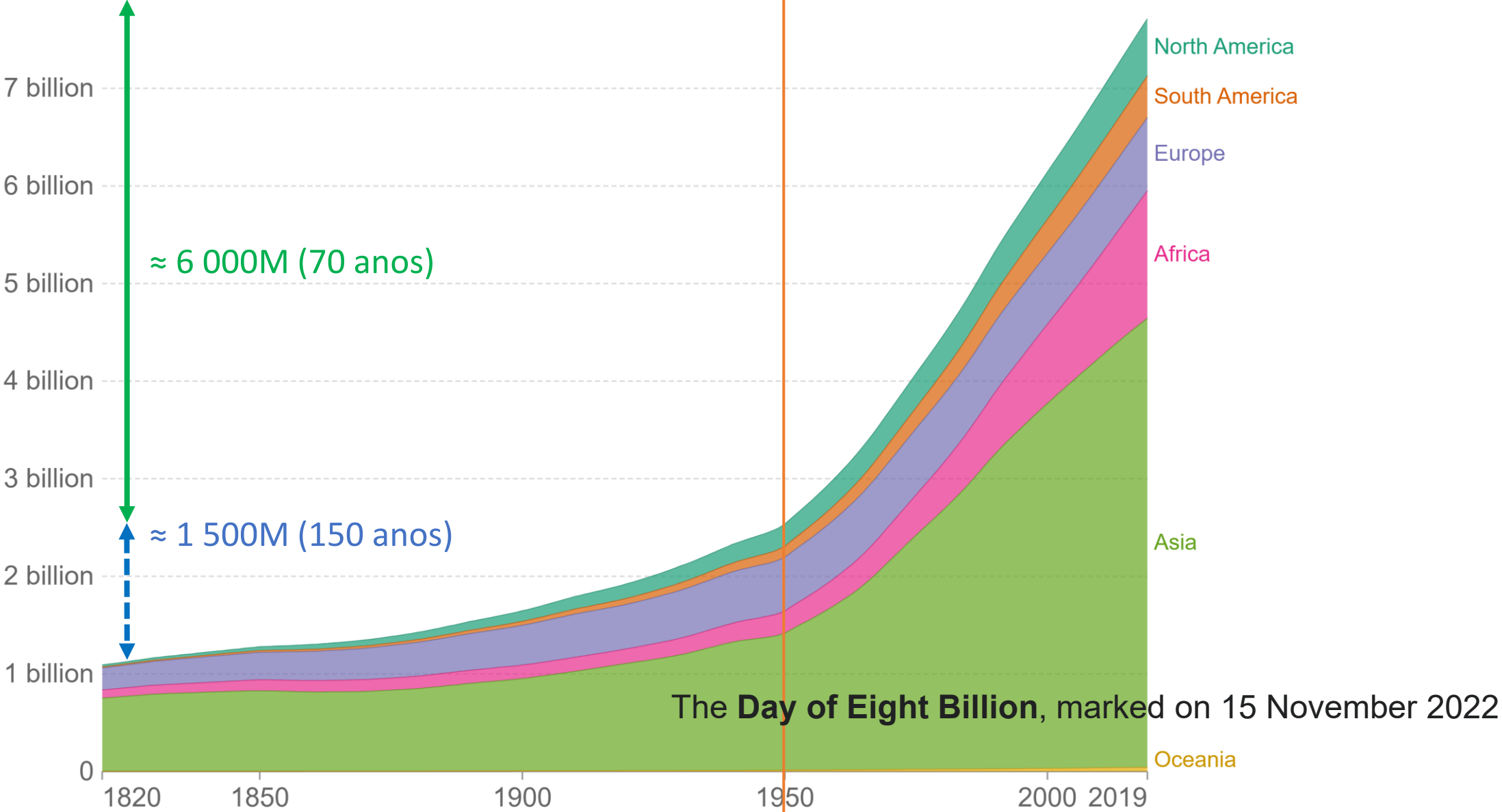


*Adopted from the 2002
University of Michigan
Sustainability Assessment*

Global Change vs. Climate Change?

- Human population growth and consumption, energy use, land use changes, and pollution are driving forces of global change.
- How do these factors impact ecological systems and human societies?
- **Global change is often seen as a series of separate problems** – **climate change**, biodiversity loss, dwindling water resources – with separate priorities and solutions.
- **But the Earth behaves as a system**, where biological and physical processes interact to determine prevalent global environmental conditions.

World population by region



The Day of Eight Billion, marked on 15 November 2022

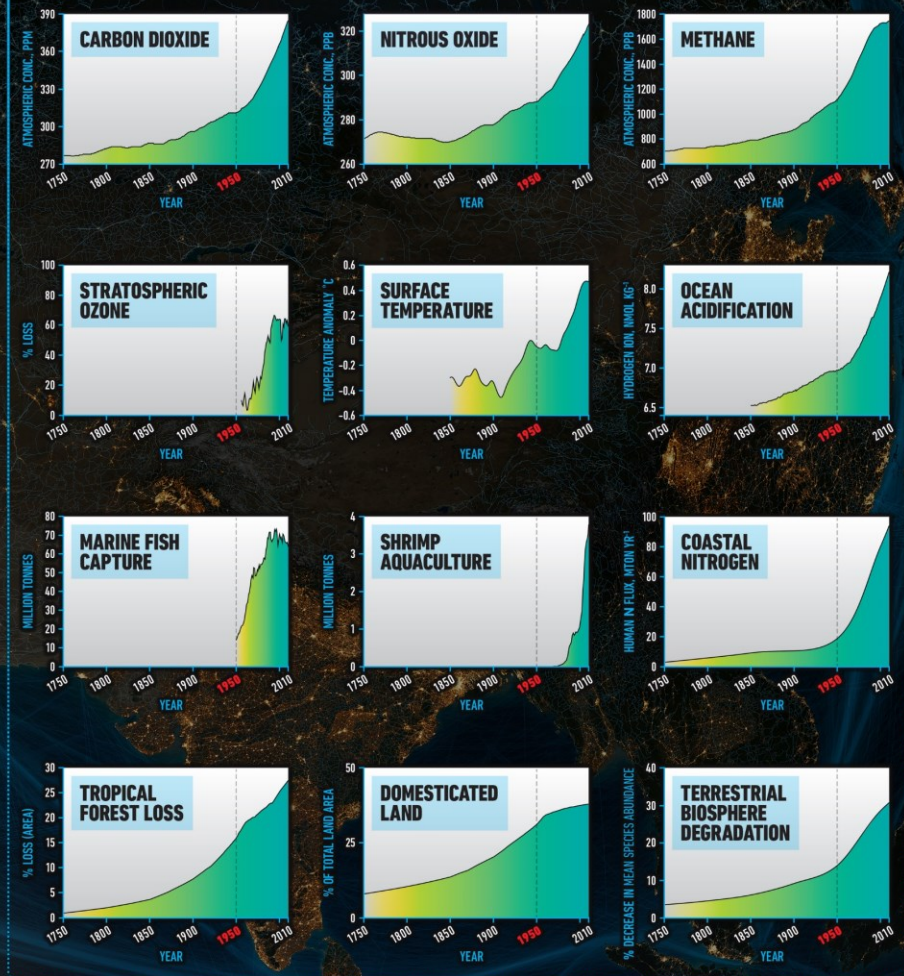
Source: Gapminder (v6), HYDE (v3.2), UN (2019)

THE GREAT ACCELERATION

SOCIO-ECONOMIC TRENDS

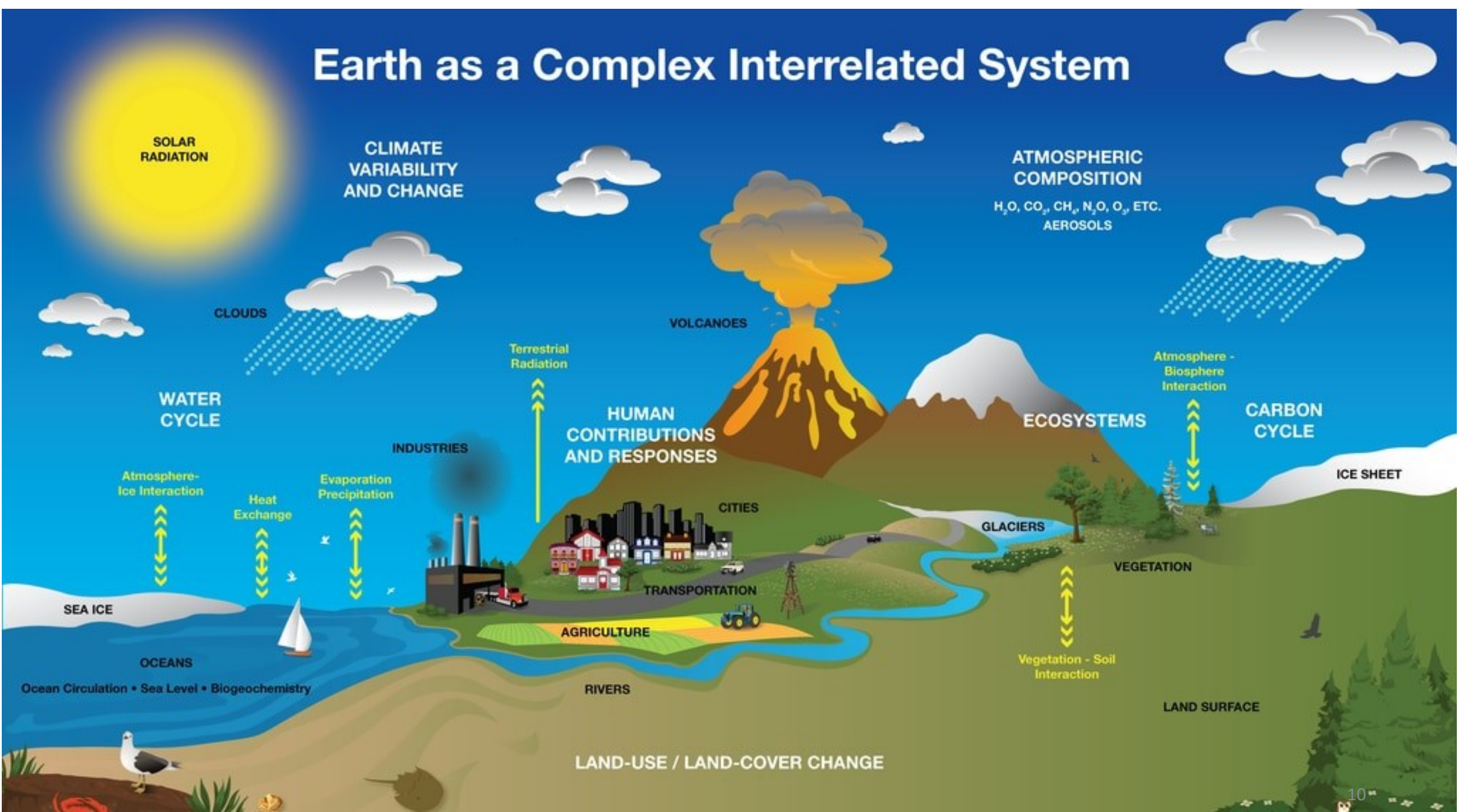


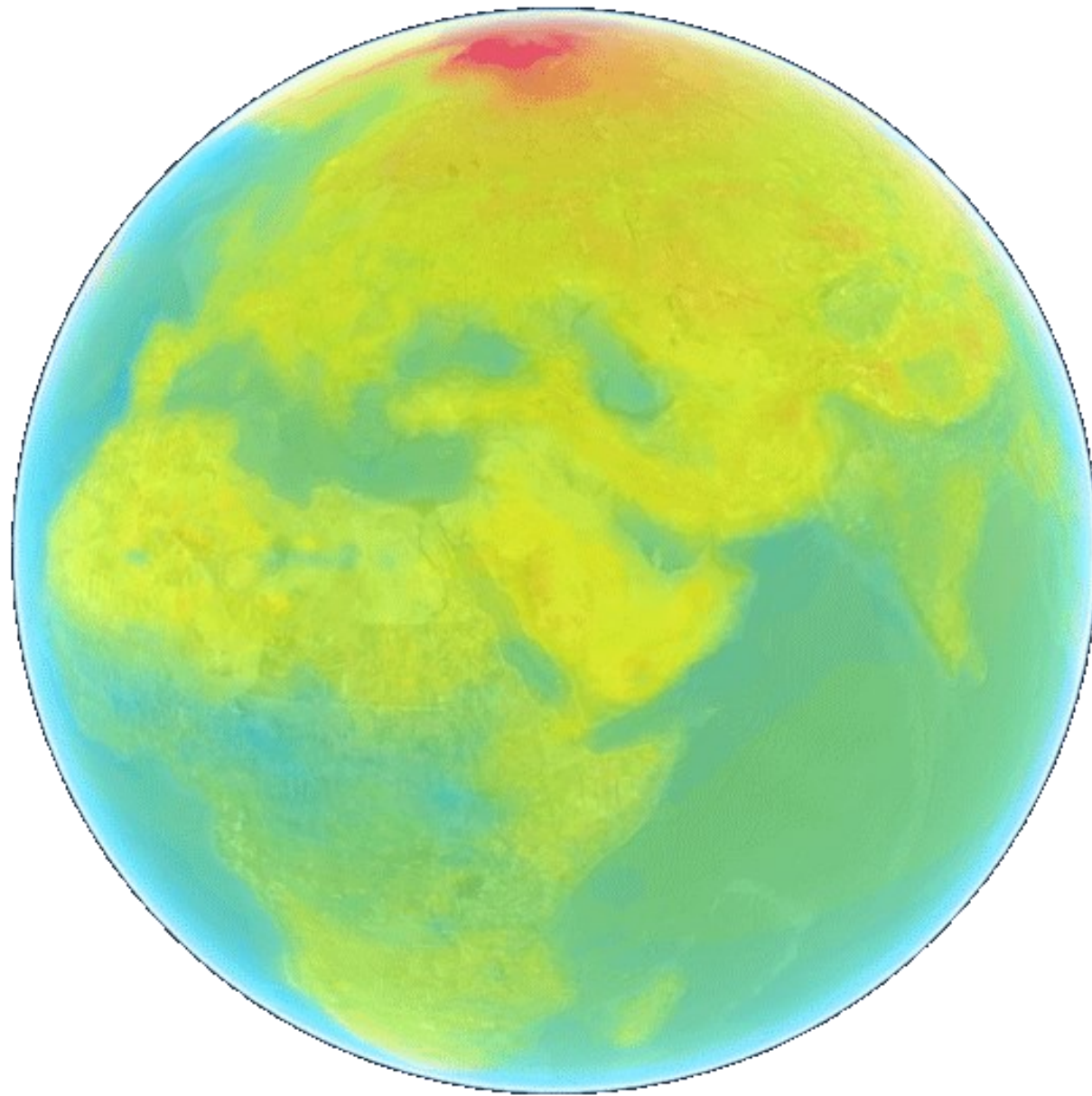
EARTH SYSTEM TRENDS



REFERENCE: Steffen, W., W. Broadgate, L. Deutsch, O. Gaffney and C. Ludwig (2015). The Trajectory of the Anthropocene: the Great Acceleration, Submitted to *The Anthropocene Review*.
 MAP & DESIGN: Félix Pharand-Deschênes / Globaïa

Earth as a Complex Interrelated System





Quando penso em Alterações Climáticas penso em...



Adverse impacts from human-caused climate change will continue to intensify

a) Observed widespread and substantial impacts and related losses and damages attributed to climate change

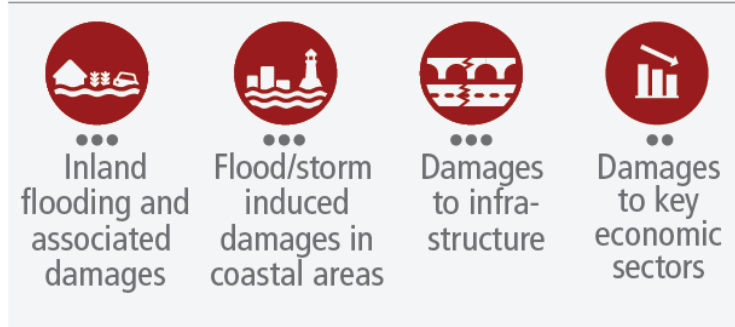
Water availability and food production



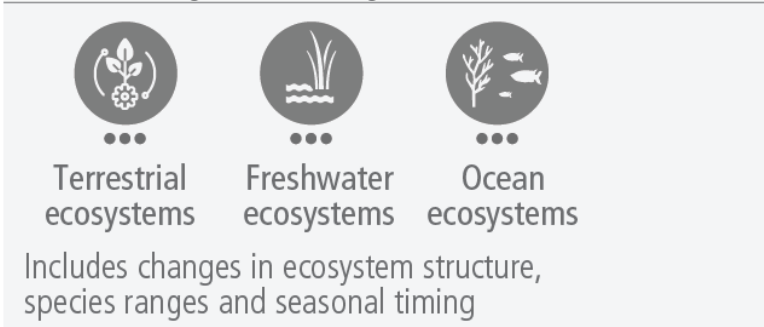
Health and well-being



Cities, settlements and infrastructure






Biodiversity and ecosystems



Key

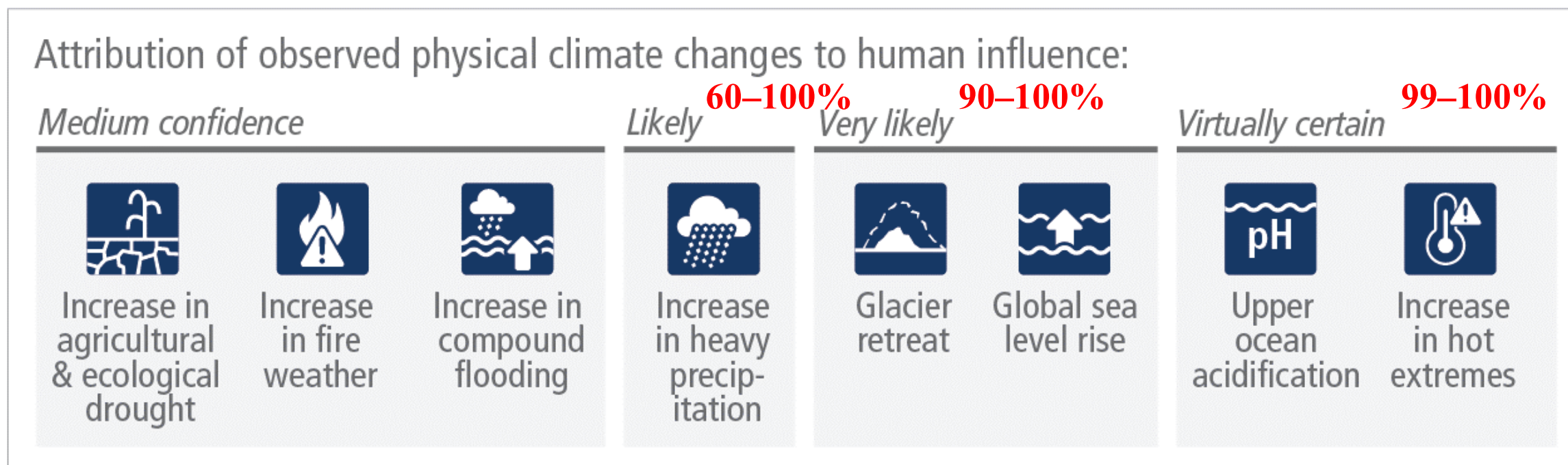
Observed increase in climate impacts to human systems and ecosystems assessed at global level

-  Adverse impacts
-  Adverse and positive impacts
-  Climate-driven changes observed, no global assessment of impact direction

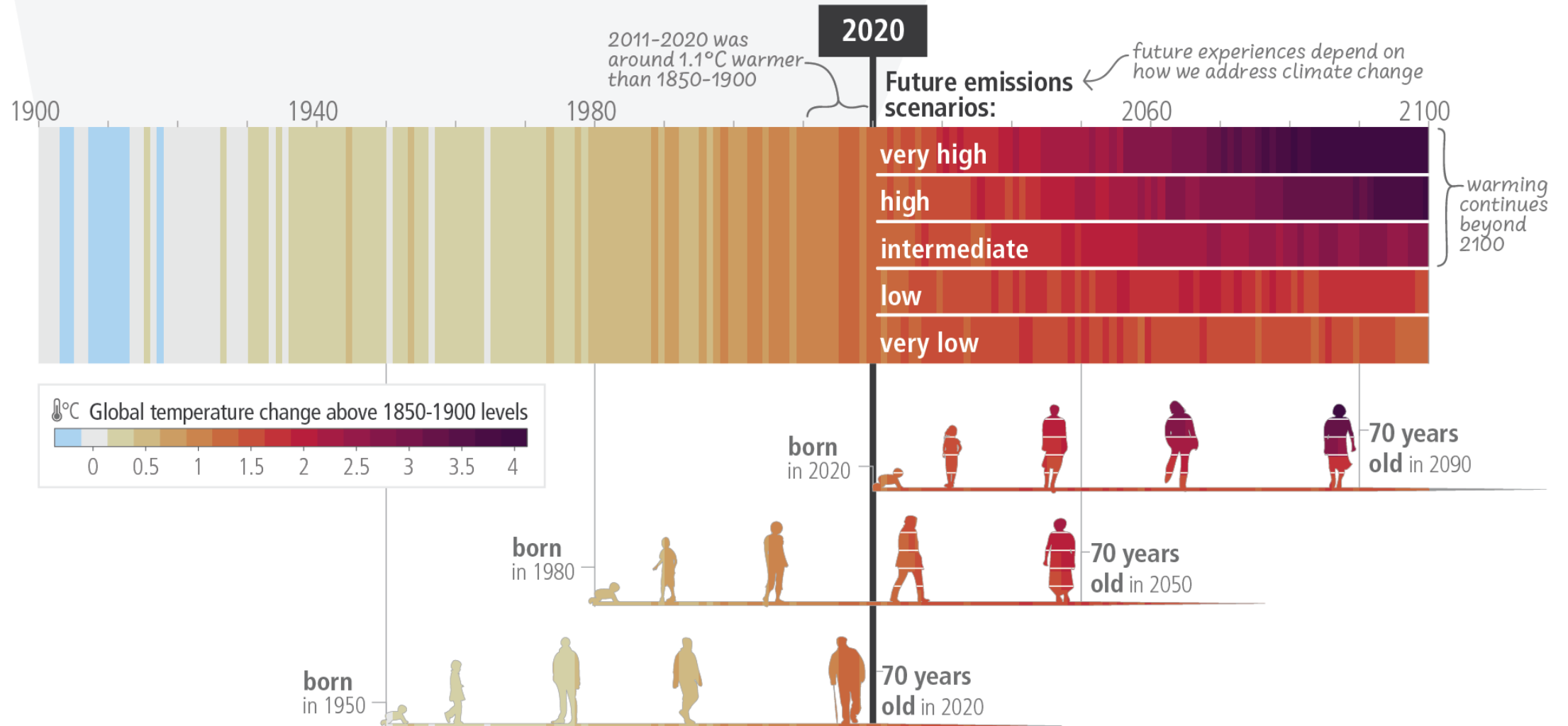
Confidence in attribution to climate change

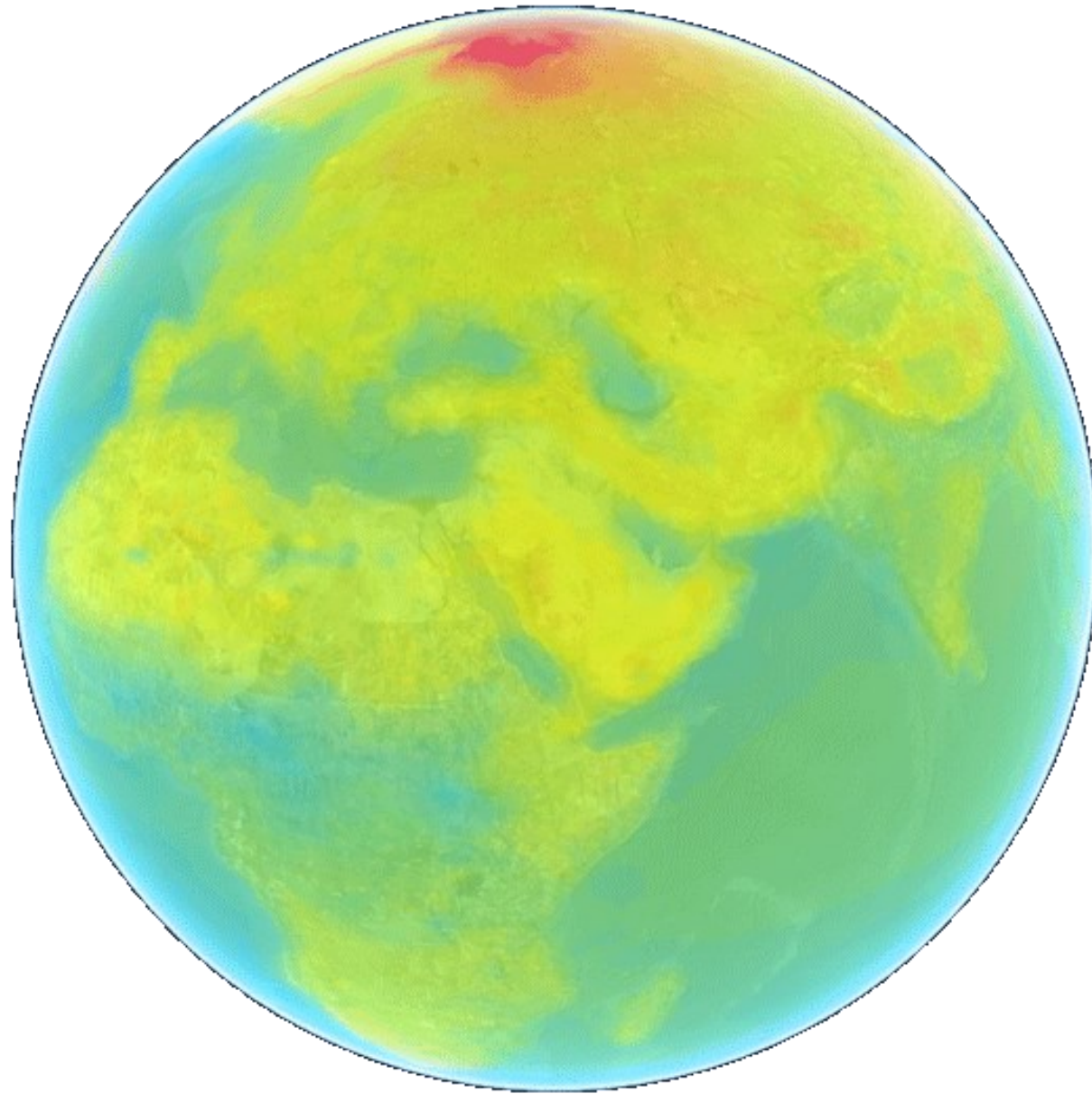
- *High or very high confidence*
- *Medium confidence*
- *Low confidence*

b) Impacts are driven by changes in multiple physical climate conditions, which are increasingly attributed to human influence

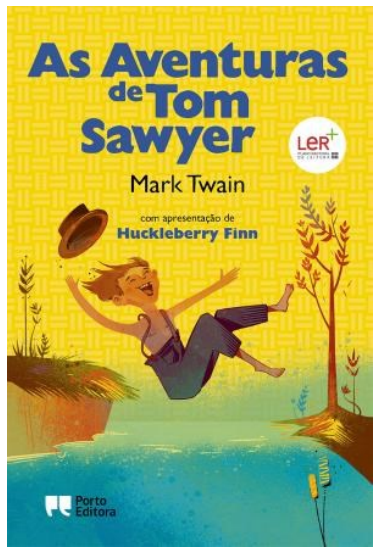
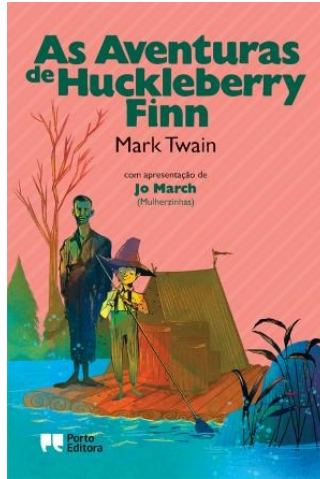
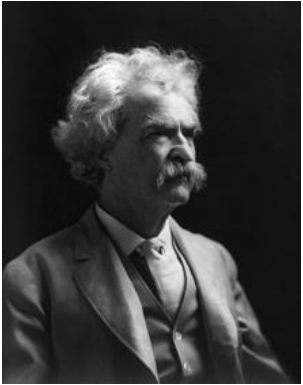


c) The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near-term





Mark Twain (1835-1910)



“Climate is what we expect,
weather is what we get”

“Climate lasts all the time,
weather only a few days”

Tempo (meteorologia) e Clima

Tempo = estado da atmosfera, em períodos 'curtos' (tipicamente horas a semanas)

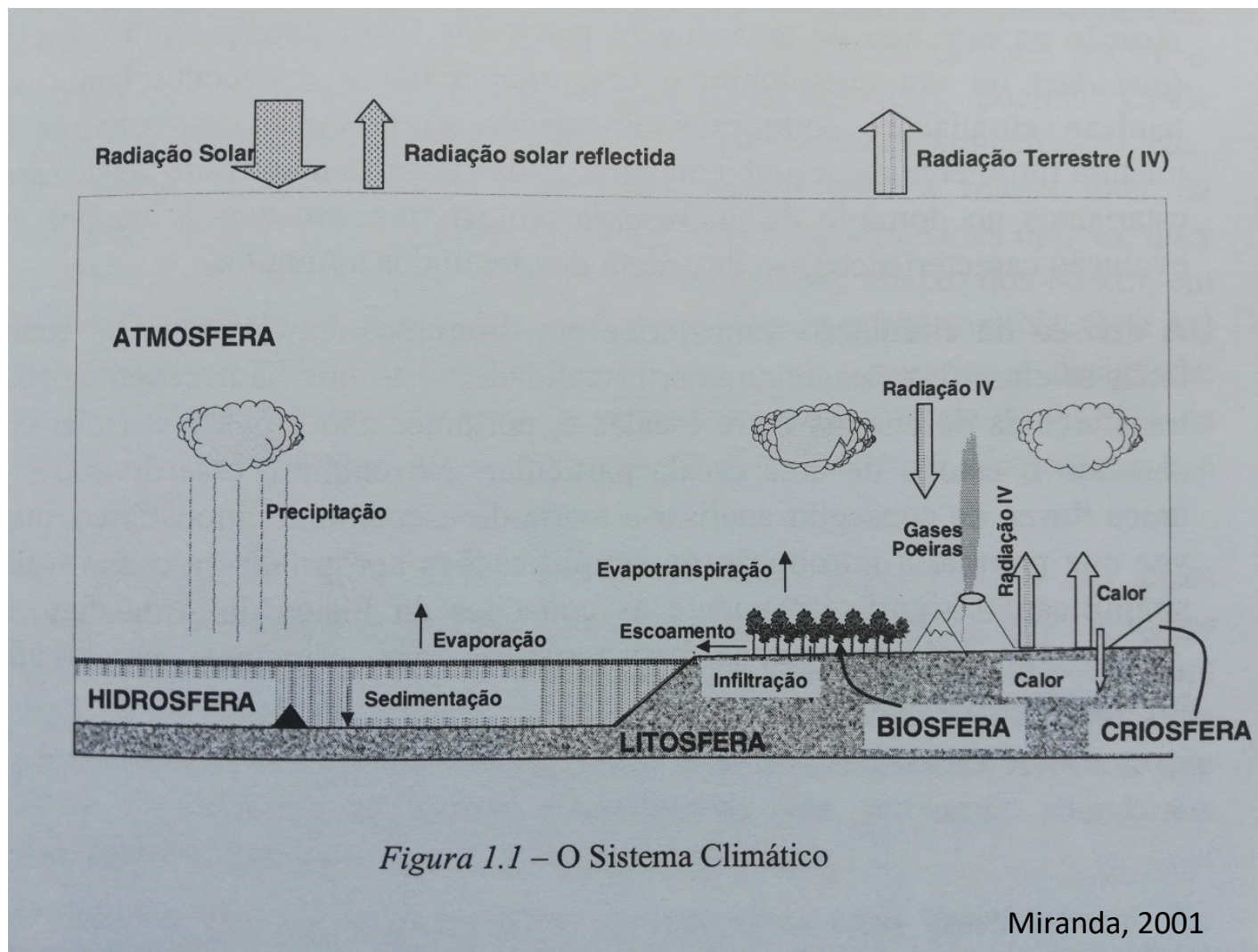
Clima = características médias da atmosfera num determinado local, em períodos 'longos' (tipicamente 30 anos)

Descrevem o mesmo sistema, utilizam as mesmas variáveis (e.g. temperatura, precipitação, humidade, velocidade vento), mas referem-se a diferentes escalas temporais.

A diferença entre tempo e clima é uma medida da escala temporal utilizada!

Sistema Climático AUHUCULUB

- ✓ **A** = subsistema + rápido, com modificações em poucos dias, estrutura vertical e grande complexidade.
- ✓ Todos os outros subsistemas (**H, C, L, B**) = maior inercia e modificações de estado com variações mais lentas.
- ✓ **B** com variações significativas no ciclo anual, muito influenciadas pela atividade humana (usos do solo, agricultura)



Horas a semanas: **A** pode considerar-se como único subsistema (**S≈A**)
Meses a séculos: é necessário considerar também **H, C, B**
+ longos: é necessário considerar todos os subsistemas (incluindo **L**)

Composição e balanço energético

Tabela 1.2 – Composição da atmosfera junto da superfície

Componente		Concentração Volúmica (%)	Partes por Milhão em vol. (ppmv)
Azoto	N ₂	78.08 ⁽¹⁾	
Oxigénio	O ₂	20.95 ⁽¹⁾	
Árgon	Ar	0.93 ⁽¹⁾	
Néon	Ne	0.0018	
Hélio	He	0.0005	
Hidrogénio	H ₂	0.00006	
Xénon	Xe	0.000009	
Vapor de água	H ₂ O	0. a 4	
Dióxido de carbono	CO ₂	0.036 ^a	360
Metano	CH ₄	0.00017 ^b	1.7
Óxido nitroso	N ₂ O	0.00003 ^b	0.3
Ozono	O ₃	0.000004 ^b	0.04
Ozono (Estratosfera)		0.001 ^b	10
Partículas		0.000001 ^b	0.01
Clorofluorcarbonetos	CFCs	0.00000001 ^b	0.00001

(1) % calculadas para o ar seco

(a) valor em 1990, cf. Figura 1.2

(b) valor médio, a concentração varia de ponto para ponto

GHG	GWP for 100 years
CO ₂	1
CH ₄	23
N ₂ O	296
HFC - 23	12 000
HFC - 134a	1 300
SF ₆	22 200

Source: IPCC Third Assessment Report (2001).

The image shows a cross-section of Earth from space. The Sun is in the top left, emitting a large yellow arrow representing solar radiation towards the Earth. A large red arrow points upwards from the Earth's surface towards space, representing outgoing infrared radiation. The Earth's surface is shown with green land and blue oceans. The background is a dark blue space with stars.

A superfície da Terra erradia energia (radiação IV) para o espaço

Radiação solar (UV) aquece a superfície da Terra

Ausência GEE
Temperatura à superfície:

-18°C



A diagram illustrating the greenhouse effect. At the top left, a large, glowing orange and yellow sun is partially visible. A large yellow arrow points from the sun towards the Earth's surface. The Earth is shown from space, with blue oceans and green continents. In the center, four red arrows represent energy exchange: one points up from the surface, one points down to the surface, and two point up from the atmosphere. The background is a dark blue space with white stars.

A superfície da Terra erradia energia (radiação IV) para o espaço

Radiação solar (UV) aquece a superfície da Terra

Os GEE absorvem parte da radiação emitida pela Terra

Presença GEE
Temperatura à superfície:

15°C

Variabilidade Climática

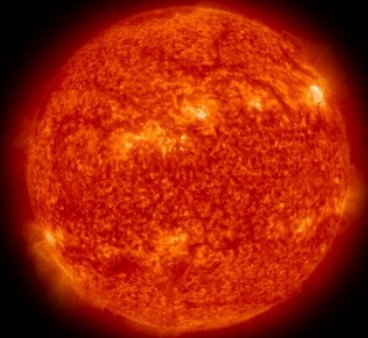
Externa

- ✓ **Parâmetros Orbitais (excentricidade, inclinação do eixo, precessão do eixo e da órbita)**
- ✓ **Atividade solar**
- ✓ **Meteoritos**
- ✓ **Vulcões**
- ✓ **Retroações**

Interna

- ✓ **Regimes de circulação atmosférica**
- ✓ **Regimes de circulação oceânica**

Natural



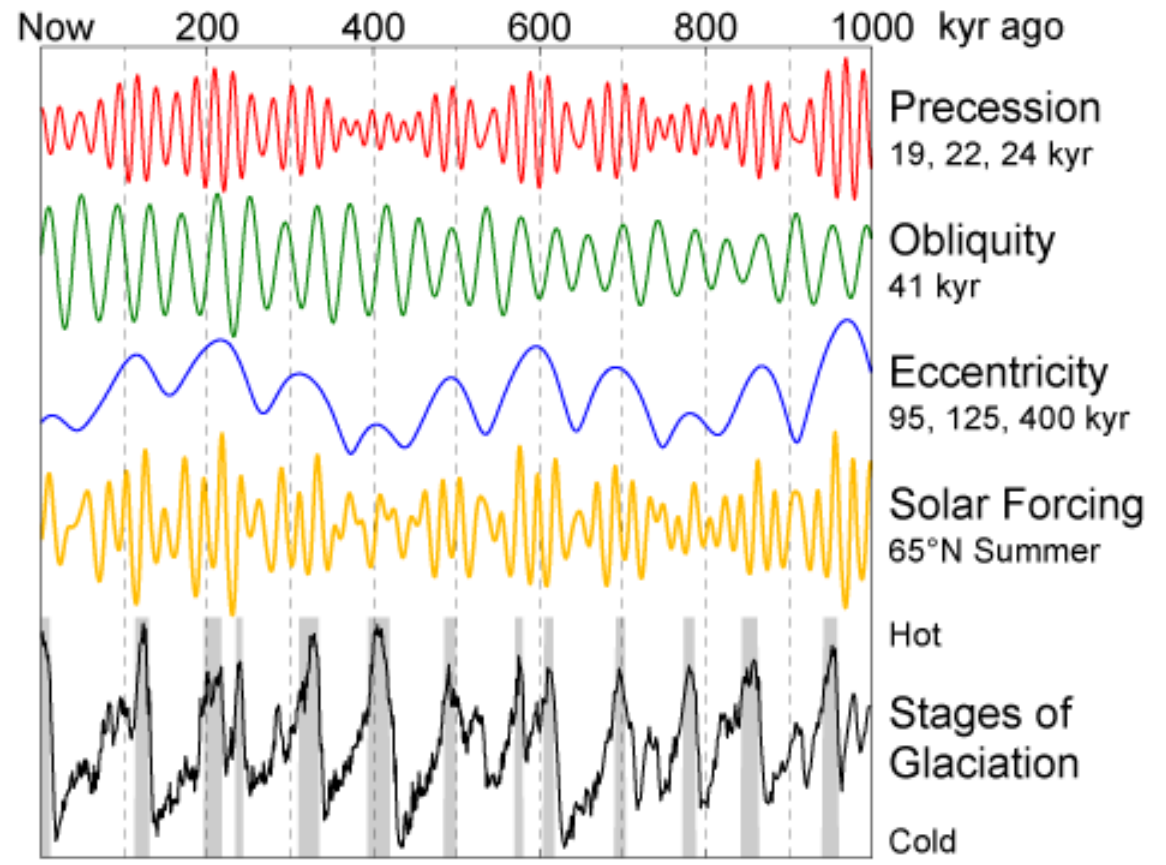
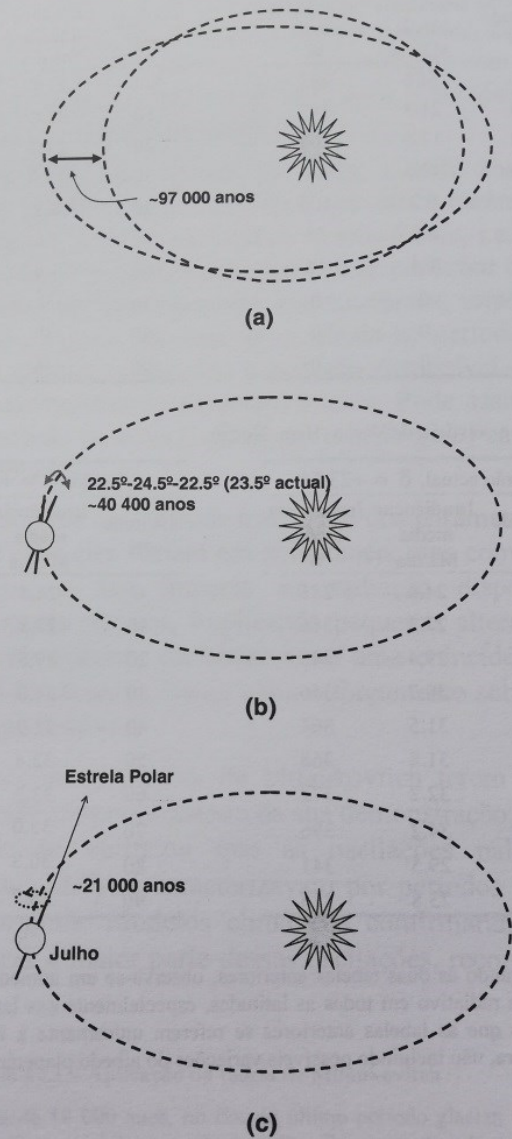
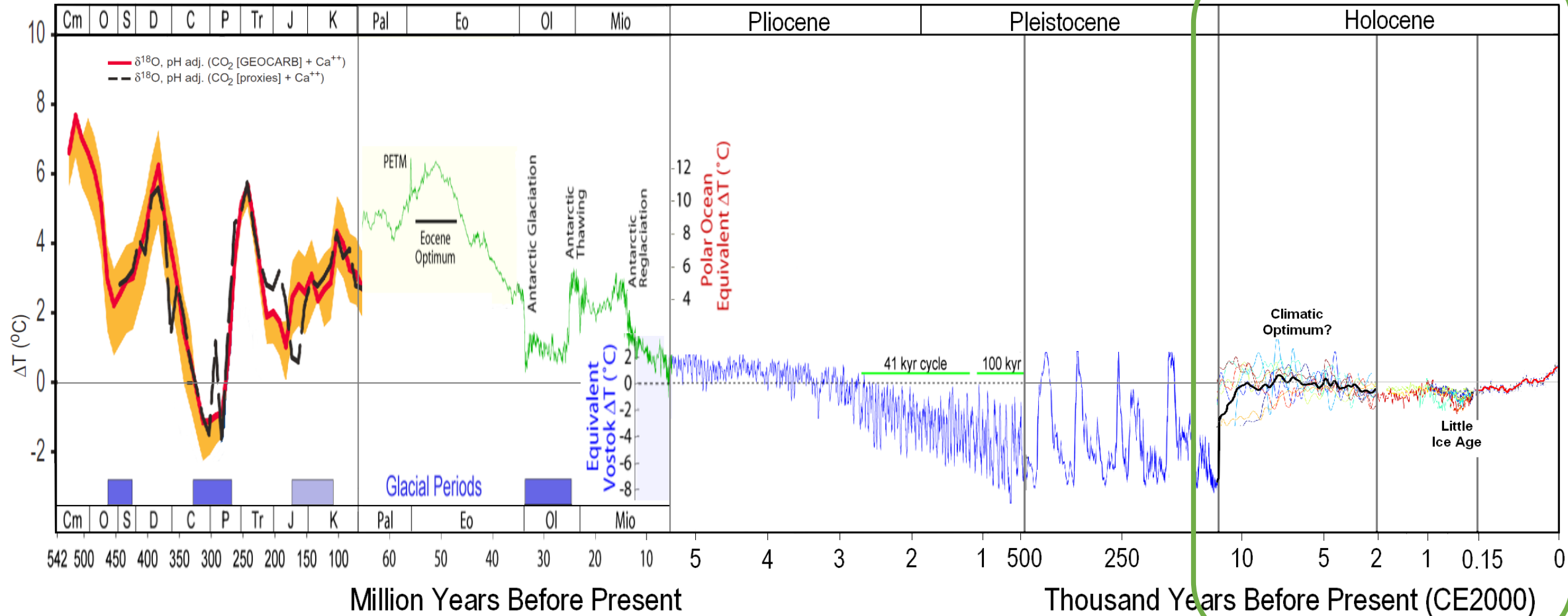
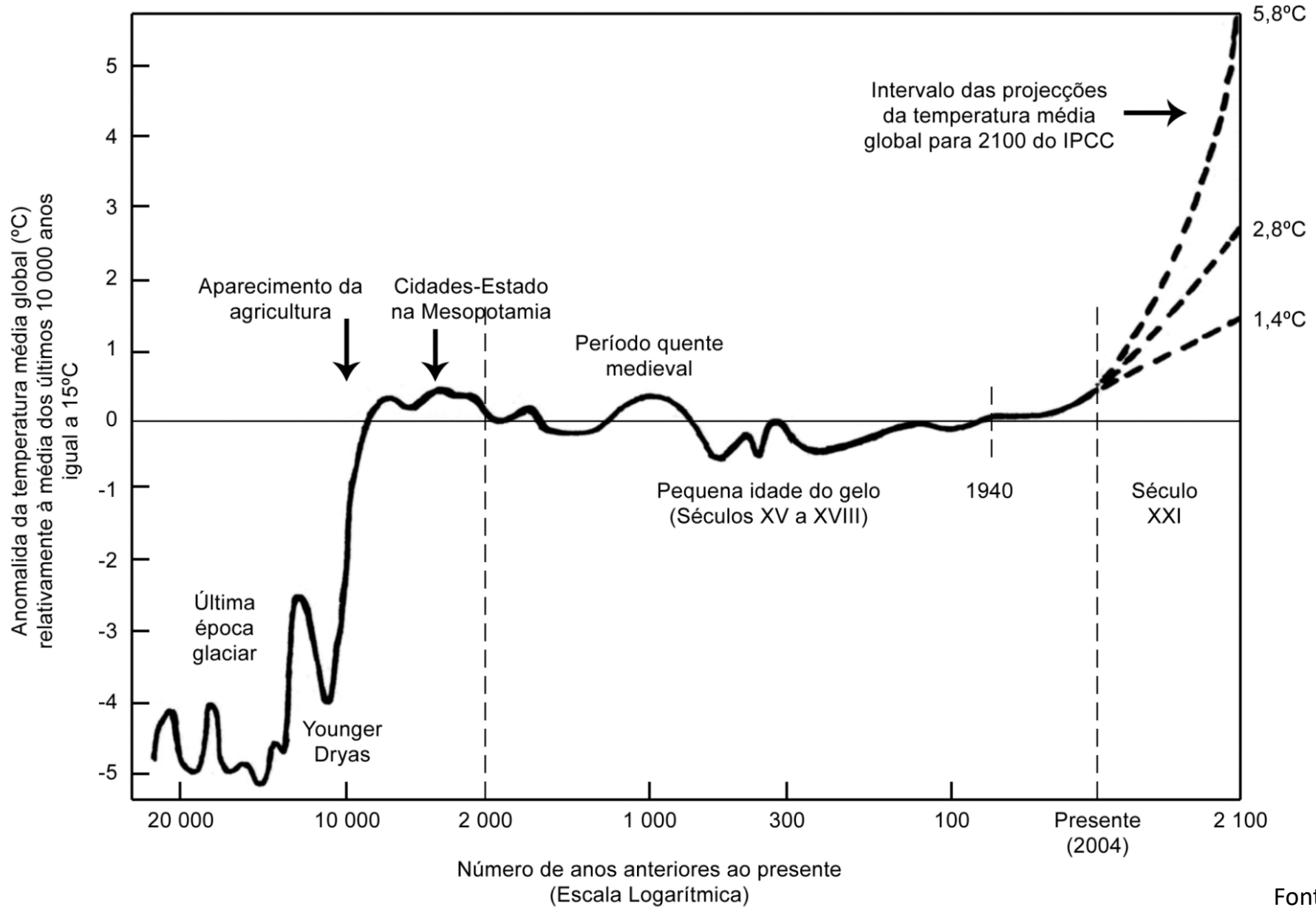


Figura 12.8 – Ciclos de Milankovitch: (a) oscilação da excentricidade – período de 97 000 anos, (b) oscilação da inclinação do eixo (nutation) – período de 40 400 anos, (c) precessão do eixo – período de 21 000 anos. Nota: os desenhos não estão à escala (a excentricidade e a nutação estão exageradas).

Temperature of Planet Earth





*Latest CO₂ reading: **420.68 ppm**

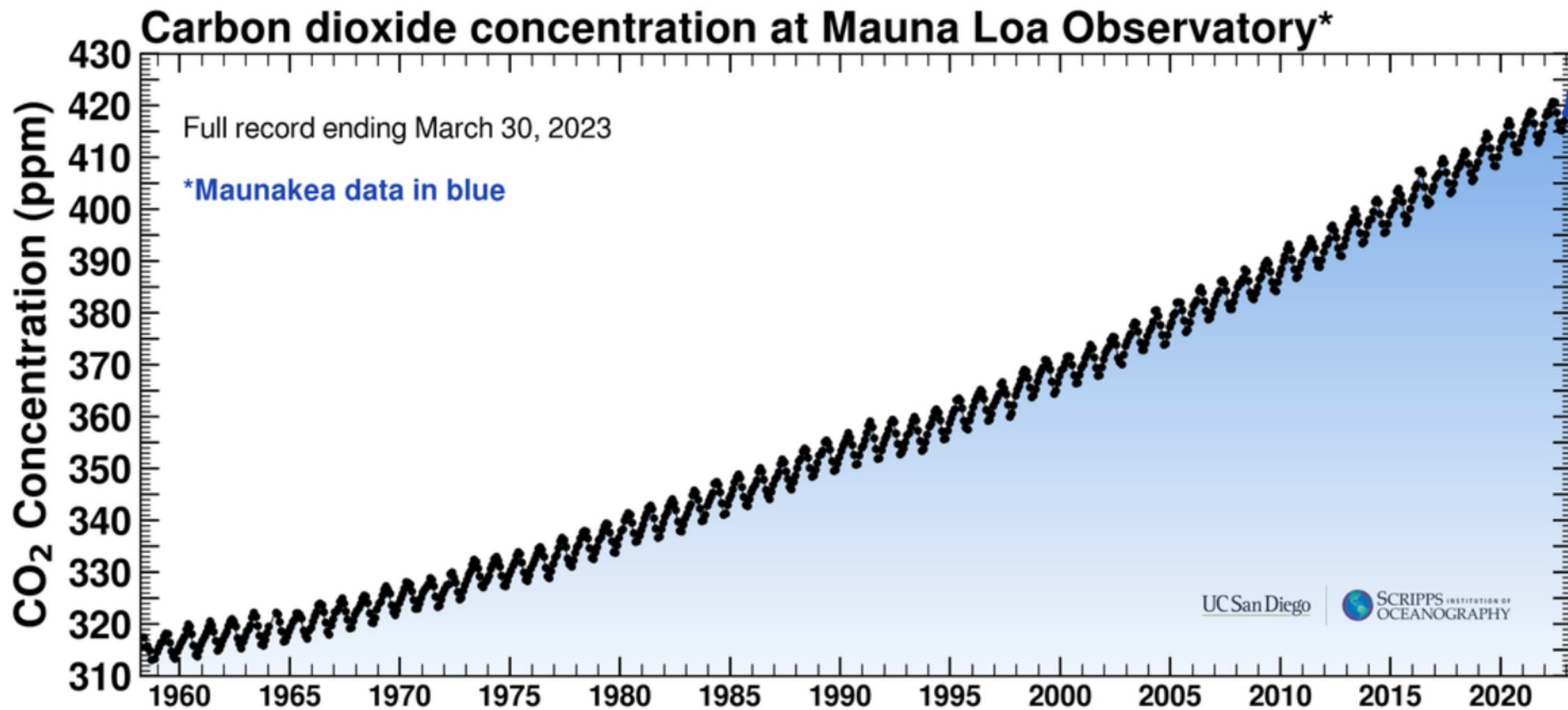
The Keeling Curve

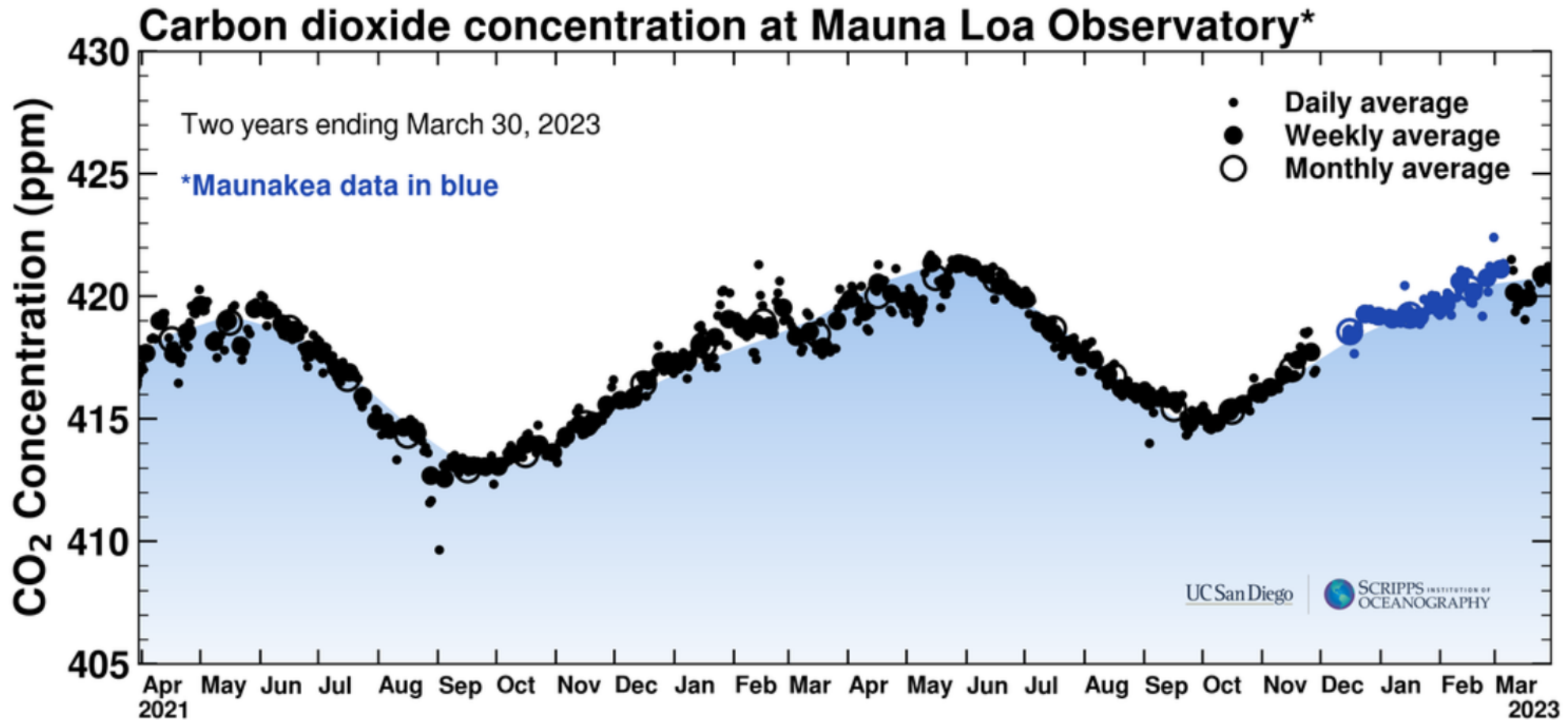
[HISTORY](#)

[MEASUREMENT NOTES](#)

[VIDEOS](#)

[OTHER CLIMATE INDICATORS](#)

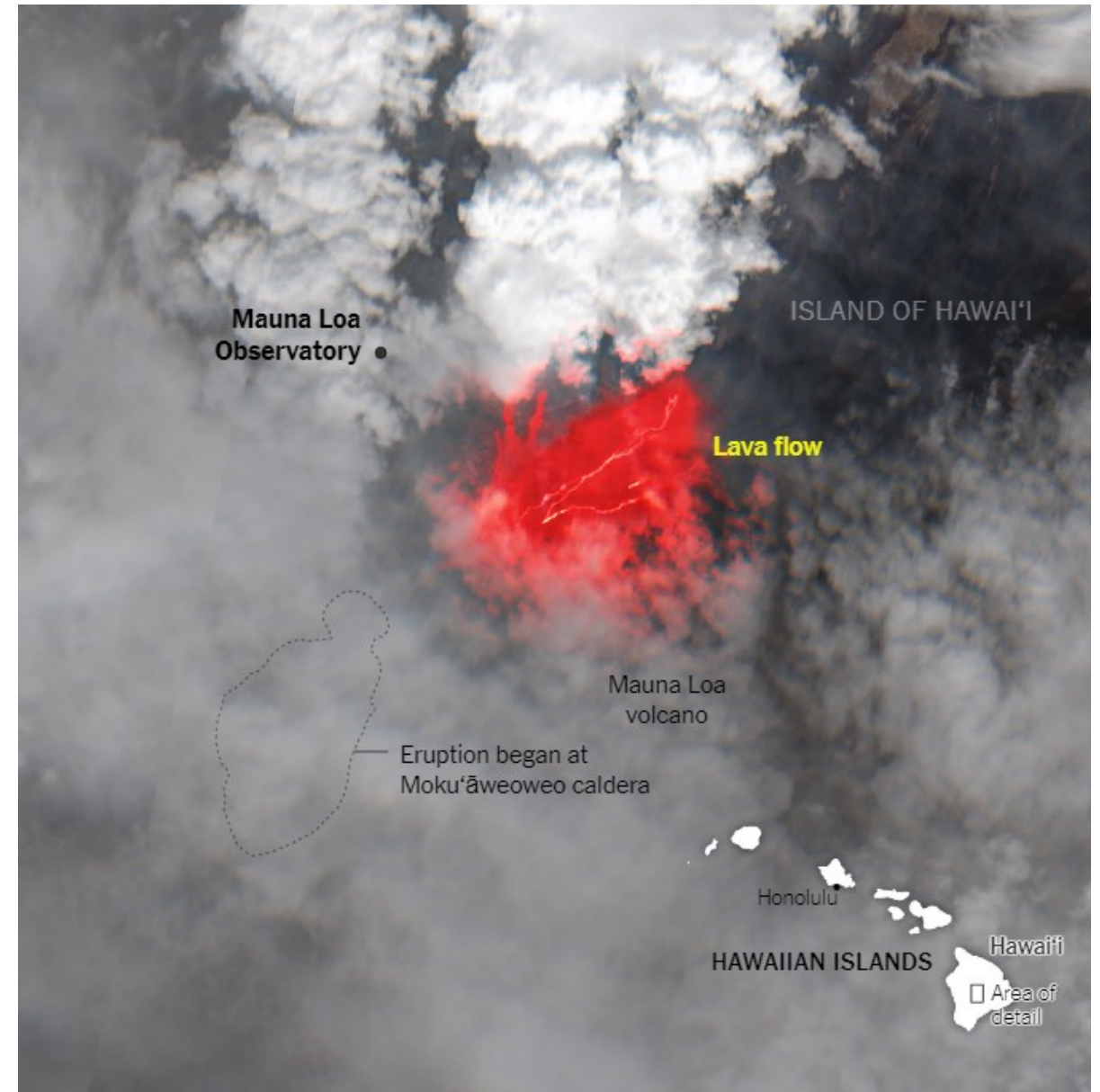
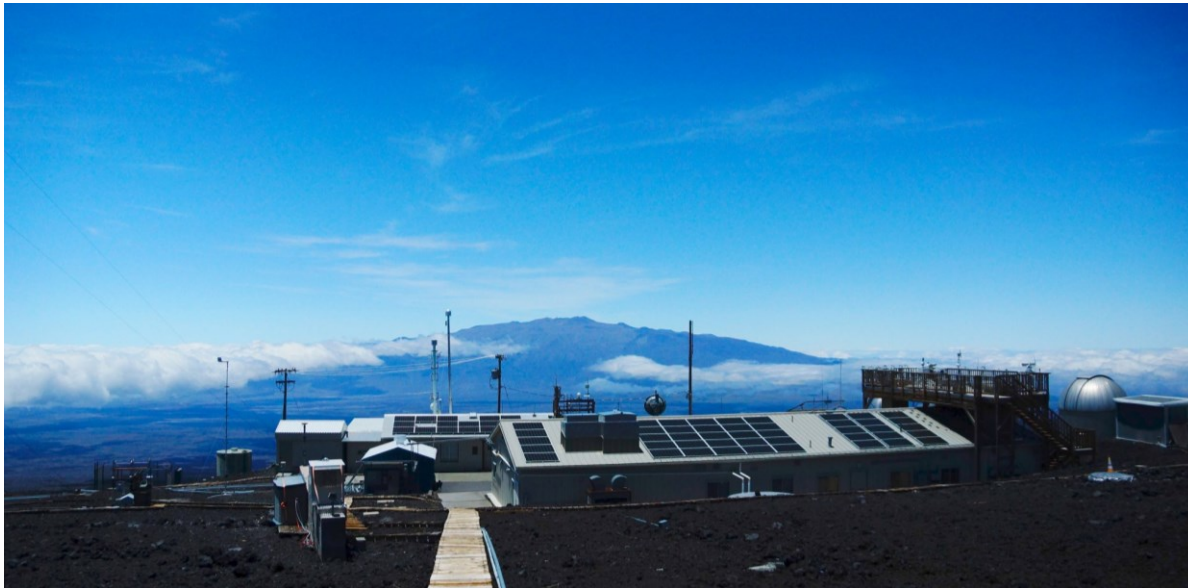






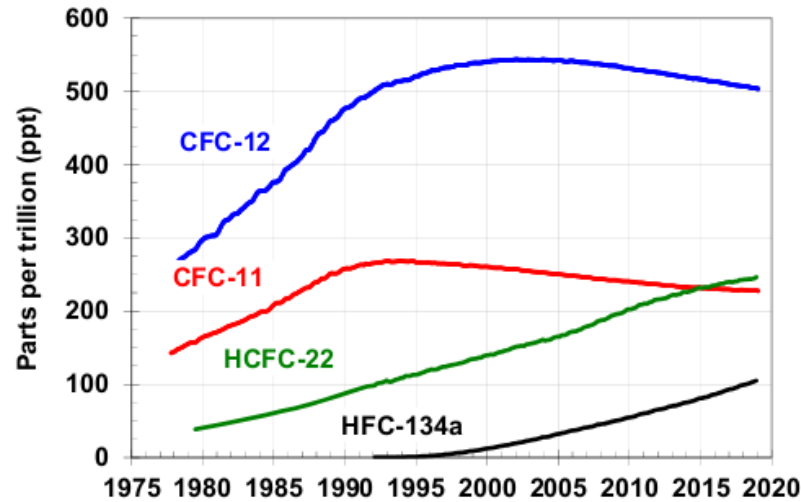
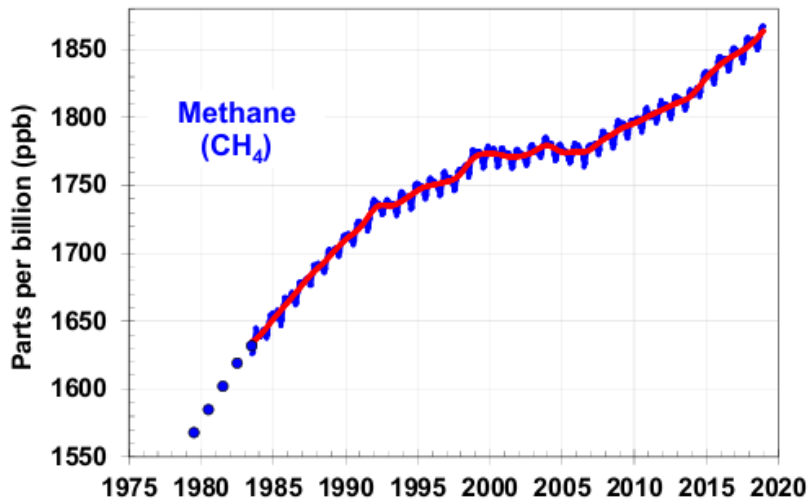
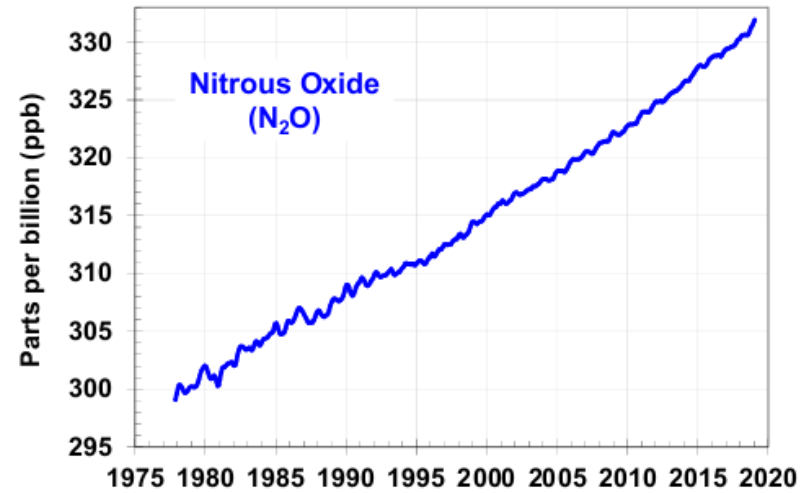
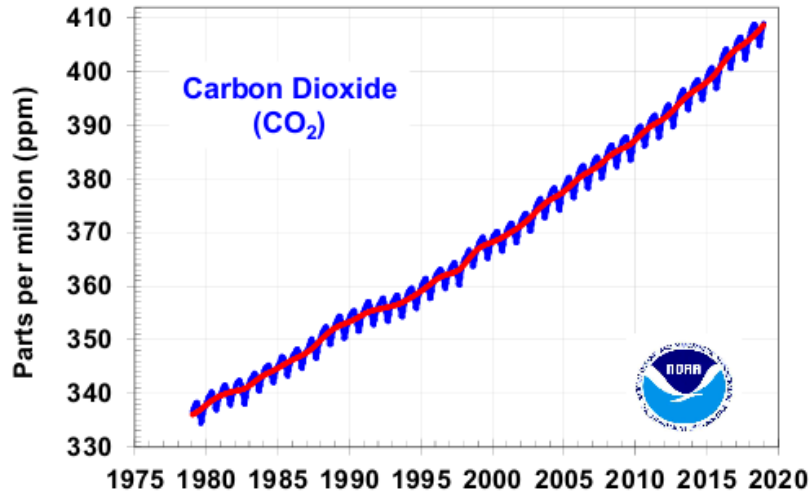
Mauna Loa Eruption Threatens a Famous Climate Record

By [Elena Shao](#) Dec. 2, 2022



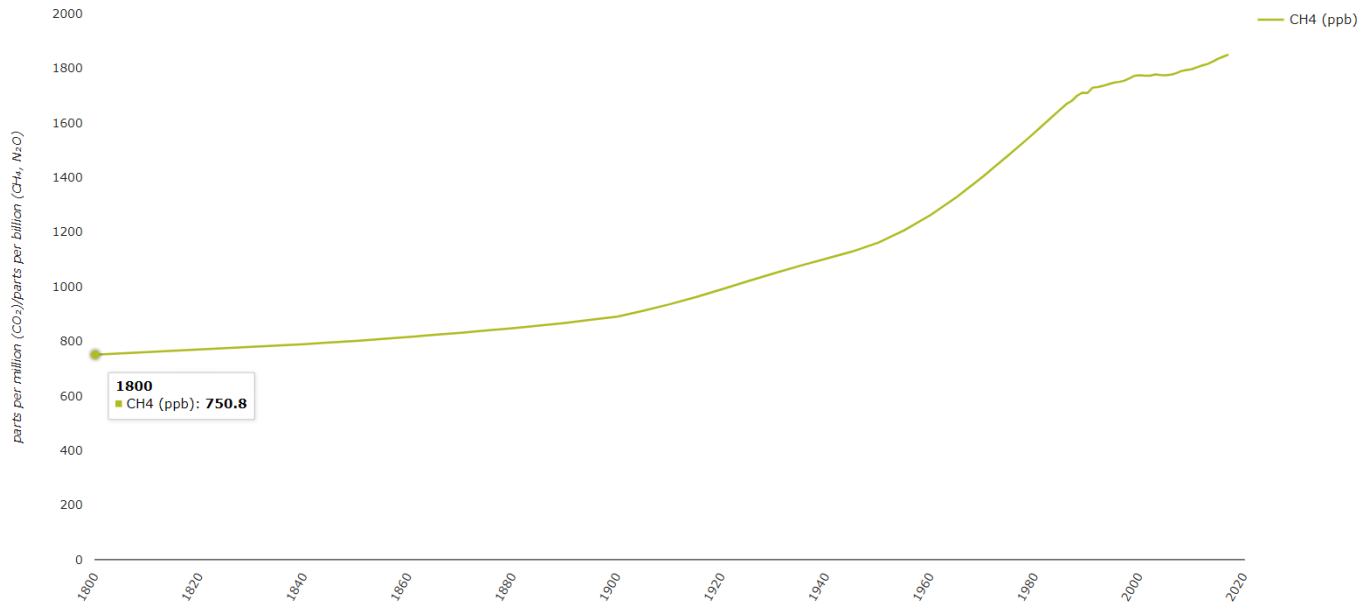
Source: Copernicus • Notes: Image captured by satellite on Nov. 28, 2022. Heat from lava flow highlighted

Tendências principais Gases com Efeito de Estufa (GEE)

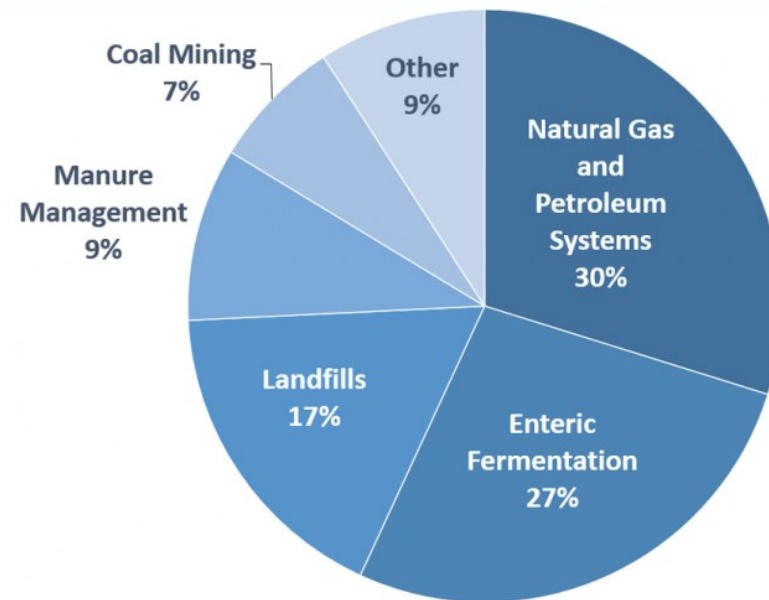


Polutant
 CH4 (ppb)

Chart — Trends in atmospheric concentrations of CO2 (ppm), CH4 (ppb) and N2O (ppb), between 1800 and 2017

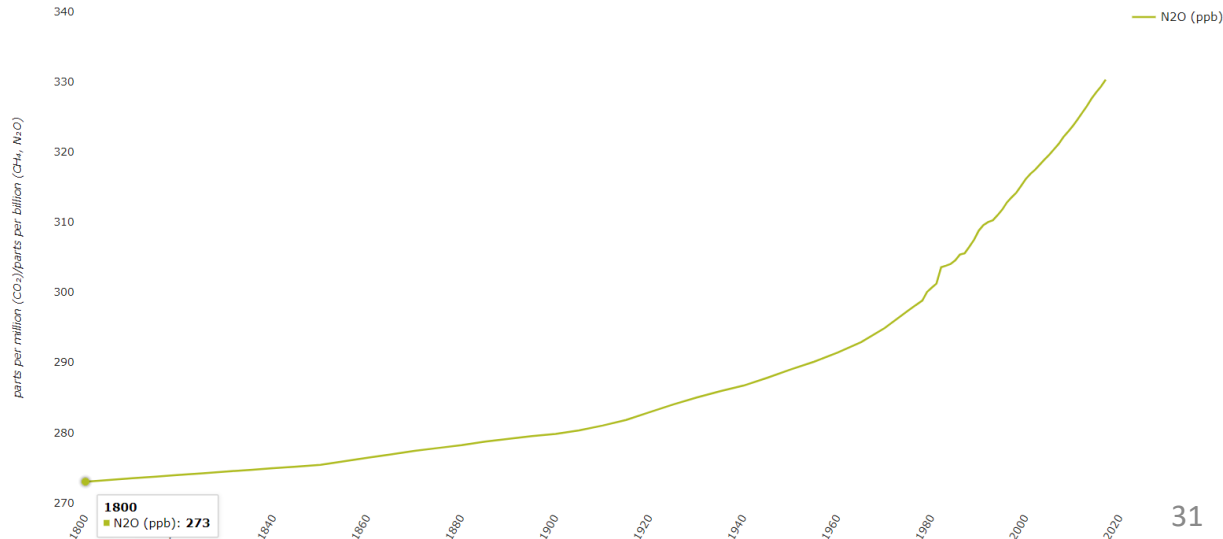


2019 U.S. Methane Emissions, By Source

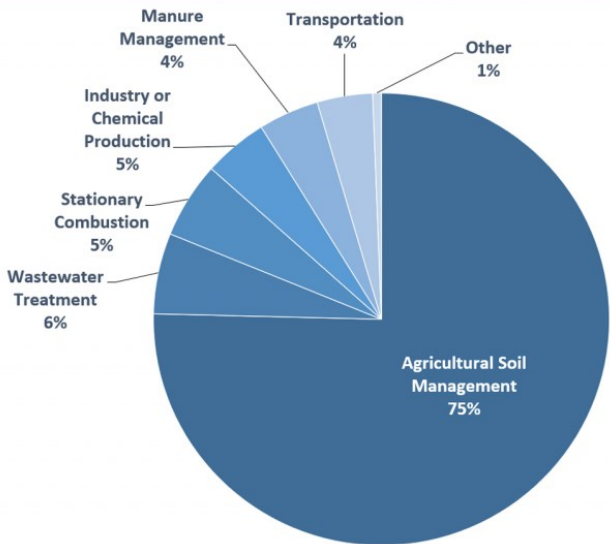


Polutant
 N2O (ppb)

Chart — Trends in atmospheric concentrations of CO2 (ppm), CH4 (ppb) and N2O (ppb), between 1800 and 2017

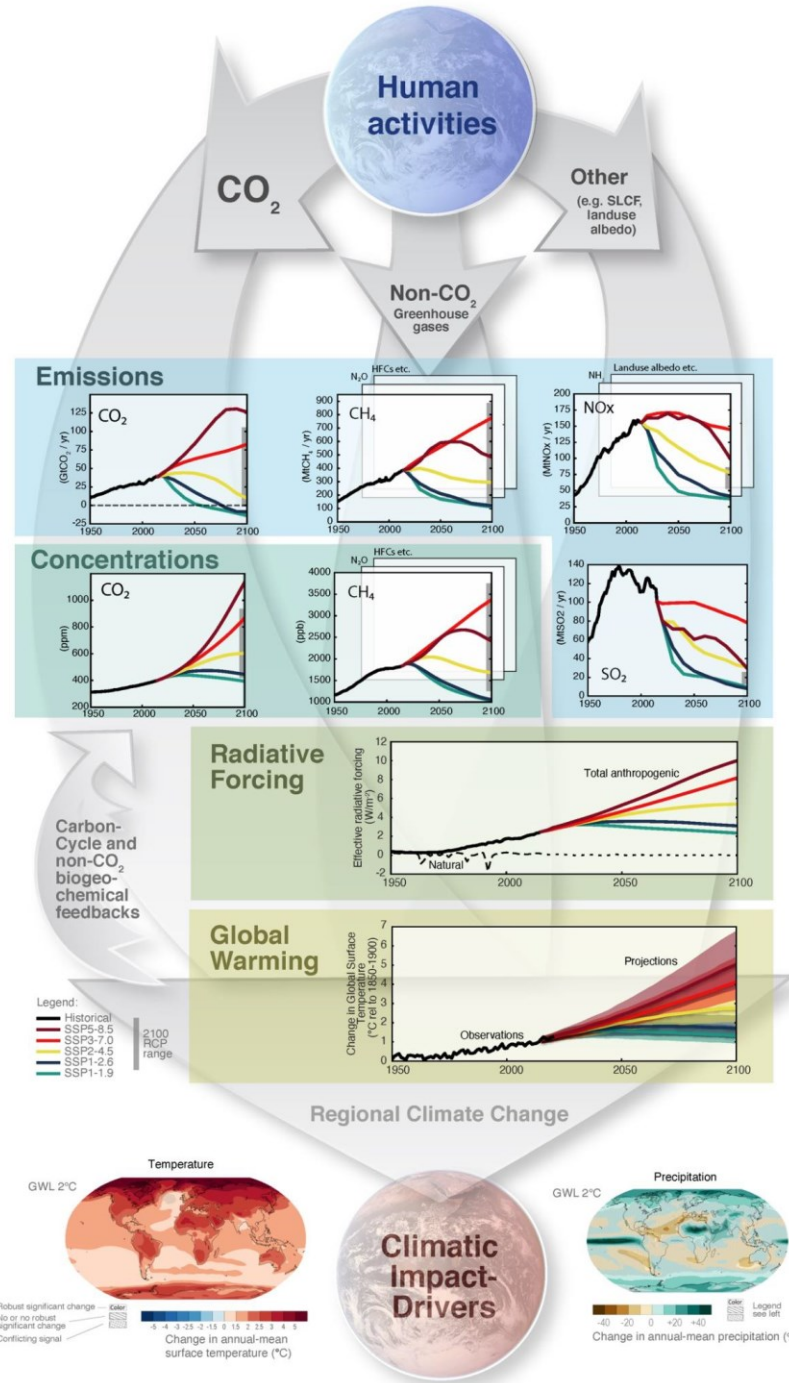


2019 U.S. Nitrous Oxide Emissions, By Source



Greenhouse gas	Average lifetime in the atmosphere	Global warming potential of one molecule of the gas over 100 years (Relative to carbon dioxide=1)
Carbon dioxide	50-200 years*	1
Methane	12 years	21
Nitrous oxide	120 years	310
CFC-12	100 years	10,600
CFC-11	45 years	4,600
HFC-134a	14.6 years	1,300
Sulfur hexafluoride	3,200 years	23,900

The climate change cause-effect chain



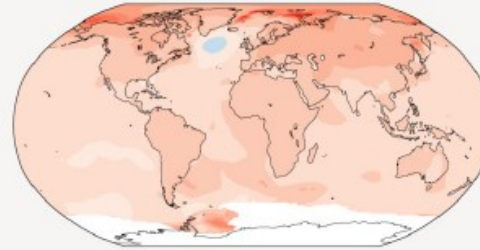
With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture

Figure SPM.5

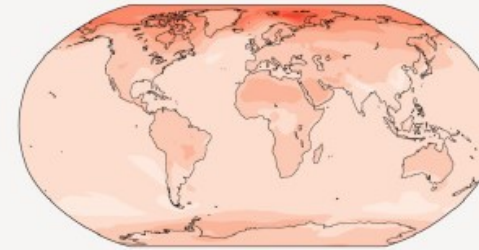
a) Annual mean temperature change (°C) at 1 °C global warming

Warming at 1 °C affects all continents and is generally larger over land than over the oceans in both observations and models. Across most regions, observed and simulated patterns are consistent.

Observed change per 1 °C global warming



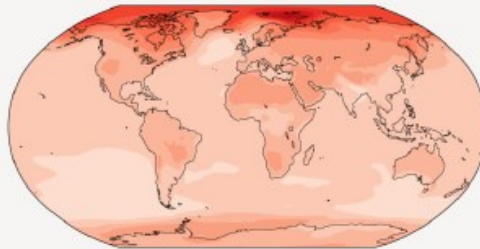
Simulated change at 1 °C global warming



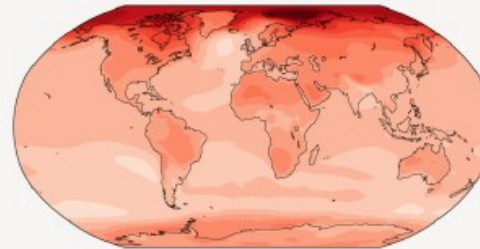
b) Annual mean temperature change (°C) relative to 1850-1900

Across warming levels, land areas warm more than oceans, and the Arctic and Antarctica warm more than the tropics.

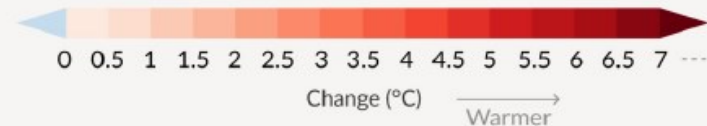
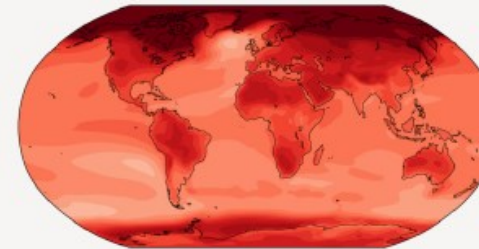
Simulated change at 1.5 °C global warming



Simulated change at 2 °C global warming



Simulated change at 4 °C global warming



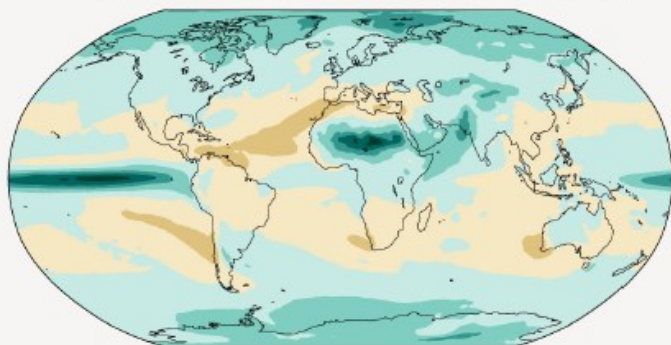
With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture

Figure SPM.5

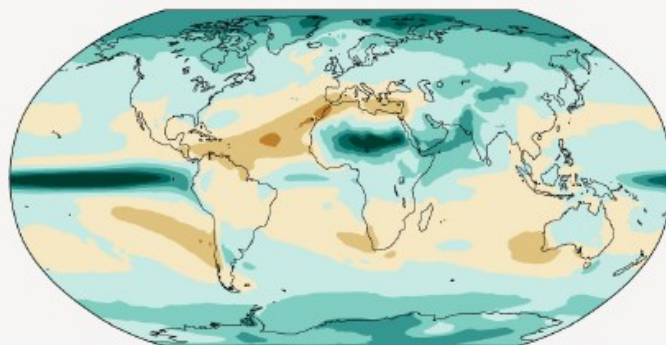
c) Annual mean precipitation change (%) relative to 1850-1900

Precipitation is projected to increase over high latitudes, the equatorial Pacific and parts of the monsoon regions, but decrease over parts of the subtropics and in limited areas of the tropics.

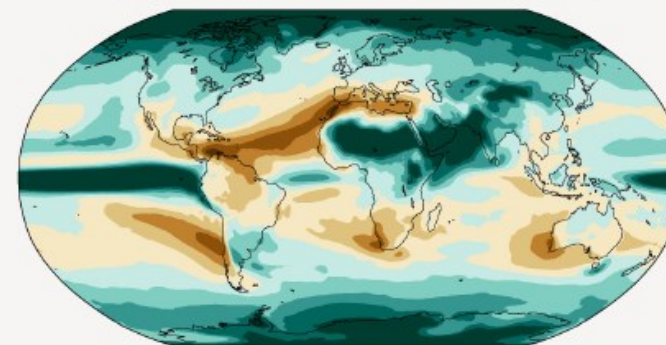
Simulated change at 1.5 °C global warming



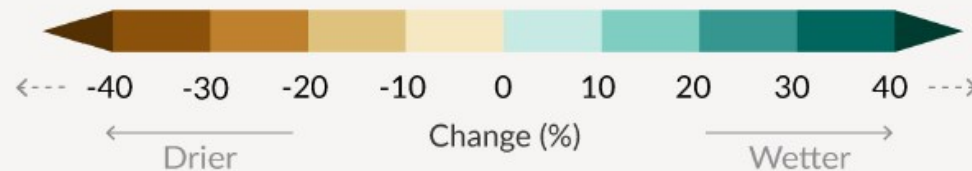
Simulated change at 2 °C global warming



Simulated change at 4 °C global warming



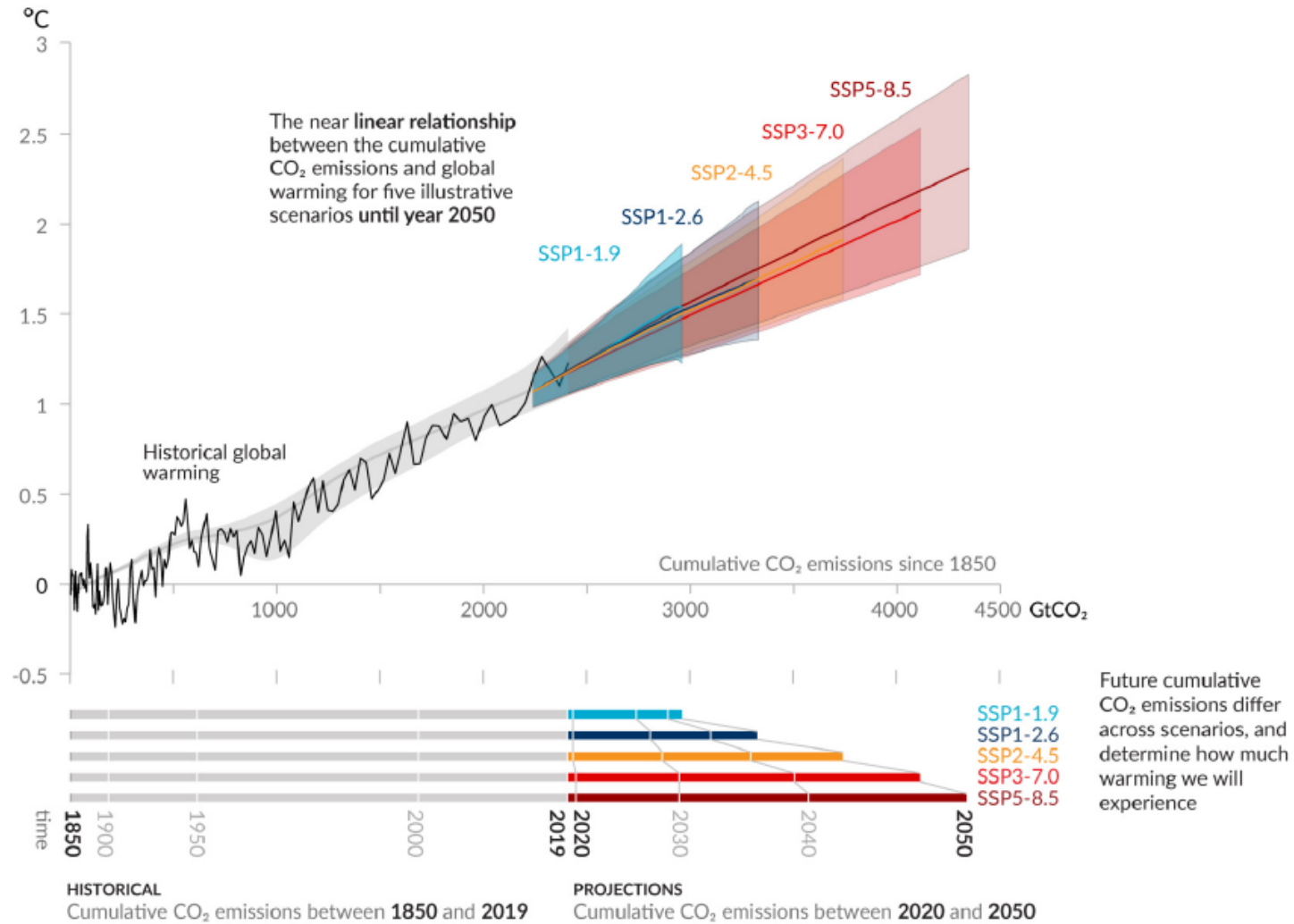
Relatively small absolute changes may appear as large % changes in regions with dry baseline conditions



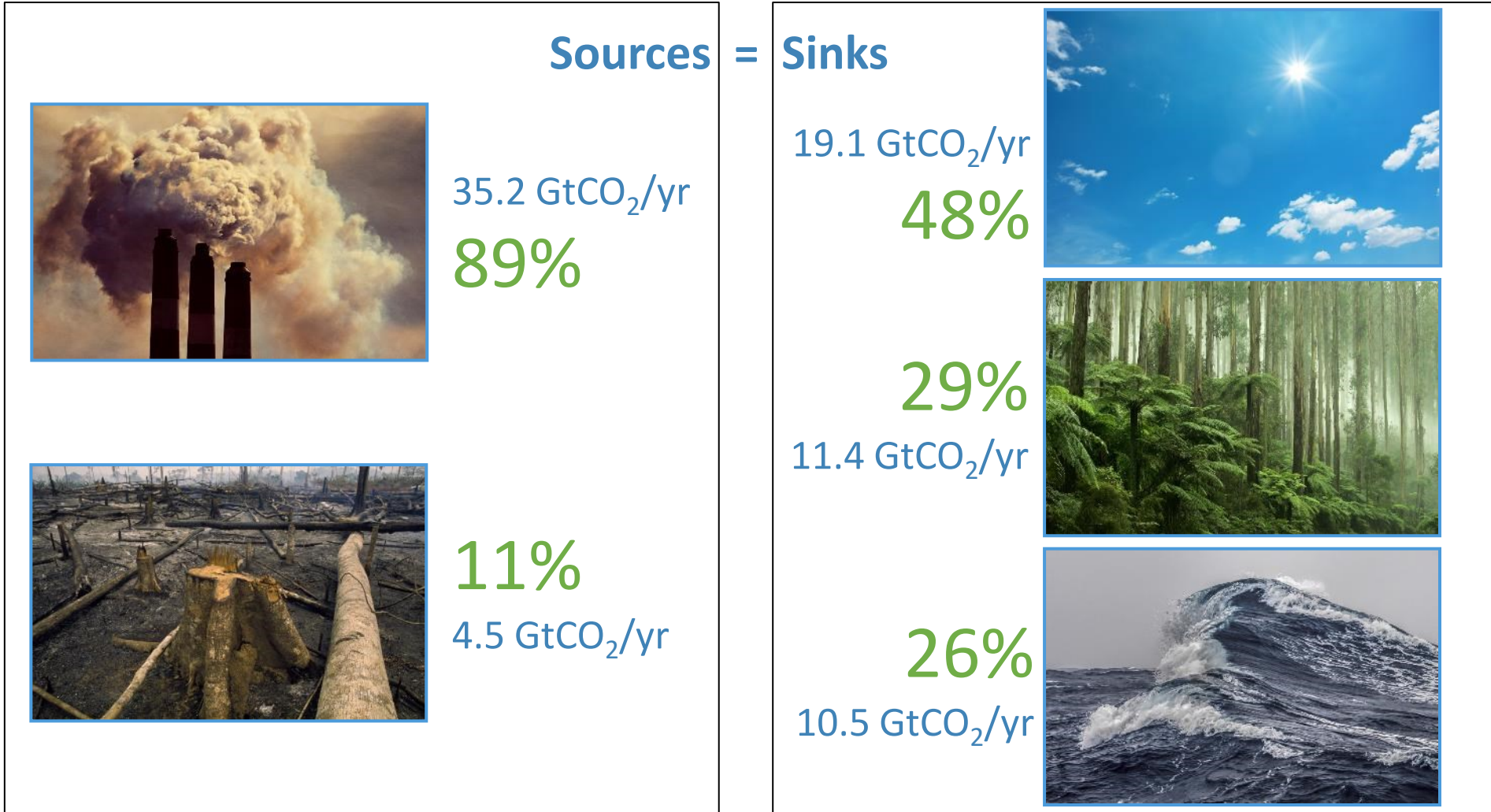
Every tonne of CO₂ emissions adds to global warming

Figure SPM.10

Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO₂ emissions (GtCO₂)



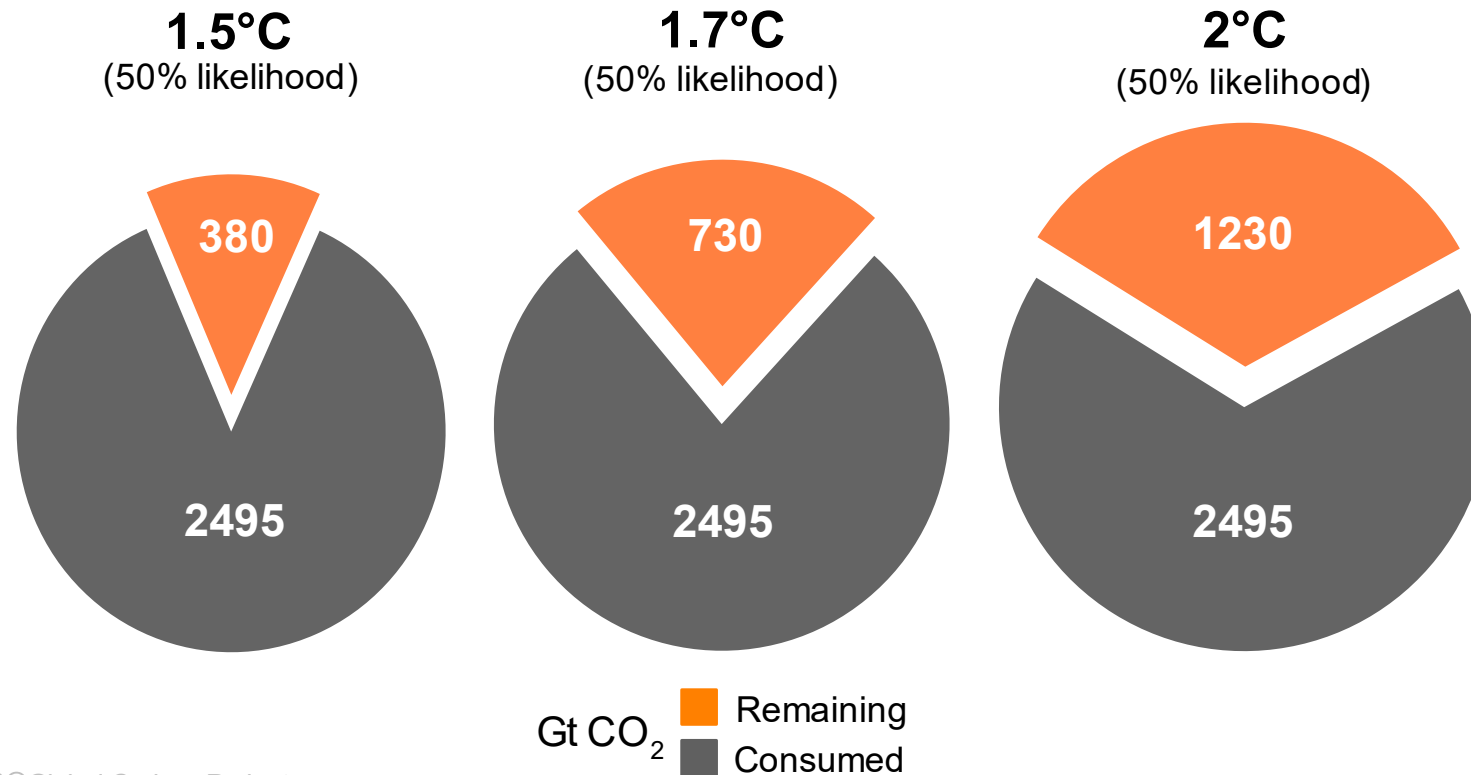
Fate of anthropogenic CO₂ emissions (2012–2021)



Budget Imbalance:
 (the difference between estimated sources & sinks) **3%**
 -1.2 GtCO₂/yr

Remaining carbon budget

The remaining carbon budget to limit global warming to 1.5°C, 1.7°C and 2°C is 380 GtCO₂, 730 GtCO₂, and 1230 GtCO₂ respectively, equivalent to 9, 18 and 30 years from 2023. 2610 GtCO₂ have been emitted since 1750



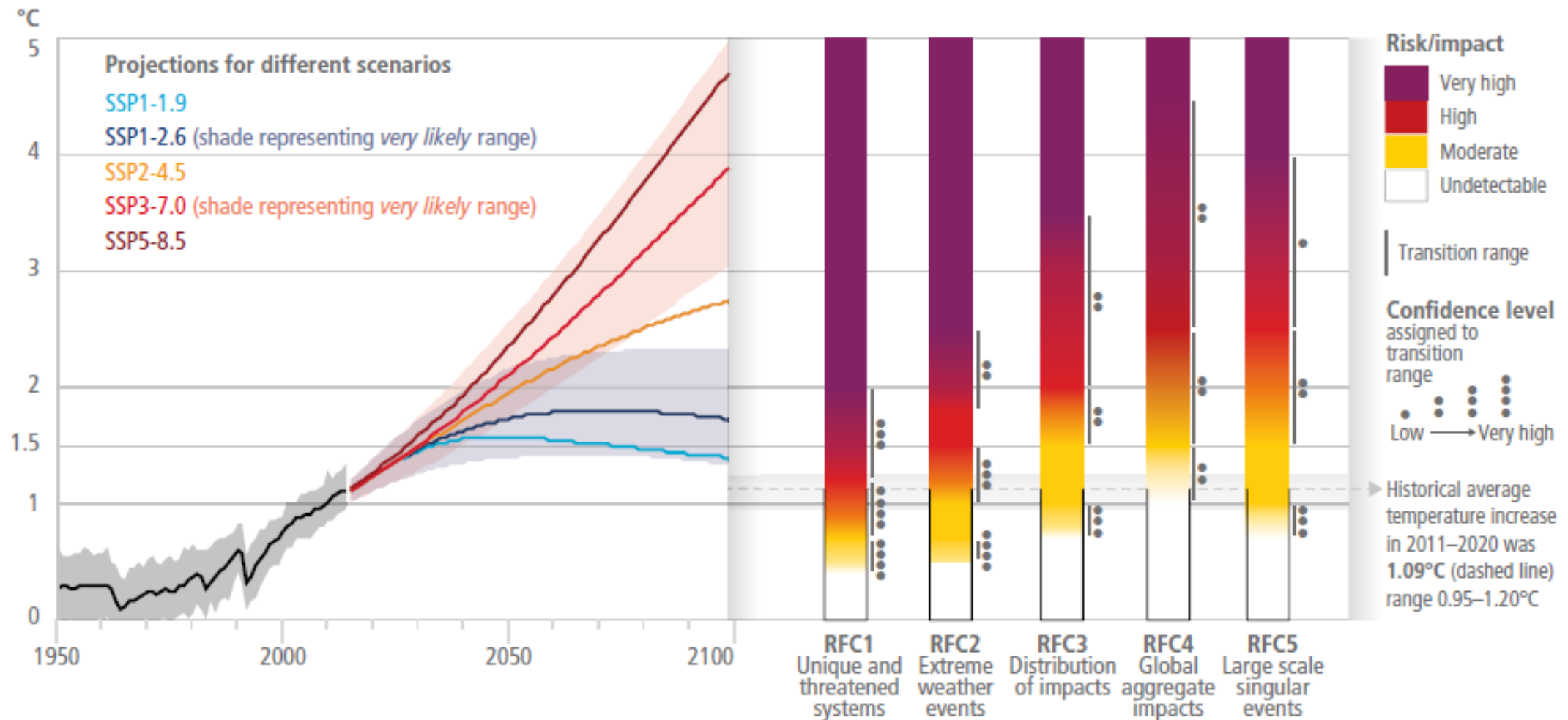
© Global Carbon Project

The remaining carbon budgets are updated from IPCC AR6 WG1 Chapter 5 by removing additional historical emissions since 1 January 2020. Quantities are subject to additional uncertainties e.g., future mitigation choices of non-CO₂ emissions
 Source: IPCC AR6 WG1; [Friedlingstein et al 2022](#); [Global Carbon Budget 2022](#)

Global and regional risks for increasing levels of global warming

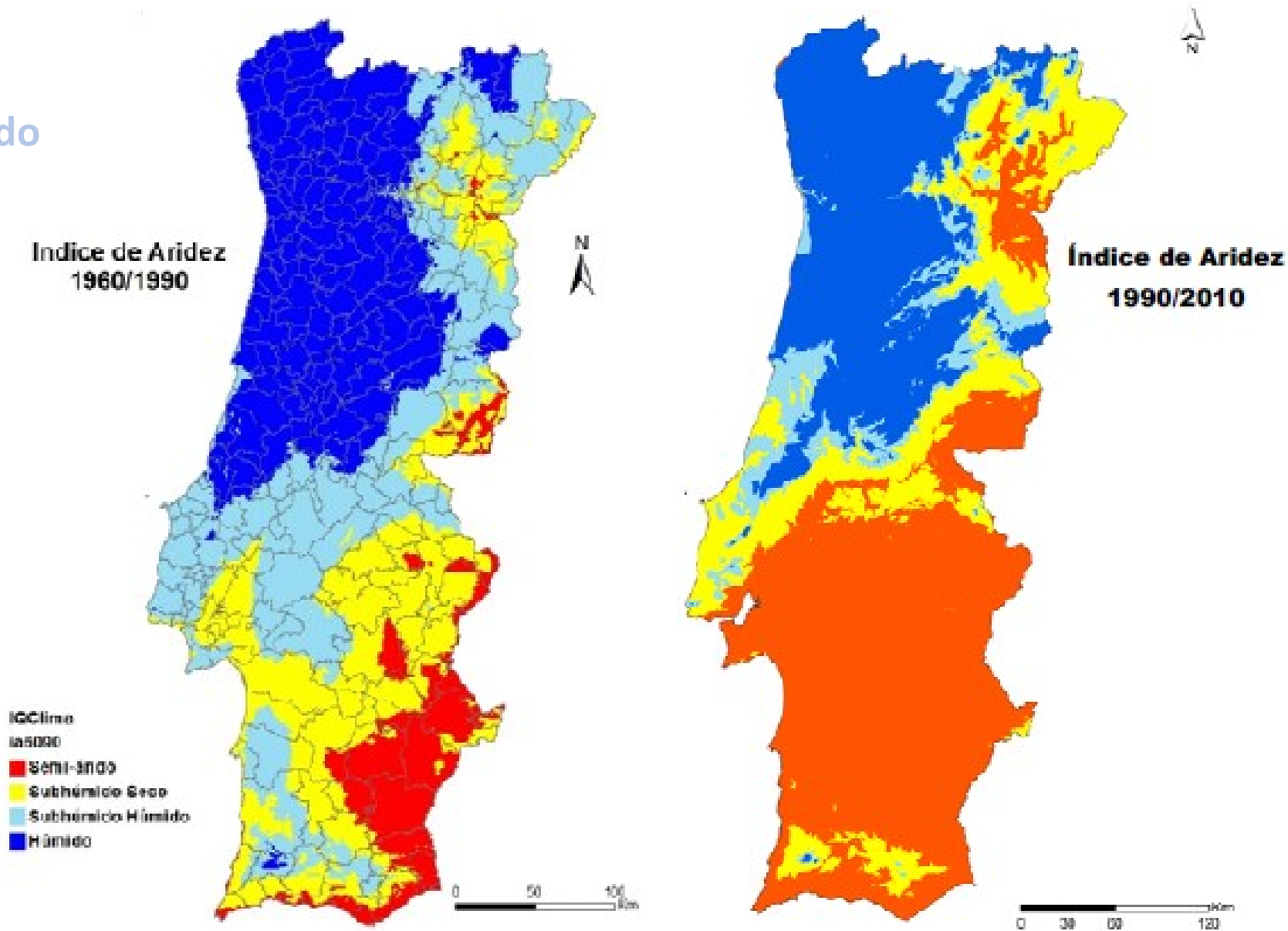
(a) Global surface temperature change
Increase relative to the period 1850–1900

(b) Reasons for Concern (RFC)
Impact and risk assessments assuming low to no adaptation

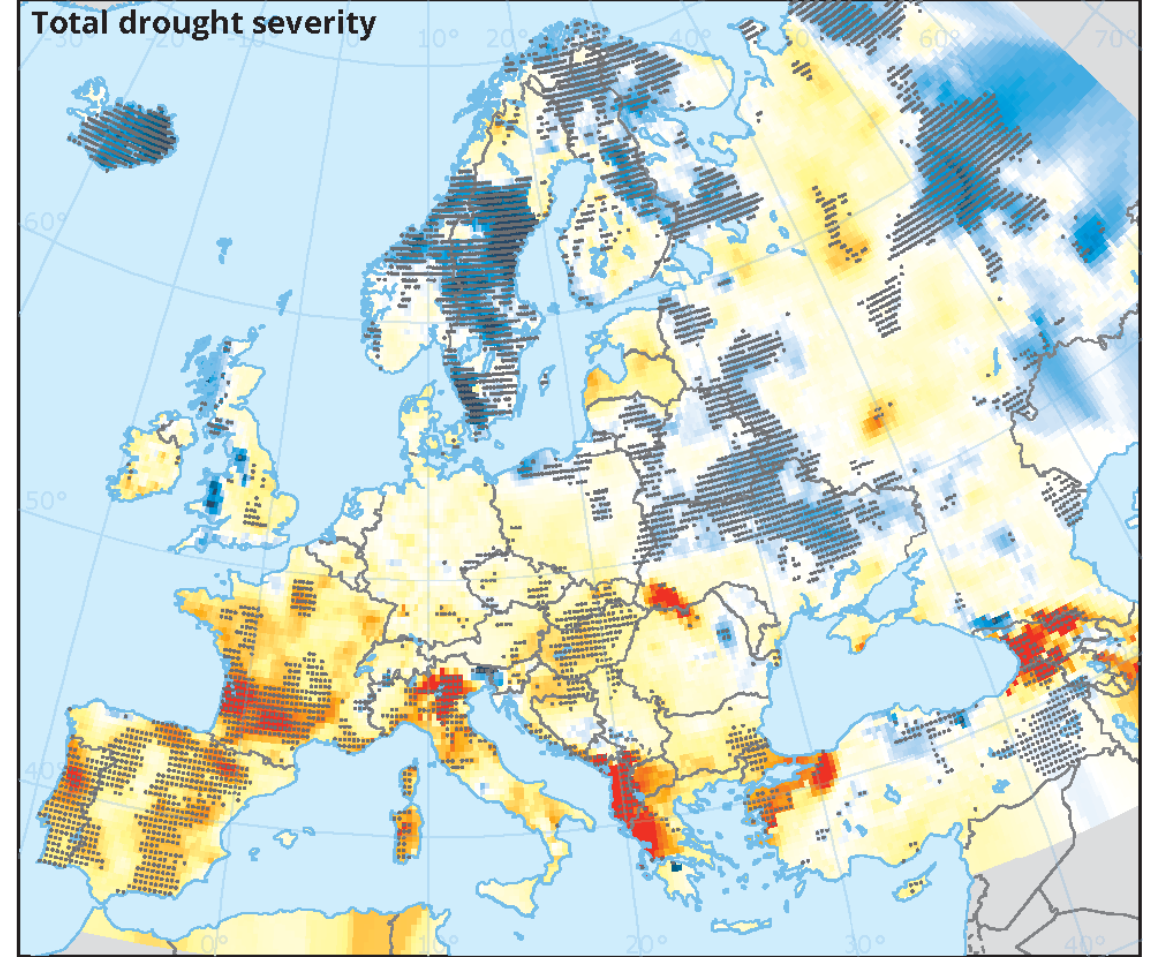
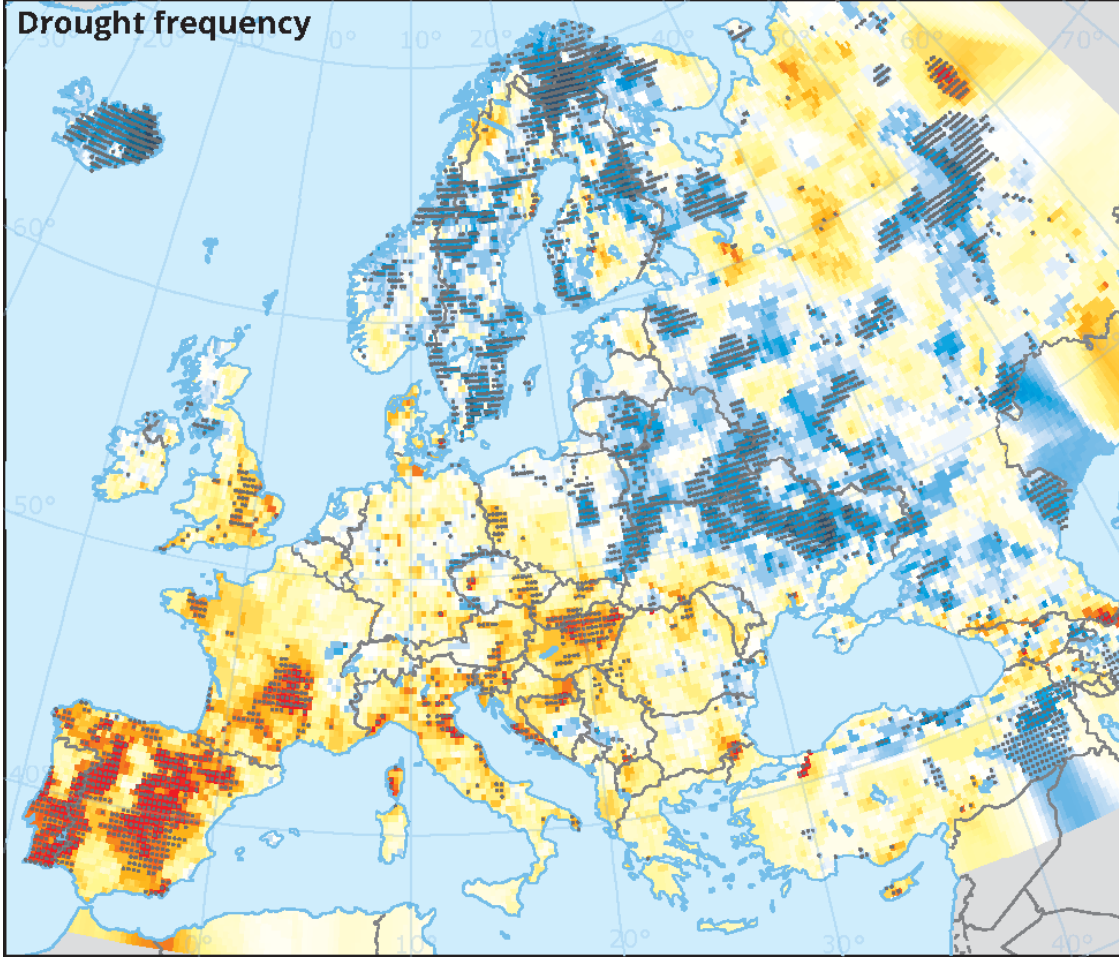


Evolução do Índice de Aridez em Portugal continental nos últimos 50 anos

- Semiárido
- Sub húmido seco
- Sub húmido húmido
- Húmido

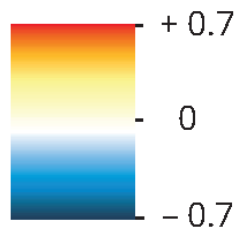


Fonte: CNCCD 2004; Del Barrio *et al*, 2010; Sanjuan *et al*, 2011

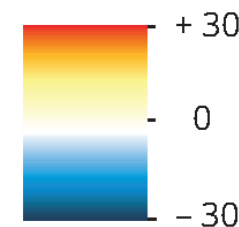


Observed trends in frequency and severity of meteorological droughts

Drought frequency
(events/decade)



Total drought severity
(score/decade)



Outside coverage

Significance of trends

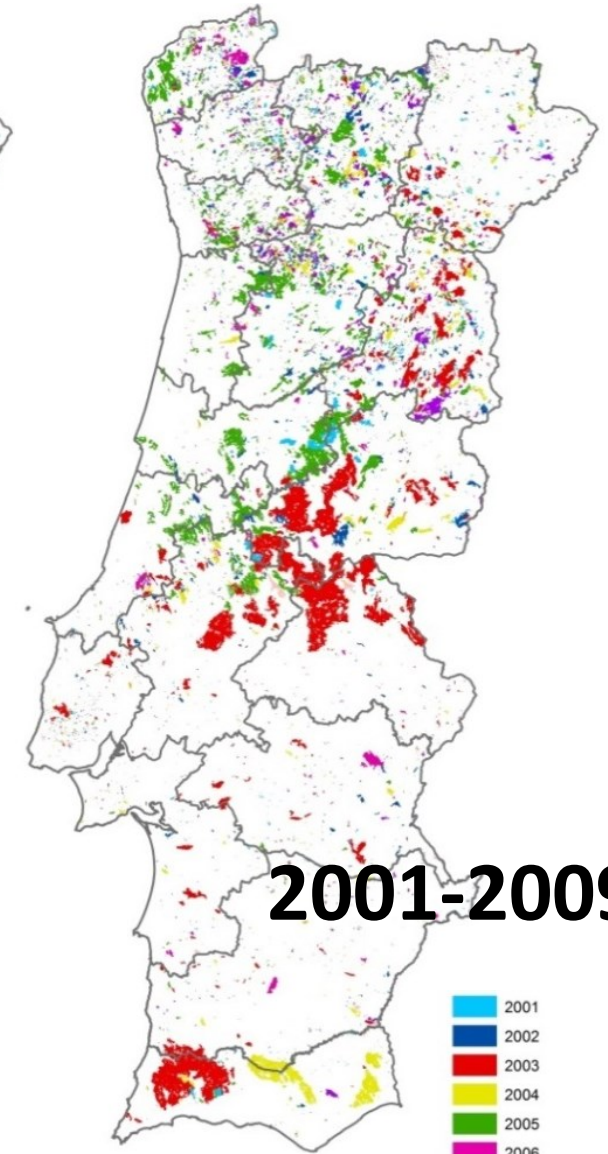
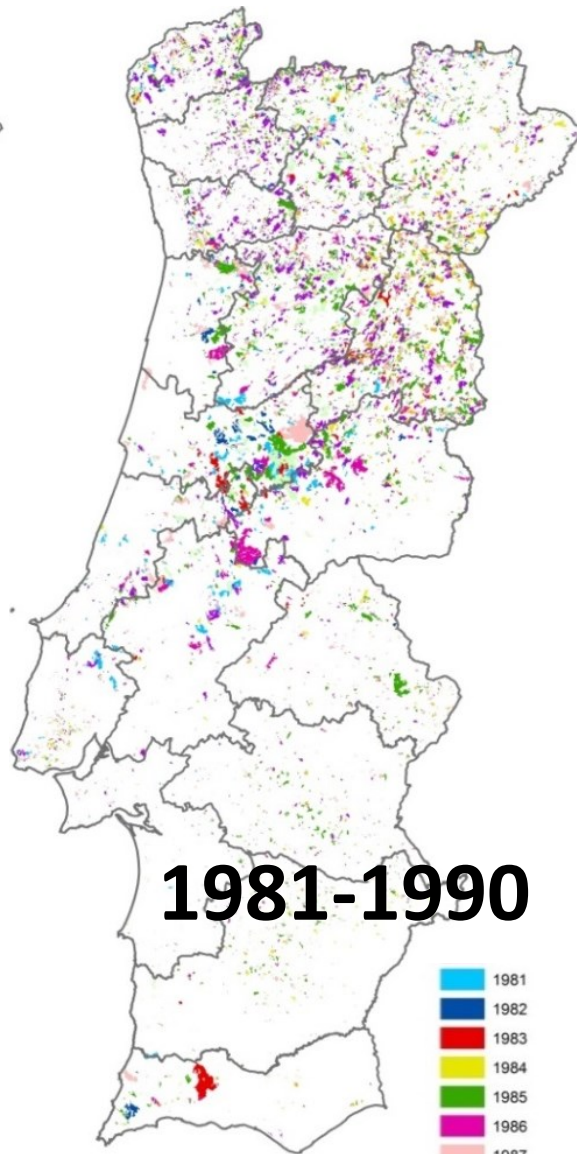
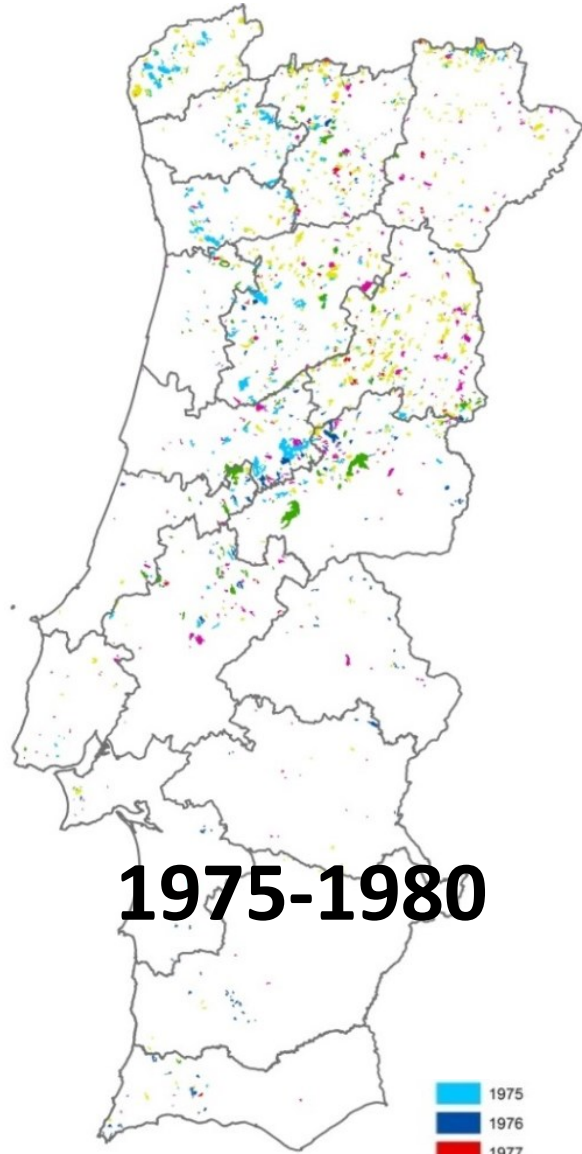
0 500 1 000 1 500 km

EEA (2016)

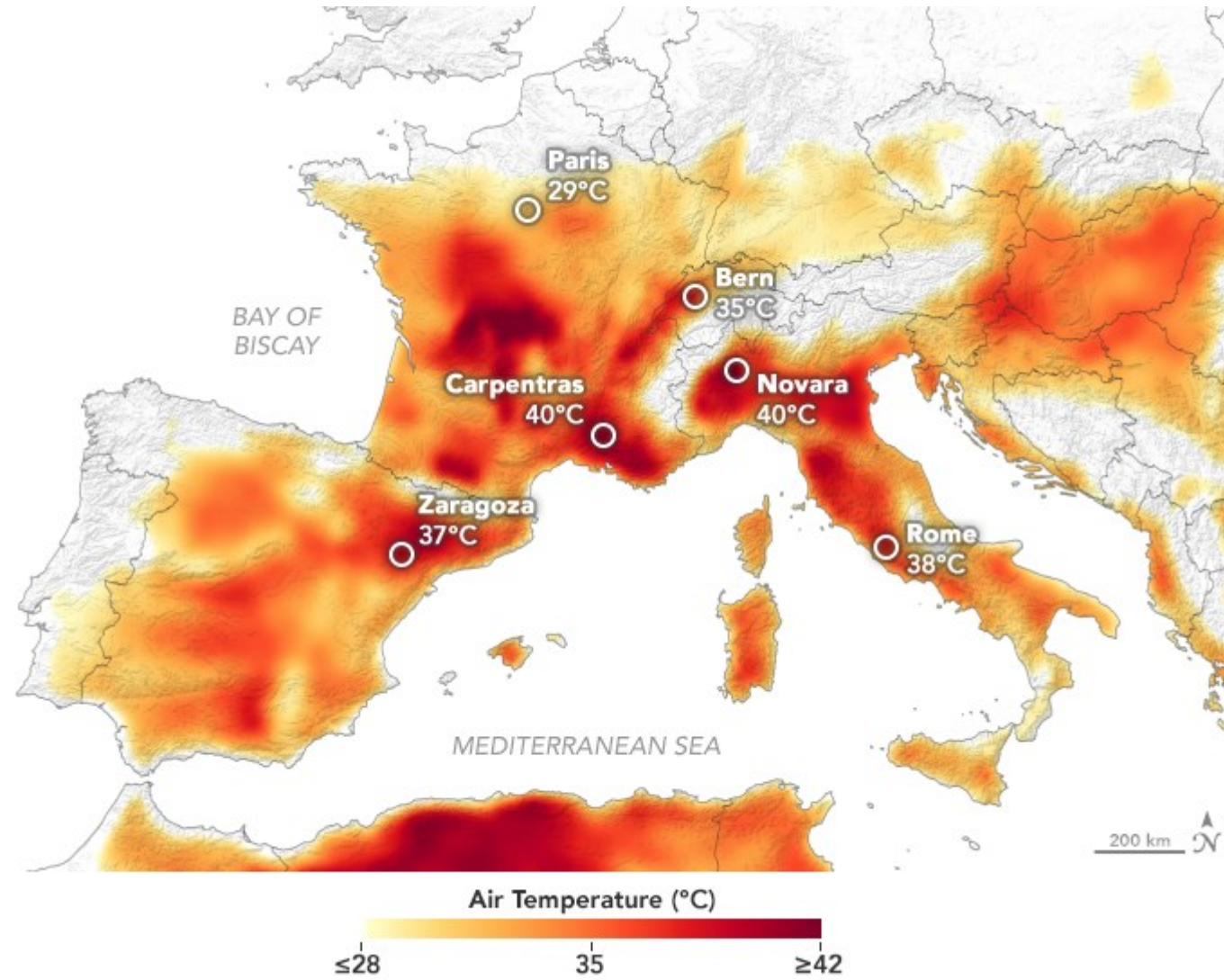
1950-2012

**Combinação 3
índices - SPI, SPEI
and RDI para 12-
meses**

Perímetros das áreas queimadas em Portugal Continental (satélite Landsat)

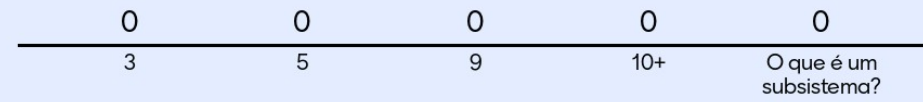


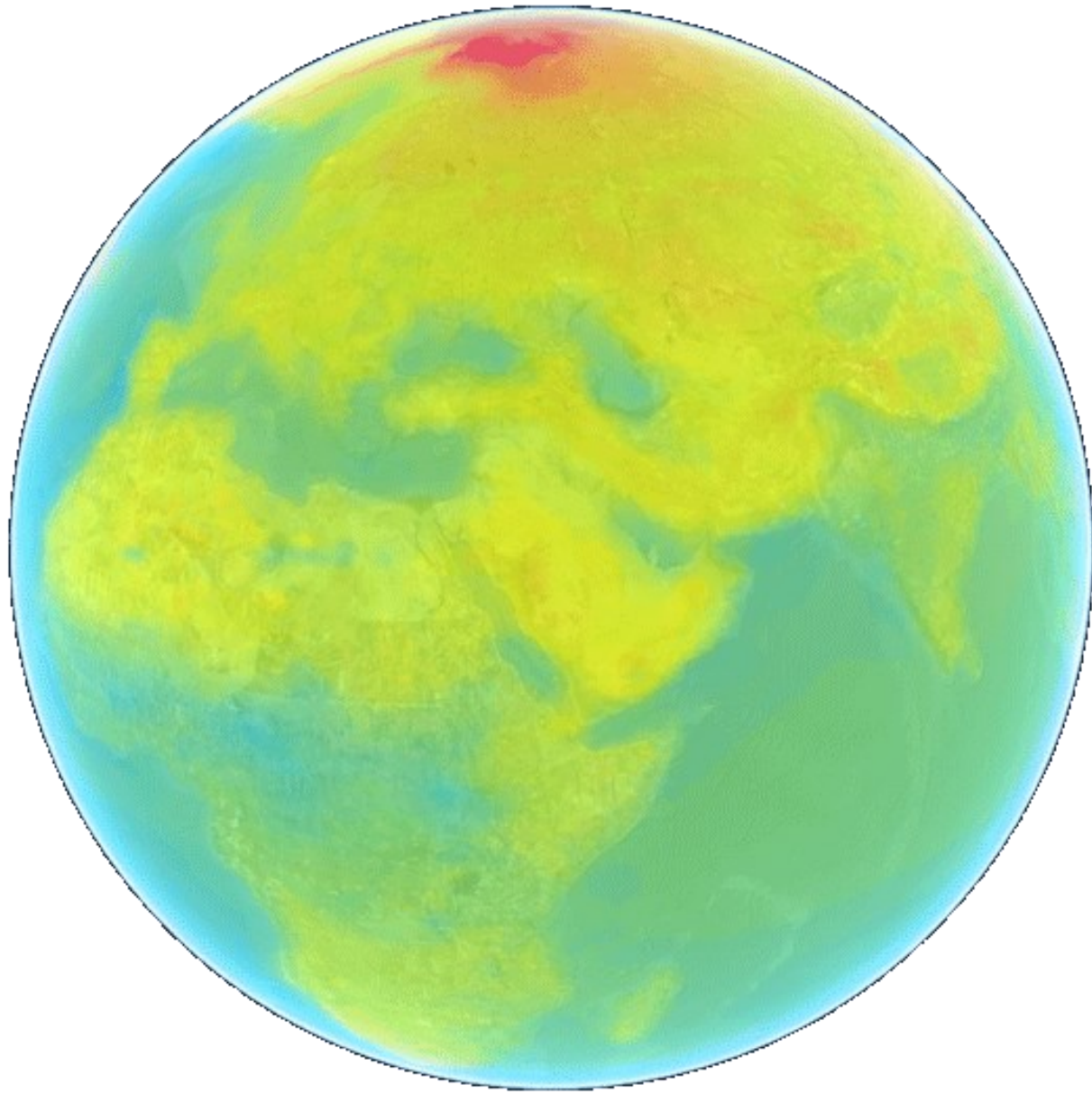
27 Junho 2019



<https://earthobservatory.nasa.gov/images/145249/heatwave-scorches-europe>

Quantos subsistemas tem o sistema climático?





Organizações de Sociedade Civil apoiam e convocam

A SOLUÇÃO ESTÁ NA NOSSA GERAÇÃO

GREVE ESTUDANTIL MUNDIAL 24 MAIO PELO CLIMA

10h30

A mudança política por justiça climática que exigimos ainda não aconteceu. Até que as alterações climáticas sejam uma prioridade governamental, continuaremos a lutar. Agora que já estás de pé, não te voltes a sentar!

#FAZPELOCLIMA

@greveclimaticaeestudantil

@doravantedesign

@doravantedesign



Stockholm, Sweden



London, UK



Melbourne, Australia



Gurugram, India



Créditos: (1) Jonathan Nackstrand /AFP/Getty; (2) Dan Kitwood /Getty; (3) Anushree Fadnavis /Reuters; (4) David Crosling /AAP

Rua de Sao Bento 24.05.2019



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Respostas às Alterações Climáticas

Mitigação



Impactos GLOBAIS



Adaptação



Impactos LOCAIS





SUSTAINABLE DEVELOPMENT GOALS



United Nations

A/RES/70/1



General Assembly

Distr.: General
21 October 2015

Seventieth session
Agenda items 15 and 116

Resolution adopted by the General Assembly on 25 September 2015

[without reference to a Main Committee (A/70/L.1)]

70/1. Transforming our world: the 2030 Agenda for Sustainable Development

Agenda 2030 ONU (25 setembro 2015)

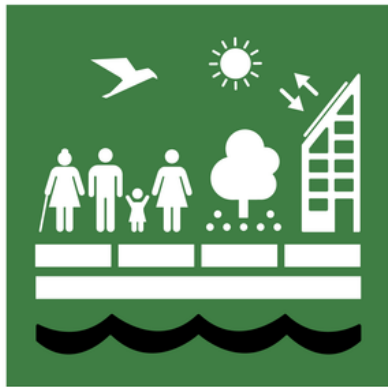
ODS 13

- O Objetivo de Desenvolvimento Sustentável 13 (**ODS 13 – Ação Climática**) caracteriza-se por uma forte aposta na implementação coletiva de estratégias e ações que **limitem o aumento da temperatura média global à superfície em 1.5°C**, relativamente ao período pré-industrial (1850-1900).
- Espera-se desta forma poder **prevenir e/ou adaptar** os sistemas naturais e humanos aos potenciais impactos das alterações climáticas.
- Para tal são desenvolvidas respostas (estratégias, planos e medidas) de **ação climática** tanto ao nível internacional, como na União Europeia e em Portugal.



Adotar medidas urgentes para combater as alterações climáticas e os seus impactos

TARGET 13-1



STRENGTHEN RESILIENCE AND ADAPTIVE CAPACITY TO CLIMATE RELATED DISASTERS

TARGET 13-2



INTEGRATE CLIMATE CHANGE MEASURES INTO POLICIES AND PLANNING

TARGET 13-3



BUILD KNOWLEDGE AND CAPACITY TO MEET CLIMATE CHANGE

TARGET 13-A



IMPLEMENT THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

TARGET 13-B



PROMOTE MECHANISMS TO RAISE CAPACITY FOR CLIMATE PLANNING AND MANAGEMENT

Goal 13. Take urgent action to combat climate change and its impacts*

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

13.2 Integrate climate change measures into national policies, strategies and planning

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

* Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.

Nations Unies

Conférence sur les Changements Climatiques 2015

COP21/CMP11

Paris France



Acordo de Paris

- O Acordo de Paris no âmbito da Convenção-Quadro das Nações Unidas para as Alterações Climáticas (UNFCCC) foi adotado em dezembro de 2015 em Paris, França, na 21ª sessão da Conferência das Partes (COP) da UNFCCC. O Acordo, adotado por 195 Partes da UNFCCC, entrou em vigor em 4 de novembro de 2016 - atualmente 193 das 197 Partes da UNFCCC ratificaram o Acordo.
- Um dos objetivos do Acordo de Paris (Art. 2º - temperatura) é o de:
“Limitar o aumento da temperatura média global bem abaixo de 2°C acima dos níveis pré-industriais e prosseguir esforços para limitar o aumento da temperatura a 1,5°C acima dos níveis pré-industriais, reconhecendo que isso reduzirá significativamente os riscos e impactos das alterações climáticas”.
- O Acordo visa ainda fortalecer a capacidade dos países para lidar com os impactos das alterações climáticas (Art. 7 - adaptação)



United Nations
Framework Convention on
Climate Change

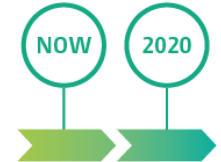
O objetivo final da UNFCCC é o de **estabilizar as concentrações de gases de efeito estufa na atmosfera num nível que evite a interferência humana perigosa com o sistema climático.**

A UNFCCC propõe que “tal nível deve ser alcançado dentro de **um prazo suficiente** para permitir que os ecossistemas se adaptem naturalmente às mudanças climáticas, para garantir que a produção de alimentos não seja ameaçada e para permitir que o desenvolvimento económico prossiga de maneira sustentável”.

Parties pledged their best efforts in nationally determined contributions and agreed to report on progress regularly, as well as increase ambition over time. A global stocktake every five years, beginning in 2023, will assess collective progress.



Temperature goal
Limit the global rise to as close as possible to 1.5 °C.



Pre-2020 action and support
Encourage action between now and 2020 by all actors, including non-Party stakeholders.



Transparency and the global stocktake
Robust transparency and accounting, supported by international review and global stocktakes.



Finance, technology and capacity-building
International cooperation to support a low-carbon and climate-resilient future.

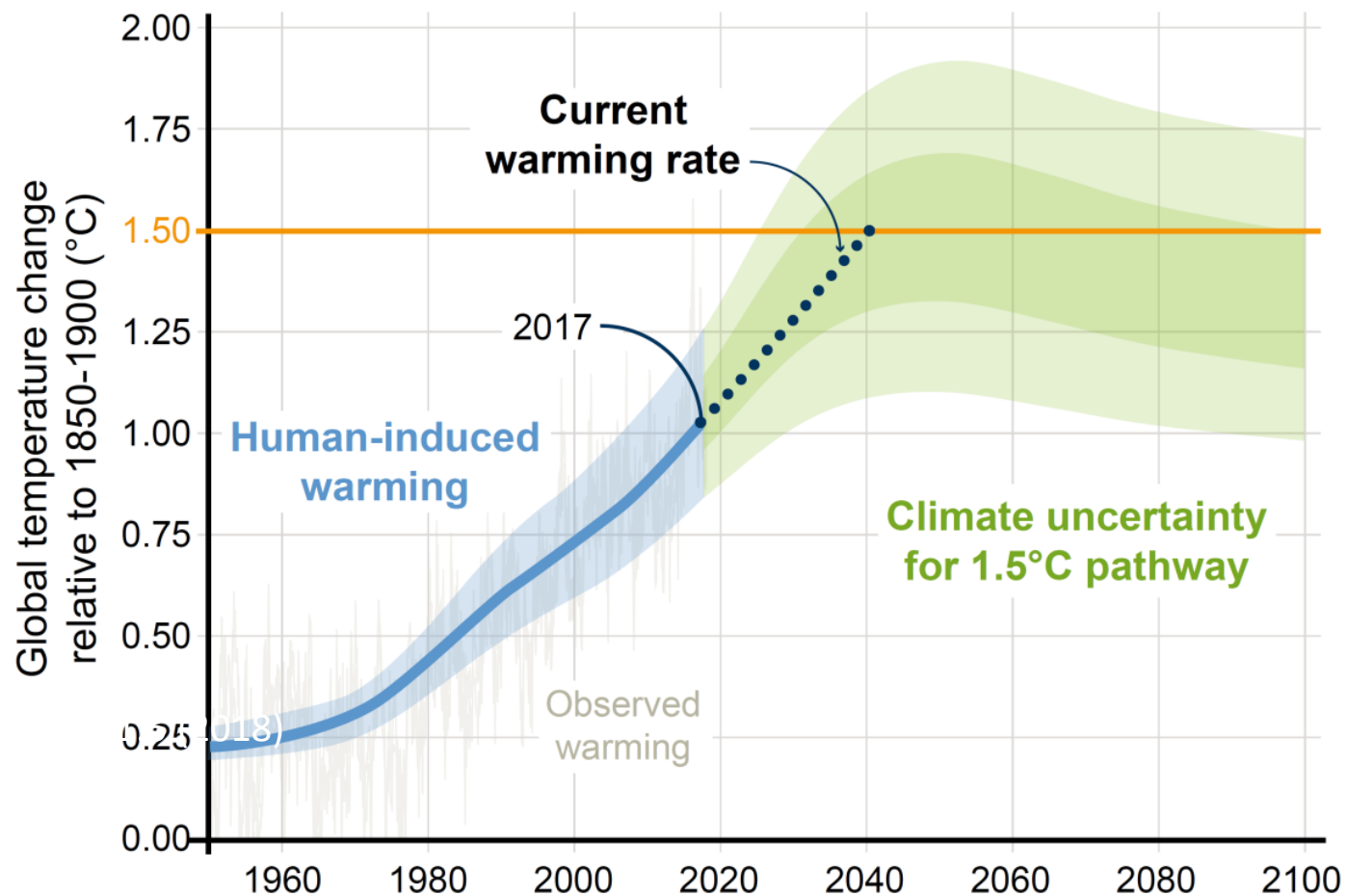


Mitigation and voluntary cooperation
All Parties must prepare nationally determined contributions (NDCs) and work to achieve them, reporting on progress, and regularly enhancing ambition.



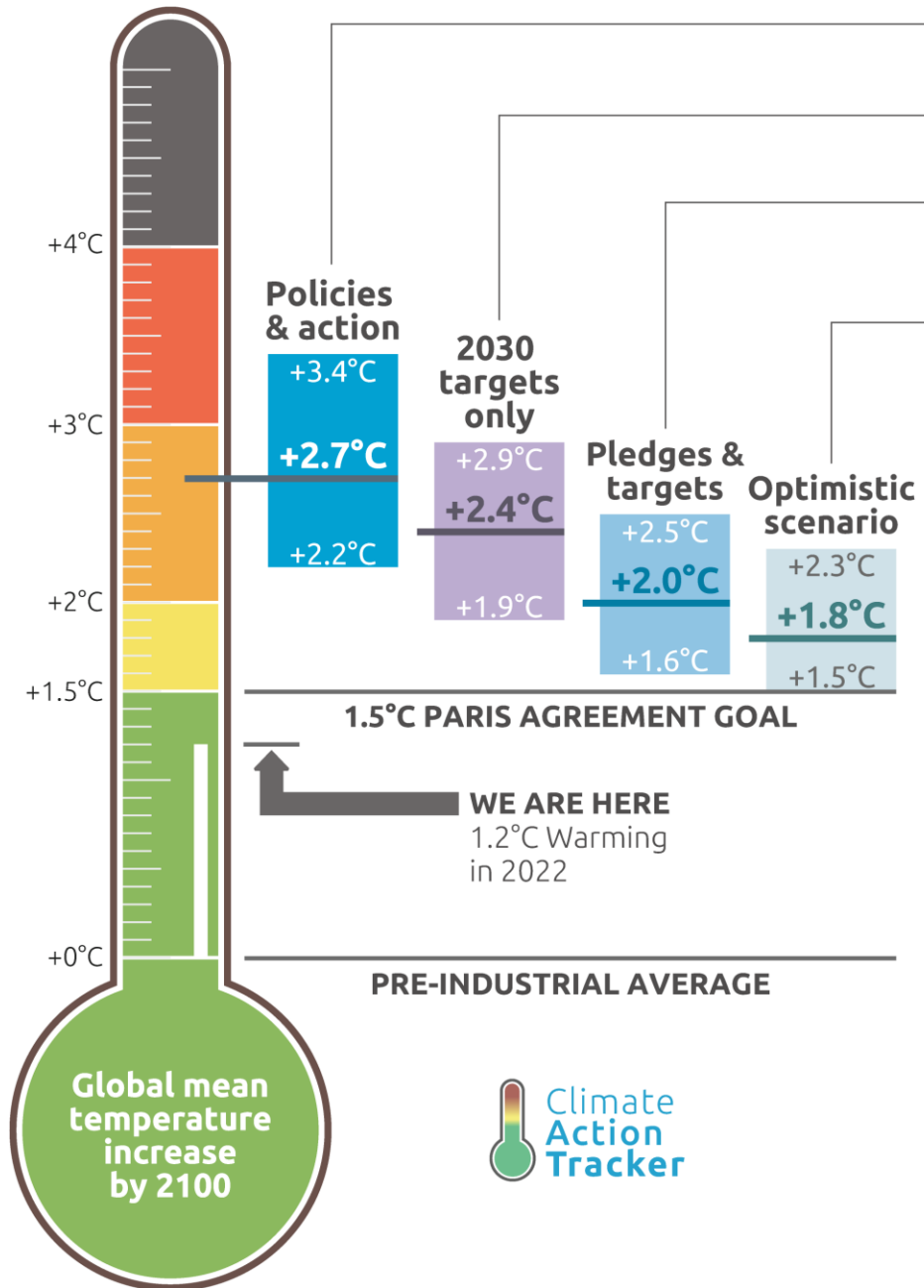
Adaptation and loss and damage
Strengthen national adaptation efforts and support vulnerable countries to cope with climate change effects.

Quão perto estamos já do limite de 1,5°C ?



O aquecimento global induzido pela ação antrópica, atingiu já 1°C acima dos valores pré-industriais em 2017.

Às taxas atuais, a temperatura global poderá atingir o limiar de 1,5°C por volta de 2040 [2030-2052].



Policies & action

Real world action based on current policies †

2030 targets only

Based on 2030 NDC targets* †

Pledges & targets

Based on 2030 NDC targets* and submitted and binding long-term targets

Optimistic scenario

Best case scenario and assumes full implementation of all **announced** targets including net zero targets, LTSs and NDCs*

† Temperatures continue to rise after 2100

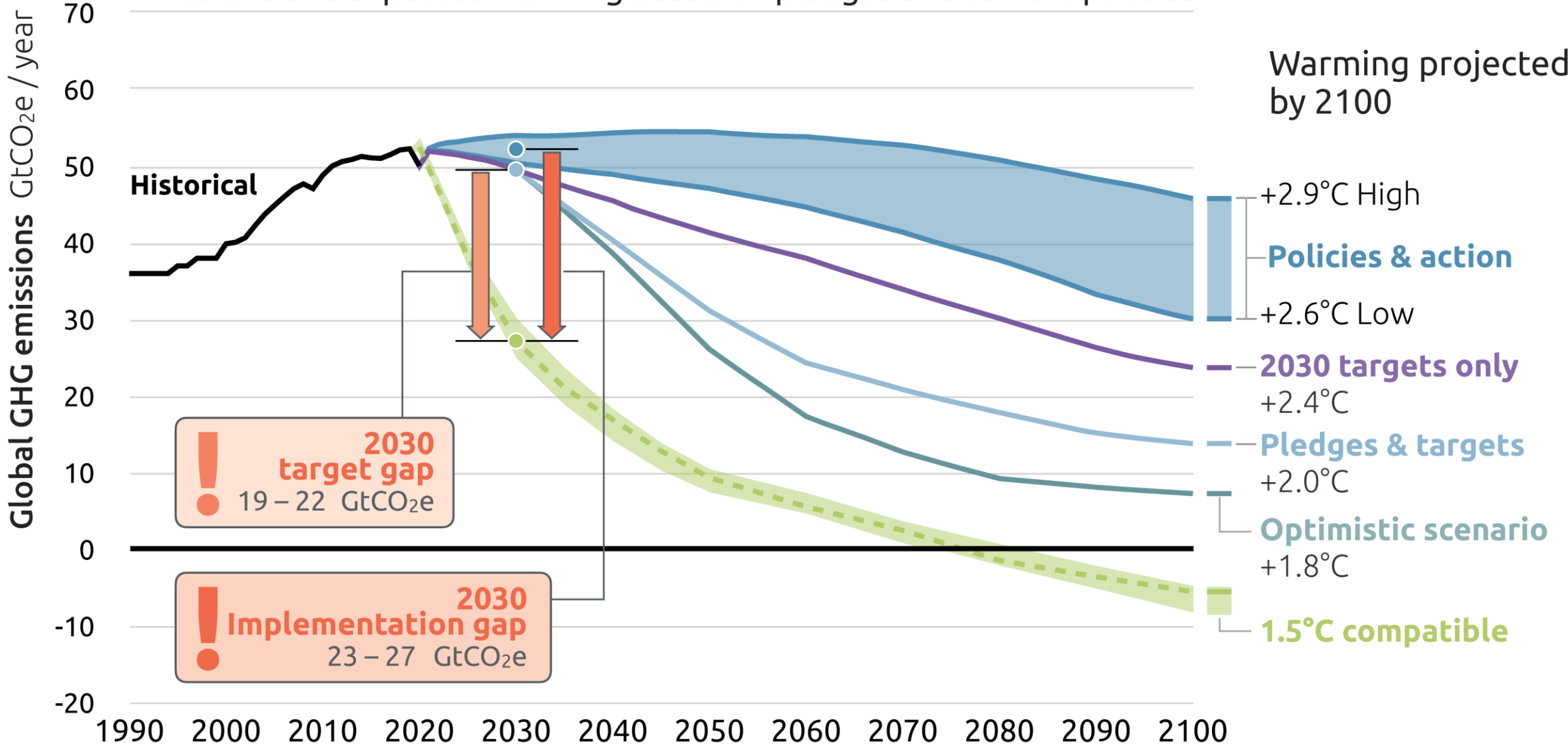
* If 2030 NDC targets are weaker than projected emissions levels under policies & action, we use levels from policy & action

CAT warming projections Global temperature increase by 2100

November 2022 Update

2100 WARMING PROJECTIONS

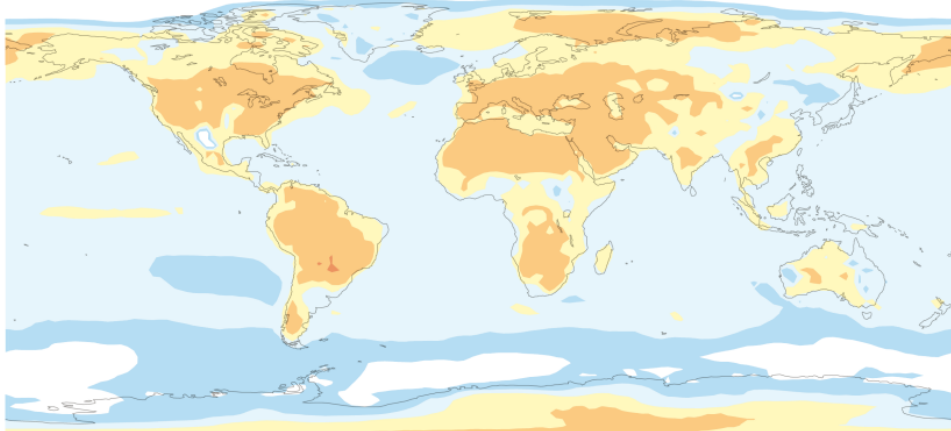
Emissions and expected warming based on pledges and current policies



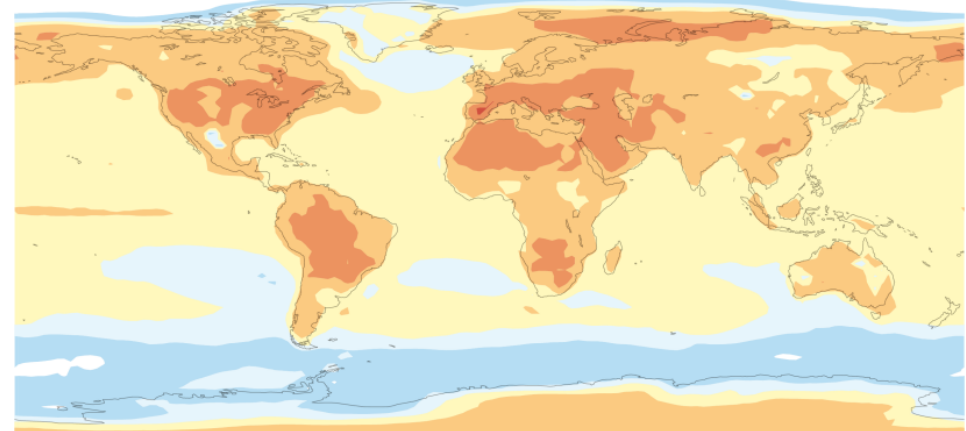
FAQ3.1: Impact of 1.5°C and 2.0°C global warming

Temperature rise is not uniform across the world. Some regions will experience greater increases in the temperature of hot days and cold nights than others.

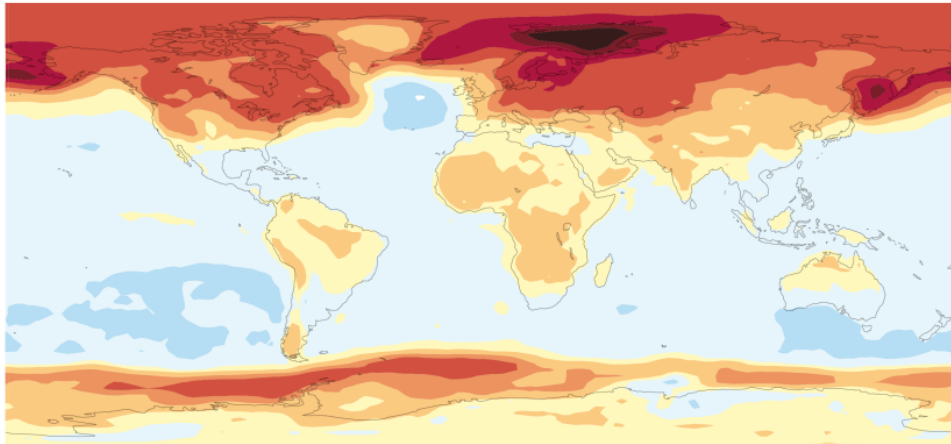
+ 1.5°C: Change in average temperature of hottest days



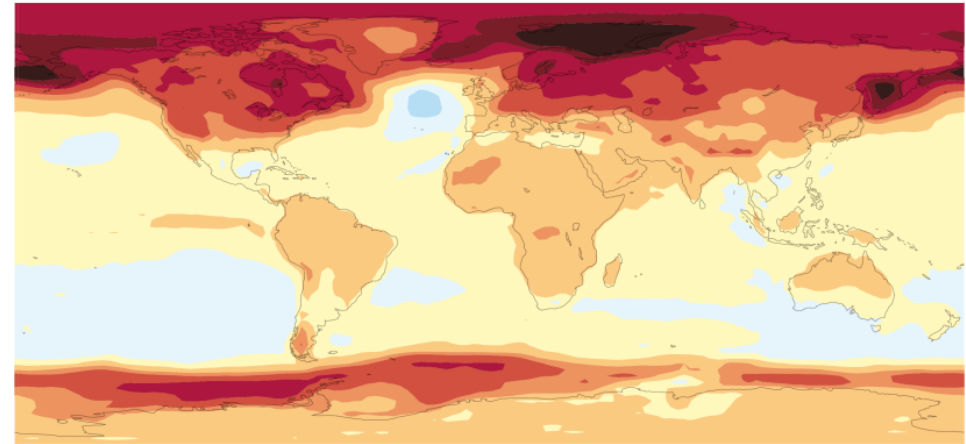
+ 2.0°C: Change in average temperature of hottest days



+ 1.5°C: Change in average temperature of coldest nights



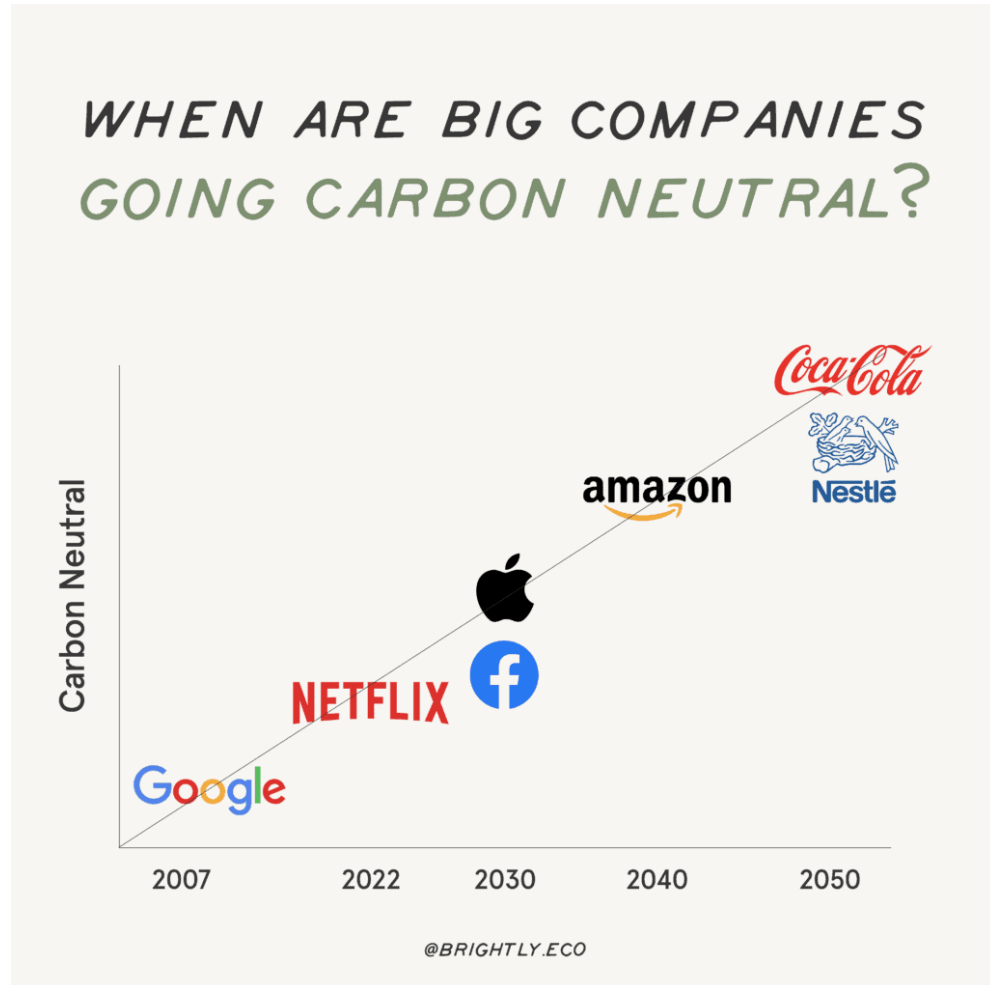
+ 2.0°C: Change in average temperature of coldest nights



°C



Ambições - uma chuva de conceitos?



Brad Smith
@BradSmi

Today Microsoft announced an ambitious goal and a detailed plan to become carbon negative by 2030, remove our historical carbon emissions by 2050, and launch a \$1B climate innovation fund.



blogs.microsoft.com

Microsoft will be carbon negative by 2030 - The Official Microsoft Blog

The scientific consensus is clear. The world confronts an urgent carbon problem. The carbon in our atmosphere has created a blanket of gas that traps heat and ...

Neutralidade Carbónica (Carbon neutrality)

Neutralidade Climática (Climate neutrality)

Um estado em que as atividades humanas não resultam em nenhum efeito líquido no sistema climático.

Atingir tal estado exigiria o equilíbrio das emissões residuais com a remoção de emissões (dióxido de carbono), bem como a contabilização dos efeitos biogeofísicos regionais ou locais das atividades humanas que, por exemplo, afetam o albedo da superfície ou o clima local.

Emissões Líquidas Zero (Net zero emissions)

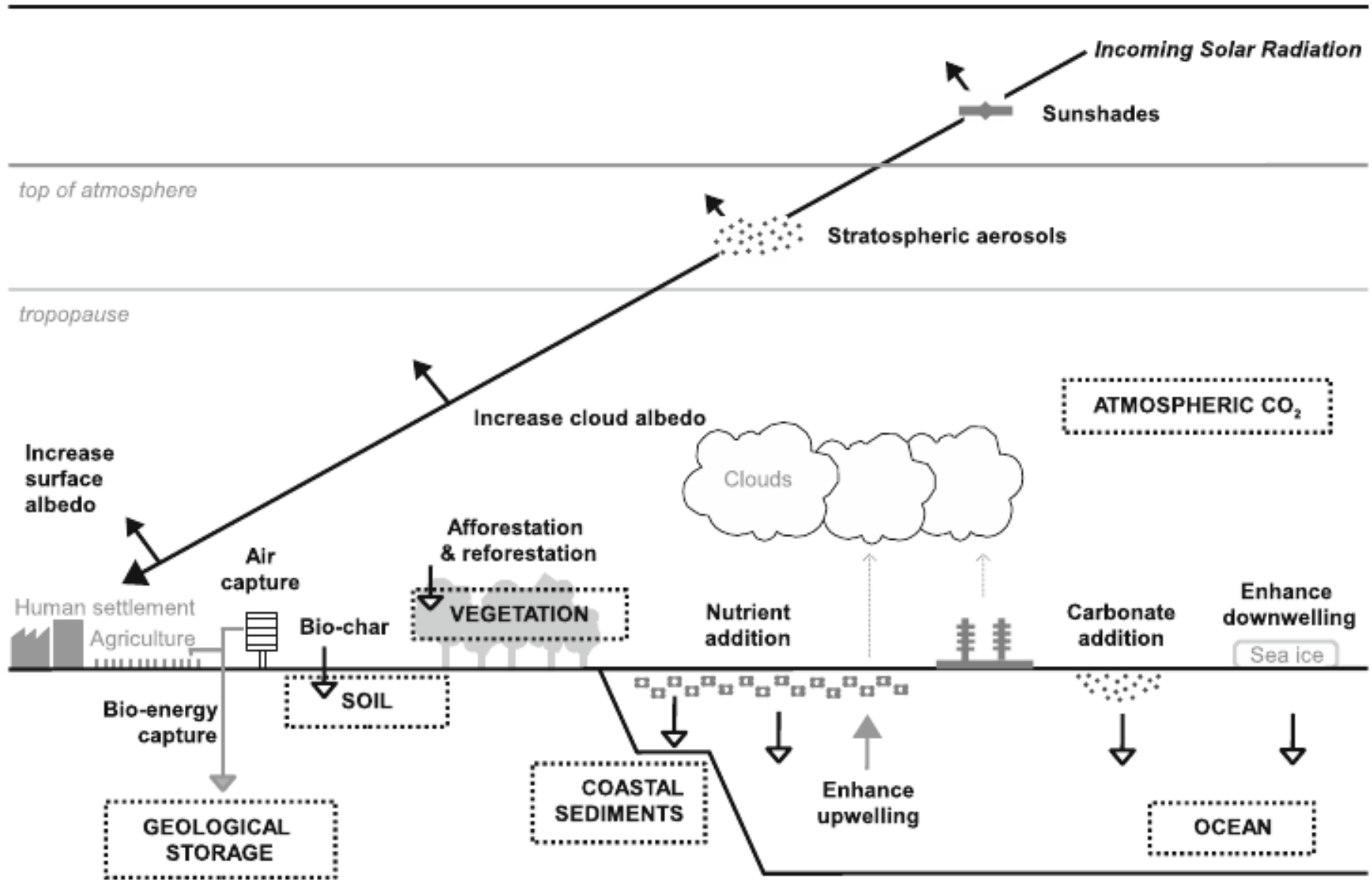
As emissões líquidas zero são alcançadas quando as emissões antropogénicas de gases com efeito de estufa para a atmosfera são equilibradas por remoções antropogénicas durante um período especificado.

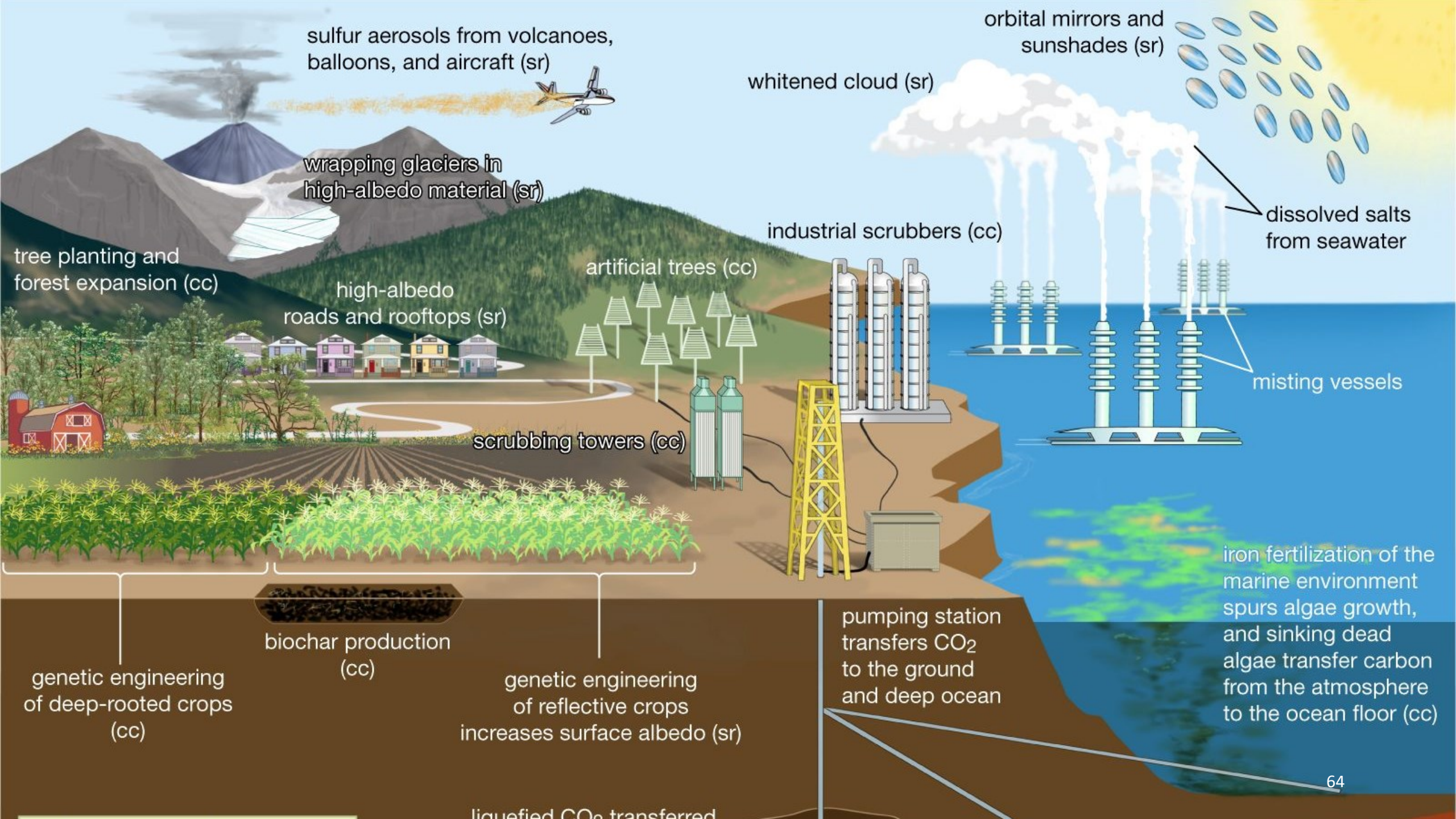
Emissões Negativas (Negative emissions)

Remoção de gases com efeito de estufa (GEEs) da atmosfera por atividades humanas deliberadas, ou seja, além da remoção que ocorreria por meio de processos naturais do ciclo do carbono.

Emissões Líquidas Negativas (Net negative emissions)

Um estado de emissões líquidas negativas é alcançado quando, como resultado das atividades humanas, mais gases com efeito de estufa são removidos da atmosfera do que são emitidos para ela.

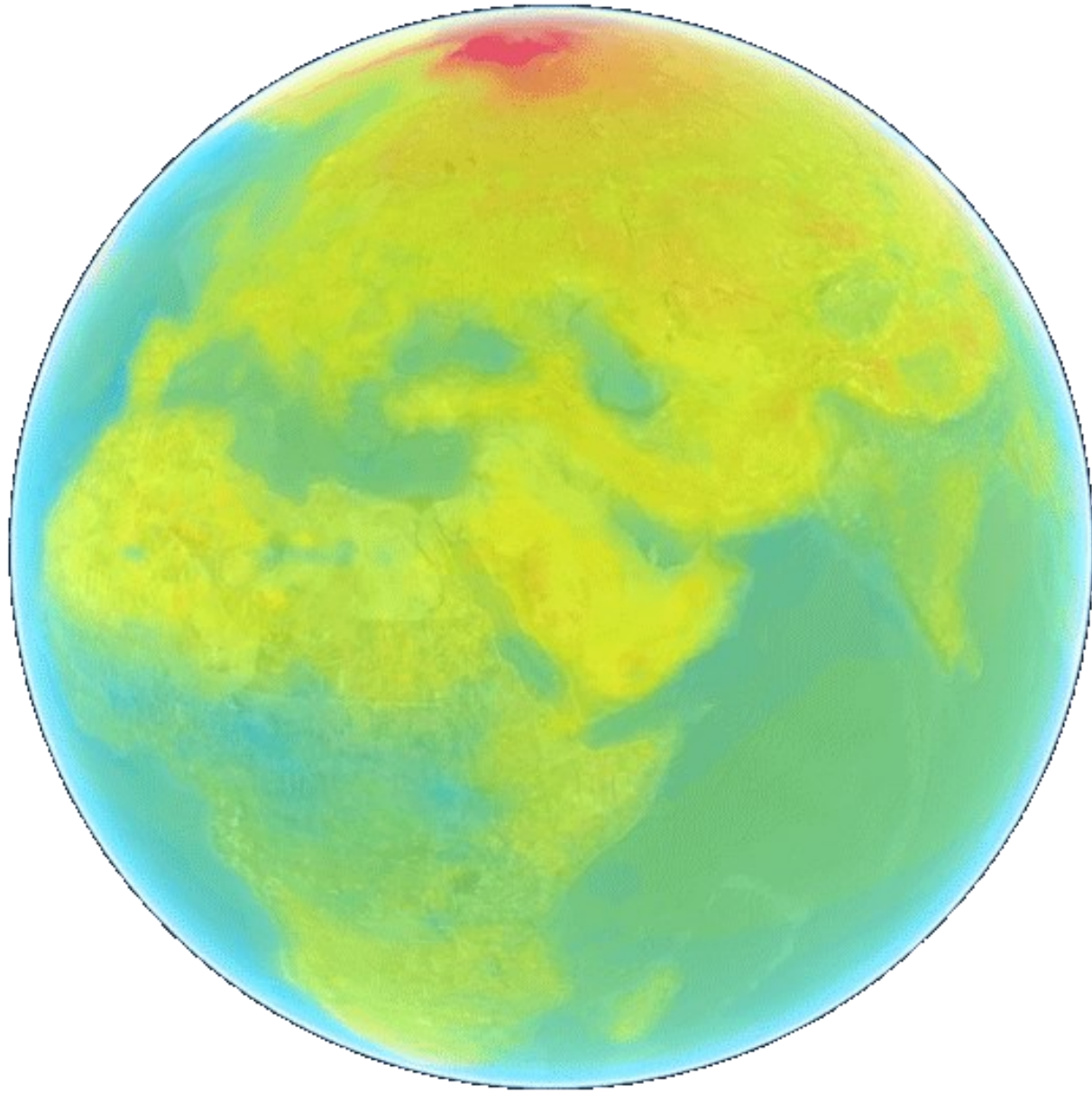




World's largest plant capturing carbon from air starts in Iceland

Reuters





Respostas às Alterações Climáticas

Mitigação



Impactos GLOBAIS



Adaptação



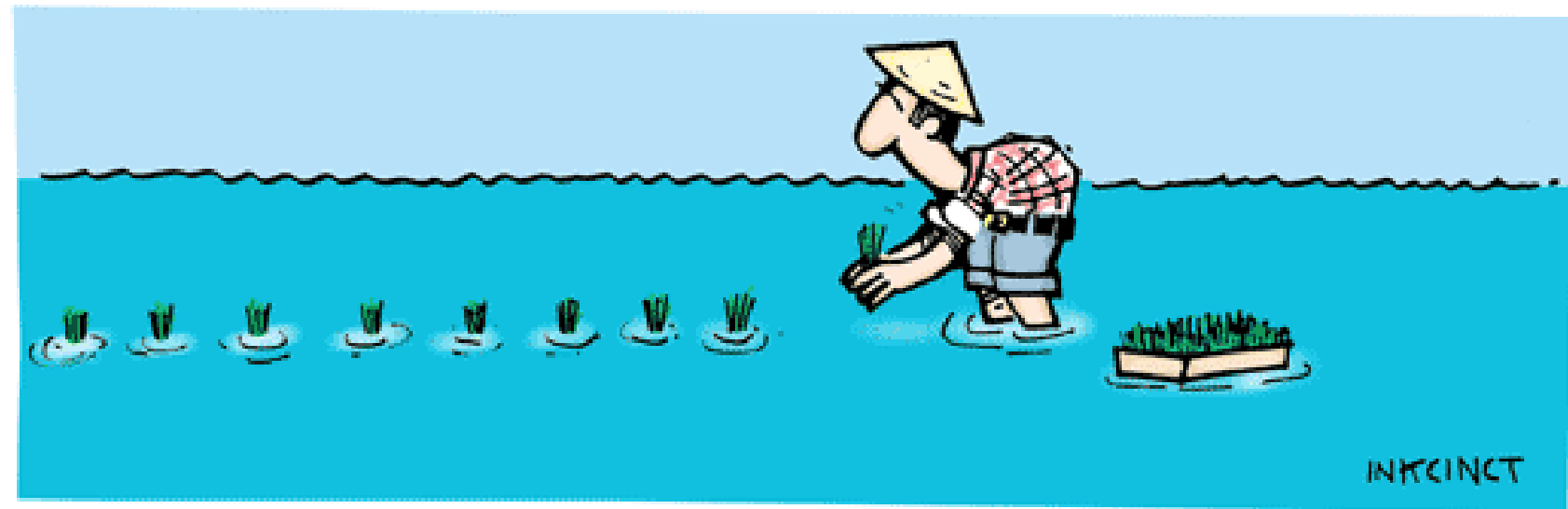
Impactos LOCAIS



FARMING PRACTICES ...



LAST YEAR



THIS YEAR

INKCINCT

Table 1 Characteristics of mitigation and adaptation (adapted from Füssel and Klein 2006)

	Mitigation of climate change	Adaptation to climate change
Target systems	All systems	Selected systems
Scale of effect	Global	Local to regional
Lifetime	Centuries	Years to centuries
Lead time	Decades	Immediate to decades
Effectiveness	Certain	Generally less certain
Ancillary benefits	Sometimes	Often
Polluter pays	Typically	Not necessarily
Actor benefits	Only little	Almost fully
Monitoring	Relatively easy	More difficult



Melhorar a capacidade adaptativa

- Desenvolver a capacidade institucional
- Desenvolver as condições necessárias e um 'ambiente' favorável à adaptação



Diminuir a vulnerabilidade e/ou aproveitar oportunidades

- Ações (intervenções) que reduzam sensibilidade e/ou exposição ao clima (atual ou projetado) e aproveitem oportunidades que surjam



Planeada



Reativa

Adaptação

Pró-ativa

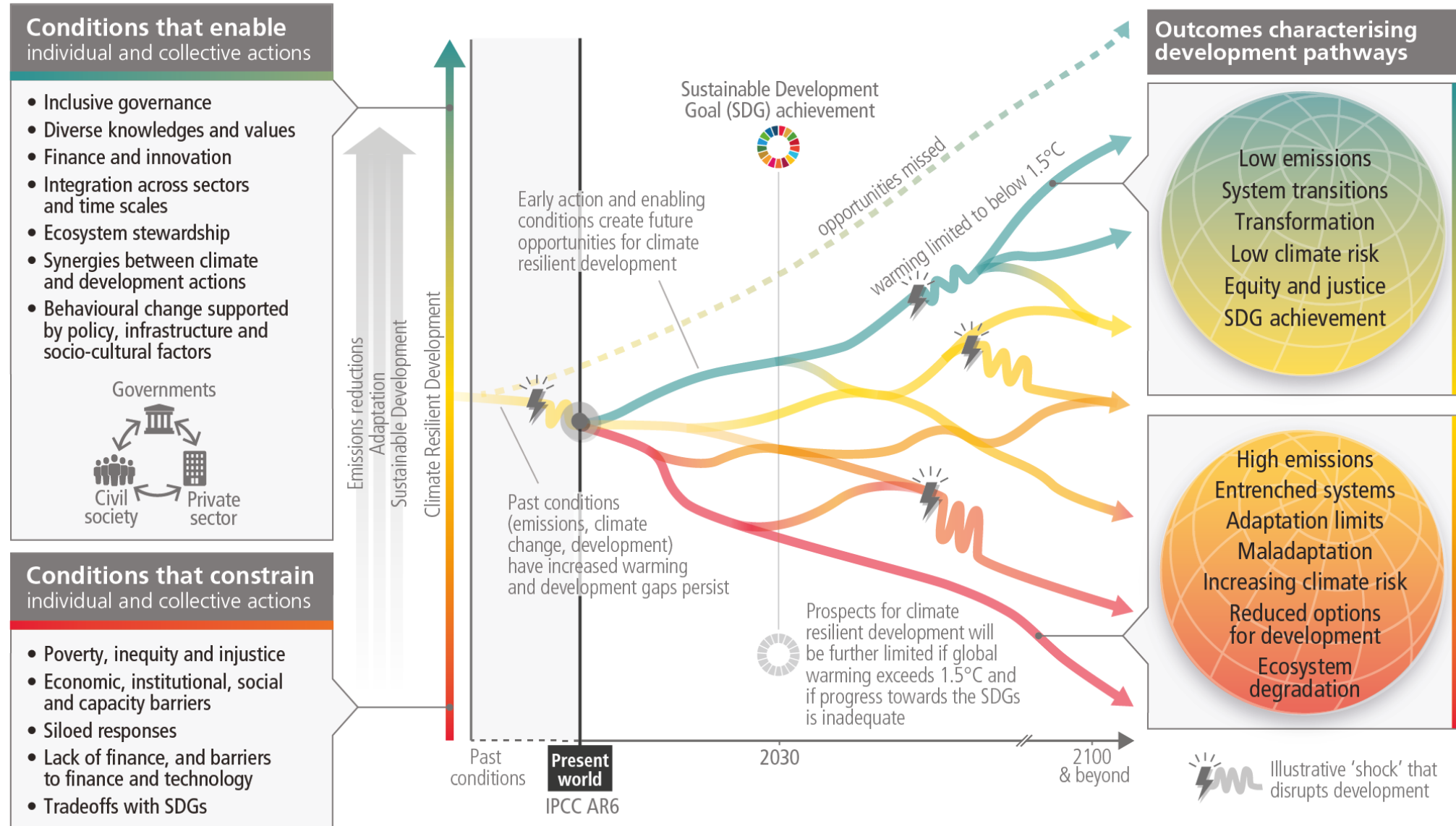


Autónoma



There is a rapidly narrowing window of opportunity to enable climate resilient development

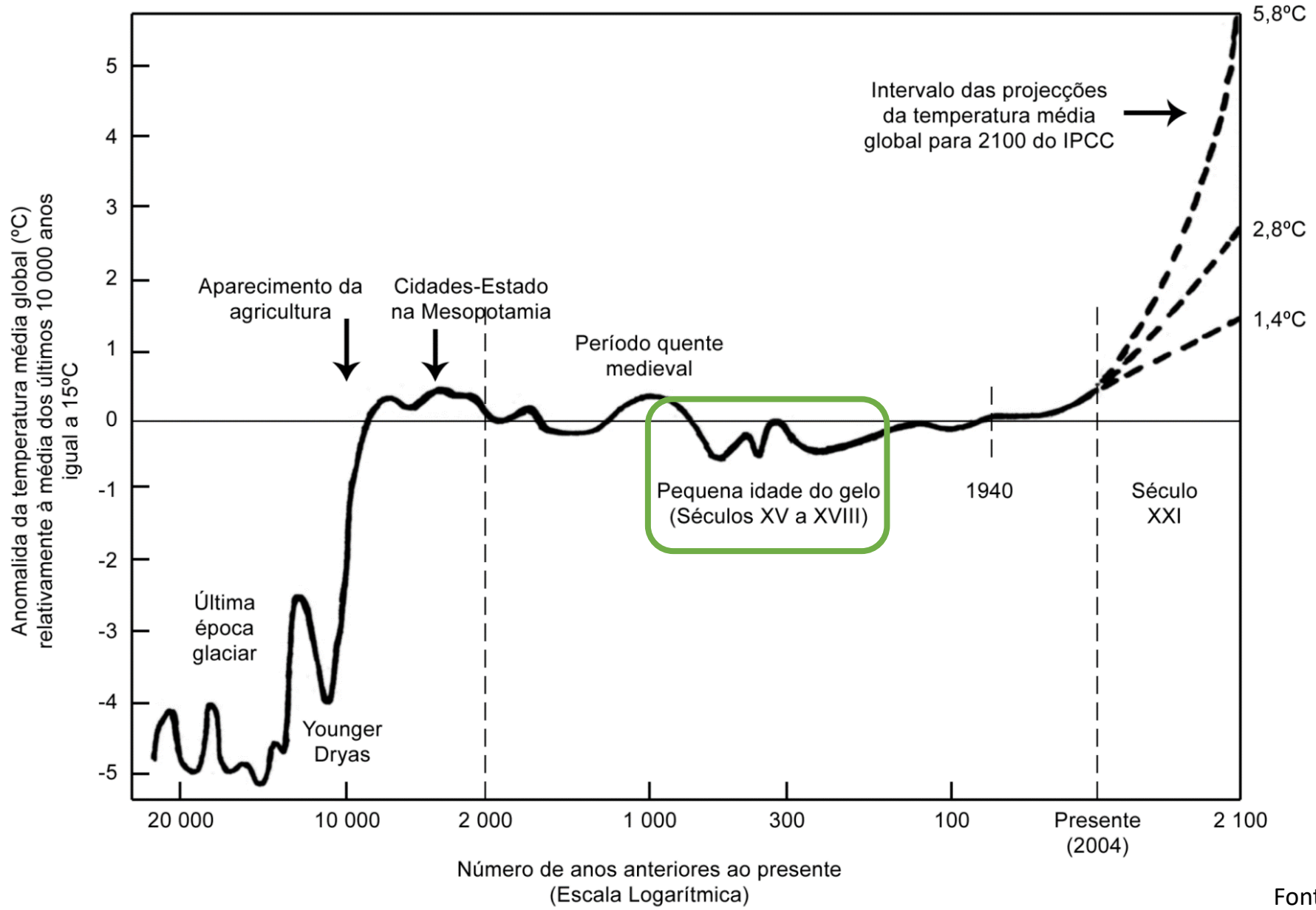
Multiple interacting choices and actions can shift development pathways towards sustainability



Obrigado pela vossa atenção



Washington Crossing the Delaware, MMA-NYC, 1851
Depiction of Washington's attack on the Hessians on
the morning of December 26, 1776
Emanuel Leutze 1816-1868



Obrigado pela vossa atenção



*Mort Künstler, Washington's Crossing, 2011
Image courtesy of the artist.*